### **B. SUMMARY Technical Report**

1. **Project processors**

General designer Reming consult, a.s.

Responsible Designer akp, s.r.o. and Buildings designs

Architecture, construction part Ing. arch. Ján Pavúk, PhD.

Ing.arch.PeterLunter  
Static Ing. Csaba Meszáros

and Sanitary Installation Ing. Norbert Jókay

Electrical installation Ing. Marek Mojto

Heating Ing. Norbert Jókay

Gas installation Ing. Norbert Jókay

Fire Protection Ing. Ladislav Vámoš

acoustics Ing. Dušan Dlhý

Project of organisation of construction Ing. arch. Peter Lunter

Construction budget Ing. Ján Kubovčák

**2. Specification of construction**

SO 01 administrative object of the Slovak Embassy with housing part

SO 02 reconstruction of ramp to garages

SO 03 reconstruction of fencing

SO 04 LOW VOLTAGE (LV) CONNECTION\*

SO 05 reconstruction of reinforced areas

SO 06 reconstruction of landscaping

SO 07 water connection

SO 08 sewage connection

SO 09 GAS CONNECTION

NOTE \* WAS IMPLEMENTED IN 2017

### **Basic data characterizing the building and its future operation**

Built-up area 647.49 m2

Green area 292.187m2

Total usable area 2,962.88 m2

Area of underground garages 1,518.9 m2

Number of floors 2 + 4 + 1, total 7

Number of parking positions 16

1. **ARCHITECTURE AND CONSTRUCTION PART**

**E** 01. Architecture, construction part

02. Technology of elevator

03. Technology of kitchen

04. Static assesment

05. Structured cabling - light current wiring

06. Electrical installation

07. Fire alarm system

08. Voice fire alarm

09. System of input control\*

10. Camera system\*

11. Alarm system\*

12. Gas installation

13. I&C Gas

14. Ventilation and cooling

15. Health and Sanitary Installation

16. Heating

17. Fire Protection

18. Project of organisation of construction \*\*

Note \* Provides Ministry of Foreign Affairs of the Slovak Republic- section SBPI

\*\* Provides general contractor

**All references to STN standards are only informative. Relevant comparable standards for the territory concerned apply!**

### **01. Architectural and arrangement solution**

The land of the building is located in the metropolitan area of London - Kensington, 25 Kensington Palace Gardens, on a plot. The reconstruction of the building of the Slovak Embassy in London is based on the conditions stipulated in the zoning plan for the location in Kensington Palace Gardens. The building is a separate construction located along Kensington Palace Gardens, its volume above the adjusted ground recedes to the defined construction line of the building line. The calculation of the existing built-up area is only based on the area of the relevant lot belonging to the building. The built-up area does not include the green courtyard above the single-storey underground garage.

The reconstructed building is the original part of the whole area of the Czechoslovak Embassy. After the split of the two states, the property was split and the building at 25 Kensington Palace Gardens remained the property of the Slovak Republic.

The existing location of the building considers the material and spatial relationships of the area and requirements of the investor. The objective of the solution was the maximisation of utilisation of the building for the present requirements of the Slovak embassy. The simple and compact volume of the main site, is as regards its brutalist architecture, a reflection of the time, and is of high quality. In 1971, the building was awarded the prestigious RIBA architectural award. The regular rhythm of the facade is accented by distinct concrete bays and mouldings, large-scale glass facade, spiral staircase, whose silhouette forms and accents the main entrance with wide entry stairs and a massive entrance canopy. An essential part of the proposed idea was the creation of a spacious compact green courtyard above the underground garage, accessible from the entrance hall of the building and from the ground floor foyer. The interior rooms features a two-floored hall with a gallery, as the other administrative rooms are strictly utilitarian. The open, transparent entrance hall connected with the green courtyard is in contrast with the regular pattern of the facade and is a suitable entrance for visitors to the building.

### **3. Information on the building**

The building has 4+1 upper and  2 underground floors connected with staircases and an elevator. The entrance to the building from Kensington Palace Gardens by the levelling concrete staircase. The entrance foyer, which now has a security door area, gives access to the social hall and to the interior of the Embassy. The Consular department with controlled entry for the public and side entrance to the office can be accessed from Kensington Palace Gardens by a barrier-free gangway along the southern facade in the area of the spacious English courtyard. Security checks are undertaken at the lodge, to keep the entrance hall free. Behind the security door area is the entrance to the elevator and staircase and for guests to the social hall.

### **4. LAYOUT AND OPERATIONAL SOLUTION**

**2nd underground floor**

* technical and economic rooms
* social and hygiene rooms
* kitchen with corresponding storage rooms
* storages and archives belonging to individual administration departments

**1st underground floor**

* technical facilities
* social facilities belonging to representation rooms
* hygiene facilities belonging to representation rooms
* cryptography offices
* server room
* consular department
* underground garage (16 spaces)

**1st upper floor**

* entrance rooms
* representative rooms
* social rooms
* administrative rooms
* technical and economical rooms
* bar
* hygiene facilities for people with mobility issues

**2nd upper floor**

* representative rooms
* social rooms
* economic rooms

**3rd upper floor**

* representative rooms
* administrative rooms with offices for 27 employees.
* technical and economical rooms
* hygiene facilities

**4th upper floor**

* administrative rooms with offices
* technical and economical rooms
* hygiene facilities
* apartments for employees, 4 apartments, of which 1 for courier

**5th upper floor**

* technical rooms

the description of the existing situation is based on documents from the investor and a check of the actual situation will be undertaken!!!

**5. fundamental structures**

There will be no intervention in the original white tank except for punctures for new or reconstructed utility connections: water, sewerage, gas. The LV connection has been implemented and is suitable for the new load requirements.

### **6. Vertical bearing structures**

Existing situation

The vertical bearing system of underground floors is by monolithic interior columns structures and pillars supplemented with interior bearing walls with a thickness of 200, 250, locally 300 mm, situated in both main axes of the building. The vertical bearing system of underground floors along the perimeter of the building comprises reinforced concrete external walls with a thickness of 300 mm. Cross-sections of columns differ as required, see drawing part of design documentation.

In the upper floors, interior columns and pillars are used. The pillars are supplemented with bearing walls with a thickness of 200 or 250 300 mm, situated at the centre of the arrangement and in the surroundings of the communication core of the building.

Proposed situation

Demolition will also be required in vertical bearing structures due to the route of new ventilation pipes, central heating pipes, gas piping and electrical wiring. Demolition for new door openings in bearing walls will be required on the 3rd and 4th upper floor due to the adjustment of the layout. A detailed description of demolition work is given in part SO 01.1 Architectural and Construction Solution of the Site - Floor Drawings and SO 01.2 Static Provision.

### **7. Horizontal bearing structures**

Existing situation

All ceiling structures were originally implemented in the form of continuous monolithic boards reinforced by reinforced concrete girders and tied with reinforced concrete columns and pillars. Their thickness was determined based on spacing and stress. Boards mostly have a thickness of 130 mm. Over a part of the 1st underground floor was proposed a board with a thickness of 280 mm due to the higher load from the vegetation roof. We believe that the ceiling structure of the building are few points locally reinforced with the required shear reinforcement (mainly around vertical columns, corner parts of vertical walls, or their loose ends).

Ceiling boards are combined with girders in the 1st underground floor.

The sloped ramp for the entrance of cars to the underground garage will be formed by a monolithic board with a thickness of 250 mm.

The back courtyard part is covered by monolithic boards.

Proposed situation

Due to the routing of new ventilation pipes, central heating pipes, gas pipes and electrical wiring, demolition will also be required in horizontal bearing structures. For a detailed description of demolition work, see SO 01.1 Architectural and Construction Solution of the Site - Floor Drawings and SO 01.2 Static Provision.

### **8. vertical transportation Structures**

*Ramp*

Existing situation

In the underground floor in the building there is a ramp for access to the garage. The ramp is from reinforced concrete, with a gradient of 14% and a passable width of 4500, 4100 and 3200 mm, including 2 kerbs with a 250mm width. The finishing is from concrete. This will be completely demolished.

Proposed situation

The new ramp will be from reinforced concrete. The wear layer will have anti-slip finishing from epoxy paint. For a description of structure, see SO 01.1 Architectural and Construction Solution of the Site - Floor Drawings and SO 01.2 Static Provision.

*Staircases*

Existing situation

There are two communication cores in the building. One consists of a four-arm staircase and elevator shaft, which connects all floors. The staircase is from lateral boards with half-landings. The staircase is a fire escape route, type A.

The second core consists of a single-arm staircase connecting floors in the focal centre of the layout of the building. All staircase arms are monolithic, placed on monolithic landings. The finishing will comply with requirements regarding anti-slip measures. The bannisters of the staircase are a transparent stainless structure filling the mirror of the staircase.

The entrance to the building from street level is by an exterior levelling staircase. It consists of cranked lower horses with prefabricated reinforced concrete steps.

Proposed situation

Maintained in full scope. The single arm interior staircase will have wooden steps and upgraded wooden hand rails. The escape staircase will have a chemically or mechanically cleaned surface. The first and last step of each arm will have a fixed warning sign pursuant to the relevant safety decree.

The levelling staircase will have a chemically or mechanically cleaned surface.

*Elevator*

Existing situation

The existing rope elevator has been non-functional for a number of years. The producer is unknown. It will be completely disassembled and demolished with transport to the waste dump.

Proposed situation

BASIC PARAMETERS

TYPE OF ELEVATOR : electric passenger and cargo elevator with self-service pursuant to STN EN 81-20/50

and Decree of Government no. 235/2015 Coll.

GROUP: Ac1

TYPE DESIGNATION: STREAM

CAPACITY: 630 kg / 8 persons

NOMINAL SPEED: 1.0m/s

BUILDING OF THE ELEVATOR: Embassy of the Slovak Republic, London

HUB: 16.97m

NUMBER OF STATIONS/CARGO : 6/6 , non passable

IDENTIFICATION OF STATIONS: -2,-1,0,1,2,3

### MANUFACTURER: OTIS NEC, Avenne des Montoires, Gien Cedex, France

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### 1. TECHNICAL DESCRIPTION

### 1.1. TYPE OF CONSTRUCTION OF ELEVATOR GeN2 Stream is an electrical traction elevator using a gearless drive of a synchronous electrical motor with permanent magnets and as load supporting devices, covered flat steel ropes. The elevator has type certificate no. 0088/0961143/059 and is of a new generation construction type. The equipment for brake release uses a backup auxiliary source built-in distributor for emergency manual operation.

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### 1.2. PLACE OF INSTALLATION OF ELEVATOR The elevator will be placed in the elevator well with dimensions 2160x1735. The fencing material of the well is a concrete structure. The machine is deployed in the upper part of the well. The distributor is located under it. The emergency operation panel is accessible from the platform in the top floor in a lockable cabinet, which is a part of the doorframe. /see layout drawing / The depression of the elevator is proposed for a dimension of 1100 mm. The upper part of the well, i.e. the distance from the threshold of the last station to the ceiling of the well will be 3680 mm.

### 1.3. ENGINE ROOM - MAIN SWITCH

is part of the panel of inspection trip in the function of the fuse of drive of elevator machine, 230V socket, fuses of well lights.

- ELEVATOR GEN2 STREAM 630/1.0 Synchronous electrical motor with permanent magnets has a shaft with traction low diameter disc, so it can be installed on a side wall at the highest point of the well. The motor shaft will extend to the traction disc for flat ropes and laid by means of a support pedestal on the drive frame - Elevator distributor GCS 222LVA. The elevator distributor and the drive will form an integrated unit and will be located inside the well on a side wall. The emergency and inspection panel will be located on the highest platform at the well door, or in the front wall of the well from the platform side. The emergency and inspection panel will allow all controls required for the performance of emergency release and inspection operations – VENTILATION will be provided pursuant to STN EN 81-20 – well, via a ventilation opening on the top of the well (min. 1% of the area of well).

1.4. WELL - GUIDE RAIL OF THE CAGE 2 units type: T89/B - GUIDE RAIL OF THE COUNTERBALANCE 2 units type: T89/A\_T Individual parts of guide rails are screwed together using joints of guide rails. The ends of guiderails are secured against mutual lateral displacement by cams. The guide rails will be anchored to the side wall by guide anchors, which will be screwed into the side wall using an anchor system provided by the company HILTI. - FLAT STEEL ROPES 34KN- 4 X 25 X 3.3 Flat steel ropes will be covered in polyurethane, with a minimum breaking strength of 34 kN. Four flat steel ropes will be used to increase the bearing capacity. - ELEVATOR CABIN 1100 X 1400 X 2300 will be mounted in the frame of the cage with a new type of construction with painted flat ropes. The material of the cabin will be plasticized steel sheet. The weight of the cabin will be 1070kg. The elevator cabin will be used for direct transport of passengers and cargo. In the given case for the elevator with a bearing capacity of 630 kg, i.e. 8 persons, or cargo of the above weight. – a COUNTERWEIGHT will be mounted in a steel frame. The filling material of the counterweight will be steel plates. The weight of the counterweight will be 1426kg. The counterweight and the elevator cabin will form a balanced aggregate connected by ropes hung over the traction disc. - SPEED LIMITER OTIS 20602A

Provides for monitoring of the cabin speed downwards. If the trigger speed is exceeded, the catchers are triggered. In the given case, it is located in the well. It will be triggered from the emergency operation panel remotely through the distributor. The maintenance will be performed from the well from the cabin. - OR ROPE Diameter 6.3mm, is fixed to the catcher levers. - CATCHERS OTIS A9672E Type: sliding cylindrical, type of trigging: when speed is exceeded. They prevent uncontrolled motion of the cabin downwards. - BRAKING EQUIPMENT TYPE: 27076GT Equipment against uncontrolled speed of the cage upwards: Type of triggering: trigger speed of the cage upwards exceeded. They prevent uncontrolled motion of the cabin upwards. - LIMIT SWITCH XCKP521 It forms a part of the well equipment. It will be triggered by the cage passing the upper (lower) extreme position. It will provide for an upper (lower) extreme position of the run of the cage. -WELL DOOR PRIMAP 900X2100 Type of door: automated central CLD from stainless steel sheet, forms an assembly together with the cabin doors. Clearance of the door 900x2100mm. - DOOR LOCK FAA 23400L Prevents the door from opening unless the elevator cabin is behind it.

- ELEVATOR CONTROL DCL- collecting in single direction, type SIMPLEX. The control keypad has a vandal resistant construction with an indicator of position and direction of the cabin in the elevator cabin with buttons for all floors + door opening button, sound alarm to call the supervisor of the elevator in the event the elevator jams, and a button for opening - closing the door. A part of the control combination is the key controller ISC-parking in station with open door, signalling of overload and bidirectional communication equipment of elevator in the event the elevator jams can be activated by pushing the button with the ring symbol. Within 5 seconds will be dialled the phone number to the non-stop rescue service, which will undertake the rescue. On the floors there will be a vandal resistant button to call the elevator to the a given floor.

- ENERGY ABSORBING BUMPER ACLA

Located under the cabin 1 unit 300403A and under the counterweight 2 units 300 401A, provides for attenuated coasting to stop

- REVISION DRIVE Control keypad for this type of drive is located on the roof of the cabin and used for service activities.

- FOLDABLE LADDER is located in the depression of the well. It will be foldable as its min. depth of step is 180 mm. This distance could not be complied with if it was fixed. When unfolded, this position secured by an electrical switch LPS. When unfolded, the safety circuit is interrupted. In the depression - in the well within reach of the well door is located a STOP switch and the switch for well lighting.

- WELL LIGHTING - by lights as prescribed by STN EN 81-20, upper and lower light at a distance of 500mm from the ceiling – and from the well bottom. The other lights will be located between them to provide for a min. intensity of lighting of 50lx.

1.5. ELECTRICAL INSTALLATION - The elevator is connected to the three-phase system 3x230V/400V, 50Hz - Power input 5.4kW - Nominal current 7.8A - Starting current 12.1A - The electrical installation of the well is located in electrical channels - Cabin connection to the grid is by flexible cables - Cabin lighting by LED light

### **9. Hydro-insulation**

#### Lower construction

Existing situation

Believed to have been resolved as white tank, i.e. hydro-insulation against earth humidity was resolved on the basis of hydro construction concrete of underground walls and base plate. All joints and working gaps are water-proof, using integrated system details.

#### Upper construction

Existing situation

Hydro-insulation of flat roofs above the 1st underground floor, 4th upper floor and 5th upper floor as single-casing unventilated systems with vapour barrier, thermal insulation and roof hydro-insulation. The vapour barrier from asphalt hydro-insulation stripes was melted on the reinforced concrete panel. Before melting, the concrete was painted with asphalt penetration varnish. The hydro-insulation was freely laid on the thermal insulation covered by a separation layer of geotextile and filled with a load layer. Hydro-insulation was also used in the roof system with vegetation substrate.

Proposed situation

All original flat roofs and vegetation roofs will be replaced by new ones. All details of hydro-insulation systems must be pursuant to regulations of the producer. A certified hydro-insulation system as a whole must be used including all accessories. The hydro-insulation must extend to outer walls and attics. For glass walls, the hydro-insulation must have a watertight connection (melting) with the steel structure of profiles. All passages of sanitary installations must be thoroughly sealed and insulated.

The site contractor must provide for functionality of hydro-insulation systems and in the event of a fault, they must perform a repair to restore the system to a fault-free state. A flood test must be performed for roofs after laying the insulation before coverage by protection layers.

#### Others.

The flooring and lining of kitchens and WC will be glued after painting with hydro-insulation. (e.g. system Schomburg Aquafin). The implementation technology must comply with regulations and type details of the producer. All original system components must be used.

### **9. Thermal insulation**

#### Outer wall

Existing situation

The outer wall that is partially resolved as reinforced concrete elements with suspended reinforced concrete cladding does not have a thermal insulator. The only site elements with thermal insulation are the loggias, but the technical condition of existing insulators is unsuitable.

The remaining part of the outer wall is a single glass pane, with unsuitable thermal resistance for current requirements, i.e. permanent greenhouse effect.

Proposed situation

The reinforced concrete walls with facade cladding will remain unchanged, as thermal insulation cannot be installed without disrupting the original author’s artistic expression as regards the exterior and interior.

#### Roofs

Existing situation

The thermal insulation of roof cladding above the 1st underground floor, 4th upper floor and 5th upper floor is a gradient layer from lightweight concrete with a thickness of 20-100mm. The thickness of the thermal insulation was proposed pursuant to recommended values by standards.

Proposed situation

All thermal insulation will be implemented with thermal resistance compliant with minimum requirements of currently valid relevant standards. The occurrence of thermal bridges must be prevented when it is installed. The composition will be supplemented with vapour barriers to prevent condensation in the structure.

#### ATTICS

Existing situation

No thermal insulation.

Proposed situation

The original solution will be maintained to not disturb the original author’s artistic expression of the building exterior

The details of the proposed thermal insulation of walls, ceilings and lower ceilings is in the annex of this Technical Report.

### **10. Acoustic Insulation**

Existing situation

Acoustic insulation that cannot be defined.

Proposed situation

The detailed description the proposed acoustic insulation of floors is in the annex of this Technical Report.

### **11. Outer facade wall**

*CONCRETE FACADE WALL*

Existing situation

The outer wall is the most striking architectural element of the existing exterior. It should comply with acoustic, thermotechnical, static and fire protection requirements for the facade. However, the thermotechnical demands were not addressed at the given time and remain an insolvable problem.

A distinct facade element is large format glass. This is single glass panes which in the event of a frameless design are inserted in the full outer niches in the interior lining and filled with binder. Opening parts are mounted in aluminium frames. The thermotechnical demands were not addressed here too, but unlike concrete cladding this can be resolved.

Proposed situation

We will respect copyright and the reservations of the conservation authority and the results of consulting and the subsequent specialist calculation for thermal technology. The result is the preservation of the original facade cladding with all its technical deficiencies. It is proposed to clean it, for example, with FINALIT agent or with hot pressurized steam and subsequent impregnation using nanotechnology.

The large format glazing will be replaced by new glazing in the system solution to preserve all proportions of ceiling frames or frameless glass. It is therefore proposed to use the solution of the JANSEN company, which provides the system ART, JANISOL and structural  glazing (also for glass pivot doors), whose use will provide the required quality and the original architectural and artistic expression. The finishing will be elox silver to imitate the original natural aluminium as much as possible.

The only change regards the entrance doors at the front and from the courtyard. They are currently opening interior non-insulating doors. For this reason, after consulting the investor it was decided this door should be an exterior sliding door with photocell to maintain the original structure and proportions.

The glazing of walls and windows is from insulation double glass, glazed in a traditional way by a system glazing bar. The glazing of the front and rear facade must comply with the following parameters:

- insulation-double-glass Ug=1.1 W/m2K

- heat transmission ratio for profile frame Uf=1.4 - 1.7 W/m2K

- glass from exterior is hardened. It complies with the security function to prevent unauthorised entry to the open area. It must have a structure corresponding to its nature, i.e. laminated safety glass

- glass in the 1st upper floor must comply with burglary protection class min. P2A

- spacer frames of double glass must be in concrete imitating colour !!!

- the supplier is obliged to ensure the uniformity of the facade by using the same thickness and uniform type of exterior glass. Even small differences in the thickness of the glass are important for the overall unity of the facade.

The anchoring of window frames will be implemented pursuant to the production documentation of the supplier. The fire resistant band between individual floors consists of the existing concrete facade cladding. The points of contact of metal with various electrochemical potential, points of joints of steel, zinc coated and concrete parts must be separated by elements from dimensionally stable plastic material, resistant against water and ageing of material. Next to power bonds (anchoring, etc.) must be used substances with sufficient strength.

The shielding is a combination of exterior and interior shielding. The exterior shielding consists of consoles- loggias with variable depth. The interior shielding against solar radiance is resolved by interior vertical blinds.

Individual elements, structure units and their parts must be produced and mounted as fully functional, i.e. including all filling and terminal structures and parts required for the structure. The supplier will be fully liable for the functioning.

### **11. Roof cladding**

Existing situation

On the 5th upper floor, the building has an impassable flat unventilated roof and on the 1st upper floor a vegetation roof. Reconstruction and maintenance of all its layers and parts is required as they were constructed 50 years ago.

Proposed situation

After application of penetration paint on the gradient ceiling board a vapour barrier will be melted. A heat insulation layer will be laid afterwards. The current hydro-insulation layer will be laid on to it. Three types of flat roofs with different structure were used in the building.

The attics will remain as they are currently are, with hydro-insulation in the newly milled slot from the interior side of the attic.

Inlets will be made with a collar for superior connection of hydro-insulation and with a cover against congestion.

The site contractor must ensure the functionality of roof cladding by holding a flood test.

The detailed composition of proposed thermal insulation of walls, ceilings and lower ceilings is in the annex of this Technical Report.

### **12. Flooring**

Existing situation

Several types of flooring were used in the building. Their selection resulted from the functional content of the room. All floors including screed up to the level of the reinforced concrete ceiling board will be removed and new floors will be installed.

Proposed situation

Epoxy flooring was proposed on the 2nd underground floor in different quality according to the type of room.

Epoxy flooring was proposed on the 1st underground floor in a different quality according to the type of room. Stone tiling was proposed in rooms of the consular department, in social and sanitary rooms. It will be painted with hydro-insulation paint and all system accessories (tapes, corners, etc.) will be used in social facilities. Carpet was proposed in cloakrooms and related area in this zone.

Stone tiling in combination with carpet was proposed for the 1st upper floor and 2nd upper floor in entrance and representation rooms. Stone tiling was proposed in social and sanitary rooms. Epoxy flooring was proposed in the preparation room.

Carpet was proposed on the 3rd upper floor in all office and communication rooms. Stone tiling was proposed in social and sanitary rooms.

Carpet was proposed on the 4th upper floor in all office and communication rooms. Stone tiling was proposed in social and sanitary rooms for offices. Vinyl flooring is proposed in the apartment in the daily and night zone and Gres flooring is proposed in sanitary rooms.

Cement screed with epoxy flooring will be used on the 5th upper floor.

All joints of connection of flooring to adjacent structures of walls and partitions must comply with details prescribed by the producer for prevention of acoustic bridges.

New flooring with an overall thickness of 50mm will be used in underground and upper floors except for the 1st upper floor, where the thickness will be 75mm. Important is the usage of acoustic cork pad to prevent impact noise.

#### Carpet

Floors in office areas and corridors are mostly carpet. Antistatic carpet with cropped hair, thickness 8mm with antibacterial treatment, load class 33, e.g. MILLIKEN- FORMWORK 2.0 TRUS was proposed. The carpet will be glued in 500x500mm squares in the whole on the base. As the plinth of carpet flooring in joint with rendered or plasterboard wall is proposed stainless ground sheet height 100mm, thickness 1mm. Proposed carpet in representation rooms: e.g. DESSO PALATINO A072 4406 L33,09 LRV 7,58.

#### Stone tiling 1

Stone tiling - granite, with mat finishing, with dimension 16.5x33x10 mm, type e.g. NERO ZIMBABWE was proposed in representation rooms, social and sanitary rooms. Prescribed joint 4mm. As plinth of stone flooring in joint with rendered or plaster board wall is proposed stainless ground sheet height 100mm, thickness 1mm.

#### Stone tiling 2

Large ceramic tiling, format 500 x 3.5mm- was proposed for social and sanitary rooms of apartments - must be cut in half (with water-jet) - (Grespania ceramica- Coverlam- Supreme).

#### Vinyl flooring

Floating vinyl floor was proposed in apartment rooms in the daily and night zone and in the communication rooms of apartments, e.g. EGGER Design+, natural oak, with lamellas with dimension 1295 x 243 x 5.0 mm, load 33, ditch V8, cam joint, finishing TPU, bearing plate UWF, cork pad.

#### Epoxy paint floor

The flooring structure in the underground garages and technical rooms are proposed as a single-component UV resistant epoxy paint, e.g. SIKA . The material will be applied in two layers.

The paint will be applied on a clean and dry slightly rough base without dust particles. The concrete must be at least 28 days old.

#### Metallic flooring

To create the integral effect cuts and fields between convectors at the glass walls will be filled with anodized aluminium sheet with a thickness of 4mm glued on the floor.

The detailed description of the proposed composition of floors is in the annex of this Technical Report.

### **13. Exterior tiling and staircases**

Existing situation

It was proposed to demolish exterior tiling with base layers and replace them by new ones. The entrance to the building from street level will be by an exterior levelling staircase. Loggias will be concrete polished scribble with raw fraction with a size of 80-120mm.

Proposed situation

The exterior tiling must comply with requirements of frost resistance and skid. It is proposed to use the material: stone tiling - granite, with mat finishing, with dimension 16.5x33x10 mm, type e.g. NERO ZIMBABWE, with frost resistance finishing, e.g. by firing.

It is proposed to clean the exterior levelling staircase, e.g. with FINALIT agent or with hot pressurized steam and subsequent impregnation using nanotechnology. It is proposed to clean the loggias, e.g. with FINALIT agent or with hot pressurized steam and subsequent impregnation using nanotechnology. It is proposed to treat the dilation joints with SOUDABAND acryl T90 8-20x20mm. For insulation around inlets is proposed SOUDABAND ALU- bitumen self-adhesive tape.

### **14. Partitions**

#### Walled partitions

Existing situation

The partitions in the building are from various materials. They are from rendered reinforced concrete, not rendered reinforced concrete with fluting, walled, wooden partitions and cabinet partitions. As there are layout adjustments and demolition work on each floor, due to the complex solution of details regarding built-in movables and existing and proposed hingeless doors with frames, all existing interior plaster will be removed.

The installation cores are reinforced concrete shells, sometimes walled. Ceilings are concreted.

Proposed situation

The interior non-bearing partitions in the basement and masonry work will be brick, e.g. WIENERBERGER with different thickness. Partitions in rooms must be walled up to the ceiling board. Partitions must be connected to the bearing masonry by means of anchoring metal bands as defined by the technological regulations of the producer. Contact joint wall - reinforced concrete ceiling will be filled with PUR foam and joined by flexible binder. If a wall must have fire durability, the joint must have a fire resistant sealing with boards from rock wool with a minimum volume mass of 60kg/m3.

Except underground floors and some masonry work in other floors, almost all partitions will be from plasterboard. All plasterboard partitions, including inspection openings must be implemented pursuant to regulations and type details of the producer. All used parts must be from a certified system of a single producer. All partitions must have a dilation connection to the ceiling structure to prevent faults due to sagging of the ceiling. In rooms with wet operations or under ceramic lining will be used waterproof impregnated plasterboard plates. Partitions will be jacketed. The second front plate will terminate from the ceiling offset by 15mm and have a zinc coated profile 10x25mm, thus producing a slot of 12mm. The equipment items will be anchored by special fixtures to prevent transmission of vibration in the surrounding structure (e.g. by flowing water). The filling of partitions will be of rock wool with thickness of 40mm with minimum volume mass of 30kg/m3. Waterproof plasterboard plates will be used for installation front walls in social facilities. The exterior wall of plasterboard partition will be aligned with the front of other walls after rendering.

In the 1st underground floor, 2nd upper floor and 5th upper floor in technological rooms are locally plasterboard partitions proposed as fire resistant pursuant to the project of fire protection.

Well walls are structured as walled. The partitions will have fire durability pursuant to the fire protection project. The inspection doors to wells must comply with requirements prescribed by the fire protection project.

Glass system partitions are used in the ground floor in the rooms of the consulate department. They must comply with acoustic parameters and requirements defined by the investor (security, darkening, etc.) In the conference room rooms, is used safety glass mounted on aluminium poles, e.g. Reynaers. Gaps between glass will be covered by safety steel sheet with thickness of 7mm covered under the pressure plate profile of glazing. The security partitions of conference rooms include a concrete wall on which a security feeding mechanism is mounted, e.g. Kovel. The cover of the feeding desk is similar to a carpenter structure from sprayed MDF board on a frame structure.

### **15. Ceilings and Lower Ceilings**

#### Interior ceilings

Existing situation

All existing lower ceiling structures on the 2nd underground floor, 1st underground floor, 1st upper floor, 3rd upper floor and 4th upper floor are from asbestos-cement boards. Their complete disassembly together with auxiliary structures is required. On the 2nd upper floor is an acoustic lower ceiling from wooden lamellas with a suspended ceiling structure in a combination of acrylic sheet and hardboard, directly above its level.

Proposed situation

It is proposed to remove the suspended ceiling structure of acrylic sheet and hardboard and replace it by a new combination of acrylic glass and plasterboard structures. It is proposed to upgrade the existing wooden lamellas. Partial disassembly in the event of implementation of new piping/wiring and installations. All piping/wiring must run in the floor to the level of lower ceiling structures. Cable passages must be drilled from bottom.

#### Interior Lower Ceilings

In the interior parts of the building are proposed whole pasteboard and cassette MDF ceilings in various combinations. For details, see part Architectural and Construction Solution of the Site - Lower Ceiling Drawings. The basic cassette ceiling will be from from a system, e.g. FANTONI 600x600mm. The Architectural, Artistic and Construction Solution of the Lower Ceiling is almost identical with the original author’s design. The grid of lights in the corridor will respect the original author’s grid. In selected areas, are proposed full plasterboard ceilings. Above them will run the utility piping and wiring. As a material was used the plasterboard system with plates with a thickness of 12.5 mm and zinc coated CD profiles. The joints of plasterboard plates will be taped, bound and polished. Impregnated plasterboard is used in sanitary rooms. In office rooms, the ceiling covers the mounting ventilation and fancoil units located under the ceiling. In offices there will be a lower ceiling under fancoils MDF cassette for servicing air conditioning units, replacement of filters and setup of electronics, and for the suction of air into the unit. In the rectangular part of the ceiling will be a grille for the inlet of fresh and cooled air from the ventilation and air conditioning.

In the grid of the bearing element of the ceiling must be left openings for the mounting of lights and grilles. All plasterboard ceilings, including inspection openings must be implemented pursuant to regulations and type details of the producer. All used parts must be from a certified system of a single producer. All ceilings must have a dilation connection to the ceiling structure to prevent faults due to sagging of the ceiling.

#### Exterior Lower Ceilings

Awning with ceiling from wooden lamellas around the entry portal. The Architectural, Artistic, Material and Construction Solution of the Lower Ceiling is identical with the original author’s design. It consists of an aluminium system base grid on which are fixed wooden mahogany or mahogany imitation lamellas.

### **16. Finishing - EXTERIOR**

The exterior finishing consists of two components of the facade shell. First is the steel structure of window openings with glazing. The second one is the facade envelope by existing reinforced concrete facade cladding. It is proposed to completely clean it, e.g. with FINALIT agent or with hot pressurized steam and subsequent impregnation using nanotechnology. This is described in more detail in the part - Exterior Wall.

### **16. Finishing - INTERIOR**

*CONCRETE*

Existing situation

Vertical reinforced concrete structures are in some positions architectural. These are mainly pillars in representation rooms on the 1st upper floor and 2nd upper floor and in office and apartment rooms on the 3rd upper floor and 4th upper floor.

Proposed situation

It is proposed to retain their finishing, as it is a distinct artistic element which must be preserved. It is proposed to completely clean it, e.g. with FINALIT agent or with hot pressurized steam and subsequent impregnation using nanotechnology.

*PLASTERING*

− interior plaster will be from polished plaster

− edges will be reinforced by a corner profile - under plaster - zinc coated steel

− final finishing: double abrasion resistant paint with white interior dispersion paint

− concrete walls around cores in offices with finishing unified with plasterboard partitions.

− in rooms of entrances of underground garages masonry will be painted from inside with abrasion resistant paint. All colours will be agreed with the architect.

*Lining*

− superior large ceramic tiling, format 1000x 500x 3.5mm- in sanitary facilities on the 2nd underground floor and in apartments on the 4th upper floor (Grespania ceramica- Coverlam- Supreme) and superior large ceramic tiling, format 500 x 3.5m (Grespania ceramica- Coverlam- Supreme)

− to the level of the lower ceiling in sanitary facilities

− the tiling will be laid on a highly deformable adhesive for large format tiling (e.g. Mapei Ultralite S2). The base hydro-insulation spatula and hydro-insulation binders will be performed within the uniform system, including all required accessories for sealing corner joints, passages, etc.

− behind the kitchen in kitchens unit lining from inox sheet with thickness of 1mm, glued with PU adhesive .

The detailed composition of proposed finishing of interior walls and ceilings is in the annex of this Technical Report.

### **17. FILLINGS OF openings - EXTERIOR**

### A JANSEN window system was proposed for the facade cladding, with finishing anodised silver as imitation of natural aluminium. In positions of glazing of escape staircase and pivot doors will be used the JANSEN facade system. This will be a steel profile system with interrupted thermal bridge and improved thermotechnical parameters. Opening and non-opening elements alternate in the grid of all facades.

The main entrance to the building and the entrance from the courtyard will be by automated door DORMA-KABA .

### **18. FILLINGS OF OPENINGS - INTERIOR**

*Door - steel*

Standard solid steel doors will be used in underground floors. Locally with grille. Steel frames will be from hot galvanised sheet with a thickness of 1.45mm. The finishing will be performed by powdered firing paint (see door listing, RAL will be approved by the architect). The profiles of frames will have a profile sealing from PVC (increase of acoustic and thermal insulation). The height of door openings will be 1970mm. A single frame will be used in masonry partitions for direct walling in (e.g. universal frame, type “U”). Most steel doors are proposed with fire resistance pursuant to requirements of the fire protection project.

*Glass walls - aluminium*

The interior glazed walls of the consular department and its conference rooms in the 1st underground floor have a fire resistance of 45min pursuant to the fire protection project. They are proposed from certified aluminium system Reynaers CS77FP, glazed, from profile with glass complying with requirements of the fire protection. The door wings and frameless glass walls are equipped with security coating at eye level. Sand blasted engraved foil with the Slovak state symbol will be used for the coating. For social and sanitary facilities will be used doors with hidden hinges and hidden frame aligned with the wall using aluminium for anchoring in plasterboard e.g. Metamod TUT. In social facilities are proposed for the cabins full-glass doors in aluminium frames Dorma Alexa. The wings will be from structured glass with transparent opaque foil.

*Door - wood*

The interior doors in offices in underground floors are wooden, full, and plain. Locally with grille or glazing. The height of the doors will be 2000mm with upper full transom or grille. The thickness of the wing is 60mm. The door wing will be with a groove. It will be coordinated with the frame in such that on the inner front (towards office) the frame will be on the same plane as the door wing and towards the corridor the door wing will be aligned with the plane of the glazing of the side transom. The frame will be folded, wooden in the same structure as the door wing, for the full height of 2000mm. The finishing of the door wing will be a wooden mahogany veneer. The sample will be agreed with the architect and client.

Metal fittings. All fittings and their accessories are proposed in polished stainless steel. There will be 3D adjustable hidden hinges (e.g. Simonswerk Tectus). If required, door closers will be used. They will have a slide arm. The handles will be with a split shield, from polished stainless steel with stainless rosettes, on stainless pads under the rosettes - class ZS (for extremely stressed door wings).

The system and types of used locks in individual rooms corresponds with the requirements defined by the client. Used types of locks:

− Mechanical locks

− Electromechanical locks with cylinder insert, connected to the access system and Fire Alarm System (EPS)

− locks with cylinder insert DIN Europrofile (“fab”) - (will be

specified based on submitted sample – double sided,

single sided, with WC handle)

*Glass walls*

On the 1st underground floor, in consular department rooms will be used system glazed partitions with aluminium profiles Reynaers CW50 without interruption of thermal bridge. The poles will be anchored in the concrete ceiling by hidden steel anchors. The glass stops at the ceiling. The partition must comply with acoustic and security parameters and requirements defined by the investor. In conference rooms will be used safety glass mounted in aluminium poles. Gaps between glass will be covered by a safety steel sheet with a thickness of 7mm covered under the pressure plate profile of glazing. The security partitions of conference rooms include a concrete wall on which a security feeding mechanism Koval is mounted. The cover of the feeding desk is similar to a carpenter structure from sprayed MDF board on a frame structure.

*inspection doors*

Inspection doors with fire resistance are proposed for access to installation shafts of distribution, e.g. Promat SP. The door dimensions are mostly 600x600mm. The doors are mounted in ceramic masonry or plasterboard front walls.

### **19. Locksmith products**

Locksmith products consist mostly of reinforcement profiles, which are part of the list of fillings of interior openings.

### **21. Carpentry products**

Existing situation

Carpentry products include mainly doors with frames, wooden partitions, large format lining, staircase handles, steps, built-in furniture, built-in cabinets, kitchen units. Except for kitchen units that will be dismounted most original products will be preserved and upgraded.

Proposed situation

Tea kitchenettes - all tea kitchenettes will be tailor made. The countertop will consist of DTD with finishing from high-pressure laminate. The side finishing will have a stainless profile. Doors and bodies of cabinets will be from DTD plates with laminated finishing for common operation. The fixtures will be from the PUSH system. In the kitchen will be a lining of the wall behind the kitchen unit from stainless sheet – machine polishing KORN 320. All fittings must be of high quality and durable (e.g. Schachermayer). Good performance of details must be emphasized during the installation.

Contact desks in consular departments consist of workplaces with working table with mounted security feeding compartment - drawer, e.g. KOVAL holding EK 5150 and communication equipment EK 5200. They are proposed from LDTD plates in white colour, pearl design, with ABS edge. The elevated part of the reception desk will be made from a single piece of mdf plate. The plates will be sprayed with highly resistant acryl paint with roughing pouring. The plinth is glued with inox sheet, thickness 1mm with a 100 mm height.

**22. Technical equipment of access control**

The access control system uses for identification and authorisation of authorised person mainly the contactless identifier, card, and tag for contactless reader. The system is used for control of persons and prevention of unauthorised movement of people in the building. The controlling software controls who may enter a specific zone and limits access permit by time and the number of passes to the zone. All passes implemented through card readers are registered in the database of controlling software for subsequent documentation of movement of people or vehicles.

The system processes signals from card readers that will be mounted in the elevator, at the elevator in the garages, on both sides of the door to the staircase, doors to the server room and on tourniquets, through control unit. The card readers for the attendance system will be located at the glass entrance door to the building, in the 1st underground floor and 1st upper floor.

**23. FENCING**

Existing situation

The fencing of area is a separate construction object. It will serve for the separation of the area from neighbouring lots.

Proposed situation

It is proposed to maintain the original fencing with adjustment made by removal of old paint and implementing new paint as a copy. It is proposed for security reasons as required by the investor to mount in the horizontal level of reinforced concrete plinth in the street zone oriented in Kensington Palace Gardens stainless steel antihomeless spikes.

**24. LANDSCAPE SHAPING**

Existing situation

The roof above the 1st underground floor on garages will be a vegetation roof with grass.

Existing green islands and green belts in front of the building will be maintained.

Proposed situation

Complete reconstruction of vegetation roof above the 1st underground floor with all layers. Final adjustment with grass.

**25. CONSTRUCTION FOR VERTICAL TRANSPORT\_SO 02**

RAMP

The ramp will be made of reinforced concrete. The backing layer is designed with an anti-skid coating with an epoxy coating. Description of construction see SO 01.1 Architectural and building solutions - floor plans and SO 01.2 Static security.

**26. RECONSTRUCTION OF OPLOTENIA\_SO 03**

Areal fencing is a separate building. It is used to separate the site from surrounding land. We suggest preserving the original fencing with the removal of original paints and new paintings in the copy. At the horizontal level of the ferro-concrete basement fencing in the street zone facing Kensington Palace Gardens, we propose, for safety reasons, to install urban seat protectors as required by the investor.

**27. RECONSTRUCTION OF CONCRETE PLANS \_ SO 05**

Exterior paving must meet the requirements of frost resistance and anti-skid resistance.

We suggest that the exterior balancing stairclean, for example, FINALIT or hot steam under pressure and subsequent impregnation based on nanotechnology.

**28. RECONSTRUCTION OF SOFTWARE\_S0 06**

The roof over 1pp above the garages is designed as a vegetation with a lawn. We propose a complete reconstruction of the vegetation roof above the level of 1pp with all layers. Finishing with grassing. The green islands and the green strips, which are solved in the front of the object with the grass, remain preserved.

### **29. Note**

The supplier of the construction is obliged to implement all work pursuant to valid technical standards for the given environment and comply with all technological and safety procedures, to comply with all recommendations of producers and suppliers of construction material, to respect relevant standards regarding permitted dimension deviations of implemented structures from the proposed status. It is particularly important that the supplier prevents building moisture.

For specific construction structures, construction procedures must be consulted with technical representatives of producers and suppliers. The drawing documentation of non-standard products is not a substitute for the workshop documentation of the suppliers. Before the start of production, the workshop documentation must be approved by architects of the project.

Proposed materials are referential. Equivalent technical parameters and quality must be maintained in the event of a change. Construction punctures must be confirmed by subcontractors.

Dimensions must be checked on site before the start. Deviations from the project must be consulted with the architects of the project. The designer does not bear any liability for changes made without the written consent of the designer !!!

This Technical Report is an inseparable part of design documentation including drawings.

Elaborated by: Ing. arch. Ján Pavúk, PhD.

Annexes: Tables of composition of structures

**02. eLEVATOR**

This document was elaborated pursuant to NV 436/2008

BASIC PARAMETERS

KIND OF ELEVATOR : electric small cargo

TYPE OF ELEVATOR : ISO-A 100/0,4

GROUP: Ac3

CAPACITY: 100 kg

HUB: 9944 mm

NOMINAL SPEED: 0.4 m/s

NUMBER OF STATIONS/CARGO : 3/3 - passable

IDENTIFICATION OF STATIONS: -2,0,1

CONTROL: Simple external, by buttons at the platform

NUMBER OF ELEVATORS: 2

TYPE OF DRIVE: 3+PEN, 400/230V 50Hz   
PRODUCER: Metallschneider, Germany.

OBJECT OF THE ELEVATOR: Embassy of the Slovak Republic, London, UK

1. TECHNICAL DESCRIPTION

1. TYPE OF CONSTRUCTION OF ELEVATOR

The elevator is, as regards the type series, a new generation of construction compliant with all requirements regarding operation. The elevator was produced by the manufacturer OTIS a.s., J.Opletala, Breclav, pursuant to STN EN 81.31. The elevator has a modular design, i.e. the elevator shaft consists of segments. Their assembly will result in a bearing structure of the shaft in which the elevator machine and the elevator cage will be placed.

1. PLACE OF INSTALLATION OF THE ELEVATOR

The elevator is placed in the elevator shaft with dimensions 900x550mm (width x depth) with the elevator machine mounted in the grid. The bottom of the machine is covered by steel galvanized sheet. The elevator distributor is located in the machine area. The shaft consists of a bearing structure, which is a part of the delivery of the elevator. The structure is located in a walled shaft. The front wall of the shaft is covered in plasterboard.

- MAIN SWITCH

Is located in the area. The main switch (HV) is mounted in the distribution box and labelled RV. The box consists of a lockable main switch and it also performs the function of overload breaker, fuses and switches of light circuits and 230V socket

- Elevator Distributor

Is located in the machine area. The distributor contains modules controlling the elevator. A detailed specification and wiring diagram form a part of the documentation

1.3. MACHINE ROOM

ELEVATOR MACHINE BO 18.24

consists of an asynchronous electrical motor with an output of 0.55 kW. The worm gear-box is connected by coupling with the horizontally mounted electrical motor. The output from the gear-box is the traction disc. The whole equipment is fixed on a frame, which is mounted on flat silent rubber blocks.

- LIGHTING OF THE MACHINE ROOM

Consists of a lamp with a min. intensity of 200lx.

1. SHAFT

- GUIDE RAIL OF THE CAGE 2 units type: T 45/5 dimension . 45 x 45 x 5 metal sheet

- GUIDE RAIL OF THE COUNTERBALANCE 2 units

Individual parts of guide rails are screwed together by means of joints of guide rails. The ends of the guiderails are secured against mutual lateral displacement by cams. The guide rails are anchored to the side wall by means of guide anchors, which are screwed into the bearing structure of the shaft.

- BEARING CABLES

Type: HAMBURGER Drahtseilerei, diameter, 2 units

They transmit the load of the cabin - counterbalance. The ends are fixed by means of lever hinges with electrical securing of the release of cable SO26 at the cabin, thus providing for the event stressing of the bearing equipment.

- ELEVATOR CAGE 600 X 450 X 900

The elevator cannot pass stations. It is mounted in a steel frame. The material of the cabin is PLATAL- laminated sheet. The elevator cabin is used for direct transport of cargo. In the given case, for a load with a weight of up to 100 kg.

- COUNTERBALANCE 1 unit

Is mounted in a steel frame. The filling material of the counterbalance are cast iron bricks. The counterbalance together with the elevator cabin form a balanced aggregate connected by cables hanging over the traction disc.

- STOPPER

Located at the bottom of the shaft, provides for coasting to stop

- SHAFT DOOR

Type of door: vertical sliding barriers - 600x900mm (width x height)

- CABIN DOOR

Without cabin door

- DOOR LOCK TV 3074

Ensures door will not open unless elevator cabin is behind it.

- ELEVATOR CONTROL

The elevator is equipped with a simple control, button controllers at the platform.

1. ELECTRICAL INSTALLATION

* The elevator is connected to the grid 3x400V, 50Hz,16A, P=0.55kW, In=1.6A, Ia= 9.6A
* The electrical installation of the shaft is deployed in electrical channels.
* Other electrical data is stated in the electrical technical report and in the layout drawing

This document was elaborated pursuant to NV 235/2015

BASIC PARAMETERS

ELEVATOR TYPE : electric passenger and cargo elevator with self-operation

pursuant to STN EN 81-20/50 and Decree of Government no. 235/2015 Coll.

GROUP: Ac1

TYPE DESIGNATION: STREAM

CAPACITY: 630 kg / 8 persons

NOMINAL SPEED: 1.0m/s

BUILDING OF THE ELEVATOR: Embassy of the Slovak Republic, London

HUB: 16.97m

NUMBER OF STATIONS/CARGO : 6/6 , non-passable

IDENTIFICATION OF STATIONS: -2,-1,0,1,2,3

MANUFACTURER: OTIS NEC, Avenne des Montoires, Gien Cedex, France

1. TECHNICAL DESCRIPTION

1. TYPE OF CONSTRUCTION OF ELEVATOR

GeN2 Stream is an electrical traction elevator using a gearless drive of synchronous electrical motor with permanent magnets and covered flat steel as load supporting devices cables. The elevator is, as regards the type series, type certificate no. *0088/0961143/059* and is of a new generation type of construction. The equipment for brake release uses a backup auxiliary source which is built-in in the distributor, which is used for manual emergency operation.

1. PLACE OF INSTALLATION OF THE ELEVATOR

The whole elevator is located in the elevator shaft with dimensions 2160x1735. The material of fencing of the shaft is a concrete structure. The machine is deployed in the upper part of the shaft. The distributor is located under it. The emergency operation panel is accessible from the platform on the top floor in a lockable cabinet, which is a part of the doorframe. /see layout drawing /

The depression of the elevator is 1100 mm.

The upper part of the shaft, i.e. the distance from the threshold of the last station to the ceiling of the shaft is 3680 mm.

1.3. MACHINE ROOM

- MAIN SWITCH

is part of the panel of inspection trip in the function of a fuse of the drive of elevator machine, 230V socket, fuses of shaft lights.

- ELEVATOR MACHINE GEN2 STREAM 630/1.0

The synchronous electrical motor with permanent magnets has a shaft with a traction low diameter disc, so it can be installed on a side wall at the highest point of the shaft. The motor shaft is extended to the traction disc for flat cables and laid by means of support pedestal on the drive frame.

- Elevator Distributor GCS 222LVA

The elevator distributor and the drive form an integrated unit and are located in the inside of the shaft on a side wall. The emergency and inspection panel are located on the highest platform at the shaft door, or in the front wall of the shaft from the platform side. The emergency and inspection panel allow all controls required for the performance of emergency release and inspection operations

- VENTILATION

is provided pursuant to STN EN 81-20 – shaft, via a ventilation opening at the top of the shaft (min. 1% of the area of shaft.) 1.4.SHAFT

- GUIDE RAIL OF THE CAGE 2 units type: T89/B

- GUIDE RAIL OF THE COUNTERBALANCE 2 units type: T89/A\_T

Individual parts of guide rails are screwed together by means of joints of guide rails. The ends of guide rails are secured against mutual lateral displacement by cams. The guide rails are anchored to the side wall by means of guide anchors, which are screwed into the side wall by a HILTI anchor system.

- FLAT BEARING CABLES 34KN- 4 X 25 X 3.3

Flat steel cables are covered in polyurethane envelope with a minimum tear strength of 34 kN. Four flat steel cables were used to increase the bearing capacity.

- ELEVATOR CABIN 1100 X 1400 X 2300

Is mounted in the frame of cage of a new type of construction with painted flat cables. The material of the cabin is plasticized steel sheet. Weight of the cabin 1070kg. The elevator cabin is used for direct transport of passengers and cargo. In the given case, for the elevator with a bearing capacity of 630 kg, i.e. 8 persons, or cargo of the above weight.

- COUNTERBALANCE

Is mounted in a steel frame. The filling material of the counterweight are steel plates. Weight of the counterbalance 1426kg. The counterbalance together with the elevator cabin form a balanced aggregate connected by cables hung over the traction disc.

- SPEED LIMITER OTIS 20602A   
It monitors the cabin motion speed downwards. If the maximum speed is exceeded (trigger speed), it triggers the catchers. In the given case, it is located in the shaft. It is triggered from the emergency operation panel remotely via the distributor. The maintenance will be performed from the shaft from the cabin.

- OR CABLE

Diameter 6.3mm, is fixed to the catcher levers.

- CATCHERS OTIS A9672E

Type: sliding cylindrical, type of trigger: exceeding the speed. They prevent uncontrolled motion of the cabin downwards.

- BRAKING EQUIPMENT TYPE: 27076GT

Equipment against uncontrolled speed of the cage upwards:

Type of trigger: exceeding the speed of the cage upwards. They prevent uncontrolled motion of the cabin upwards.

- LIMIT SWITCH XCKP521

It forms a part of the shaft equipment. It is triggered by the cage passing the upper (lower) extreme position. It will provide for an upper (lower) extreme position of the run of the cage.

-SHAFT DOOR PRIMAP 900X2100

Type of door : automated central CLD from stainless steel sheet, forms an assembly together with the cabin doors. Clearance of the door 900x2100mm.

- DOOR LOCK FAA 23400L

Prevents the door from opening unless the elevator cabin is behind it.

- ELEVATOR CONTROL

DCL- collecting in single direction, type SIMPLEX. The control panel has a vandal resistant construction with an indicator of position and direction of movement of the cabin in the elevator cabin with buttons for all stations + door opening button, alarm to call the supervisor of the elevator in case of jamming of the elevator and a button for opening / closing the door. A part of the control combination is the key controller ISC-parking at a station with an open door, signalling of overload and bidirectional communication equipment of elevator in the event of the jamming of the elevator is activated by pushing the button with the ring symbol. Within 5 seconds a phone number will be dialled to the permanent rescue service, which will undertake the rescue.

At stations, there is a button in a vandal-resistant construction to call the elevator to the station.

- ENERGY ABSORBING BUMPER ACLA  
Located under the cabin 1 unit 300403A and under the counterweight 2 units 300 401A, provides for attenuated coasting to a stop

* INSPECTION TRIP

Control panel for this type of trip is located on the roof of the cabin and used for service activities.

* FOLDABLE LADDER

Is located in the depression of the shaft. It is in a foldable version, as its min. depth of step is 180 mm. This distance could not be complied with by the fixed version, so a foldable version will be used. In the unfolded condition, this position is secured by electrical switch LPS. In the unfolded condition, the safety circuit is interrupted. In the depression - in the shaft within reach of the shaft door is located the STOP switch and switch for shaft lighting.

* SHAFT LIGHTING

By lights as prescribed by STN EN 81-20, upper and lower light at a distance of 500mm from the ceiling and from the shaft bottom. The other lights are deployed between them to provide for a min. intensity of lighting of 50lx.

1. ELECTRICAL INSTALLATION

* The elevator is connected to a three-phase system 3x230V/400V, 50Hz
* Power input 5.4kW
* Nominal current 7.8A
* Starting current 12.1A
* The electrical installation of the shaft is in electrical channels
* Cabin connection to the grid is by flexible cables
* Cabin lighting by LED light

Bratislava, on 10.4.2018 Elaborated by: Ing. Martin Horváth

**03. KITCHEN TECHNOLOGY**

Bližší popis VIĎ časť - 03. KITCHEN TECHNOLOGY

**04. static assessment**

*1. Introduction:*

The subject of this part of documentation is the static assessment and the proposal for the Major Overhaul of the Building of the Slovak Embassy in London for the building SO 01. The design documentation was elaborated on the basis of information from the architectural and construction part of design documentation and other involved professions. The static calculation of local bearing elements of the building was elaborated on the basis of this information.

*2. Proposed situation:*

The existing site consists of monolithic vertical and horizontal elements which are locally resolved pursuant to the original documentation for the relevant load. All dimensions must be checked before starting individual interventions into bearing elements. The different professions must be coordinated.

**A/ New elevator:** For the requested replacement of the elevator the supplier must provide fixing/securing points in the ceiling board of the elevator shaft. The positions of individual points were proposed on the basis of the fundamental scheme of the load distribution. The basic principle is the full drilling of the ceiling structure with the relevant diameter for mounting a part with a rotating suspended hook, which will be fixed in the upper part using a steel plate with structured anchoring. There were no other requirements regarding statics. Other elements will be anchored in wall elements.

**B/ Fixing of attic elements :** Due to the use of concrete cladding and its local faults, it was proposed to subsequently fix the attic elements throughout the perimeter and the scope can be adjusted in accordance with the establishment of the actual condition of suitable elements. The basic design results from the re-anchoring of the attic element in the monolithic structure. The design was based on minimisation of intervention in the concrete elements. A solution for the full drilling of the attic element in the upper part and subsequent anchoring in the monolithic vertical part was designed. The anchoring is proposed as chemical glued screw rods with a diameter of 12mm. The anchoring must be implemented under specific assumptions. The marginal anchoring must be at least 200-250 mm from the outer edge, so the anchoring will not tear out. The intermediate anchoring must be implemented at a minimum distance of 500mm. All attic elements which have deviated from the original position must be returned to their original condition before anchoring.

**C/ Fixing of lower ceiling plates of the 4th upper floor:** Due to the use of a concrete ceiling and local adjustments, it was proposed to subsequently fix the elements along the new line of window fillings. The basic design results from milling the relevant part in the concrete element. The design was based on minimisation of intervention in concrete elements. It was proposed to fully drill the lower ceiling element and the monolithic ceiling structure. The fixing is proposed as a spread plate 100/100/8 mm in the bottom part to which a screw rod is welded. In the upper part above the ceiling structure a second plate is mounted and secured by a pad and matrix. The fixing must be implemented under specific assumptions. The marginal fixing must be at least 200-250 mm from the outer edge, so the element will not break. The intermediate fixing must be implemented at a minimum distance of 500mm.

**D/ Fixing of lower ceiling plates of the 3rd upper floor:** Due to use of a concrete ceiling and local adjustments, it was proposed to subsequently fix the elements along the new line of window fillings. The basic design results from milling the relevant part in the concrete element. The design was based on a minimisation of intervention in concrete elements. It was proposed to fully drill the lower ceiling element and the monolithic ceiling structure. The fixing is designed as a spread plate 100/100/8 mm in the bottom part to which a screw rod is welded. In the upper part above the ceiling structure a second plate is mounted and secured by a pad and matrix. The fixing must be implemented under specific assumptions. The marginal fixing must be at least 200-250 mm from the outer edge, so the element will not break. The intermediate fixing must be implemented at a minimum distance of 500mm.

**E/ Fixing of balcony panel in the 2nd upper floor:** Due to use of a concrete panel on the balcony in the 2nd upper floor with local fault of deviation, it was proposed to subsequently fix the relevant element. Scope approx. 4.0m. The basic design results from the re-anchoring of the panel element in the monolithic structure. The design was based on a minimisation of intervention in the concrete elements. A solution of full drilling of the panel element in the upper part and subsequent anchoring in the monolithic vertical part was proposed. The anchoring will be chemical glued screw rods with a diameter of 12mm. The anchoring must be implemented under specific assumptions. The marginal anchoring must be at least 200-250 mm from the outer edge, so the anchoring will not tear out. The intermediate anchoring must be implemented at a minimum distance of 500mm. Individual panels must be checked and the fixing must be resolved pursuant to the identified condition.

**F/ Additional roof load from vegetation layer:** According to the original composition which was a load of around 420 kg/m2, the new composition with a vegetation layer with a thickness of 120 mm (using substrate up to 240kg/m3) with corresponding layers is approx. 408 kg/m2. From this comparison, the ceiling structure is suitable for the new composition.

**G/ Additional load for “I” rails of the 2nd upper floor:** Locally-mounted rolled elements I 380 with mounting details for the bearing structure are currently loaded by the glass frame with single pane. This element must be recalculated for double glazing. The basic assessment was focused on the deformation of the structure, which is more important than the bearing capacity of the element. The vertical load has doubled, but the bending is around 2.00mm, where the limit is 17.5 mm. The structure is suitable. The steel structure and its anchoring must be checked when it is exposed and if it is poor condition, the elements must be replaced!!!

**H/ Assessment of elements at the stairs:** The requirement to remove unsuitable parts of the outer wall at the staircase anticipates the use of rolled steel elements. These elements are currently loaded by the outer walls of individual floors. It is possible to remove such elements as the new outer wall will be anchored in lining of individual floors.

**I/ Assessment of garage plate :** The requirement for implementation is that the ceiling structure above the exterior garages can carry an increased load from the scaffolding, travelling crane and concreting work. The ceiling structure will be exposed to the bearing structure. All layers will be removed (vegetation + insulation). The support must be addressed in the full scope for the whole plate (as it will be a new monolithic plate). A precise specification of equipment that will encumber the ceiling structure is required before the construction work begins. New layers of the vegetation roof will be implemented after the termination of use of this part of the structure.

**J/ Access ramp to the garage:** The requirement is in the design of new structure of the local part of the ramp. The description of the existing part, the design of the new part and a precise specification are included in the drawing part.

**K/ New door opening in the 3rd upper floor:** The construction adjustments locally interfered with the bearing monolithic concrete structure with a thickness of 275mm. Creation of new opening by cutting. Due to the position of the opening steel elements were proposed for bordering the opening. The basic element is angle L80/6 with three edges from both sides. In the lower part the element is mounted on an anchoring plate. On the perimeter, the angle is anchored with M8 anchors in corresponding positions. All steel profiles are in contact with the concrete to be mounted in the cement bed to connect the structures.

**L/ New door opening in the 4th upper floor:** The construction adjustments locally interfered with the bearing monolithic concrete structure with a thickness of 275mm. Creation of new opening by cutting. Because of position of the opening were designed steel elements for bordering the opening. The basic element is angle L80/6 with three edges from both sides. In the lower part is the element mounted on an anchoring plate. The angle is on the perimeter anchored with M8 anchors in corresponding positions. All steel profiles are in contact with concrete to be mounted in the cement bed to connect the structures.

**M/ New openings for ventilation:** The construction adjustments interfered with local bearing elements (wall and ceiling). In the building, for new routings and new requirements were proposed new passages in the wall elements and also some new smaller ones in ceiling elements. For ceiling elements, the existing passages will be used to the maximum possible degree. In the whole building, new passages are proposed identically. Passages through wall elements with a circular cross-section do not need bordering. Rectangular passages are bordered with a steel structure on the perimeter from both sides of the wall element. The whole principle is similar to a new door opening. For local masonry structures with broader openings were also proposed steel elements in the head of the existing opening. An alternative solution is the use of ceramic capping. For new openings in the ceiling structures, bordering elements will be “U” profiles fixed on the ceiling structure with anchoring.

**N/ Concreting of passages :** Unused passages must be closed. Larger openings must be concreted. The concreting and connection with existing structures is designed using mounting auxiliary steel elements on the perimeter. The basic procedure consists of anchoring two angles that are welded together. One angle is anchored from the upper side that secures skid and the other from side which is for collaboration. From the lower part will be mounted the casing and on the lower part of angles will be mounted a grid from reinforcement. The whole element will then be concreted. The concreting is primarily addressed in the ceiling above the 2nd upper floor, but this principle can be applied if unnecessary openings are found.

**O/ Ramp :** The construction solution requires the building of an access ramp where the bridging of a height of approx. 600 mm will be provided. The new ramp will be concrete. In the middle part is proposed a concrete railing which will be from exposed concrete. The height provision will be resolved by a monolithic board with a thickness of 150 mm which will have surface treatment. Under the bearing structure was proposed dry concrete to create a gradient for the bearing structure. At the foot of the ramp a new structure will be connected with the foundation slab by drilling the reinforcement and connection with the mesh material of the ramp. The central partition from exposed concrete should be implemented first (and will be implemented at two height levels). The anchoring is resolved by drilling the reinforcement into the foundation slab. The listing of reinforcement and description of material is in the drawing part.

Such structures will safely transmit both the permanent and effective load to the foundation. The structure was designed and assessed pursuant to STN EN standards (see list of used literature).

*3. Conclusion:*

I conclude that in the event of uncertainties during construction or changes from the proposed status, the designer of statics must be invited and individual adjustments must be resolved after mutual consulting. Partial parts of the project were modelled and assessed in computer using the program Scia Engineer 17. For all notes, see the relevant part.

*4. List of used literature:*

STN EN 1991-1-1: General loads - Volume weight, self-weight, and effective load of buildings

STN EN 1991-1-3: General load - Snow load

STN EN 1991-1-4: General load - Wind load

STN EN 1992-1-1: Design of concrete structures

STN EN 1993-1-1: Design of steel structures

STN EN 1995-1-1: Design of wooden structures

*Zlaté Klasy, September 2018 ...............................................*

*Ing. Mészáros Csaba*

**05. STRUCTURED CABLING - light current wiring**

**07. Fire Alarm System**

**08. Voice fire alarm**

List of documentation

Text part

Technical Report

Fire Alarm System (EPS)

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Drawing part

1. Fire Alarm System (EPS) Diagram
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5. Section Plan 1st Upper Floor
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10. Legend

# 

# Fire Alarm System (EPS)

# General

### Subject of the project

The subject of this design documentation for implementation is the draft and elaboration of the electrical fire safety system, (hereinafter the “EPS”) for the construction building SO 01 of the project “MAJOR OVERHAUL OF THE OBJECT OF THE SLOVAK EMBASSY IN LONDON” at the address: London, 25 Kensington Palace Gardens, UK.

The design documentation is designed on the basis of information from the fire protection and construction part project, which resulted in required measures for the installation of fire safety systems. The EPS is required in the building under consideration on the basis of the requirements of the investor and UK standards. The draft considers the incorporation of an advanced address system so that the EPS is functional and complies with requirements for the equipment in the given building. Under standard conditions, fires will be signalled by automated fire detectors in the initial stage.

The subject of the project does not include the following:

* connection of the EPS switchboard – 230V/50Hz from the LV distributor and of other elements that require a power supply
* power supply for fire technical equipment

Information for the elaboration of the project was the following:

- construction drawings

- requirements of the fire protection designer

- requirements of the investor

- technical conditions of the utilised devices and electrical products

- requirements of other technicians

# Basic technical data

### Regulation and standards

The design documentation was elaborated pursuant to valid Slovak laws, decrees and standards.

### Wiring network and protection

A) EPS switchboard and external power supply

Wiring network, protection

1+N+PE~50Hz 230V/TN-S

Protection against electrical shocks in standard operations:

- insulation of live parts (STN 33 2000-4-41 Article 411.2)

- by prevention or covers (STN 33 2000-4-41 Article 411.2)

Protection against electrical shocks in the event of a fault:

- automated disconnection in the event of a fault in the network TN (STN 33 2000-4-41 Article 411.3.2)

- supplementary protection by connection (STN 33 2000-4-41 Article 415.2)

B) EPS wiring

2-24V, DC/ IT

Protection against electrical shocks during standard operations:

- insulation of live parts (STN 33 2000-4-41 Article 411.2)

Protection against contact with live or exposed parts:

- low voltage – PELV (STN 332000-4-41, Article 414)

The protection against electrical shocks will be provided pursuant to STN 33 2000-4-41 for standard operation by coverage and insulation. In the event of a equipment fault, there will be automated disconnection from the power source, and for light power wiring protection will be by safe voltage. The installation must be undertaken pursuant to  STN 33 2000-4-41, and STN 33 2000-5-523.

Wiring is not located in areas with a hazard of atmospheric discharges, or low frequency (LF) or high frequency (HF) interference. Additional overvoltage protection is not required. The requirements of electromagnetic compatibility pursuant to STN 33 2000 are fulfilled.

The assembly of the EPS may be performed by an organisation with authorisation for such activities and training for the above-stated system.

The equipment must comply with all valid requirements of electrical engineering regulations and STN standards. It must be tested before commissioning as to whether it has been installed pursuant to the documentation, if it has the required properties as a whole, and if there is a hazard to life or health and if it interferes with other equipment.

All EPS components must comply with the requirements of individual parts of the EN 54 standard. The supplier is obliged to provide certificates on conformity with this standard for individual components.

### Requirements for cover of electrical devices

The electrical equipment of this project is located in an environment defined by the protocol on stipulation of external influences. The protocol on the stipulation of external influences is a part of the project for heavy current wiring. The activities of the proposed equipment will have no impact on rooms with light current wiring.

### Short-circuit data

The short-circuit data was determined by calculation from the public wiring network, on the basis of cable cross-section and length and serial securing elements.

The following short-circuit data was determined for the switchboard:

In = 10 A

Ik“ < 10.0 kA

Evaluation of short-circuit safety – all utilised components must comply with the above-stated short-circuit data.

# Technical description

For fire protection requirements for the building based on the requirements of fire protection designer was proposed an EPS which will serve as reserved fire safety equipment in buildings for the improvement of their fire safety. The installation of the EPS and early intervention can efficiently reduce the intensity of fire in the building or its part, and thus reduce the fire risk and protect human life, health, materials and the environment in the event of fire. The main tasks of the EPS from a functional viewpoint are early detection of primary fire signs, reporting the event to the system operator, notifying persons about the hazard and activation of the fire safety equipment that will prevent the spread of fire and facilitate its liquidation. The measures against fire will be in four phases:

- detection of fire signs in its initial phase,

- reliable distinction between a real fire, and a false alarm,

- clear signalling to present persons and intervening personnel,

- efficient organisation of effective intervention.

This process must run during the first 4-5 minutes from the occurrence of fire, otherwise it may be too late to prevent irretrievable losses. Early detection of fire by the EPS is very important from the point of view of prevention for the rescue of life and material. The EPS can be classified into 3 separate groups of equipment:

a) automated and button fire detectors (hereinafter “Detectors”)

b) switchboard with control

c) input and output elements (couplers)

Automated Detectors are devices measuring characteristic physical variables in the monitored area and on the basis of specific values, they send a signal to the switchboard. Button Detectors react to a manual sounding of the alarm. The switchboard’s processes the message and using output elements passes the information to specific equipment to perform programmed actions. The process can be classified into detection, evaluation of detected signal, processing of the result by the switchboard and organisation of the subsequent equipment.

The basis terms and conditions for the operation of EPS are stipulated in the Decree of Ministry of Interior of the Slovak Republic no. 726/2002 Coll. stipulating features of a fire alarm system, conditions for its operation and provision for regular inspection

If the switchboard of the EPS is not installed at a place of continual operation, an element between the switchboard of the EPS and a place of continual operation must provide for the passing of the signal on activities and conditions of the EPS § 3 (1) (c) of Decree no. 726/2002 Coll.)

1. signalling of fire,

2. signalling of fault,

3. deactivation,

4. testing,

5. idle

For the given building was proposed a technical solution of fire protection using a BOSCH system, which will be the system producer for all components. The central unit is the modular fire switchboard FPA 5000.

The building will be connected to a single control unit located in room no. -231 - Fire Protection wiring + light current.

Fire detection is provided by addressable automated optical smoke, combined optical heat and manual button detectors in circuit wiring connected to the automated switchboard. The detectors will be installed on the ceiling of the monitored area and will react to the occurrence of smoke and an increase in temperature in a defined area depending on the installation height.

The switchboard is powered by 230V/50Hz voltage with a separate inlet for each control unit. This network inlet will run from the electrical LV fire distributor with a three-wire cable NHXH-J E30 3x1.5 from the fuse 10A/B/1. It is prohibited to connect any other appliances to this inlet. The switchboard will supply the whole system with energy (except for the linear optical detector), even in an emergency due to a power supply outage by a backup battery. The system will provide such a backup supply pursuant to the standard for a min. period of 30 hours in the event of inactive condition and 30 minutes in the event of an alarm.

### Fundamental advantages compared to a standard EPS

1. Usage of fully addressable switchboard with exact localisation of message position
2. Replacement of ionising fire detectors with optical smoke detectors (equal or higher sensitivity and no subsequent costs in the event of impairment of the detector)
3. No signal lights (due to precise addressing, this is not required)
4. The detectors are arranged in message lines instead of fire loops (maximum 254 automated and button detectors can be arranged in a single line), the cabling is simplified
5. The differentiated reset eliminates false alarms and reduces the time until a real alarm is sounded

### Sounding of fire alarm

The switchboard can be set to a two-level control, i.e. a “DAY” regime and a “NIGHT” regime. As there will be no permanent service in the building, the switchboard will be set to the “NIGHT” regime.

In the day regime, the switchboard will react to an impulse from automated detectors – the section alarm. Based on this, the operator must up to time T1 (within 1 minute) confirm the receipt of alarm and in the time up to T2 (5 minutes) the operator must check the veracity of the alarm. If the operator reacts in a timely manner and confirms the receipt of the message by the time T1 lapses, a countdown of the interval T2 will start, which is identified as the time for the examination of the location. During this time, the operator must visually inspect the place of the message and in the event of a small incident, or the start of a fire, liquidate it by means of improvised or suitable tools (fire extinguishers, fire hydrants, powder, etc.). If the operator does not do this in the required time, the switchboard will signal a general alarm.

In the event of a false alarm, the switchboard will reset. In the event of an impulse from button detectors T1 and T2 will be ignored. Alarms in the given building will be sounded by audio or acoustic signalling of the switchboard in the room where it is located and by evacuation radio.

If the “NIGHT” regime is set, under this regime the switchboard will immediately sound a general alarm from the button and from automated detectors. As there will be no permanent security service in the building, the switchboard will send a message via GSM transmitter or direct telephone line to responsible persons (security service or directly the fire brigade).

In the event of the sounding of a fire alarm, the operator must follow the fire technical guidance which must be elaborated by the user. The operator must call the fire brigade in the event of fire. If there was a false alarm, the operator will reset the switchboard.

### Fire switchboard

In premises with the most demanding safety requirements and high demand on reliability of the system, a microprocessor controlled switchboard BOSCH FPA 5000 will be used. FPA 5000 is a modular EPS switchboard with optional subsequent extension. The current system switchboard is an intelligent input and output unit, which after receiving information from a detector, will organize the output equipment. The individual input and output elements of the system can be combined by software into a group with equal features. The activation of different groups of detectors can be linked to the activation of various output groups. Such links may also be subject to operator’s action, such as confirmation of message, reset of system, etc. In addition, duration until confirmation, time for the survey of location of the message, set regime DAY/NIGHT, etc. The switchboard also has an internal memory for storage of messages, which is subsequently available for the analysis of incidents.

The switchboard is equipped with an internal control and operating panel where alarm and faults will be signalled optically and acoustically. The LCD touch display on the control panel will display the address of the detector, the name of the room and by touching other buttons other data can also be displayed, e.g. time, type of fault, etc. The switchboard will be equipped with a RS232 module for communication with the Voice Fire Alarm System (HSP).

### External control keypad

### Remote keypad FMR 5000 13 is designed for full remote control of the switchboard. Up to 32 switchboards, external control keypads or OPC servers can be connected to a single FPA 5000 network. The user interface of external keypad is identical with the control keypad of the switchboard with all the functions of the switchboard. The external keypad FMR 5000 is also suitable for embedded and surface assembly and is powered directly from the switchboard. For the control keypad located at the information panel in the foyer area on the 1st upper floor, which will be in operation during working hours, will be created a network using connecting individual switchboards and control keypad into a circuit by cable JE-H(St)H-V 2x2x0.8.

### Detectors

Fire detectors with optical, maximum temperature and temperature difference sensors are in the building proposed as optical smoke and multi-sensor fire detectors. It is suitable for garages to use multi-sensor detectors with dual optical sensors, as there is a lower probability of false alarms compared to standard multi-sensor optical temperature detectors. Automated analogue process fire detectors with the highest reliability are proposed for buildings with a medium to high concentration of values. Detectors and other equipment are connected by a twin conductor power and data bus. The detector will detect pollution, in the event of which the detector must be cleaned from dust particles. The switchboard will recognize each detector and allocate to it an address in the zone or set parameters. 254 elements can be connected to a circular line. An adverse influence is the interruption or short circuit of the detection line (bus). The full functionality of the line is also secured in the event of interruption due to the circular typology, where the line starts and ends in the switchboard. A short circuit of the line will result in disconnection of the damaged section of line by the two closest neighbouring short circuit breakers. The standard allows for a possible outage of max. 32 detectors concurrently.

The detectors will be installed in the ceiling pursuant to the design documentation. If there is a lower ceiling in the area under consideration, the sensor must also be mounted in the lower ceiling and be connected with the parallel indicator located under the sensor. The installation must be adjusted to the artificial lighting and ventilation. Manual button detectors will be installed on the escape routes, at the exits at a height of 1.2 to 1.5m above the floor.

Due to the complexity of ceiling, for the monitoring of a part of the representation area on the 1st upper floor, was used the linear optical detector Fireray 50RV, which will using a transmitted light beam and its reflection from a suitably placed mirror monitor this area.

### Structures and type of cable wiring

Wiring for detection lines leading to elements of the EPS is proposed with cables JE-H (St)H-R 1x2x0.8. These cables have a higher resistance against flame spread, and are halogen free with a low smoke density. Electrical equipment in operation during fire must have a secure permanent power supply by cables resistant against flame spread and functional during burning for the required time. For the controlled fire technical equipment, alarms and switching of fire protection equipment is proposed the cable JE-H(St)H-V E30 1x2x0.8. The wiring of networking of switchboards and connection of the control keypads to the network will be by cable JE-H(St)H-V E30 2x2x0.8. This cable has increased resistance against flame spread, functionality during a fire for a min. period of 30 minutes, and is halogen-free with a low smoke density in the event of burning. The connection of the EPS switchboard will be by cable NHXH-J E30 3x1.5. The connection of LSN detectors will be by a mutual connection of individual detectors in a circuit and connection in the switchboard.

The cables will run on the surface in technical premises, in premises with a lower ceiling above the ceiling, in plasterboard partitions or under mortar of walls and ceilings. Functioning cables will run in riser ducts on metal grates or on metallic fixing strips. Cables for detection lines of the EPS will be in riser ducts running on a light current cable ladder together with cables of the structured cabling. Such a ladder will be included in the supply of structured cabling. Main routes functioning in the event of fire will run in a fire resistant cable duct under the ceiling anchored in the bearing structure.

Cables will run in partitions when traversing walls and ceilings protected by flexible halogen free pipes. Fire bushings or binders with corresponding fire durability must be used for traverses through fire protection sections.

Pursuant to STN 34 2300 and STN 33 2000-5-52 the distance of heavy current line must be for convergence up to 5m at least 6cm, above 5m at least 10cm and for crossing at least 1 cm.

Cable routes to the controlled fire technical equipment, alarms, switching of fire protection and cable routes of networking of switchboards must be implemented in standardised fire resistant routes, which are separated from other cable wiring. They must not be laid in plastic protective pipes!

All cables, cable bearing systems and their accessories must comply with fire resistance properties pursuant to the fire protection project, STN 92 0203 and STN 92 0205.

### Equipment controlled by the EPS

The EPS will through input and output equipment on a circular bus, provide for the required switching outputs for the control of fire technical equipment. Such control elements are differently programmable for the requirements of the specific device. In the event that outputs switching specific voltage or current are required, these will be provided from the power supply units of such equipment, without influencing the current EPS.

The EPS will switch on the equipment for expelling smoke and heat from the area of the fire, switch on the evacuation radio, switch off the ventilation, disable audio equipment in the event of fire and other alarm messages, close the fire flaps, thus preventing the spread of fire to other fire protection sections.

### The EPS on site directly controls the following equipment:

1. closure of fire closures - rollers (vertical fire roller in the basement separating the building from the Czech embassy), which will automatically close in the event of fire without delay and will remain permanently in a closed position (the EPS impulse will activate the electric motors which form a part of roller doors) - the roller door will be connected to a backup power supply, i.e. UPS of the building. This roller may not be mechanically locked during the operation or blocked in any other way.

2. opening of all electrically opening doors and gates except for those separating neighbouring fire protection section for facilitation of escape of people from the building during fire. These will automatically open without delay and will remain permanently in the open position (the EPS impulse will activate the electric motors which form a part of sliding or opening doors) - the electric sliding rollers door will be connected to a backup power supply, i.e. UPS, they have their own built-in battery or mechanical system with a weight. These doors may not be mechanically locked during the operation.

3. shut-down of all common operating ventilation equipment, activation of fire ventilation of staircases and fire entrance halls forming the protected escape routes (CHÚC),

4. the system controls the passenger elevator which, in the event of fire, will (also if occupied by persons) move to the entrance station in the 1st upper floor, i.e. remotely in the event of the EPS signal. In the event of the occurrence of a fire, the passenger elevator will move to the entrance station, where after the cabin is empty it will no longer work and the door will remain closed after the cabin is empty.

5. voice fire alarm, in the event of fire the EPS switchboard will send the instruction for activation of EVACUATION MESSAGE, e.g. “Please leave the building”, which will be repeated until its manual switching off. The button detector of the EPS will activate the equipment without delay. The equipment for voice signalling of a fire will be connected to its own backup power supply, i.e. its own battery source in the Voice Fire Alarm System (HSP) rack

6. unblocking of all electrically blocked doors by the EPS impulse to the SKV (Access Control System) switchboard in the server room on the 1st underground floor

- control of all above-stated equipment by the EPS impulse will be used to shut-down the whole site.

*Another method for controlling the fire protection equipment of the building under consideration must be consulted with a fire protection specialist and subsequently discussed or approved by the competent authority of the fire crew and rescue service.*

In the event that in the building a door is blocked by the electronic system, it will be required that such a door is equipped with an electromagnetic lock with reverse function, i.e. in idle condition (door is locked) the electromagnetic lock is under power and the release only occurs after the interruption of such power, i.e. by disconnection of the voltage free contact from the EPS switchboard. The door lock will be automatically unblocked immediately after the voltage drop and the door will thus enable free passage of people away from the danger. The closing may only happen after manual intervention directly on the control unit.

The main EPS switchboard and the Evacuation Radio switchboard are located in room no. -231 - Fire Protection wiring + light current, on the 2nd underground floor. The EPS can also be controlled from the keypad at the information panel in the foyer area on the 1st upper floor, which will be in operation in working hours. In the event that there is no permanent service in the Fire Alarm office, transmission of the signal to a place selected by the investor with permanent service (outside of the building under consideration) with non-stop service: must be provided pursuant to § 2 (11) of Decree of Ministry of Interior of the Slovak Republic no. 726/2002 Coll. the transmission of the signal on the EPS activities on site pursuant to § 3 (1) (c) of the quoted Decree, above all the display of the following status:

- signalling of fire

- signalling of fault

- deactivation

- testing

- idle state.

## *Requirements for heavy current*

The switchboard is powered by voltage 230V/50Hz with a separate inlet. This network inlet will run from the LV fire distributor with a three wire cable NHXH-J E30 3x1.5 from the fuse 10A/B/1. Another inlet from the fire distributor for the linear optical detector of the EPS monitoring the representation area will also run by a separate inlet cable NHXH-J E30 3x1.5 from the fuse 10A/B/1.

It is prohibited to connect any other appliances to these inlets. These inlets will be included in the supply of the heavy current part.

# Terms and conditions for the operation of the EPS

Upon the handing over of the EPS equipment for the operation, an inspection must be performed pursuant to Section 15, Clause 2, Letter d).

A further inspection must be performed at least once a year, unless the producer of the EPS stipulates, due to the environmental influences, a shorter time limit in the technical documentation.

The natural person with special authorisation for the inspection of the EPS equipment must issue a confirmation on the performance of an inspection and on its result.

## *§14 of Decree 726/2002 Coll.*

(1) A User of a Fire Alarm System

a) is responsible for the provision for permanent operation by an employee trained by the producer or legal entity with authorisation for such activity

b) is liable for the proper keeping of a log book

c) must keep the accompanying documentation on the Fire Alarm System pursuant to §13 Section 4,

d) must provide for alternative measures as regards provision for fire protection of the site if the Fire Alarm System is not operational.

(2) The Fire Alarm System must be be operated by employees, which were

instructed;

on how to proceed with activities pursuant to instructions for operation from the producer and keep records in the log book of the Fire Alarm System.

(3) The user must in the event of a change to construction in the monitored area or to technology

provide by a natural person with special authorisation for design of the Fire Alarm System equipment an assessment of the fulfilment of requirements pursuant to § 2 Section 2.

(4) The user will provide for permanent operation in the location of the main switchboard

or for the transmission of a signal on the status of such a switchboard to a place with a permanent service; the user will from such places provide to the fire alarm office the transmission of messages related to the seeking and providing help.

(5) If the transmission of signal to a place with permanent service of another legal entity is provided,

the user will provide for documentation, above all a layout drawing of the protected area with access roads, specific orders and instructions in the event of a fire or fault and place it in the agreed location.

(6) The electric fire alarm is operational,

if it is operated pursuant to § 13 Section 1, does not signal a faulty status and where not more than one year has passed since the performance of the annual inspection.

The user of the Fire Alarm System equipment is obliged to determine and to provide to a sufficient level for retraining of persons responsible for the operation of equipment, persons authorised to operate the equipment and persons responsible for maintenance of the Fire Alarm System equipment.

General obligations of the employer

With regards to assuring occupational safety and health, the employer is obliged to comply with obligations stipulated by special regulations. The employer is also obliged to allocate employees for work taking into consideration their health condition, skills and authorisations pursuant to special regulation and not permit them to perform work not compliant with their health condition, skills and for which they do not have authorisations pursuant to special regulations, (§ 8a Section 1 Letter l of Act no. 158/2001)

Regular inspections of the Fire Alarm System equipment are to be performed pursuant to Decree 726/2002 Coll. of Laws § 15

1. daily

* they may be performed by an instructed employee pursuant to § 20 of Decree 508/2009 and § 15 Section 4 of Decree 726/2002 authorised to operate the Fire Alarm System equipment.

1. monthly

* \* they may be performed by an instructed employee pursuant to § 20 of Decree 508/2009 and § 15 Section 4 of Decree 726/2002 authorised to maintain the Fire Alarm System equipment by performing monthly inspections of the Fire Alarm System

1. quarterly

* \* they may be performed by an instructed employee pursuant to § 20 of Decree 508/2009 and § 15 Section 4 of Decree 726/2002 authorised to maintain the Fire Alarm System equipment by performing quarterly inspections of the Fire Alarm System

\* Inspections in the scope of monthly and quarterly inspections, if these are simple applications without connection to fire safety equipment, may be performed by an “Instructed Employee”, who is not entitled to interfere in the part of circuits connected with the grid, which are located under the cover, as there is a hazard of electrical shock. See STN 34 3108 Safety regulations for handling electrical equipment by persons without qualification for electrical engineering.

For more complicated installations, where an undesired start of fire protection equipment may occur during inspection, it is required that employees authorised for maintenance have an electrical engineering qualification pursuant to § 21 of Decree 508/2009 and are equipped with the required diagnostic devices for the given operation.

1. annually

* they may be performed by a natural person with special authorisation for inspection of the Fire Alarm System equipment. Such a person may also perform the inspections stipulated in § 15 Section 2 Letter a) to c).

General principles

1) The "Person responsible for the operation of the EPS" and the operator of the EPS must be informed before the start of an inspection about the performance of any inspection of EPS equipment.

2) Undesired activation of connected equipment connected to EPS must be prevented before the start of inspection, e.g. self-extinguishing equipment (SHZ), shut off of power, fire gate, roof flaps, etc.

# CONCLUSION

It is required during implementation that the implementation company has the required qualification for the performed works and training for the given systems. All wiring and assembly work must be performed pursuant to regulations and standards valid at the time of assembly. The work will be delivered after the completion of assembly and elaboration of the first initial professional inspection and test by a protocol to the customer and the trial operation will start. The training of responsible employees to whom will be delivered manuals for operation and accompanying documentation must be performed upon the handing over of the site. The functionality of the mounted equipment will be verified during trial operation. The given system must be tested in trial operation (12 days) and any errors must be corrected before the handing over of the work to the operator. The work can then be handed over to the customer by means of protocol.

The accompanying documentation must be supplied for each equipment and must comply with its design. It contains manuals and instructions for the operation and log book of the operation of the EPS.

Design documentation of the AS-IS status must be requested from the supplier in the event of changes, adjustments and other intervention in the design documentation. Changes from the original project may only be performed after the approval of the designer. Any discrepancies and uncertainties must be consulted with the designer.

The operator is obliged to maintain all electrical equipment and accessories in a condition compliant with electrical regulations and standards for their safe and reliable operation. He is obliged to appoint persons responsible for the equipment, operation and maintenance. He is also obliged to elaborate before the commissioning of a EPS equipment Fire Alarm Rules for the EPS part. He must organise professional inspections and professional tests at defined regular time limits. The proposed EPS does not require any changes to the designed technologies of the building equipment.

# 

# Voice fire alarm (HSP)

# General

The design documentation was elaborated for the level of implementation project. The project includes the voice fire alarm (HSP), building SO 01 of the project “MAJOR OVERHAUL OF THE OBJECT OF THE SLOVAK EMBASSY IN LONDON” at the address: London, 25 Kensington Palace Gardens, UK.

The building will be connected to a single control unit located in a 19” RACK, room no. -231 on the 2nd underground floor. The project was elaborated on the basis of the requirements of the general designer, fire protection designer and information available at the time of elaboration of the project.

The alarm sound of the building will be implemented by a digital 100V evacuation radio system PLENA VOICE ALARM from BOSCH, which is certified pursuant to the standard EN 60849 - Sound systems for emergency purposes and STN EN 54. The certificate will be an inseparable part of the delivery of the system. As the evacuation radio system is of key importance for the safe evacuation of the building, the radio system must comply with all the below stated requirements. The proposed technology must be complied with.

The voice fire alarm (HSP) project does not address the following:

* connection of the radio switchboard – 230V/50Hz from the LV distributor and of other elements that require power supply

Information for the elaboration of the project was the following:

* architectural and construction solution of the site
* requirements of fire safety requirements of the site
* requirements of the main architect and investor

# Basic technical data

### Regulation and standards

The design documentation was elaborated pursuant to valid Slovak laws, decrees and standards.

### Wiring network and protection

A) Power supply of the Voice fire alarm (HSP) switchboard and external power sources:

1+N+PE~50Hz 230V/TN-S

Protection against electrical shock in standard operations:

- insulation of live parts (STN 33 2000-4-41 Article 411.2)

- by prevention or covers (STN 33 2000-4-41 Article 411.2)

Protection against electrical shock in the event of a fault:

- automated disconnection in the event of a fault in network TN (STN 33 2000-4-41 Article 411.3.2)

- supplementary protection by connection (STN 33 2000-4-41 Article 415.2)

B) Voice fire alarm (HSP) wiring

2 AC 100V 40Hz÷16kHz

Protection against electrical shock in standard operations:

* insulation of live parts, prevention, covers (STN 332000-4-41, Article 412)

Protection against electrical injuries in the event of a fault:

* by electrical separation (STN 33 2000-4-41 Article 411.3)

### Requirements of cover of electrical devices

The electrical equipment of this project is located in an environment defined by the protocol on the stipulation of external influences. The protocol on the stipulation of external influences is a part of the project for heavy current wiring. The activities of proposed equipment will have no impact on rooms where there is light current wiring.

### Short-circuit data

The short-circuit data was determined by calculation from the public wiring network, on the basis of cable cross-section and length and serial securing elements.

For the switchboard was determined the following short-circuit data:

In = 16 A

Ik“ < 10.0 kA

Evaluation of short-circuit safety – all utilised components must comply with the above-stated short-circuit data.

### Requirements for the system

The voice fire alarm system must comply with all the requirements of standards STN EN 60849 and STN EN 54. The operation logs required by the standard must be properly maintained from the commissioning of the system. The supplier must be able, after the activation of the system, to perform the professional measurement of audibility which will verify the fulfilment of minimum audibility of the message prescribed by the standard and to prepare a protocol on the performed measurement. An authorised person must pursuant to STN EN 60849 perform regular tests and inspections of the system. The voice fire alarm switchboard must have the following functions:

1. Automated monitoring of functionality of the control unit with error message to the operator and external systems,
2. Automated monitoring of all installed microphone stations for the evacuation, including the microphone circuit, control and signalling circuits and line between the microphone station and the switchboard with error message to the operator and external systems. A system is not permitted where the switchboard only performs such monitoring at one microphone station which has to be installed directly at the switchboard,
3. Automated monitoring of functionality of amplifiers with error message to the operator and external systems,
4. Required number of backup amplifiers and function of automated switching on the backup amplifier by failure of the operating amplifier,
5. Automated monitoring of function of 100V line and loudspeakers.
6. Automated detection of earthing outlet of 100V wiring with error message to the operator and external systems,
7. In the event of an identified short circuit of a specific zone, the system will automatically take such a zone out of operation and other zones will remain fully operational,
8. Automated logging of events in the system memory with optional output to a connected personal computer - the memory has a capacity for a storage of min. of the last 256 events,
9. Built-in generator of warning signal with the possibility to address in all zones, in selected zones and in the predefined zone groups in a sequence specified by the setting of the system based on fire protection guidelines,
10. Built-in unit for digital recording and transmission of min. 25 evacuation messages with a capacity of 6 minutes with the possibility to address in all zones, in selected zones and in the predefined zone groups in a sequence specified by the configuration of the system based on fire protection guidelines. The system will be equipped with the function - Holding the Message,
11. Optically separated logical control inputs for communication with the EPS and others. - a min. of 4 inputs will be available
12. Alphanumerical LCD display at each microphone station for communication with operators. The system will allow the automated passing of predefined instructions and guidance for the operating personnel in emergency situations. The system will be able to generate all messages and guidance for the operators in the Slovak language.
13. The switchboard will be equipped with its own backup source for a nominal output for a min. period of 30 minutes.

# Technical solution

With regard to sound equipment, the building will be split into 6 separately accessible loudspeaker zones. The evacuation radio will ensure that an important message is heard in time where required - fire - signalling from the EPS or microphone message - leakage of chemical substance, fire, etc. - in a specific loudspeaker zone, zones or in all zones concurrently.

Messages in line circuits can be implemented separately for each line, or as a general command to the whole site.

Message of the home (evacuation) radio calling for evacuation will be implemented:

* automatically with permanent record on the basis of a signal from the EPS or a message from evacuation microphone on the control unit of the voice fire alarm (HSP)

## *Switchboard*

The output of the evacuation radio will be 240W / 100 V (+ output of backup amplifiers 240W). The output amplifiers will be equipped with protection against short circuit, overload and overheating and with proprietary temperature controlled ventilation. The switchboard will perform continuous monitoring of functionality of amplifiers using pilot frequency with an error message to the operator and external systems, The system will include the required number of backup amplifiers. In the event of the failure of the operating amplifier, the system will automatically connect a backup amplifier, to replace such an amplifier. The system is dimensioned for a single channel operation. The system must be supplemented in the event of dual channel operation.

The radio switchboards BOSCH Plena Voice Alarm System comply with all the basic EVAC requirements of the standard EN 54-16 and STN EN 60849 - continuous monitoring of the switchboard, switching to backup amplifiers, monitoring of loudspeaker lines, recording and replaying of up to 255 digital messages, collaboration with the fire protection switchboard and remote control. The switchboard is modular and consists of a basic 6-zone unit with built in 240W/100V/70V amplifier, digital message broadcaster and from 6-zone extension amplifiers. The switchboard allows safety messages (EMG-emergency) and BGM-back ground music) in a single channel or dual channel operation of up to 60 zones, connection of 8 broadcaster stations - each with extension of up to 48 buttons, connection of up to 60 control inputs. The switchboard is compatible with PLENA equipment series, such as amplifiers, BGM music source - CD, MP3 player/tuner, mixer amplifiers, etc.

## *Automated monitoring of 100V wiring / loudspeakers*

The system will perform automated monitoring of 100V wiring and connected loudspeakers by monitoring the pilot tone at 20 kHz with an error message to the operator and external systems. For monitoring using a pilot tone will be connected at the end of each loudspeaker line a module for pilot tone detection with voltage free contact which will, in the event of the loss of signal, disconnect the contact and thus signal the failure of the loudspeaker line in the switchboard. From the module for pilot tone detection, the signal of its continuity will be transmitted to the voice fire alarm (HSP) switchboard by means of cable JE-H(St)H-V E30 1x2x0.8. The system will also be able to detect failures in the secondary winding of the converter transformer, or on the converter of the loudspeakers. In the event of an identified short circuit of any zone, the system will automatically take such a zone out of operation, while other zones will remain fully operational. From the module for pilot tone detection will the signal of its continuity be transmitted to the voice fire alarm (HSP) switchboard by means of cable JE-H(St)H-V E30 1x2x0.8.

## *Broadcaster station*

The broadcaster station has 6 buttons for the selection of zones or a group of zones and one button for selection of all zones. The large button will connect the microphone, open the EMG channel and mute the music. An additional button extension can be connected to each broadcaster station for the control of all connected zones (max. 9 extensions). The connection of a microphone station with the switchboard will be implemented by cable JE-H(St)H 4x2x0.8. The broadcaster station will be placed on the information panel in the foyer area on the 1st upper floor. The broadcaster station is used for common operational messages. For messages during fire and evacuation, the microphone on the control unit of the voice fire alarm (HSP) will be used.

## *Loudspeakers*

4 types of loudspeakers will be used in the building. They will be installed by embedded assembly, suspended assembly or by mounting on the surface of walls and ceilings. By connection of the inlet conductor to the relevant feeder of transformer, the loudspeaker output can be set up to its maximal nominal output. The volume is regulated by an external volume controller. In rooms with a lower ceiling with a sufficient area above the lower ceiling, will be used embedded modular loudspeakers 6W. In representation premises with an overhauled beam lower ceiling under the ceiling of the 2nd upper floor will be used suspended loudspeakers. In garages, and in kitchens and in selected technical rooms will be used horn loudspeakers 10W. In other premises will be used modular loudspeakers 6W with surface montage.

The embedded loudspeakers, suspended loudspeakers and loudspeakers for the surface have a larger beam angle (4kHz@128°), thus reducing the required number. These loudspeakers are modular, i.e. by changing the accessories all three types can be used for surface, suspended or embedded assembly.

All loudspeakers must be installed such that all areas, even those without directly installed loudspeakers will receive clear sound. The reason is the provision for audibility of fire radio message throughout the entire building.

The loudspeakers will be mounted on the ceiling or wall of selected premises in accordance with lighting and air conditioning equipment.

## *Backup source for UPS*

All key elements of the system for its evacuation function will be powered from the proprietary source for the backup power supply, which will allow the operation of system with a nominal output for a min. period of 30 minutes in an active condition and 24 hours in inactive condition.

## *Cable wiring for voice fire alarm (HSP)*

All conductors and cables will run in standardised fire resistant routes which are separated from other cable wiring.

The safe distance between light current wiring and heavy current wiring must be complied with when installing wiring. All conductors and cables will numbered by the supplier in the rooms of their termination. The route for sound will be implemented by a twin cable type NHXH E30. The cross-section of the loudspeaker wiring was determined on the basis of the length and output of the loudspeaker wiring and is stipulated in drawing no. 02 Diagram of Voice Fire Alarm System (HSP). The cables will run above the lower ceiling, in plasterboard partitions, under mortar of walls and ceilings, or on the surface in technical rooms and garages. Cables will run in riser ducts on metal grates, or on metallic fixing strips. The main routes functioning in the event of fire will run on a fire resistant cable duct under the ceiling anchored in the bearing structure. The connection between the messaging unit and the switchboard of the sound system will be implemented by cable JE-H(St)H-V E30 4x2x0.8, as for the connection between the switchboard and remote control panel. The connection between the EPS switchboard and the Voice Fire Alarm System (HSP) switchboard implemented through interface RS232 will be by cable JE-H(St)H-V E30 4x2x0.8. For sound wiring, may only be used cables with low smoke density in the event of burning (BH), resistant against flame spread (ZO) functional during burning for the required time (PH) pursuant to the Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 94/2004 Coll. The cable transitions between fire sections must be sealed with fire protection binder and paint, type HILTI CP671C/F.

Pursuant to STN 33 2000-5-52 the distance of heavy current line must be for convergence up to 5m at least 6cm, above 5m at least 10cm and for crossing at least 1 cm.

All cables, cable bearing systems and their accessories must comply with fire resistance properties pursuant to the fire protection project, STN 92 0203 and STN 92 0205.

## *Requirements for heavy current*

For the power supply of the home (evacuation) radio switchboard are required two LV inlets from the corresponding fire power distributor, which is connected through diesel power unit, by cable NHXH-J E30 protected by a single-pole circuit breaker 16A/C/1. As there is a requirement for the backup of the system for 24 hours if idle, and 30 min. for evacuation message, the switchboard will be connected to the heavy current outlet via its own UPS from its own batteries. In the electrical part will be proposed for the switchboard single breakers with the HSP label.

The cable powering the switchboard will have a min. resistance of 30min. The supply of heavy current wiring, power supply wiring, protection elements up to electric buses is the subject of the heavy current electrical project.

# Conditions for the operation of the voice fire alarm

The handing over of the equipment for the voice fire alarm must be undertaken pursuant to §13 Section 5 of Decree no. 726/2002 Coll., and inspection must be performed pursuant to Section 15, Clause 2, Letter d) of Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 726/2002 Coll. of Laws in the scope stipulated in Clause 4 “Content of individual inspections” of the Direction. A functional test of voice fire alarm must be focused on the fulfilment of requirements pursuant to § 90 Section 2 of Decree of Ministry of Interior of the Slovak Republic no. 94/2004 Coll. – audibility of speech.

During the approval process for the site, must be submitted certificates on the documentation of properties of used components pursuant to STN EN 54-16, STN EN 54-24, STN EN 54-4, or STN EN-54-23, which must be issued by a notified person and in compliance with requirements pursuant to Regulation (EU) No. 305/2011.

The operator of the voice fire alarm (HSP) must ensure regular inspections of HSP, i.e. daily, monthly, quarterly and annually pursuant to § 15 (20) of the Decree of Ministry of Interior of the Slovak Republic no. 726/2002 Coll.

The daily, monthly and quarterly inspection or their parts may only be performed by an instructed employee trained by the producer of the voice fire alarm (HSP) or by a natural person with special authorisation for installation and repair of the voice fire alarm (HSP) equipment.

The annual inspection of the voice fire alarm (HSP) may only be performed by a natural person with special authorisation for inspection of the voice fire alarm (HSP). Such a person may also perform the daily, monthly and quarterly inspection.

The content of individual inspections is as follows:

1. daily inspection of voice fire alarm (HSP) includes above all the following:
2. displaying the idle status, voice signalling status, fault signalling status, deactivation status (if such an optional function was used)
3. status of signalling the power supply from main or backup power source,
4. monthly inspection of the voice fire alarm (HSP) includes above all the following:
5. check of condition of battery connections and its fixing
6. inspection of equipment displaying individual statuses (if such an optional function was used)
7. quarterly inspection of the voice fire alarm (HSP) includes above all the following:
8. inspection of condition of backup power supply
9. functional test of equipment displaying individual statuses (if such an optional function was used)
10. functional test of loudspeakers and of voice message
11. functional test of visual signalling and displaying equipment for alarm and evacuation of persons and their coordination with the voice message pursuant to STN EN 54-23 Fire Alarm System . Part 23: Fire Alarm System equipment. Visual signalling equipment.
12. annual inspection of voice fire alarm (HSP) includes above all the following:
13. functional check of backup power supply including trial operation of voice fire alarm (HSP) with the backup power supply
14. functional check of visual signalling and displaying equipment for alarm and evacuation of persons
15. functional check of loudspeakers, of equipment displaying individual statuses:

ca) surface and interior area, including its cleaning

cb) sealing, conductors, tightening of connections, fuse cartridges, terminal plates

cc) individual functions of equipment, including recharging of accumulator

cd) backup accumulators of RAM memory and backup accumulators for signalling out of operation

ce) interconnection of individual equipment

1. check of audibility of speech (such a check must also be performed after any construction or interior change that could influence the acoustic conditions).

The inspection of voice fire alarm (HSP) may be performed on days of inspection of the EPS. Records of inspection of the voice fire alarm (HSP) should be registered in the operating journal of the EPS.

## *Conclusion*

The design documentation project was elaborated pursuant to information available at the time of elaboration and pursuant to the requirements of the main engineer, fire protection designer and the investor. All equipment proposed in this project is approved in the Slovak Republic. The proposed systems are compliant with standards and legal regulations valid in the Slovak Republic.

It is required during implementation that the implementation company has the required qualification for the performed work and training for the given systems. All wiring and assembly work must be performed pursuant to regulations and standards valid at the time of assembly. The work will be delivered after the completion of the assembly and elaboration of the first initial professional inspection and test by means of protocol to the customer. The training of responsible employees to whom will be delivered manuals for operation and accompanying documentation must be performed upon the handing over of the site.

The design documentation of AS-IS status must be requested from the supplier in the event of changes, adjustments and other interventions to the design documentation. Changes to the original project may only be performed after the approval of the designer. Any discrepancies and uncertainties must be consulted with the designer.

The operator is obliged to maintain all electrical equipment and accessories in a condition compliant with electrical regulations and standards for their safe and reliable operation. He is obliged to assign persons responsible for the equipment, operation and maintenance. He must organise professional inspections and professional tests in defined regular time limits.

**06. Electrical installations,  low voltage connection\_SO 06**

Drawing part

1. SECTION PLAN 2ND UNDERGROUND FLOOR
2. SECTION PLAN 1ST UNDERGROUND FLOOR
3. SECTION PLAN 1ST UPPER FLOOR
4. SECTION PLAN 2ND UPPER FLOOR
5. SECTION PLAN 3RD UPPER FLOOR
6. SECTION PLAN 4TH UPPER FLOOR
7. SECTION PLAN 5TH UPPER FLOOR
8. LIGHTNING CONDUCTOR AND EARTHING
9. LV DIAGRAM
10. CBS DIAGRAM
11. SLP DIAGRAM
12. DISTRIBUTOR RH
13. DISTRIBUTOR R-2.BOILER ROOM
14. DISTRIBUTOR R-2.GARAGE
15. DISTRIBUTOR R-2.KITCHEN
16. DISTRIBUTOR R1.KITCHEN
17. DISTRIBUTOR R2.KITCHEN
18. DISTRIBUTOR R-1.VENTILATION
19. DISTRIBUTOR R-1.SPS
20. DISTRIBUTOR R1.SPS
21. DISTRIBUTOR R3.ADM
22. DISTRIBUTOR R4.ADM
23. DISTRIBUTOR APARTMENTS R4.B1 (B2, B3)
24. DISTRIBUTOR APARTMENTS R4.B4
25. DISTRIBUTOR RTECH
26. DISTRIBUTOR R-1.SERV
27. DISTRIBUTOR RPO
28. LEGEND

# General

### Subject of the project

The subject of this project is electrical installation, interior heavy current and light current wiring, artificial lighting for the project of the major overhaul of the Embassy of the Slovak Republic in London.

The subject of the project is the following:

- low voltage connection

- heavy current wiring and artificial lighting

- light current wiring (data, TV)

- lightning conductor and earthing

The subject of the project is not the following:

- light current connections (cable TV, tel.)

- EPS (Fire Alarm System), HSP (Voice Fire Alarm)

Design specification

Information for the elaboration of the project was the following:

- requirements of architect and investor

- technical conditions of the utilised devices and electrical products

# Basic technical data

### Regulation and standards

This project is mainly based on the following standards and regulations:

STN 33 2000-4-41 Electrical installations with low voltage. Part 4-41: Provision for safety. Protection against electricity shock.

STN 33 2000-4-43 Electric engineering regulations. Electric equipment. Part 4: Safety. Chapter 43: Protection against overcurrent

STN 33 2000-4-473 Electric engineering regulations. Electric equipment. Part 4: Safety. Chapter 47: Utilisation of protection measures, Section 473: measures for protection against overcurrent

STN 33 2000-5-51 Electrical installations of buildings. Part 5-51: Selection and construction of electric equipment. Common rules

STN 33 2000-5-52 Electrical installations with low voltage. Part 5-52: Selection and construction of electric equipment. Electric wiring

STN 33 2000-5-54 Electrical installations with low voltage. Part 5-54: Selection and construction of electric equipment. Earthing systems and protection conductors

STN 33 2000-7-701 Electrical installations with low voltage. Part 7-701: Requirements for special installations or premises. Premises with bath or shower.

STN 33 3210 Distribution equipment. Common provisions

STN 34 1398 Protection against lightning. Active lightning conductors

STN 73 6005 Spatial arrangement of lines of technical equipment

STN EN 1838 Lighting applications. Emergency lighting.

STN EN 12464 -1 Light and lighting. Lighting of workplaces. Part 1: Indoor workplaces and other standards and regulations related to them.

STN 92 0203 Fire safety of buildings. Uninterrupted power supply by fire

STN EN 60079-10 Explosive atmospheres Part 10-1: Classification of areas. Explosive gas atmospheres

STN EN 60079-14 Explosive atmospheres. Part 14: Electrical installations design, selection and erection and other standards and regulations related to them.

### Wiring network, protection

3+PEN~50Hz 400/230V/TN-C

3+N+PE~50Hz 400/230V/TN-S

1+N+PE~50Hz 230V/TN-S

Protection action: Basic protection

Protection against direct human contact (STN 33 2000-4-41 Article 411.2)

- insulation of live parts (STN 33 2000-4-41 Annex A, A.1)

- by prevention or covers (STN 33 2000-4-41 Annex A, A.2)

Protection action: Protection in the event of a fault

Protection against indirect human contact (STN 33 2000-4-41 Article 411.3)

- protection earthing and protection connection (STN 33 2000-4-41 Article 411.3.1)

- automated disconnection in the event of fault in network TN (STN 33 2000-4-41 Article 411.3.2)

Supplementary protection (STN 33 2000-4-41 Article 411.3.3)

- supplementary protection by current protector RCD (STN 33 2000-4-41 Article 415.1)

- supplementary protection by connection (STN 33 2000-4-41 Article 415.2)

### Requirements of cover of electrical devices

Electrical equipment for this project is located in an environment defined by the Protocol on the stipulation of external influences, which is part of this report.

### Output balances

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Number | Pi (kW) | Pp (kW) | Beta |
| Apartment unit | 4 | 20 | 9 | 0.44 |
|  |  |  |  |  |
| Total apartments | 4 | 80 | 35 | 0.44 |
| Concurrency ratio for group of apartments pursuant to STN 33 2130 | |  |  | 0.60 |
| Total apartments | | 80 | 21 | 0.26 |
| Offices on 4th upper floor | | 20 | 10 | 0.50 |
| Offices on 3rd upper floor | | 45 | 20 | 0.45 |
| Garages | | 10 | 7 | 0.70 |
| Elevators, escalators | | 10 | 10 | 1.00 |
| Common areas | | 76 | 38 | 0.50 |
| COOLING | | 64 | 44 | 0.70 |
| VENTILATION | | 30 | 18 | 0.60 |
| KITCHEN | | 55 | 39 | 0.70 |
| HEALTH AND SANITARY INSTALLATIONS | | 21 | 5 | 0.25 |
| Central heating | | 12 | 4 | 0.30 |
|  | |  |  |  |
| Total | | 422 | 216 | 0.51 |

The circuit breaker in the existing metering distributor is 400A/3

Importance level of power supply:

Level 3 - all regular equipment and appliances

Level 1 – for equipment or appliances related to fire safety:

- emergency lights (secured by means of CBS)

- fire-safety fan,  ATS, sliding doors, gates (secured by backup power supply UPS, located in room no. -231)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Appliances | Pi (kW) | Pp (kW) | Beta |
| UPS 20kVA | Fire safety ventilation | 0.4 | 0.4 | 1 |
| ATS | 0.6 | 0.6 | 1 |
| Sliding doors | 6 | 4.2 | 0.7 |
| Gates | 6 | 3.6 | 0.6 |
|  | Total | 13 | 8.8 | 0.68 |

Circuit breaker at the inlet to UPS: 40A/3

Importance level of power supply:

Level 1 - all equipment and appliances powered from distributor R-1.SERV (secured by backup power supply – UPS)

### Measurement of electrical energy

The measurement of electrical energy is undertaken by the metering distributor ER located in the garage.

### Compensation of power factor

The compensation of the power factor will be central in the RC distributor with automated regulation located at the RH distributor.

### Protection against overcurrent and short-circuit

The protection of outlets for secondary distributors against overload and short-circuit is undertaken by breakers and circuit breakers.

The protection of outlets of lighting, outlets for the power supply of technological equipment against overload and short-circuit is undertaken by breakers. The protection of socket outlets is by breakers with serial current protector 30mA

The protection of outlets for motors above 500W is provided by motor triggers that provide for the protection of such motors against overcurrent, overload and short-circuit or in accordance with requirements of individual professions.

The short-circuit currents are reduced by fuses or by cascading the breakers (serial breaker will short-circuit current to a value which can be switched off by the default breaker).

### Protection against overvoltage

In the main distributor of the object RH is proposed the overvoltage protection level 1+2 (class B+C). The secondary distributors at a distance of more than 15m from the main distributor will have at the inlet an overvoltage protection of level 2.

Selected socket circuits, sockets for connection of computers and sockets and outlets for connection of important equipment sensitive to overvoltage will be resolved as level 3 of protection against overvoltage by a surge voltage protector, type 3 (class D). At the interface of the protection zone of the lightning conductor (LPZ), through which lead the power supply cables of equipment located on the roof and on the exterior outside the protected area of the lightning conductor will be lightning current protectors and surge voltage protectors type 1 or 2 (class B or C).

### Residual hazard

There will be no residual hazard provided there is compliance with project requirements, proper application of requirements on protection against electrical accidents, and regular revision and maintenance.

Technical description

### SO06 Low voltage connection

The existing metering distributor ER is mounted in the garage and equipped with breaker 400A and invoicing measurement. The metering distributor is connected from the transformer station at the Czech embassy. From the metering distributor ER will be by cable line 3 x 1-YY 1x185 + 1-YY 1x95 zž (green-yellow) connected the new main distributor of the object mounted in room -231. The cable line will be placed in a duct leading under the ceiling through the garage premises and entry premises from the garage to the object. The cable line will end at the terminals of the main switch of the object.

### SO01 Main object

### Electric wiring

### Distributors

The premises under consideration are powered from the main distributor of the object RH, from which are connected secondary distributors for individual floors Rx.B. for apartments Rx.ADM for office premises, Rx.SPS for common areas, RTECH and Rx.VZT for technology, Rx.KUCH for kitchens, R-1.GAR for the garage, R-1.KOT for the boiler room, fire safety distributor RPO for fire safety equipment, and from R-1.SERV for the server room.

The main distributor RH is connected from the existing metering distributor ER located in the garage. The metering distributor is connected from the transformer station of the Czech embassy. The main distributor RH will be connected from the metering distributor by cables 3x 1-YY 1x185 + 1-YY 1x95. The cables will lead under the ceiling of the garage in the main duct.

The connection of individual distributors and cable types for their connection are shown in the Low Voltage Diagram.

Distributor RH – steel sheet, cabinet, 2 bays. Next to the distributor RH will be the compensation distributor RC 53.0kVAr/400V. The compensation distributor will be specified after the trial operation. All secondary distributors of the embassy will be powered from the main distributor. All outlets will have a secondary electricity measurement. The main switch with undervoltage coils for TOTAL STOP and CENTRAL STOP will be in the inlet. The surge voltage protector B+C and breaker outlets for individual secondary distributors will be mounted in the distributor.

Distributors Rx.B.x – for apartments in design under plaster, power the lighting, socket wiring and technological equipment of individual apartments. The main switch will be in the inlet. The individual circuits are protected against electrical accidents by supplementary protection by a current protector with a residual current of 30 mA. They are protected against short-circuit and overload by breakers. The protection against overvoltage is by overvoltage protection class C.

Distributors Rx.ADM – for administration in design under plaster, type or on surface in niche will power the lighting, socket wiring and technological equipment of individual office premises. The main switch will be in the inlet. The individual circuits are protected against electrical shock by supplementary protection by current protector with a residual current of 30 mA. They are protected against short-circuit and overload by breakers. The protection against overvoltage is resolved by overvoltage protection class C.

Distributors Rx.SPS – for common areas in design under plaster, or on surface in niche, power the lighting, socket wiring and technological equipment of individual common areas. The main switch will be in the inlet. The individual circuits are protected against electrical shocks by supplementary protection by a current protector with a residual current of 30 mA. They are protected against short-circuit and overload by breakers. The protection against overvoltage is by overvoltage protection class C.

Distributor R-1.SERV – steel sheet, for surface, supplies light current distributors and servers in the server room. The main switch will be in the inlet. The individual circuits are protected against electrical shocks by supplementary protection by a current protector with a residual current of 30 mA. They are protected against short circuit and overload by breakers. The protection against overvoltage is by overvoltage protection class C. Each light current distributors RACK will be powered by a separately protected outlet terminated by a pair of sockets. Sufficient output and space reserve will be left in the distributor for the addition of other outlets for supplemented supplementing rack cabinets with servers and their cooling in the future. The main inlet can be switched off using an undervoltage coil and inlet from UPS with buttons Central CS and Total Stop TS.

Distributor RPO – fire safety distributor for surface, backed up via UPS 20.0kVA/3f/3f with batteries for min. 60 minutes. It powers the fire safety fan and 8.01 and servo drive for flap 8.03 for CHÚC, ATS in the boiler room, sliding doors and fire safety gates. The fire safety distributor is located with the UPS for fire protection in a separate room. The fire safety distributor is powered from the main distributor RH through BY-PASS. The main switch will be in the inlet. Individual circuits are protected against short circuit and overload by breakers. The protection against overvoltage is by overvoltage protection class C. The fire safety equipment is controlled by a signal of the Fire Alarm System leading to RPO. The distributor includes a section for CENTRAL and TOTAL STOP buttons

Distributor RTECH – steel sheet technological distributor separately standing on the roof for the connection of the technology on roof - CHLAD VZT ÚK (COOLING VENTILATION CENTRAL HEATING). The main switch will be in the inlet. The individual circuits are protected against electrical shocks by supplementary protection by current protector with a residual current of 30 mA. They are protected against short circuit and overload by breakers. The protection against overvoltage is resolved by overvoltage protection class B+C.

Distributor R-1.VZT, R-1.KOT R-1.GAR – steel sheet technological wall distributor in technical rooms or in the garage for the connection of VENTILATION technology, boiler room and garage. The main switch will be in the inlet. The individual circuits are protected against electrical accidents by supplementary protection by current protector with a residual current of 30 mA. They are protected against short circuit and overload by breakers. The protection against overvoltage is by overvoltage protection class C.

All distributors, except for fire protection distributors and fire protection parts of distributors which are not powering fire safety equipment, can be switched off in the event of fire by the button CENTRAL STOP pursuant to STN 92 0203. The fireman can switch off fire protection parts and distributors in the event of fire with the button TOTAL STOP pursuant to STN 92 0203. The CENTRAL STOP and TOTAL STOP buttons will be located at the place of permanent service.

### Lighting and sockets

The lighting of individual parts of the building will be dependent on the purpose of the given room. For individual premises will be specified pursuant to the standard (STN EN 12464-1 Light and lighting of workplaces. Part 1: Indoor workplaces) the required intensity of lighting and other light and technical parameters. For this intensity and for the selected type of lights, their number and deployment was calculated. The intensity of lighting in individual premises will be as follows:

1. corridors 100 lx
2. staircase 150 lx
3. technical rooms 200 lx
4. office premises 500 lx
5. conference rooms 500 lx
6. receptions 300 lx
7. social rooms 200 lx
8. kitchens 200 lx
9. dayrooms and restrooms 100 lx
10. storage rooms 100 lx
11. cleaning room 100 lx
12. garage 75 lx

The lights will be fixed to the ceiling or to the wall. In rooms with a lower ceiling, they will be embedded in the lower ceiling.

The exact types of lights will be specified after consultation with the architect, lighting specialist and investor.

The light control is at the entry to the relevant rooms or by motion sensors. Fans for social rooms in the technical room on the 5th upper floor and controlled by a button. Lighting control in room no.102. The foyer led lighting in the staircase will be controlled centrally from the controller cabinet. Dimming lights will be dimmed by a high power dimmer in the distributor R1.SPS and controlled by a button. Exterior lighting at the entrance and for backlighting the facade is controlled by an astronomic switch in the distributor.

The embedded lights in the fire protection plasterboard must have a fire resistant cover.

The mounting height of electrical devices is as follows (unless stipulated by the device):

switches - 1.2m above the floor

sockets - 0.3m above the floor - except for area of the kitchen unit and bathroom

- 0.5 m, 1.5m, 2m above the floor - in the area of the kitchen unit and bathroom

lights - 2.0m above the floor - wall lights

The arrangement of devices is shown in the section drawings.

In the bathroom premises the lights in the washing area must be installed so that their bottom edge is at least 1.8 m above the floor. The light source of lamps must be covered by protection glass. All outer parts of lights lower than 2.5m above the floor must be from a durable insulating material – pursuant to standard STN 33 2000-7-701 Article 701.58 N1. In a room containing a bath must be established a local supplementary connection pursuant to STN 33 2000-7-701 Article 701.415,.2 which must connect protection conductors with non-live parts and accessible external conductive parts in the whole room. Yellow-green wire CY 4mm2 led under the plaster in a PVC pipe ø 20 under the plaster will be used for the connection.

### Central battery system

The lighting of escape routes will be marked with pictograms and fitted with safety emergency lighting - i.e. lights powered from a central battery system located in a room with fire safety distributors -231. (the type will be pursuant to STN EN 60598-2-22 and pursuant to Article 18.5 STN 92 0201-3). The emergency lighting will be designed such that it illuminates emergency exits and indicates the escape route. The central battery system includes built-in battery sources for the operation of emergency lighting during an electricity outage for a min. of 60min.

### Cable lines

The cables for installation are of type N2XH non-fire protection equipment and NHXH E60 fire protection equipment and CBS. The inlet to the fire protection equipment and its control and lighting of the protected escape routes must be run in halogen-free fire resistant cables E60, e.g. NHXH. All conductors and cables running along standardised fire resistant routes must run separately from other cables.

The main routes from the central riser through the staircase will be run above the plasterboard fire protection lower ceiling.

The dimensions of the cables is in accordance with valid standards pursuant to the following criteria:

* permitted cable load
* short circuit durability of cables
* voltage decrease
* provision for switch-off by protection against electricity shocks

The cable will run under the plaster of walls and ceiling, above the lower ceiling, in the double floor or on the surface or in metal ducts.

### Cable support systems

Cables are designed depending on the type of premise in which they are passing:

a) cables fixed by grips above the lower ceiling – main routes in the lower ceiling

b) cables in protective pipes - in plasterboard partitions - branching to devices

c) cables in fixed protection pipes or clips in the area above the lower ceiling - branching to individual appliances and equipment

d) cables in protective pipes under the plaster of ceiling and walls - premises without plasterboard lower ceiling

e) cables on cable structure - main routes from the distributor

f) cables running in a double floor - socket wiring in administrative premises

### COOLING technicians

For the cooling technicians, the electricians will connect the exterior cooling units mounted on the roof and interior channel units from individual distributors for each floor. For the server room, the electricians will connect two exterior units in the technical room in the 5th upper floor. The connection between the exterior and interior units for the server room is included in the delivery of the COOLING technicians.

### VENTILATION technicians

For the venting technicians, the electricians will connect the main ventilation units on the roof and in the technical rooms. The electricians will in individual social facilities connect fans which will be operated by separate switches. The control of venting units on the roof will be undertaken by proprietary I&C systems.

The electricians will provide in the garage for the connection of the control unit EC-vent in the technical room in the 1st underground floor and rewiring with CO sensors in the garage. The fan VZT102 for ventilation the garage will be powered by cable N2XH-J 7x1.5 from the control unit. The servo drive no. 1.10 will open at the same time when the fan starts.

For the ventilation of the boiler room, the electricians will provide for the connection of fan VZT701 with the proprietary controller. The ventilation and central heating controllers must be connected with cable J-H(st)H 4x2x0.8. A local I&C should be mounted in the boiler house for control of emergency conditions of the ventilation or central heating. It is suitable to run a cable J-H(st)H 4x2x0.8 for the signalling of emergency conditions.

The venting unit which electricians will connect to electricity will ventilate the kitchen. The control is provided by proprietary I&C of the unit.

### CENTRAL HEATING technicians

The electricians will provide for the central heating technicians the connection of boilers in the boiler room, pumps for boilers, top-up equipment and neutralizer. The electricians will also provide for the lighting of the boiler room, service sockets and a 24V socket. The boiler room will be equipped with a STOP button, which will switch off the technology, except for the lighting of boiler room. Electricians will connect in the boiler room the I&C of the boiler room, which is a part of the delivery of the boiler room.

Electricians will connect the floor heating distributors in stories with floor heating.

Electricians will connect the roof inlet heating on the roof.

### HEALTH AND SANITARY INSTALLATIONS (ZTI) profession

The electricians will for the health and sanitary installations technicians in the boiler room provide for the connection of a circulation pump and submerged pump. The electricians will provide for the connection of the submerged pump in the elevator shaft.

The electricians will provide in social rooms and allocated premises for the connection of sewage water pumps.

The electricians will in the boiler room provide for the connection of ATS from the distributor RPO from the backed up section of UPS.

The electricians will in the WC provide for the connection of the control of urinals, and sink units and hand dryers.

On the roof and on the 2nd upper floor must be implemented frost protection for rainfall inlets and central heating wiring running externally. The garage entrance will be secured by electrical floor heating controlled by a regulator in distributor R-2.GAR and sensors on the ramp.

### Elevators

The electricians will provide for the elevator shaft the connection of the elevator station. The elevator supplier will provide the shaft lighting and the service sockets in the elevator shaft.

### Fire safety equipment

The electricians will provide for the connection of fire protection equipment from the fire protection distributor which is powered from two sources (grid and UPS)

The fire protection ventilation of CHUC mounted on the roof and the power supply of ATS mounted in boiler room will be connected from the fire protection wiring. The start of ventilation will be based on fire safety buttons on each floor or a signal from the Fire Alarm System .

Backup source UPS 20kVA 3f/3f with a battery module for fire protection equipment with a min. backup time of 60min.

The EPS (Fire Alarm System), HSP (Voice Fire Alarm) and CBS will be connected from RPO from the not backed up section. The secondary power supply is a part of separate systems EPS (Fire Alarm System) and HSP (Voice Fire Alarm).

### Telephone / data cabling, structured optical cabling

Shielded cabling will be used for the structured cabling with a single central node for the whole object – main data distributor DH.

The wiring will run from a main data distributor DH by 4-pair halogen-free twisted shielded installation cables F/UTP Cat.6 LSOH, with impedance of 100 ohm, above the lower ceiling, in double floor, in walls and plasterboard partitions in protective pipe ø 25 in floor channels for selected rooms to outlets and sockets, in star wiring. The main data distributor DH will be located in room no. -119 - server room – cabinet type RACK 19“.

The used structured system consisting of the main data distributor DH, horizontal and vertical metallic cabling, connecting cables, socket systems and connectors category 6, designed for transmission frequency up to 250MHz allows the operation of various types of network protocols and flexible implementation of changes in network configuration. All terminals for metallic cables, patch-panels, connecting cables and socket systems are terminated by the shielded connector RJ45.

Data sockets will be installed at a height of 0.3m, unless otherwise stipulated on the drawing, in common frames with heavy current frames. Pursuant to requirements, cables can be connected in cable distributors for data connection for telephone line connection, or for other information networks stipulated by the investor.

The main cable routes will be above the lower ceiling, in metal ducts. Routes with less cables are laid above the lower ceiling on grips, where a plasterboard lower ceiling is considered, or in HDPE pipes - premises without lower ceiling. Cables in the wall under the plaster or in plasterboard partitions run to embedded sockets. Cables in floor installation channels run to sockets in floor boxes.

For the light current distributor, DH heavy current technicians will equip the server room with separately protected sockets above each rack cabinet. These sockets will be powered from distributor R-1.SERV backed up by UPS. The data distributor DH is earthed 200 Slovak growers green/yellow conductor CH-R 16 at the main earthing bus implemented in room no. -231.

Active elements of the structured and structural optical cabling will be supplied by the provider selected by the investor.

Clearing distances from heavy current cable– - 200 mm for unprotected and 100 mm for protecte– - must be complied with for light current wiring.

### TV wiring

The project has addressed the passive part of TV wiring. For individual light current cabinets DT in apartments from the riser area will be installed a protective pipe with a retractable conductor running in the lower ceiling. TV sockets in apartments are connected by a coaxial cable VCCKY 75-4.8 in a protective pipe in star wiring from the light current cabinet of the apartment.

The submitted draft technical solution anticipates the building of a connection of TV wiring at the expense of the provider selected by the investor, the TV connection is therefore addressed as a preparation by means of protective pipes from the roof, from the border of the land plot.

Clearing distances from heavy current cables - 200 mm for unprotected and 100 mm for protected - must be complied with for light current wiring.

### Video-doorman (home intercom system)

The home intercom system consists of a button tablet (with video camera) with a built-in contactless reader at the gate and entrance door, with electromagnetic locks at the entrance at gates and internal video-unit at the lodge. The power supply, including the control unit, is installed in the distributor R1.SPS. Safe escape from the building must be provided for in the event of fire.

Interior wiring comprises shielded cables J-H(st)H 4x2x0.8. All cables of DDZ (home intercom system) running under plaster or in the floor are protected against mechanical damage by protective pipe ø 16mm. The electromagnetic door lock will be connected by cable J-H(st)H 2x2x0.8. The exact type of cable will be specified by the implementation based on the selected system of the home intercom system (DDZ).

Clearing distances from heavy current cables - 200 mm must be complied for light current wiring.

### Main connection, interior earthing and connection

The main earthing terminal plate will be connected to the common earthing network by means of FeZn pole ø 10 mm band FeZn 30/4. Earthing by means of wire CY 6÷25 mm2 with cross-section pursuant to STN 33 2000-5-54 must be prepared from the terminal plate:

* conductive metal structures of cable wiring
* conductive metal structures of the bearing part of the building
* equipotent buses for supplementary connection in technology rooms
* main pipes entering the object (water, gas, etc.)
* distributors of light current wiring
* metal parts of central heating, boiler, ventilation, cooling and supplementary linking.

On the HUS terminal plate will be connected all networks entering the object (water, sewage, gas, etc.). The networks must be earthed at the entry point of the building by the conductor CYA 25 zž (green-yellow).

On the HUS will be connected all PE terminal plates of the distributors, metallic non-live conductive parts of technology and main cable routes with conductors CYA 6 zž (green-yellow) – CYA 25 zž (green-yellow). In the building will be from HUS drawn the earthing conductor CYA 25zž (green-yellow), to which will be connected at risers the terminal plates for the linking. From the terminal plates will be with conductors CYA 6 -25 zž (green-yellow) earthed the PE terminal plates of the distributors.

A secondary earthing terminal plate will be installed in the server room and all light voltage to which all light current equipment and distributors will be earthed by the conductor CYA 4 zž (green-yellow).

In bathrooms and washrooms will be implemented a supplementary linking by the conductor CY6 zž (green-yellow).

The earthing terminal plate which will be mounted in the I&C gas station mounted on the facade will also be connected to the earthing. From the specified terminal plate, will be by conductor CYA 6 zž (green-yellow) implemented the mutual linking of all fittings in the gas metering system.

### Lightning conductor and earthing

There is an existing lightning conductor on the building which will be replaced by a new lightning conductor.

The earthing of the building is existing. An inspection of all earthing points will be implemented. If any deficiencies are identified on the basis of inspection, they will be corrected.

The main earthing terminal plate HUS of the object will be connected to the main earthing of the building.

The building will be protected against atmospheric discharges by a lightning conductor elaborated pursuant to STN EN 34 1398. Based on the risk calculation, the building was classified in LPS III. The lightning conductor system will be active lightning conductor equipment.

The calculation of the active lightning conductor was undertaken pursuant to STN 34 1398:

Length of the building 25 m, witdh of the building 26 m, height of the building 20 m.

Protection class – LPL III

Radius of protection: in the height of 17 m (height of chimneys) - required 11m - calculated 20 – excess 9m

in the height of 15.8 m (height of roof) - required 16m - calculated 41 – excess 25 m

COLLECTION SYSTEM:

Active lightning conductor W20 with ΔT=20µs on a rod with a length of 3m fixed by brackets on the wall of the highest part. As collector wiring will be used the insulated conductor with equivalent distance s=0.75m. On the wall the wiring is on supports on the flat roof with an adapter (one unit per each meter). Two outlets must be installed for the lightning conductor. We recommend the use of the existing outlets if possible.

One outlet will run in the staircase shaft and will be connected by a testing clamp to the new earthing which will be run in the band in the excavation. The second outlet will run on the outer wall and via testing clamp terminate on the new earthing.

An action counter is installed on one outlet of the active lightning conductor.

SUFFICIENT DISTANCE for linking pursuant to STN 34 1398 part 5.6 is for active lightning conductor:

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where ki ratio applicable to class LPS

ki=0.04 for LPS class III

kc depends on lightning current flowing though the outlet

kc = 0.66 for two separate earthing outlets

km ratio related to the electrical stability of the material which is located between the two end points of the loop:

km=0.5 for solid material, km=1 for air

l is length, in metres, along the whole outlet (from the next equipotent connection point), until the point where there is sufficient distance

All earthed metallic mass located closer than the calculated sufficient distances must be connected to the lightning conductor (or to the collection line from the lightning conductor to the outlet)

REVISION AND MAINTENANCE

The arrester does not require any maintenance. Periodical professional inspections are performed at intervals pursuant to Article 8.1.4 STN 341398 and pursuant to Annex no. 8 Decree of SÚBP (Slovak Office for Safety at Work) no. 74/1996 Coll. A standard interval for protection level III is 3 years. The protection system must also be checked every time the building is altered, repaired or hit by lightning.

**12. gas instalation**

1.1. Description

The existing MP gas pipeline is routed in the vicinity of the land of the investor under consideration. The existing MP gas connection runs on the plot and terminates at the existing gas metering and control cabinet. The LP pipe continues after the cabinet into the existing boiler room of the building under consideration.

On the basis of investor requirements, it is proposed to dismantle the existing gas metering and control cabinet, to dismantle the existing MP gas distribution on the investor’s land, and to dismantle the existing LP gas distribution in the building and at the building.

The designed MP gas connection DN32-STEEL+BRALEN INSULATION, will be connected to the existing MP gas connection on the investor’s land.

The gas pipeline continues on the investor’s land into the gas metering and control cabinet, where it will terminate above the floor - main gas ball valve DN32 PN16. The cabinet with a 1400x1600x550 dimension will be mounted on the investor‘s land.

The MP gas connection will be from the material: STEEL+BRALEN INSULATION and will be in the protection pipe DN 50 STEEL.

1.2. Earthworks

All works on site must be performed pursuant to STN EN. The earthworks will be performed according to STN EN. Occupational safety and health rules must be complied during the performance of construction and assembly work.

Earthworks may only start after the marking of all existing underground technical networks and underground objects. At crossing points of underground technical networks mainly in the range of up to 0.8 m below the ground surface (ST cables, long-distance optical cables, HV, LV power lines, etc.) excavations must be implemented with caution.

The trench will be 0.6 wide, and the average depth of the excavation will be 0.8 - 1.3 m in the greenery area. The coverage of the gas pipeline will be a min. of 0.8 m away from roads and under pavements. The minimum coverage under the road will be 1 m. The remainder of the trench above the sand bed will be filled with extracted soil away from the reconstructed road. Terrain disrupted by construction work will be restored to its original condition. The debris will be transported to a dump by the competent environmental authority.

2.0. Gas consumption for the building:

Gas boiler - 3 units

- low temperature condensing wall gas boiler, type “Vitodens 200-W” with a nominal heat output of 99 kW/unit, gas consumption 9.83 m3/hour.

Gas CONVECTOMAT – 1 unit

- with a nominal heat output of 35 kW, gas consumption 4.10 m3/hour.

Gas STOVE – 1 unit

- with a nominal heat output of 33 kW, gas consumption 3.90 m3/hour.

Gas GRILL – 1 unit

- with a nominal heat output of 14 kW, gas consumption 1.6 m3/hour.

max. gas consumption per hour:

39.090 m3/h

Annual gas consumption: 78.400 m3/year

2.1. Description - Gas Control and Measurement

At the termination point of the MP gas connection will be mounted on investor’s land the main gas closure, gas control and metering system in a vented lockable cabinet in a publicly accessible area. The cabinet is on the front side, i.e. access side, equipped with a double-wing door with mounted technological equipment of the system, controller and gas meter.

The shelter area and the surrounding 1.5 m is qualified for the environment - ZONE 2 pursuant to STN EN.

The shelter door must be labelled with plates:

- GAS CONSUMPTION MEASUREMENT

- MAIN GAS CLOSURE

- EXPLOSION HAZARD

- BAN ON SMOKING AND MANIPULATION WITH OPEN FIRE IN

A RANGE OF 1.5m

From the proposed BALL VALVE (GAS MAIN CLOSURE) DN 32 will be connected the proposed steel pipe DN32 and the pipe will continue to the controller, e.g. TARTARINY R72 G 5/4", INPUT 100 kPa, OUTPUT 2 kPa, and mounted DESIGNED INVOICING MEMBRANE GAS METER WITH TEMPERATURE COMPENSATION BK G25T, DN50 (horizontal connection) - and to individual accessories. All equipment will be mounted in the designed cabinet on the investor’s land.

Before the gas meter will be mounted: the ball closure, controller, e.g. TARTARINY R72, gas filter DN32 PN16, pressure meter (range 0-160KPa) and thermometer with a range -30 - +50°C mounted in a welded-on piece at an angle of 45° (welded-on piece blended and inserted in the middle of the pipe bore), BALL CLOSURE VALVE DN32 PN16 MAIN GAS CLOSURE. The metering device for the tapping will be the PROPOSED INVOICING MEMBRANE GAS METER BK G25T, DN50 . After the gas meter will be mounted: testing ball valve DN15 PN15 with blinding plug, pressure meter, ball closure DN50-PN16, PRESSURE METER ∅160, RANGE 0-6 kPa, THREE-WAY PRESSURE METERING VALVE, PRESSURE MEASUREMENT CONNECTION DN 15.

The gas consumption measurement is undertaken without a bypass.

The pipe joints will be welded, except for flanged joints of fittings. Steel welding flanges with a PN16 neck will be used to connect flange joints. Nuts and screws pursuant to STN EN must be used for flange joints. Flange joints must have a conductive connection pursuant to STN EN. All flange joints must be equipped with fan pads.

Gas distribution will be produced from welded black steel threaded pipes, quality of material 11 353.0, dimensions DN 15 – DN 65. The inner gas distribution will be painted yellow after installation and testing.

* 1. Connection of pipes.

The steel pipe for gas distribution will be connected by welding.

Pipe welding must be performed pursuant to EN 12 732:

All welding works on gas pipes must be performed by welders authorised for such activity pursuant to EN 287-1.

The welded surfaces and adjacent inner and outer pipe surfaces must be immediately before welding properly cleaned from rust, turnings, pollutants, grease, etc. in a minimum width of 10 mm.

After completion, surfaces must be labelled with the mark of the welder (stainless material is recommended)

Quality of welded joints must be pursuant to STN EN:

The average weld quality must be assured by visual inspection and non-destructive or destructive tests. The minimum scope of non-destructive tests must be pursuant to table 22, minimum 3 welds.

3.1. Switching of boiler room to gas

The LP gas piping will lead from the cabinet mounted on the investor’s land at the building.

The LP gas pipe will continue from the cabinet in the ground and through the outer wall of the 2nd underground floor to the gas boiler room in the building.

The main gas closure DN50-PN16 will be mounted before the entry of gas to the boiler room.

The gas boiler room will be in the category III – between 0 and 0.5 MW - with an output of 297.0 kW.

Gas boiler:

The safety equipment will ensure the interruption of gas supply to the burner in the event of the following:

- extinguishing of flame (ionisation fuse of flame will be used),

- interruption of power supply (boiler operation depends on power supply),

- decrease of combustion air pressure below the admissible value – air pressure guard,

The gas boiler is equipped with a monitoring hole for reliable and easy optical control of gas combustion.

Each boiler is equipped with metering devices:

- gas pressure before the burner,

- each boiler is equipped with a metering and control outlet allowing for sampling gas exhaust.

The gas piping will continue to the boiler room and on to the gas boilers and accumulation pipe DN200, length 4.00m. The accumulation pipe will be equipped with a pressure meter and thermometer. The DN200 will drop from the accumulation pipe for the supply of gas boilers by a drop – equipped with ball valve, pressure meter, control valves and venting pipe – connection of gas boilers, the venting pipe will continue from the gas boilers via a pipe under the ceiling, where it will run together with the venting pipe through and above the roof - the pipe in a duct of the building will be painted.

Gas consumption:

Gas boiler - 3 units

- low temperature condensing wall gas boiler, type “Vitodens 200-W” with a nominal heat output of 99 kW/unit, gas consumption 9.83 m3/hour.

max. gas consumption per hour:

29.490 m3/h

Annual gas consumption: 35,900 m3/year

Gas parameters:

gas type - natural petroleum gas

calorific value Qn = 34,000 k J/m3

density = 0.702 kg/m3

explosion limit % of concentration: lower 5.0 %

upper 15.0%

dew point of flue gas = 60 o C

operating gas pressure = 2.0 kPa

gas pressure :

output – operating for boiler room = 1.8 – 2.0 kPa

The pipe installation will be from black steel, quality of material 11 353.1 by welding and bending of pipes. Joints on the gas piping must be welded (except for required dismountable joints), and the welds must be checked by radiography. After assembly, the pipe will be painted with yellow oil paint.

Welding work on gas equipment may only be performed by welders with official authorisation. The assembly will be made pursuant to STN EN. Assembly may only be performed by an organisation authorised for such work, or a person authorised for such work pursuant to special regulations and STN.

The electrical installation will be made pursuant to valid STN standards. The earthing of gas piping will be addressed by the electrical installation project.

The pressure test will be performed pursuant to STN EN.

The electrical installation will be made pursuant to valid STN EN standards.

The boiler room may be commissioned pursuant to STN EN, it must be equipped with:

- operating regulations

- S6 fire extinguisher

- foam device or detector for leak check of joints

- first aid kit

- battery

- detector for carbon monoxide.

Cleanliness and a dust-free environment must be maintained in the boiler room. An operating journal pursuant to STN EN must be kept for the operation of the boiler room.

* 1. Venting and degasification of the gas distribution

The venting and degasification of the gas piping will be provided by venting and degasification closures with dimension DN20 or DN25. The venting closures were designed based on STN EN. The blow-out pipes from safety valves and from safety closures run to the air together with the venting pipe. The venting pipes must not run below plaster - pursuant to STN EN. All such pipes must be earthed pursuant to STN EN .

4.1. Switching the kitchen to gas:

The designed LP gas pipe will be connected to the gas pipe in the building under the ceiling of the 2nd underground floor.

The designed LP gas distribution DN 50 - steel will be run in the 2nd underground floor under the ceiling in the kitchen room. An ball closure DN 50 will be mounted before the entry to the kitchen. The gas pipe will continue in the building under the ceiling of the 2nd underground floor for gas appliances. Before them will be mounted ball closures pursuant to the requirements of the kitchen technology.

Gas CONVECTOMAT – 1 unit

- with a nominal heat output of 35 kW, gas consumption 4.10 m3/hour.

Gas STOVE – 1 unit

- with a nominal heat output of 33 kW, gas consumption 3.90 m3/hour.

Gas GRILL – 1 unit

- with a nominal heat output of 14 kW, gas consumption 1.6 m3/hour.

max. gas consumption per hour:

9.60 m3/h

For 12 hours / day, 365 days in year

Annual gas consumption: 42,500 m3/year

Note:

The technical and economical assessment of the proposed appliances is based on the requirements and economic feasibility of the investor and is in compliance with valid STN, EN decrees and laws.

There will be no damage to or removal of trees and other vegetation by the implementation of the above stated switching to gas. The implementation will have no adverse impact on the environment.

NOTE:

All work on gas equipment must be performed pursuant to STN EN.

* ALL CLOSURES MUST BE INSTALLED SUCH THAT THEY ARE EASILY ACCESSIBLE. STEEL GAS PIPING MUST BE EARTHED PURSUANT TO VALID LEGISLATION.
* ALL THREADED AND FLANGED CONNECTIONS ON PIPES AND FITTINGS MUST HAVE A CONDUCTIVE CONNECTION AND ALL THE EQUIPMENT MUST BE GROUNDED
* THE CABINET IS CLOSED BY A SHEET METAL DOOR WITH VENTING APERTURES 2 UNITS 300X100 IN LOWER AND 2 UNITS 300X100 IN UPPER PART OF DOOR COVERED BY A NET

Note:

Occupational safety and health rules (B1, B3-B6) pursuant to relevant legal regulations must be complied with during construction and assembly work.

REQUIREMENTS FOR Electric Part:

- mounting of main switch for the boiler room and kitchen, in the event of a power cut only the lights work

- earthing of steel pipe, PURSUANT TO STN EN 60079-10

- earthing of gas metering cabinet, PURSUANT TO STN EN 60079-10

- ALL THREADED AND FLANGED CONNECTIONS ON PIPE AND FITTINGS MUST HAVE A CONDUCTIVE CONNECTION ALL THE EQUIPMENT OF THE CABINET AND PIPES MUST BE EARTHED

- due to temporary operation a Buzzer - Gas Leakage (connect to terminals Seitron RGI-2) for boiler room and kitchen is proposed.

Bratislava, 07 / 2018 Elaborated by: Ing. Norbert Jókay

**13. I&C Gas**

List of documentation

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# General

### Scope of project

The design documentation for implementation of the site deals with the I&C equipment for gas for the project of the major overhaul of the Embassy of the Slovak Republic in London.

Design specification

* drawing documentation + consulting with architect and investor of the addressed part
* requirements of investor and involved designers
* product catalogues of designed equipment in the design documentation

# Basic technical data

### Regulation and standards

The design documentation was elaborated pursuant to valid Slovak laws, decrees and standards.

### External influences

Electrical equipment of this project is located in an environment defined by the Protocol on stipulation of external influences pursuant to STN. The Protocol on stipulation of external influences is a part of the design documentation.

### Residual hazard

There will be no residual hazard given compliance with project requirements, proper application of requirements on protection against electrical accidents, and regular inspection and maintenance.

### Gas metering

Only electrical equipment in compliance with the terms and conditions stipulated in STN EN 60079-14 Article 5.2.3. can be installed in the premises. Electrical equipment with a minimum coverage of IP 43 can be installed in the related ventilation area at a distance of up to 1.5 m around doors, windows and ventilation openings.

# Technical description

#### I&C Gas cabinet

The cabinet for instrumentation and control of gas is a separate cabinet mounted outside the building. The distance of the cabinet from the building is approx. 2m. The minimum height of the building is 14 meters.

#### Interior earthing and connection (I&C Gas)

The earthing system of I&C for gas consists of the earthing terminal plate to which are connected by the yellow-green coloured CY 6 conductor all non-live conductive parts, inlet and outlet pipes of the gas control station. Control fittings and the gas meter will be bridged with the same conductor. The earthing terminal plate is connected by the conductor FeZn φ10 or FeZn 30/4 to the existing earthing of the building.

#### Protection from static electricity

The electrical resistance of materials has the key influence on the occurrence and accumulation of electrical charge. To determine if the occurrence and hazardous accumulation of electrical charge can be anticipated is key to the option of electrostatic earthing of equipment. The method of reduction or discharge of electrical charge can be performed by protection pursuant to STN 33 2030:

* Electrostatic earthing of all electrostatic conductive or electrically conductive objects
* Reduction of electrisation of used substances
* Increase of relative humidity of air
* Usage of neutralisers
* Reduction of extent of charge source by changing technological parameters

#### Earthing of equipment (I&C Gas)

All conductive parts of equipment and conductive fluids which can be electrically charged must be earthed. If some parts of the equipment cannot be earthed for functional or other reasons by connection with the earthing system, they must be earthed with high resistance to comply with the requirements of electrostatic earthing.

When earthing it is essential to take into consideration sufficient mechanical strength of the earthing and its controllability and identification of perfect joints of individual parts of the earthing outlet (overcoming of insulation inserts in the pipe). The earthing conductors must be welded, hard connected, pressed or connected by screws. Joints between the equipment, if screwed, must have at least two fan pads.

In premises with explosion hazard Zone 2, a conductive floor is only required in exceptional cases, i.e. if there is a hazard of permanent occurrence of electrical charges.

#### Ventilation (I&C Gas)

The ventilation of gas metering is natural through ventilation openings on the cabinet.

# **Safety warnings**

The electrical equipment in this project of gas metering equipment is classified pursuant to Annex no. 1 of Decree e508/2009 Coll. in the group A/e - electrical installation in environment with explosion hazard (external influence BE3) including protection against effects of atmospheric and static electricity,

Others electrical equipment in this project is classified pursuant to Annex no. 1 of Decree 508/2009 Coll. in group B.

Only an electrical engineer acquainted with regulations on the operation of electrical equipment and with verified professional competence pursuant to Decree of Slovak Office for Safety at Work of the Slovak Republic no. 508/2009 may perform assembly work, testing, commissioning, operation and maintenance. The operators of electrical equipment must be instructed pursuant to §20 of the Decree no. 508/2009 and acquainted with STN 34 3100 - Safety Regulations for the Work and Operation on Electrical Equipment – and must comply with them.

The function, operational reliability and safety of technical equipment or its parts will be verified by prescribed inspections and tests pursuant to Decree no. 508/2009:

* during the production or assembly and following its completion
* before the commissioning
* following the deployment at the place of operation

after a shut-down for longer than one year

following the disassembly and reassembly

following the reconstruction and repair (after a change of protection)

in the event that they were decommissioned by a supervisory body

* professional inspection and tests must be performed during operation at intervals stipulated in the Decree
* if it is ordered by a supervisory body

A criteria for success is the compliance with requirements on protection against electrical shock during standard operations and in the event of a fault.

In the event of the identification of a fault, a measure will be selected that will provide for the required durability of electrical equipment in the given environment. This is mainly applicable for the reliability, durability and the resulting operating efficiency of the electrical equipment. The electric equipment must be maintained in a condition that corresponds to valid electrical standards and decrees. Each intervention in installation must be drawn in documentation of the AS-IS construction which is required for the operation, maintenance and professional testing of electrical equipment as well as for the replacement of individual parts of equipment.

All work must be finished pursuant to STN standards valid at the time of the implementation.

The supplier is obliged to draw the AS-IS implementation of the electrical installation under consideration in one copy of the design documentation.

# **Evaluation of Hazard to Occupational Safety and Health pursuant to §4 of Act no. 124/2006 Coll.**

The project minimizes the potential hazards from electricity in the following way:

* hazard to persons by contact with live parts ( direct contact ) – is addressed in the part TS (Technical report) Protection against electrical shock in standard operations pursuant to STN 33 2000 – 4 -41 (for LV) and STN 33 3201 (for HV)
* hazard to persons by contact with parts which became live due to adverse conditions, mainly due to failure of insulation ( indirect contact ) – is addressed in the part TS (Technical report) Protection against electrical injuries in the event of a fault pursuant to 33 2000 – 4 -41 and STN 33 3201
* hazard due to electrostatic phenomenon - in the construction part will be created :
* on the building will be prepared a lightning conductor installation that will outlet electrostatic charges
* technological equipment – will be earthed pursuant to the description TS (Technical report) in clause “Earthing”
* other events, e.g. overload, short-circuit effects, etc. - are addressed by protection elements
* The project respects from the point of view of operational safety and health and technical equipment in the technical report the quoted decrees and valid standards and their implementing rules.

The project prescribes the safety principles and describes sources of hazards, therefore, if the above items and technical solution and operating and inspection regulation are implemented, the design solution for hazard to safety and health can be assessed as zero.

**14. Ventilation and Cooling**

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DOCUMENTATION FOR IMPLEMENTATION OF SITE

Title of site: MAJOR OVERHAUL OF THE BUILDING OF THE SLOVAK EMBASSY IN LONDON

Address of site: London, 25 Kensington Palace Gardens, UK

Technicians: Ventilation and Cooling

1. Introduction

The project “MAJOR OVERHAUL OF THE BUILDING OF THE SLOVAK EMBASSY IN LONDON” addresses the ventilation and cooling of the premises of the above site.

1.1 Information for the Project

The project was elaborated on the basis of the following information:

* requirement of the future user of the building
* information and coordination with subsequent jobs
* drawing documentation of architecture project
* Decree of Ministry of Health of the Slovak Republic no. 237/2009, stipulating details on admissible levels of noise, infrasound and vibrations and on requirements regarding the quantification of noise, infrasound and vibrations in environment
* Decree of Ministry of Interior of the SR no. 94/2004 Coll., stipulating technical requirements for fire protection safety with regard to the construction and utilisation of buildings
* Decree of Ministry of Health of the Slovak Republic no. 259/2008 on details of requirements for the interior environment of buildings
* Protection of buildings against fire spreading via the ventilation equipment –

STN 730872

* Indoor environmental input parameters of buildings – STN EN 15251
* Multi-storey and underground garages STN 73 6058
* Decree of the Ministry of Labour, Social Affairs and Family of the Slovak Republic (MPSVR SR) no. 508/2009, defining details for the provision for occupational safety and health for work with pressure, lifting, electrical and gas technical equipment and defining the technical equipment which is considered to be reserved technical equipment
* Refrigerating systems and heat pumps. Safety and environmental requirements - STN EN 378-1+A2
* Other valid hygiene, safety and fire protection regulations applicable to the equipment under consideration
* Information from suppliers of ventilation equipment and elements considered for the project

1.2 Calculation Parameters

* Ambient air temperature for the given location:

a/ winter te = - 1 °C

b/ summer te = 32 °C

* Relative humidity of ambient air :

a/ winter 90%

b/ summer 35%

* Air volume for the equipment item:

WC – 50m3/h;

Sink – 30m3/h;

Shower –150m3/h;

Urinal – 25m3/h;

Locker – 25m3/h;

* Air volume per person:

WC – 30m3/h/p;

* Air exchange intensity:

Bathrooms – 4-8x/h

Corridors – 2x/h

Storage rooms – 2-8x/h

Technical rooms – 1-2x/h

Archive – 4x/h

Laundry – 5x/h

Conference room – 4x/h

Waste management – 10x/h

Office – 3x/h

Foyer – 3x/h

1.3 Purpose of the Equipment

The building under consideration is the major overhaul of an existing building in the centre of city of London. In the given building is addressed the forced ventilation in premises whose operation require this and in premises that cannot be ventilated in a natural way. Vacuum ventilation systems of the garage and of some smaller premises and personal hygiene premises are proposed, overpressure ventilation of the boiler room, equal pressure ventilation systems with recuperation of heat by recuperation units and heat pumps air - air for the cooling of individual premises. The systems of the heat pump will, as a priority, cover the heat load created in the building. Selected premises of the building will be equipped with channel units cooling the premises to a temperature of 24 – 28°C for the improvement of the thermal comfort, particularly in the summer. The heat pumps air - air can in winter also work in the heating regime and in the selected premises supplement the main central heating system with hot air heating by means of channel units for cooling the premises as a priority. Other premises without natural ventilation will have door or wall grills with optional ventilation from neighbouring area.

2. Description of Proposed Equipment

Equipment no. 1 – Ventilation of garage

Vacuum ventilation system was proposed for the ventilation of the garage. Sliding fan

SYSTEMAIR IV Smart EC and outlet fan SYSTEMAIR KVK Slim 400 EC are designed for an air volume flow of 150m3/h per parking place, total 2400 m3/h. The air volume flow was established by calculation.

The set up of fans for air outlet consists of a smaller sliding fan located at the entrance of garages under the ceiling and of an outlet fan under the ceiling at the end of the garage. The air will be drawn in through a perforated inlet gate with Av,min= 0.67m2 (provided by the site) and moved by the sliding fan to the end of the garage. The air outlet will be 50% at the ceiling and 50% at the floor via rectangular inlets mounted in a pipe. The outlet fan will be mounted in the pipe by quick fastening flexible FK clips. The outlet fan will discharge waste air from the garage by the distribution network to the common drainage channel in the machine room of ventilation in the 1st underground floor where the blowout pipe will end at a the cover grille to the pipe. The air will be discharged from the common drainage channel in the exterior through the rain louver on the facade of the building. In the pipe, will be mounted in front of the mounting of the blow out pipe in the common drainage channel a tight shutter with servo-drive. The servo-drive will operate in an On/Off regime. If the fan is started, the servo-drive will open the shutter, in the reverse case it will close it. (The servo-drive will be included in the delivery of ventilation). The electricians will rewire the equipment.

In the part of the piping outside the garage are, the pipe will have thermal insulation against dew by a self-adhesive rubber insulation with aluminium foil (see part of the Technical report: 4. Surface Protection, Insulation).

A noise silencer will be mounted on the pipe for noise reduction.

In the vertical fire protection partition structure in created punctures will be mounted fire flaps by a wet installation process. All installations must be performed pursuant to installation regulations of the fire flap producer.

Control will be undertaken by means of the control unit EC Vent CB (item no. 1.03 ) and the wall controller with display EC Vent RU (item no. 1.05) in room no. -118, machine room of ventilation in the 1st underground floor. The control will be located in the power distributor box. The starting of equipment will be based on a timer and on the CO level in the garage. (delivery of ventilation) Example of ventilation control: in terms of time: morning between 7.00-9.00, evening between 16.00-19.00 and the rest of the day based on the CO level in the garage. The electricians will rewire the equipment and sensors.

Equipment no. 2– Ventilation of premises in the 2nd underground floor

An equal pressure ventilation system with recuperation of heat was designed for the ventilation of storage rooms, corridors and staff bathrooms on the 2nd underground floor. The recuperation unit ATREA DUPLEX 2500 Multi Eco was designed for an air volume flow of 2370 m3/h on the basis of air exchange intensity in the premises of 2-8x, or on the basis of air volume for the equipment item (Locker – 25m3/h; Shower –150m3/h; sink – 30m3/h;)

The unit will be mounted in the technical area of the machine room of ventilation on the 1st underground floor, room no. -118. The equipment consists of inlet and outlet fan, countercurrent recuperator, filters at inlet and outlet, shutter on the suction side from exterior, water heater with a temperature gradient of 70/50°C and of flexible connection sleeves, by which the equipment will be connected to the distribution network. The ventilation unit will be equipped with a bypass flap of the recuperator. The ventilation will thus in the interim period also be possible without recuperation. The overall installed heating output is QVYK= 2.0kW.

Fresh air will be drawn in from the common inlet chamber connected with the exterior through the rain louver. The air will come to the unit through the angular pipe starting in the common inlet chamber through the cover grille in the pipe. The air will be filtered in the unit, preheated in the countercurrent exchanger, reheated by the integrated water heater in winter to 20°C. The reheating of inlet air will be used in winter to cover thermal losses from ventilation. The air will be transported by fan though the angular or circular SPIRO pipe from zinc-coated sheet to the premises under consideration.

Air intake to and from area under consideration will be via rectangular outlets and plate valves mounted in plasterboard ceiling structures pursuant to the drawing documentation in coordination with the assembly of structure of lower ceilings and lighting equipment. The distribution elements will be connected with the distribution network by extensions, overpressure chamber PB (plenum box) and flexible hoses. The air will be discharged by the recuperation unit and blown out in the common drainage channel in the machine room of ventilation on the 1st underground floor where the blow out pipe will end at a cover grille to the pipe. Air will be discharged from the common drainage channel in the exterior through the rain louver on the facade of the building. In the pipe will be mounted in front of the mounting of the blow out pipe in the common drainage channel a tight shutter with servo-drive. The servo-drive will operate in an On/Off regime. If the recuperation unit is started, the servo-drive will open the shutter, in the reverse case it will close it. The servo-drive will be connected to the control system of the recuperation unit to a location where the shutter on the suction side from the interior would be connected (such a shutter will be not mounted in the unit). (The servo-drive and rewiring with the ventilation unit will be part of the delivery of the ventilation).

All pipes leading to and from the recuperation unit in room no. -118 (machine room of ventilation on the 1st underground floor) will be thermally insulated against dew and heat losses by self-adhesive rubber insulation with aluminium foil. The drainage distribution network in the scope according to the drawing documentation and the whole inlet distribution network on the 2nd underground floor will be thermally insulated against dew by self-adhesive rubber insulation with aluminium foil (see part of the Technical report: 4. Surface Protection, Insulation).

Noise silencer are proposed for noise reduction.

Control flaps will be installed in ventilation pipes to regulate the transported air volume.

In the vertical and horizontal fire protection partition structure will be mounted in created punctures fire flaps by a wet installation process. All installations must be performed pursuant to the installation regulations of the fire flap producer.

The outlet of condensate from the unit is addressed by the health and sanitary installation project.

The ventilation unit will have a proprietary instrumentation and control system with remote control. The equipment will run non-stop. The unit will be controlled by a wall controller located in room no. -118, machine room of ventilation on the 1st underground floor. The control will be mounted in the power - distributor box.

The mixing node of the water heater and its regulation are included in the delivery of the ventilation equipment. The water heater will be controlled by the regulator of the ventilation unit. The secondary circuit of the water heater is supplemented with the pump which will compensate for the thermal losses of the heater, but not of the primary circuit of the boiler.

Equipment no. 3 – Ventilation of the large kitchen and relevant premises

An equal pressure ventilation system with recuperation of heat was proposed for the ventilation of the large kitchen on the 2nd underground floor and relevant premises (serving kitchen on the 1st upper floor). The recuperation unit ATREA DUPLEX 10100 Basic was proposed for an air volume flow of 7070m3/h. Of this 6000 m3/h will be for the kitchen on the 2nd underground floor which represents an air exchange intensity in the kitchen of 50x/h. The air volume flow of 1070m3/h for the serving kitchen on the 1st upper floor was determined from the air exchange intensity with an area of 25x/h.

The ventilation unit will be located in the ventilation machine room on the 5th upper floor. The equipment consists of an inlet and outlet fan, plate recuperator, water heater with a temperature gradient of 70/50°C, direct evaporator with coolant R410A, filters at inlet and outlet, shutter on the suction side from the exterior and of flexible connection sleeves, by which the equipment will be connected to the distribution network. The equipment will be connected with the direct evaporator to the condensing unit TOSHIBA RAV-SM 2246AT8-E Cu by an insulated pipe. The equipment will be equipped with a bypass flap of the recuperator. Ventilation is thus also possible in the interim period without recuperation. The overall installed heating output is QVYK= 26.0kW. The overall heating and cooling output of the installed condensing unit is QCH= 19.0kW, QVYK= 22.4kW. The exterior condensing unit will be located in the ventilation machine room on the 5th upper floor on a steel structure (provided by the site).

Fresh air will be drawn in through the rain louver on the facade of the object. It will be blown to the unit through the angular zinc-coated pipe. The air will be filtered in the unit, preheated in the cross-flow heat exchanger, reheated by the integrated water heater in winter to 20°C. In summer it will be recooled to 26°C by a direct evaporator. The reheating of inlet air will be used in winter to cover thermal losses from the ventilation. The recooling of air in summer will only cover the heat gains from ventilation. The air will be transported by fan though the angular pipe from the zinc-coated sheet to the premises under consideration.

The air inlet distribution will be provided in the serving kitchen on the 1st upper floor by rectangular outlets mounted in plasterboard ceiling structures pursuant to the drawing documentation in coordination with the assembly of the structure of lower ceilings and lighting equipment. The distribution elements will be connected with the distribution network by extensions. The air outlet distribution will be provided in the serving kitchen on the 1st upper floor via the ATREA digester KUBUS and fat separator GT mounted in plasterboard ceiling structures pursuant to drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment. The fat separator GT will be connected with the distribution network by an extension. For the kitchen on the 2nd underground floor is proposed a ventilation ceiling ATREA for the air inlet and outlet .

All ventilation pipes of the air outlet from the kitchen’s air will be waterproof up to the recuperation unit and with an incline towards the riser pipe, and the bottom of the riser pipe will be drained. (to be undertaken by health and sanitary installations (ZTI) technicians). The air will be discharged by the recuperation unit and blown out in the common drainage area in the ventilation machine room on the 5th upper floor where the blow out pipe will end at a the cover grille to the pipe. The air will be discharged from the common drainage area in the exterior through the extensive rain louver on the facade of the object. In the pipe, will be mounted in front of the mounting of the blow out pipe in the common drainage area a tight shutter with servo-drive. The servo-drive will operate in the On/Off regime. If the recuperation unit is started, the servo-drive will open the shutter, in the reverse case it will close it. The servo-drive will be connected to the control system of the recuperation unit to a location where the shutter on the suction side from the interior would be connected (such a shutter will be not mounted in the unit). (The servo-drive and rewiring with the ventilation unit will be part of the delivery of the ventilation)

All pipes leading to and from the recuperation unit in room no. -501 (ventilation machine room on the 5th upper floor) will be thermally insulated against dew, heat losses and gains by a self-adhesive rubber insulation with aluminium foil. The drainage distribution network in the scope pursuant to the drawing documentation and the whole inlet distribution network will be thermally insulated against dew, heat losses and gains by a self-adhesive rubber insulation with aluminium foil. Coolant distributors will be insulated against dew by rubber insulation (see part of the Technical report: 4. Surface Protection, Insulation).

A noise silencer will be mounted on the pipe for noise reduction.

In the vertical and horizontal fire protection partition structure will be mounted fire flaps in created punctures by a wet installation process. All installations must be performed pursuant to the installation regulations of the fire flap producer.

Control flaps will be installed in ventilation pipes to regulate the transported air volume.

The outlet of condensate from the unit and ventilation pipe is addressed by the health and sanitary installation project.

The ventilation unit will have a proprietary instrumentation and control system with remote control. The equipment will work with a weekly timer, or manually based on the anticipated use of kitchens. The unit will be controlled by a wall controller located in the area of the main kitchen on the 2nd underground floor.

The mixing node of the water heater and its regulation are included in the delivery of the ventilation equipment. The water heater will be controlled by the regulator of the ventilation unit. The secondary circuit of the water heater is supplemented with a pump to compensate for the thermal losses of the heater, but not of the primary circuit of the boiler. The water heater must be connected to the water heating circuit with a minimum content of 15% propylene glycol (up to -5°C) taking into consideration the frost protection of the water exchanger during the inactivity of the equipment.

The direct evaporator and the condensing unit will be controlled by a regulator on the DX exchanger of the ventilation unit. The regulator will be connected with the control system of the ventilation unit and the exterior condensing unit (delivery of ventilation).

NOTES to Equipment no. 3:

* The proper functionality and durability of the kitchen extraction equipment (ventilation ceiling, fat separator) will only be preserved by regular maintenance and replacement of the fat filters (see the prescribed interval stated by the producer).
* During the design work was cancelled on the 1st upper floor in room no. 110 – serving kitchen the continuous dishwasher with large capacity, for which was in the given room proposed the forced ventilation. The forced ventilation system will be implemented given the possible future installation of the continuous dishwasher with large capacity. However, until then the forced ventilation system for the serving kitchen will not be in operation (closing the tight flaps, regulation of the ventilation unit).

Equipment no. 4 – Ventilation of rooms on the 2nd underground floor, 1st underground floor, 1st upper floor, 2nd upper floor

An equal pressure ventilation system with recuperation of heat was proposed for the ventilation of premises on the 2nd underground floor, 1st underground floor, 1st upper floor and 2nd upper floor. The recuperation unit ATREA DUPLEX 12000 Roto was proposed for an air volume flow of 8715 m3/h on the basis of air exchange intensity on the premises of 2-3x/h and air volume per person 30m3/h/person.

The unit will be mounted in the technical area of the ventilation machine room on the 1st underground floor. The equipment consists of inlet and outlet fan, rotary generator, filters at inlet and outlet, shutter on the suction side from exterior, water heater with a temperature gradient of 70/50°C and of flexible connection sleeves, by which the equipment will be connected to the distribution network. The overall installed heating output is QVYK= 16.0kW.

The fresh air will be drawn in from the common inlet chamber connected with the exterior through the rain louver. The air will go to the unit through the angular pipe starting in the common inlet chamber through the cover grille in the pipe. The air will be filtered in the unit, preheated and partially moisturized in the rotary generator, reheated by the integrated water heater in winter to 20°C. The reheating of the inlet air will be used in the winter to compensate for thermal losses from the ventilation. The air will be transported by a fan though the angular or circular SPIRO pipe from zinc-coated sheet to the premises under consideration.

The air circulation to and from the area under consideration will be provided by rectangular outlets, linear slot diffusers and ceiling whirling outlets with overpressure chambers PB (plenum box). The overpressure chambers PB will be connected by flexible hose to the horizontal distribution network. The rectangular outlets will be mounted directly in the pipe or in plasterboard ceiling structures and connected to the distribution network through extensions. All distribution elements must be mounted in plasterboard ceiling pursuant to drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment. The air will be discharged by the recuperation unit and blown out in the common drainage channel in the ventilation machine room on the 1st underground floor where the blow out pipe will end at the cover grille to the pipe. The air will be discharged from the common drainage channel to the exterior through the rain louver on the facade of the building. In the pipe will be mounted in front of the mounting of the blow out pipe in the common drainage channel a tight shutter with servo-drive. The servo-drive will operate in an On/Off regime. If the recuperation unit is started, the servo-drive will open the shutter, in the reverse case it will close it. The servo-drive will be connected to the control system of the recuperation unit to a location where the shutter on the suction side from the interior would be connected (such shutter will not be mounted in the unit). (The servo-drive and rewiring with the ventilation unit will be part of the delivery of the ventilation).

All pipes leading to and from the recuperation unit in room no. -118 (ventilation machine room in the 1st underground floor) will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation with aluminium foil. The drainage distribution network pipe through server room no. -119 thermal insulation against dew by self-adhesive rubber insulation with aluminium foil. The drainage distribution network must have in rooms -105 and 207 in the scope pursuant to the drawing documentation fire insulation by insulation plates in a thickness for fire durability EI 45. (see part of the Technical report: 4. Surface Protection, Insulation).

A noise silencer is proposed for noise reduction.

Control flaps will be installed in ventilation pipes to regulate the transported air volume.

In the vertical and horizontal fire protection partition structure, will be mounted fire flaps in created punctures by a wet installation process. All installations must be performed pursuant to the installation regulations of the fire flap producer.

The ventilation unit will have a proprietary instrumentation and control system with remote control. The equipment will run non-stop. The unit will be controlled by the wall controller located in room no. -118, ventilation machine room on the 1st underground floor. The control will be mounted in the power - distributor box.

The mixing node of the water heater and its regulation are included in the delivery of the ventilation equipment. The water heater will be controlled by the regulator of the ventilation unit. The secondary circuit of the water heater is supplemented with a pump to compensate for the thermal losses of the heater, but not of the primary circuit of the boiler.

Equipment no. 5 – Ventilation of sanitary facilities on the 1st underground floor

An equal pressure ventilation system with recuperation of heat was proposed for the ventilation of sanitary facilities on the 2nd underground floor. The recuperation unit ATREA DUPLEX 1100 Flexi RD5 was proposed for the air volume flow of 945 m3/h on the basis of air volume for the equipment item (WC-50 m3/h, sink – 30m3/h).

The unit will be mounted in the technical area of the ventilation machine room on the 1st underground floor, room no. -118. The equipment consists of an inlet and outlet fan, countercurrent recuperator, filters at the inlet and outlet, a shutter on the suction side from exterior, external water heater with a temperature gradient of 70/50°C and of flexible connection sleeves, by which will be connected the equipment to the distribution network. The ventilation unit will be equipped with a bypass flap of the recuperator. Ventilation is thus also possible in the interim period without recuperation. The overall installed heating output is QVYK= 1.2kW.

The fresh air will be drawn in from the common inlet chamber connected with the exterior through the rain louver. The air will go to the unit through the circular SPIRO pipe starting in the common inlet chamber through the cover grille in the pipe. The air will be filtered in the unit, preheated in the countercurrent exchanger, reheated by the external water heater in winter to 20°C. The reheating of inlet air will be used in the winter period to compensate for thermal losses from the ventilation. The air will be transported by fan though the circular SPIRO pipe from zinc-coated sheet to the premises under consideration. The angular zinc-coated pipe will be used for the traversing of the pipe due to the bypass of construction structures.

Air circulation to and from the area under consideration will be provided by rectangular outlets with overpressure chambers PB (plenum box). The whole inlet or outlet distribution element will be horizontally mounted in plasterboard ceiling pursuant to drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment. Plate valves will be used for outlet of air from the pumping area. The overpressure chambers PB and plate valves will be connected by flexible hose to the horizontal distribution network. The area in which the air will be supplied and the area, from which the air will be discharged will be connected though a door without a threshold or undercut door. The air will be discharged by the recuperation unit and blown out in the common drainage channel in the ventilation machine room on the 1st underground floor where the blow out pipe will end at the cover grille to the pipe. Air will be discharged from the common drainage channel to the exterior through the rain louver on the facade of the building. In the pipe will be mounted in front of the mounting of the blow out pipe in the common drainage channel a tight shutter with servo-drive. The servo-drive will operate in an On/Off regime. If the recuperation unit is started, the servo-drive will open the shutter, in the reverse case it will close it. The servo-drive will be connected to the control system of the recuperation unit to a location where the shutter on the suction side from the interior would be connected (such a shutter will not be mounted in the unit). (The servo-drive and rewiring with the ventilation unit will be part of the delivery of the ventilation)

All pipe distributors leading to and from the recuperation unit in room no. -118 (ventilation machine room on the 1st underground floor) will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation with aluminium foil (see part of the Technical report: 4. Surface Protection, Insulation).

A noise silencer is proposed for noise reduction.

Control flaps will be installed in ventilation pipes to regulate the transported air volume.

In the vertical fire protection partition structure, will be mounted fire flaps in created punctures by a wet installation process. All installations must be performed pursuant to the installation regulations of the fire flap producer.

The outlet of condensate from the unit is addressed by the health and sanitary installation project.

The ventilation unit will have a proprietary instrumentation and control system with remote control. The equipment will work with a weekly timer based on the anticipated period of usage of sanitary facilities. The unit will be controlled by the wall controller located in room no. -118, ventilation machine room on the 1st underground floor. The control will be mounted in the power - distributor box.

The mixing node of the water heater and its regulation are included in the delivery of the ventilation equipment. The water heater will be controlled by the regulator of the ventilation unit. The secondary circuit of the water heater is supplemented with a pump compensating for the thermal losses of the heater, but not of the primary circuit of the boiler.

Equipment no. 6 – Ventilation of conference room and kitchen on the 3rd upper floor, corridor and kitchen on the 4th upper floor

An equal pressure ventilation system with recuperation of heat was proposed for the ventilation of the conference room and kitchen on the 3rd upper floor, corridor and kitchen on the 4th upper floor. The recuperation unit ATREA DUPLEX 800 Multi Eco was proposed for an air volume flow of 590 m3/h on the basis of air exchange intensity on the premises of 2-3x/h and air volume per person 30m3/h/person.

The ventilation unit will be located in the ventilation machine room on the 5th upper floor.

The equipment consists of an inlet and outlet fan, countercurrent recuperator, filters at inlet and outlet, a shutter on the suction side from exterior, water heater with a temperature gradient of 70/50°C and of flexible connection sleeves, by which the equipment will be connected to the distribution network. The ventilation unit will be equipped with a bypass flap of the recuperator. Thus, in the interim period ventilation is also possible without recuperation. The overall installed heating output is QVYK= 1.0kW.

Fresh air will be drawn in through the rain louver on the facade of the building. The air will be go to the unit through the circular SPIRO pipe. The air will be filtered in the unit, preheated in the countercurrent exchanger, reheated by the integrated water heater in winter to 20°C. The reheating of inlet air will be used in the winter period to compensate for thermal losses from ventilation. The air will be transported by fan though the angular and circular SPIRO pipe from zinc-coated sheet to the premises under consideration.

The air circulation to the area under consideration will be provided by linear slot diffusers with overpressure chambers PB (plenum box) and a plate valve. For the air outlet are proposed linear slot diffusers with overpressure chambers PB, plate valve and a rectangular outlet with overpressure chamber PB. The overpressure chambers PB and plate valves will be connected by flexible hose to the horizontal distribution network. All distribution elements must be mounted in the plasterboard ceiling pursuant to the drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment. Air will be discharged by the recuperation unit and blown out in the common drainage area in the ventilation on the 5th upper floor, where the blow out pipe will end at the cover grille to the pipe. Air will be discharged from the common drainage area to the exterior through the extensive rain louver on the facade of the building. In the pipe will be mounted in front of the mounting of the blow out pipe in the common drainage area a tight shutter with servo-drive. The servo-drive will operate in an On/Off regime. If the fan is started, the servo-drive will open the shutter, in the reverse case it will close it. The servo-drive will be connected to the control system of the recuperation unit to a location where the shutter on the suction side from the interior would be connected (such a shutter will not be mounted in the unit). (The servo-drive and rewiring with the ventilation unit will be part of the delivery of the ventilation).

All pipes leading to and from the recuperation unit in room no. -501 (ventilation machine room on the 5th upper floor) will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation with aluminium foil. The drainage distribution network in the scope pursuant to the drawing documentation and the whole inlet distribution network will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation with aluminium foil. (see part of the Technical report: 4. Surface Protection, Insulation).

A noise silencer is proposed for noise reduction.

Control flaps will be installed in ventilation pipes to regulate the transported air volume.

In the vertical and horizontal fire protection partition structure will be mounted fire flaps in created punctures by a wet installation process. All installations must be performed pursuant to the installation regulations of the fire flap producer.

The outlet of condensate from the unit is addressed by the health and sanitary installation project.

The ventilation unit will have a proprietary instrumentation and control system with remote control. The equipment will run non-stop. The unit will be controlled by the wall controller located in room no. 501, ventilation machine room on the 5th upper floor. The control will be mounted in the power - distributor box.

The mixing node of the water heater and its regulation are included in the delivery of the ventilation equipment. The water heater will be controlled by the regulator of the ventilation unit. The secondary circuit of the water heater is supplemented with the pump compensating for the thermal losses of the heater, but not of the primary circuit of the boiler.

Equipment no. 7 – Ventilation of the boiler room on the 2nd underground floor

On the basis of a requirement of central heating technicians regarding ventilation and combustion, air supply overpressure ventilation is provided for in the boiler room on the 2nd underground floor by an inlet ventilation unit SYSTEMAIR TOPVEX SF02 HWL. The volume flow of inlet air is 655 m3/h and this was set by the central heating technicians.

The inlet unit will be mounted under the ceiling of the boiler room on the 2nd underground floor. The fresh air will be drawn in through the rain louver on the facade of the building. The air will be filtered in the unit, heated to a temperature of 16°C by an integrated water heater with a temperature gradient of 70/39°C and transported by fan through the circular SPIRO pipe from zinc-coated sheet in the boiler room. The equipment will be connected to the distribution network using flexible connection sleeves. The overall installed heating output is QVYK= 3.8kW.

The air circulation to the boiler room will be provided by an extensive outlet mounted on the inlet pipe. The equipment will be equipped with a shutter with a servo-drive on the suction side, to protect the water heater against freezing. The servo-drive will be connected to the control system of the ventilation unit. (The servo-drive and rewiring with the ventilation unit will be part of the delivery of the ventilation)

The air outlet will be by overpressure to the blow out pipe with a rectangular outlet. The pipe will start in the boiler room and will run under the ceiling of the 2nd underground floor to the common drainage channel in the ventilation machine room on the 1st underground floor, where the blow out pipe will end at the cover grille to the pipe. The air will be discharged from the common drainage channel to the exterior through the rain louver on the facade of the building. In the pipe will mounted in front of the mounting of the blow out pipe in the common drainage channel a tight shutter with servo-drive. The servo-drive will operate in an On/Off regime. If the fan is started, the servo-drive will open the shutter, in the reverse case it will close it. The servo-drive will be connected to the control system of the ventilation unit. (The servo-drive and rewiring with the ventilation unit will be part of the delivery of the ventilation)

The distribution network for all fresh air suction from the exterior and the distribution network for all air discharge from the boiler room will be thermally insulated against dew by a self-adhesive rubber insulation with aluminium foil (see part of the Technical report: 4. Surface Protection, Insulation).

A noise silencer will be mounted on the pipe for noise reduction.

In the vertical and horizontal fire protection partition structure will be mounted fire flaps in created punctures by a wet installation process. All installations must be performed pursuant to the installation regulations of the fire flap producer.

The control will be located by the wall controller in the boiler room. The equipment will have a proprietary I&C system. (Part of delivery of equipment). The unit will run non-stop. If the boilers are out of operation for a long time, the equipment will run based on a weekly timer - set manually on the unit controller. Boilers must be shut down when the inlet ventilation unit is not running. The electricians will connect the control unit of the ventilation equipment with the control unit of the boiler room.

The mixing node of the water heater and its regulation are included in the delivery of the ventilation equipment. The central heating technicians will undertake the assembly and regulation. The secondary circuit of the water heater is supplemented with the pump compensating for thermal losses of the heater, but not of the primary circuit of the boiler.

Equipment no. 8 – Ventilation of Protected Escape Routes (CHÚC)

Protected Escape Routes (CHÚC) are defined in the fire safety project as type A, but in the staircase area on the 2nd underground floor and in the common corridor on the 4th upper floor, natural ventilation during emergency evacuation from the building cannot be provided. Forced pressure ventilation with 10 times air exchange per hour was propose instead of this.

The air inlet in the staircase area and corridor will be provided by the fan SYSTEMAIR RS 50-25 EC with the air output of 1035m3/h mounted in a separate area in the ventilation machine room in the 5th upper floor. The air will be drawn in through the rain louver on the facade of the building and go to the riser pipe located in the shaft in the middle of the staircase structure. In the pipe will be mounted behind the rain louver a tight shutter with servo-drive. The servo-drive will operate in an On/Off regime. If the fan is started, the servo-drive will open the shutter, in the reverse case it will close it. (The servo-drive will be included in the delivery of ventilation). The electricians will rewire the equipment. The equipment will be connected to the distribution network using flexible connection sleeves. The air will be go by the riser pipe to the 2nd underground floor, where it will be blown out in the staircase area through the rectangular outlet in the wall above the floor. On the 4th upper floor will be connected to the inlet rising pipe the horizontal distribution pipe under the ceiling of the 4th upper floor. The air circulation to the corridor area on the 4th upper floor will be through linear slot diffusers with overpressure chambers PB (plenum box). The overpressure chambers will be connected by flexible hoses to the inlet distribution network. The outlet from the corridor will be via the wall grille mounted above the door opening between the corridor and the staircase area. The air outlet from the staircase area will be provided by an automatically opening transparent structure in the staircase area (provided by the site).

In the horizontal fire protection partition structure will be mounted a fire flap between the fan and the Protected Escape Route in the created punctures by a wet installation process. The installation of the flap must be performed pursuant to the installation regulations of the fire flap producer.

The fan will be powered from two mutually independent power sources – detailed in the electrical project. The control will be by wall switch located at a position specified by the fire safety designer – to be installed by the electricians. The labelling of control elements must be with the wording VENTILATION OF ESCAPE ROUTE.

Equipment no. 9 – Ventilation of sanitary facilities of apartments

Forced vacuum air ventilation system was proposed in the bathrooms, WC and one kitchen. The volume flow of exhaust air was established on the basis of air exchange intensity in the premises of 4-8x/h, or on the basis of air volume for the equipment item (WC – 50m3/h; sink – 30m3/h;).

Air extraction from the sanitary facilities will be by radial fans SYSTEMAIR K100 EC and SYSTEMAIR K125 EC in the circular pipe. For the whole sanitary facility of each apartment was proposed one fan. The radial fan SYSTEMAIR K100 EC will also undertake the sanitary ventilation of the kitchen premises for each apartment. All fans proposed for ventilation of apartments will be mounted in the ventilation machine room on the 5th upper floor using quick fastening flexible FK clips. The air outlet from the area is undertaken by rectangular outlets with overpressure chambers PB (plenum box). The whole outlet distribution element will be mounted horizontally in the plasterboard ceiling pursuant to the drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment. The overpressure chamber PB will be connected by flexible hose to the horizontal drainage distribution network. The horizontal drainage distribution network will be connected to the riser pipe leading to the ventilation machine room on the 5th upper floor and subsequently to the outlet fan. The fans will discharge the waste air in the common drainage area in the ventilation machine room on the 5th upper floor, where the blow out pipe will end at the cover grille to the pipe. Air will be discharged from the common drainage area to the exterior through the extensive rain louver on the facade of the building.

The replacement of the extracted air will be for all premises via intake from surrounding areas through wall grilles and without threshold or undercut doors.

The riser pipe will end in the bottom part with a condensate drainage equipped with a water-proof blinded T-piece. The condensate drainage will be undertaken by the Health and Sanitary Installations (ZTI) technicians. The riser pipe and pipe on the 5th upper floor will be insulated along its whole length against dew by self-adhesive rubber insulation with aluminium foil (see part of the Technical report: 4. Surface Protection, Insulation).

If the cross-section area of two pipes traversing the fire protection partition structure is up to 0.04m2 and their mutual distance is less than 0.5m, fire flaps will be mounted in created punctures by a wet installation process. All installations must be performed pursuant to the installation regulations of the fire flap producer.

Fans will be fitted a return valve and noise silencer on the suction and delivery side. The fans will be started by a separate switch in the relevant room (to be installed by electricians). They will also be equipped with a timer to allow them to continue to run after switching off (not included in the delivery of fan - provided by the electricians), the fan for the kitchen will be without such a timer.

Equipment no. 10 – Ventilation of Combined Ladies/Man’s WC

Forced vacuum air ventilation system was proposed in the combined ladies/man’s WC - common. The volume flow of expelled air was established on the basis of the air volume for the equipment item (WC –50m3/h; sink – 30m3/h;).

The air from the combined ladies/man’s WC on the 3rd and 4th upper floor will be expelled by radial fans SYSTEMAIR K100 EC in the circular pipe. For the toilets on the relevant floor was proposed one fan. All fans proposed for ventilation of combined ladies/man’s WC on the 3rd and 4th upper floor will be mounted in the ventilation machine room on the 5th upper floor using quick fastening flexible FK clips.

The air outlet from the area will be via rectangular outlets with overpressure chambers PB (plenum box). The whole outlet distribution element will be horizontally mounted in the plasterboard ceiling pursuant to the drawing documentation in coordination with the installation of structure of lower ceilings and lighting equipment. The overpressure chamber PB will be connected by flexible hose to the horizontal drainage distribution network. The horizontal drainage distribution network will be connected to the riser pipe leading to the ventilation machine room on the 5th upper floor and subsequently to the outlet fan. The fans will discharge the expelled air in the common drainage area in the ventilation machine room on the 5th upper floor, where the blow out pipe will end at the cover grille to the pipe. The air will be discharged from the common drainage area to the exterior through the extensive rain louver on the facade of the building.

The riser pipe in the upper part and the pipe on the 5th upper floor will be identification details along its whole length against dew by a self-adhesive rubber insulation with aluminium foil (see part of the Technical report: 4. Surface Protection, Insulation).

Air from the combined ladies/man’s WC on the 2nd underground floor, 1st underground floor and 1st upper floor will be expelled by a common radial fan KVKE 160 EC in the circular pipe. The proposed fan for all sanitary facilities WC - common on the 2nd underground floor, 1st underground floor and 1st upper floor will be mounted under the ceiling of room -104 on the 1st underground floor in the room using quick fastening flexible FK clips.

The air outlet from the area will be via rectangular outlets with overpressure chambers PB (plenum box). The whole outlet distribution element will be horizontally mounted in the plasterboard ceiling pursuant to the drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment. The overpressure chamber PB will be connected by flexible hose to the horizontal drainage distribution network. The horizontal and vertical outlet distribution network leading from all sanitary premises will be joined in the lower ceiling of the 1st underground floor to the common outlet pipe connected to the outlet fan. The blow out pipe from the fan will be mounted to the facade of the building, where it will end at the rain louver in the pipe.

The replacement of the expelled air will be for all premises under consideration via intake from surrounding areas through wall grilles and without threshold or undercut doors.

All riser pipes will end in the bottom part with a condensate drainage equipped with a water-proof blinded T-piece. The condensate drainage will be installed by the Health and Sanitary Installations (ZTI) technicians.

If the cross-section area of two pipes traversing the fire protection partition structure is up to 0.04m2 and their mutual distance less than 0.5m, fire flaps will be mounted in created punctures by a wet installation process. All installations must be performed pursuant to the installation regulations of the fire flap producer.

Fans will be fitted with a return valve and a noise silencer on the suction and delivery side. The fans will be started by the light switch in the relevant room (to be installed by electricians). They will also be equipped with a timer so the fans can still run after switching off (not included in the delivery of fan – to be installed the electricians).

Equipment no. 11 – Cooling on the 4th upper floor

Equipment, type TOSHIBA VRF was proposed for the cooling of rooms on the 4th upper floor. The system is composed of the exterior unit TOSHIBA MAP1406HT8P-E 14PS and of interior channel units TOSHIBA with corresponding output in rooms. The overall installed cooling output is QCH= 40.0 kW and the heating output is QVYK= 45.0 kW. The heat pump air - in winter air can also be in a heating regime and in selected rooms supplement the main system of central heating with hot air heating by channel units. However, the system is proposed for cooling of rooms as a priority.

The exterior units will be located in the ventilation machine room on the 5th upper floor on a steel structure (will be provided by the site). The interior channel units will be mounted in the plasterboard lower ceiling and will be accessible through inspection hatches. The main idea is that the channel units will draw in the heated air from the lower ceiling through the rear part of the equipment. If the construction structure will not allow it, the air will be drawn in by the bottom part of the equipment. The cooled area and the ceiling area will be connected by vertically mounted rectangular inlets in the lower ceiling for air suction. The air distribution in the area will be by a rectangular outlet with overpressure chambers PB (plenum box) connected by a ventilation pipe with the channel units. Circular pipe and flexible hoses will be used. Distribution elements will be mounted in the lower ceiling pursuant to the drawing documentation in coordination with the installation of the structure of the lower ceilings and lighting equipment. The adjustment of lamellas of inlet distribution element must be performed with respect to comfort of users in the area used.

All ventilation connection pipes will be thermally insulated as and overpressure chambers PB will be insulated against dew from the external part (see part of the Technical report: 4. Surface Protection, Insulation).

The exterior and interior unit will be connected by a communication cable and a pair of copper pipes with form pieces. The coolant R410A will flow in the copper pipe. The coolant piping will be insulated and will run in the installation shaft and in the lower ceiling. The proposed routing of the pipe will be adapted to the situation identified on the site.

The condensate drainage pipe will be installed by the Health and Sanitary Installations (ZTI) technicians.

The interior units will be controlled by wall controllers. Each interior unit will have a wall-mounted controller.

A breakdown of energy consumption for cooling will be established for apartment units and connected to a network from a PC (Interior delivery). The PC must be located in a area with access restricted to persons authorised to handle energy equipment and recording measurements.

Some rooms in the area under consideration do not comply with criteria for critical concentrations in the event of coolant leakage in a room. These are rooms smaller than 29.5m2 where interior cooling units are located. The equipment will be therefore supplemented by a TOSHIBA System Leak Detection & Isolation System. The system consists of a sensor detecting coolant leakage in rooms that do not comply with the required criteria, of insulation valves on the coolant distribution network located in front of such a room and of a control system in the relevant room. The sensors will be installed in rooms at a location prescribed by the producer of the system, i.e. 150 mm above the floor and as close to the interior cooling unit as possible. The sensors and the connecting cabling must be installed before the completion of the finishing of walls on which they will be mounted. The system will be enter emergency status in the relevant room in the event of leakage of coolant. The relevant insulation valves will close in the coolant system, the specific interior cooling unit will switch off, error L30 will be displayed on the wall control panel and the alarm will start. The users of the relevant rooms must be informed that such a system is installed and in the event of coolant leakage will be required to leave the room and inform the relevant service technician. The affected room may be reused after thorough ventilation, but the cooling system may only be used after checking and removal of the fault by a person competent to undertake this. During emergency conditions regarding any of the interior equipment, the remaining cooling system will remain in operation without restrictions.

Equipment no. 12 – Cooling of offices on the 1st underground floor, 1st upper floor, 3rd upper floor, and conference room in the 3rd upper floor

Equipment, type TOSHIBA VRF was proposed for the cooling of rooms on the 1st underground floor, 1st upper floor 3rd upper floor, and conference room on the 3rd upper floor 4th upper floor. The system is composed of the exterior unit TOSHIBA MAP2206HT8P-E 22PS and of interior channel units TOSHIBA with a corresponding output on rooms and floors. The overall installed cooling output is QCH= 61.5 kW and the heating output is QVYK= 64.0 kW. The heat pump air - in winter air can also be in the heating regime and in selected rooms supplement the main system of central heating with hot air heating by means of channel units. However, the system is designed for cooling of premises as a priority.

The exterior units will be located in the ventilation machine room on the 5th upper floor on a steel structure (will be provided by the site). The interior channel units will be mounted in the plasterboard lower ceiling and accessible through inspection hatches. The main idea is that the channel units will intake the heated air directly from the lower ceiling through the rear part of the equipment. If the construction structure will not allow this the air, will be drawn in by the bottom part of the equipment. The cooled area and the ceiling area will be connected by vertically mounted rectangular inlets in the lower ceiling for air suction (1st underground floor, 3rd upper floor) and linear slot diffusers (1st upper floor). The air distribution in the area will be via rectangular outlet (3rd upper floor) and linear slot diffusers (1st underground floor, 1st upper floor) with overpressure chambers PB (plenum box) connected by a ventilation pipe with the channel units. Circular pipe and flexible hoses will be used. Distribution elements will be mounted in the lower ceiling pursuant to the drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment. The adjustment of lamellas of inlet distribution element must be performed taking into consideration user comfort in the given area.

All ventilation connection pipes will be thermally insulated and overpressure chambers PB will also be installed against dew from exterior part (see part of the Technical report: 4. Surface Protection, Insulation).

The exterior and interior unit will be connected by a communication cable and a pair of copper pipes with form pieces. The coolant R410A will circulate in the copper pipe. The coolant piping will be insulated and will run in the installation shaft and in the lower ceiling. The proposed pipe routing must be adjusted to the situation identified on the site.

The condensate drainage pipe will be installed by the Health and Sanitary Installations (ZTI) technicians.

The interior units will be controlled by wall controllers. Each interior unit will have its own wall-mounted controller.

Some rooms in the area under consideration do not comply with criteria for critical concentrations in the event of coolant leakage in a room. These are rooms smaller than 32.0 m2 , where interior cooling units are located. The equipment will therefore be supplemented by the TOSHIBA System Leak Detection & Isolation System. The system consists of a sensor detecting coolant leakage in rooms that do not comply with the required criteria, of insulation valves on the coolant distribution network located in front of such rooms and of a control system in the relevant room. The sensors will be installed in rooms as prescribed by the system producer, i.e. 150 mm above the floor and as close to the interior cooling unit as possible. The sensors and the connecting cabling must be installed before the completion of the finishing of walls on which they will be mounted. The system will be enter emergency status in the relevant room in the event of a leakage of coolant. The relevant insulation valves will close in the coolant system, the specific interior cooling unit will switch off, error L30 will be displayed on the wall control panel and the alarm will sound. The users of the relevant rooms must be informed that such a system is installed and in the event of leakage of coolant, it be required that people leave the room and inform the relevant service technician. The affected room may be reused after thorough ventilation, but the cooling system may only be used after checking and removal of fault by a person competent to undertake this. During a emergency with regard to any of the interior equipment, the remaining cooling system will remain in operation without restrictions.

Equipment no. 13 – Cooling of representative rooms on the 1st upper floor, 2nd upper floor

Equipment, type TOSHIBA VRF was proposed for cooling of rooms on the 1st upper floor and 2nd upper floor. The system is composed of the exterior unit TOSHIBA MAP2206HT8P-E 22PS and of interior channel units TOSHIBA with corresponding output in relevant rooms and floors. The overall installed cooling output is QCH= 61.5 kW and the heating output is QVYK= 64.0 kW. The heat pump air - in winter air can also be in the heating regime and in selected rooms supplement the main system of central heating with hot air heating by means of channel units. However, the system is designed for cooling of premises as a priority.

The exterior units will be located in the ventilation machine room on the 5th upper floor on a steel structure (will be provided by the site). The interior channel units will be mounted in the plasterboard lower ceiling and accessible through inspection hatches. The main idea is that the channel units will draw in the heated air directly from the lower ceiling through the rear part of the equipment. If the construction structure will not allow it the air will be drawn in by the bottom part of the equipment. The cooled area and the ceiling area will be connected by linear slot diffusers and by ceiling whirling outlets in the lower ceiling. The air distribution in the area will be by linear slot diffusers and by ceiling whirling outlets with overpressure chambers PB (plenum box) connected by ventilation pipe with the channel units. Circular pipe, and for the bypass of construction structures angular pipe and flexible hoses will be used. Distribution elements will be mounted in the lower ceiling pursuant to the drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment. The adjustment of lamellas of inlet distribution element must be performed with respect to the comfort of users of the given area. In the representative area, room no. 102 and in the dining room area, room no. 111 is proposed a vertical structure of airflow from whirling outlets take into consideration the sufficient cooling of two-storey high premises. However, the comfort of users must also be considered in these two cases.

All ventilation connection pipes will be thermally insulated as will the overpressure chambers PB against dew from the exterior part (see part of the Technical report: 4. Surface Protection, Insulation).

The exterior and interior unit will be connected by a communication cable and a pair of copper pipes with form pieces. The coolant R410A will circulate in the copper pipe. The coolant piping will be insulated and will run in the installation shaft and in the lower ceiling. The proposed routing of the pipe must be adjusted to the facts identified on the site.

The condensate drainage pipe will be installed by the Health and Sanitary Installations (ZTI) technicians.

The interior units will be controlled by the wall controllers. In two cases, from the interior units will be created equipment sets which will with a single common wall controller. In other cases, each channel unit will have the its own wall-mounted controller (see drawing documentation).

Equipment no. 14 – Cooling of the server room on the 1st underground floor

The cooling of the technical room of the server, room no. - 119 will be provided by 2x air condition equipment, type TOSHIBA Single Split. The equipment is composed of exterior condensing unit RAV-SP 564ATP-E and from interior cassette unit RAV-SM564UTP-E. The overall installed cooling output is QCH= 2x5.0 kW. At the time of installing the equipment, one equipment will be a one-hundred percent reserve - it will not be used. However, to protect both equipment sets, it is recommended to alternate the use of the equipment at weekly intervals – this can be undertaken by the server or building administrator manually on the wall controller with optional weekly timing. In the future, in the event of enlargement of the server capacity both will equipment run concurrently and in the event of the outage of one of them, fifty percent operation will still be possible.

The exterior units will be located above each other in the ventilation machine room on the 5th upper floor on a steel structure (will be provided by the site). The interior units will be mounted in the lower ceiling pursuant to the drawing documentation in coordination with the installation of the structure of lower ceilings and lighting equipment.

The interior and exterior cooling units will be connected by the copper pipe with circulation of coolant R410A and by the communication cable. It is necessary to comply with the maximum length of coolant distribution of 50 m. The designed routing of pipe must be adjusted to the facts identified on the site..

The interior units will be equipped with a fully automated regulation with a separate wall controller. The cooling equipment has optional all-year-round cooling.

The exterior condensing unit will be powered by two mutually independent power sources (to be installed the electricians).

The condensed water from the interior unit will by expelled via plastic pipe via an odour trap in the interior sewerage (to be installed the Health and Sanitary Installations (ZTI) technicians).

Equipment no. 15 – Ventilation of other premises without windows

The ventilation of other premises without windows will be by perforation of door structures with a minimum free area Av,min pursuant to the drawing documentation (addressed by the site). Such a door will be between a ventilated and unventilated area. Another proposed method for ventilation of such premises is by standard or fire protection wall ventilation grilles, so that one element is always used for air inlet (in the bottom part of the room) and the second one for the outlet (in the upper part of the room). The volume air flow was established on the basis of air exchange intensity of 2 x/h.

The ventilation of the ventilation machine room on the 1st underground floor and on the 5th upper floor will be by non-closing apertures on the exterior. Such apertures will be equipped with rain louvers with enlarged gaps between the strips (PZ-ALS). The volume flow of air was established on the basis of an air exchange intensity of 1 x/h. As part of the reconstruction of the ventilation machine room on the 1st underground floor will be replaced all non-standard sized rain louvers by new louvers with enlarged gaps between the strips (PZ-ALS) The current dimensions of construction apertures must be measured before ordering the products. As part of the reconstruction of the ventilation machine room on the 5th upper floor will be replaced the existing full height louvers with new full height segment louvers (PZ-SEG). Such louvers must be equipped with an opening transition element (opening segment) pursuant to the design in the drawing documentation. The current dimensions of construction apertures must be measured before ordering the products.

NOTES to Equipment no. 15:

* In the ventilation machine room in the 1st underground floor, room no. -118, will be retained the dimension of original louvers pursuant to construction requirements due to the architecture. But due to practicality, from the interior side of the machine room the two louvers will be closed by a construction such that only an aperture to the exterior of 200mm will remain. These are louvers not used for the suction and blow out of ventilation units. Twice the aperture width of 200mm while preserving the current height of the apertures is sufficient for the unforced ventilation of the ventilation machine room .

3. Noise Protection

The following measures were proposed for the prevention of noise and vibration transmission:

* The piping will be supported by damping rubber at the suspensions.
* Noise silencers will be mounted in the inlet and outlet pipes. They prevent excessive noise transmission from fans in the unit into ventilated rooms.
* The ventilation and cooling channel units will be connected by a flexible connection to the pipe network..
* Selected distribution elements will be supplemented with acoustic insulation, which will be included in the delivery of the distribution element from the producer.

4. Surface Protection, Insulation

Equipment no. 1 – Ventilation of garage

The ventilation pipes will be made from zinc-coated sheet without finishing.

In the garage area, room no. -226, the pipe will be without insulation, from room no. -227 to the end of the outlet pipe in room no. -118 (ventilation machine room on the 1st underground floor) will be thermally insulated against dew by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

Equipment no. 2– Ventilation of premises in the 2nd underground floor

The ventilation pipes will be from zinc-coated sheet without finishing. The flexible connection hoses will be from aluminium and thermally insulated in the part of the inlet distribution network.

All pipes leading to and from the recuperation unit in room no. -118 (ventilation machine room on the 1st underground floor) will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil. The drainage distribution network in the scope pursuant to the drawing documentation and the whole inlet distribution network on the 2nd underground floor will be thermally insulated against dew by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm.

Equipment no. 3 – Ventilation of the large kitchen and relevant premises

The ventilation pipes will be from zinc-coated sheet without finishing.

All ventilation pipes of the outlet from the interior for ventilation of the relevant premises will be waterproof and will be inclined towards the riser pipe, where the bottom of the rising pipe will be drained.

All pipes leading to and from the recuperation unit in room no. -501 (ventilation machine room in the 5th upper floor) will be thermally insulated against dew, heat losses and gains by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil. The drainage distribution network in the scope pursuant to the drawing documentation and the whole inlet distribution network will be thermally insulated against dew, heat losses and gains by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

Coolant distributors will be insulated against dew by rubber insulation with a thickness of 9 mm.

Equipment no. 4 – Ventilation of premises on the 2nd underground floor, 1st underground floor, 1st upper floor, 2nd upper floor

The ventilation pipes will be from zinc-coated sheet without finishing. The flexible connection hoses will be aluminium.

All pipes leading to and from the recuperation unit in room no. -118 (ventilation machine room on the 1st underground floor) will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

The drainage distribution network piping through the server room no. -119 will be thermally insulated against dew by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

The drainage distribution network must have in rooms -105 and 207 in the scope pursuant to the drawing documentation a fire insulation by insulation plates Rockwool Techrock 80 ALS in a thickness of 40 mm for the fire durability EI 45.

The inlet and outlet drainage distribution network must in room -117 at the point of adverse transition of pipe in the scope pursuant to the drawing documentation have an acoustic insulation K-Flex K-FONIK ST GK 072 in the overall thickness of 13 mm.

Equipment no. 5 – Ventilation of sanitary facilities on the 1st underground floor

The ventilation pipes will be from zinc-coated sheet without finishing. The flexible connection hoses will be aluminium.

All pipes leading to and from the recuperation unit in room no. -118 (ventilation machine room on the 1st underground floor) will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

The overpressure chamber PB for the air inlet will be supplemented by interior acoustic insulation, thickness 6 mm, which will be a component of the delivery from the producer of the distribution element.

Equipment no. 6 – Ventilation of the conference room and kitchen on the 3rd upper floor, corridor and kitchen on the 4th upper floor

The ventilation pipes will be from zinc-coated sheet without finishing. The flexible connection hoses will be aluminium and thermally insulated in the part of the inlet distribution network and in a part of the outlet distribution network only in room no. 326.

All pipes leading to and from the recuperation unit in room no. -501 (ventilation machine room on the 5th upper floor) will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 30mm with aluminium foil.

The drainage distribution network in the scope pursuant to the drawing documentation and the whole inlet distribution network will be thermally insulated against dew and heat losses by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

Equipment no. 7 – Ventilation of the boiler room on the 2nd underground floor

The ventilation pipes will be from zinc-coated sheet without finishing.

The distribution network in the whole scope of fresh air intake from the exterior and the distribution network in the whole scope of air outlet from the boiler room will be thermally insulated against dew by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

Equipment no. 8 – Ventilation of Protected Escape Routes (CHÚC)

The ventilation pipes will be from zinc-coated sheet without finishing and thermal insulation.

Equipment no. 9 – Ventilation of sanitary facilities of apartments

Equipment no. 10 – Ventilation of Combined Ladies/Man’s WC

The ventilation pipes will be from zinc-coated sheet without finishing.

The upper part of the riser pipe under the ceiling of the 4th upper floor and part of the pipe traversing the ventilation machine room on the 5th upper floor will be thermally insulated against dew by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

Equipment no. 11 – Cooling in the 4th upper floor

Equipment no. 12 – Cooling of offices on the 1st underground floor, 1st upper floor, 3rd upper floor, and conference room on the 3rd upper floor

Equipment no. 13 – Cooling of representative premises on the 1st upper floor, 2nd upper floor

The ventilation pipes will be from zinc-coated sheet without finishing. The flexible connection hoses will be aluminium and thermally insulated.

All ventilation connection pipes and connection flanges connecting channel units and overpressure chambers PB will be thermally insulated against dew and heat gains by a self-adhesive rubber insulation K-Flex ST DUCT – ALU, thickness 15 mm with aluminium foil.

The connecting overpressure chambers PB will be from the exterior side of the chamber thermally insulated against dew and heat gains by a self-adhesive rubber insulation K-Flex ST DUCT – ALU thickness 15 mm with aluminium foil.

The connecting overpressure chambers PB on the 3rd and 4th upper floor mounted in a horizontal position will be from the exterior side of the chamber thermally insulated against dew and heat gains by a self-adhesive rubber insulation K-Flex ST DUCT – ALU thickness 10 mm with aluminium foil.

Coolant distributors will be insulated against dew by rubber insulation with a thickness of 9 mm.

Equipment no. 14 – Cooling of the server room on the 1st underground floor

Coolant distributors will be insulated against dew by rubber insulation with a thickness of 9 mm.

5. Requirements on Subsequent Jobs

5.1 Requirements on Construction Adjustments

- Preparation of breakthroughs in construction structures for ventilation and copper piping and their cleaning following the installation. The construction structure may not encumber the pipe walls so they do not deform them.

- Provision for the structure for mounting exterior condensing units

- The installation of ventilation pipes must be coordinated with the installation of other pipes, particularly with sewerage riser pipes and other sanitary pipes.

- The assembly of ventilation pipes (distribution elements) must be coordinated with the structures of lower ceilings.

- In room no. -108, 326, 414, 415 (kitchens) will be installed circulation digesters, which will be a part of interior delivery. The ventilation technicians will only install the sanitary ventilation of the premises.

- Mounting of doors without threshold or undercut pursuant to the drawing documentation.

- Preparation of door structures with a minimum required size of perforation pursuant to the drawing documentation.

- Permanent opening of the door structure D/10 (2687x2000mm) must be provided on the 2nd underground floor to provide for the ventilation of premises separated by these structures.

- Permanent opening of the 2x door structure D/62 (1500x2000+680mm) must be provided on the 3rd upper floor to provide for the ventilation of premises separated by these structures.

- Minimum height of niches for the mounting of inlet distribution elements is 200mm.

- Minimum height of niches for the mounting of outlet (suction) distribution elements is 150mm.

- In the ventilation machine room on the 1st underground floor, room no. -118, will be pursuant to construction requirements retained the dimensions of the original louvers due to the architecture. But due to practicality from the interior side of the machine room the two louvers will be closed by a construction in such that only an aperture to the exterior of 200mm will remain. These are louvers not used for the suction and blow out of ventilation units. Twice the aperture width of 200mm with regard to the retention of the current aperture height is sufficient for unforced ventilation.

5.2 Requirements for Health and Sanitary Installations (ZTI)

2 units of floor inlet to be installed in the ventilation machine room on the 5th upper floor under the condensing units.

Drainage of condensed water from ventilation units, item no. 2.01, 3.01, 5.01, 6.01.

Drainage of condensed water from the inclined outlet pipe in the kitchen on the 2nd and 1st upper floor (at the bottom of the riser pipe connection to T-piece).

Drainage of condensed water from ventilation riser pipes (at the bottom of riser pipe V1-V9 connection to T-piece).

Mounting of the condensate pipe through odour trap in the interior sewerage (e.g. HL136 or HL21). Condensate outlet pipe to run at a minimum gradient of 1%.

Equipment no. 11 – Cooling on the 4th upper floor

Drainage of condensed water from interior air conditioning units:

MMD-AP0076BHP1-E– item no. 11.02 – 12 units

MMD-AP0056SPH1-E– item no. 11.03 – 1 unit

MMD-AP0156BHP1-E– item no. 11.04 – 3 units

MMD-AP0096BHP1-E– item no. 11.05 – 1 unit

Equipment no. 12 – Cooling of offices on the 1st underground floor, 1st upper floor, 3rd upper floor, and conference room on the 3rd upper floor

Drainage of condensed water from interior air conditioning units:

MMD-AP0076BHP1-E– item no. 12.02 – 6 units

MMD-AP0056SPH1-E– item no. 12.03 – 1 unit

MMD-AP0156BHP1-E– item no. 12.04 – 3 units

MMD-AP0096BHP1-E– item no. 12.05 – 1 unit

MMD-AP0186BHP1-E– item no. 12.06 – 5 units

MMD-AP0126BHP1-E– item no. 12.07 – 1 unit

Equipment no. 13 – Cooling of representative premises on the 1st upper floor, 2nd upper floor

Drainage of condensed water from interior air conditioning units:

MMD-AP0076BHP1-E– item no. 13.02 – 1 unit

MMD-AP0156BHP1-E– item no. 13.03 – 3 units

MMD-AP0186BHP1-E– item no. 13.04 – 4 units

MMD-AP0246BHP1-E– item no. 13.05 – 2 units

MMD-AP0276BHP1-E– item no. 13.06 – 2 units

Equipment no. 14 – Cooling of the server room on the 1st underground floor

Drainage of condensed water from interior air conditioning units:

RAV-SM564UTP-E – item no. 14.02 – 2 units

Mounting of the condensate pipe via an odour trap in the interior sewerage (e.g. HL136 or HL21). The condensate outlet pipe to run at a minimum gradient of 1%.

5.3 Requirements of Electrical Part:

Provision for power supply of ventilation equipment.

Equipment no. 1 – Ventilation of garage

1. Provision for power supply of the sliding fan

IV Smart EC, item no. 1.01 – 1 unit:

* P=350W
* I = 2.6A
* (1~ 230V/ 50Hz)

2. Provision for power supply of the fan

KVK Slim 400 EC, item no. 1.02 – 1 unit:

* P=536W
* I = 2.35A
* (1~ 230V/ 50Hz)

3. Provision for power supply of the control unit, item no. 1.03 – 1 unit:

* I = 10A
* (1~ 230V/ 50Hz)
* The control will via the control unit EC Vent CB (item no. 1.03 ) and of the wall controller with display EC Vent RU (item no. 1.05) in room no. -118, ventilation machine room on the 1st underground floor. The equipment will be started by timer and based on the CO level in the garage. (delivery of ventilation)
* The electricians will rewire the equipment and sensors

4. Provision for the connection and coupling of the servo-drive item no. 1.10 – 1 unit with the fan, item no. 1.02

* (1~ 230V/ 50Hz)
* The servo-drive will operate in an On/Off regime. If the fan is started, the servo-drive will open the shutter, in the reverse case it will close it. (The servo-drive will be included in the delivery of ventilation)
* The electricians will rewire the equipment

Equipment no. 2– Ventilation of premises on the 2nd underground floor

1. Provision for power supply of the recuperation unit

DUPLEX 2500 Multi Eco, item no. 2.01 – 1 unit:

* P=5000W
* I = 8A
* Fuse 3x16A
* (3~ 400V/ 50Hz)
* The control will be by digital wall controller with display. The equipment has the its own I&C system. (Part of delivery of equipment)

Equipment no. 3 – Ventilation of the large kitchen and relevant premises

1. Provision for power supply of the recuperation unit

DUPLEX 10100 Basic, item no. 3.01 – 1 unit:

* P=10400W
* I = 17A
* Fuse 3x20A
* (3~ 400V/ 50Hz)
* The control will be by the digital wall controller with display. The equipment has its own I&C system. (Part of delivery of equipment)

2. Provision for power supply of the condensing unit

RAV-SM 2246AT8-E, item no. 3.02 – 1 unit:

* P=6500W
* I = 18A
* (3~ 400V/ 50Hz)
* Fuse 3x20A
* The ventilation unit will be connected with the exterior condensing unit by a communication cable and communication adapter for control (to be installed the ventilation technicians).

3. Provision for power supply of the built-in lighting of the ventilation ceiling on the 2nd underground floor, item no. 3.03 – 1 unit:

* P= 1740W
* (1~ 230V/ 50Hz)

Equipment no. 4– Ventilation of premises on the 2nd underground floor, 1st underground floor, 1st upper floor, 2nd upper floor

1. Provision for power supply of the recuperation unit

DUPLEX 12000 Roto, item no. 4.01 – 1 unit:

* P=10800W
* I = 17.2A
* Fuse 3x20A
* (3~ 400V/ 50Hz)
* The control will be by the digital wall controller with display. The equipment has its own I&C system. (Part of delivery of equipment)

Equipment no. 5– Ventilation of sanitary facilities on the 1st underground floor

1. Provision for power supply of the recuperation unit

* DUPLEX 1100 Flexi RD5, item no. 5.01 – 1 unit:
* P=800W
* I = 5A
* Fuse 1x10A
* (1~ 230V/ 50Hz)
* The control will be by the digital wall controller with display. The equipment its own proprietary I&C system. (Part of delivery of equipment)

Equipment no. 6 – Ventilation of conference room and kitchen on the 3rd upper floor, corridor and kitchen on the 4th upper floor

1. Provision for power supply of the recuperation unit

* DUPLEX 800 Multi Eco, item no. 6.01 – 1 unit:
* P=800W
* I = 5A
* Fuse 1x10A
* (1~ 230V/ 50Hz)
* The control will be by the digital wall controller with display. The equipment has its own I&C system. (Part of delivery of equipment)

Equipment no. 7 – Ventilation of the boiler room on the 2nd underground floor

2. Provision for power supply of the inlet ventilation unit

TOPVEX SF02 HWL, item no. 7.01 – 1 unit:

* P=170W
* I = 1.2A
* (1~ 230V/ 50Hz)
* The control will be by the wall controller located in the boiler room. The equipment has its own I&C system. (Part of delivery of equipment)
* The unit will run non-stop.
* If the boilers are out of operation for a long time, the equipment will be run by a weekly timer – set manually on the unit controller.
* Boilers must shut down when the inlet ventilation unit is not running. The electricians will connect the control unit of the ventilation equipment with the control unit of the boiler room.

Equipment no. 8 – Ventilation of Protected Escape Routes (CHÚC)

1. Provision for power supply of the fan

RS 50-25 EC, item no. 8.01 – 1 unit:

* P=405W
* I = 1.8A
* (1~ 230V/ 50Hz)
* The fans will be started by a separate switch at a location stipulated by the requirements of the fire protection designer (to be installed by the electricians).
* The fan will be powered from two mutually independent power sources (to be installed by the electricians)

2. Provision for the connection and coupling of the servo-drive item no. 8.03 – 1 unit with fan, item no. 8.01

* (1~ 230V/ 50Hz)
* The servo-drive will operate in an On/Off regime. If the fan is started, the servo-drive will open the shutter, in the reverse case it will close it. (The servo-drive will be included in the delivery of ventilation)
* The Electricians will rewire the equipment

Equipment no. 9 – Ventilation of sanitary facilities of apartments

1. Provision for power supply of outlet radial fan K 100 EC sileo fan, item no. 9.01 – 1 unit:

* P=83W
* I = 0.7A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in room no. 439 (to be installed by the Electricians).
* The fan will be able to continue to run after being switched off (not included in the delivery of fan – to be installed by the electricians)

2. Provision for power supply of outlet radial fan K 100 EC sileo fan, item no. 9.02 – 1 unit:

* P=83W
* I = 0.7A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in room no. 416 (to be installed by the electricians).
* The fan will be able to continue to run after being switched off (not included in the delivery of fan – to be installed by the electricians)

3. Provision for power supply of outlet radial fan K 100 EC sileo fan, item no. 9.03 – 1 unit:

* P=83W
* I = 0.7A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in room no. 415 (to be installed by the electricians).

4. Provision for power supply of outlet radial fan K 125 EC sileo fan, item no. 9.04 – 1 unit:

* P=83W
* I = 0.7A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in room no. 423 and

no. 424 (to be installed by the electricians)

* The fan will be able to continue to run after being switched off (not included in the delivery of fan – to be installed by the electricians)

5. Provision for power supply of outlet radial fan K 125 EC sileo fan, item no. 9.05 – 1 unit:

* P=83W
* I = 0.7A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in room no. 427 and

no. 429 (to be installed by the electricians)

* The fan will be able to continue to run after being switched off (not included in the delivery of fan – to be installed by the electricians)

Equipment no. 10 – Ventilation of Combined Ladies/Man’s WC

1. Provision for power supply of outlet radial fan KVKE 160 EC fan, item no. 10.01 – 1 unit:

* P=67W
* I = 0.55A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in the WC room no. 105, no. -130, no. -208 (to be installed by the electricians).
* The fan will be able to continue to run after being switched off (not included in the delivery of fan – to be installed by the electricians)

2. Provision for power supply of outlet radial fan K 100 EC sileo fan, item no. 10.02 – 1 unit:

* P=83W
* I = 0.7A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in the WC room no. 323 (to be installed the electricians).
* The fan will be able to continue to run after being switched off (not included in the delivery of fan – to be installed by the Electricians)

3. Provision for power supply of outlet radial fan K 100 EC sileo fan, item no. 10.03 – 1 unit:

* P=83W
* I = 0.7A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in the WC room no. 322 (to be installed the electricians).
* The fan will be able to continue to run after being switched off (not included in the delivery of the fan – to be installed by the electricians)

4. Provision for power supply of outlet radial fan K 100 EC sileo fan, item no. 10.04 – 1 unit:

* P=83W
* I = 0.7A
* (1~ 230V/ 50Hz)
* The fan will be started by a separate switch in WC room no. 412 (to be installed by the electricians).
* The fan will be able to continue to run after being switched off (not included in the delivery of fan – technicians by the electricians)

Equipment no. 11 – Cooling in the 4th upper floor

1. Provision for power supply of the exterior VRF unit

MAP1406HT8P-E 14PS– item no. 11.01 - 1 unit

* P=12700W
* I = 19.5A
* Fuse 1x32A
* (3~ 400V/ 50Hz)
* The interior units and the exterior unit will be connected by the communication cable. (to be installed by the ventilation technicians)

2. Provision for power supply of the interior channel unit

MMD-AP0076BHP1-E– item no. 11.02 – 12 units

* P=38W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by the communication cable. The control will be by remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

3. Provision for power supply of the interior channel unit

MMD-AP0056SPH1-E– item no. 11.03 – 1 unit

* P=38W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by communication cable. The control will be by remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

4. Provision for power supply of the interior channel unit

MMD-AP0156BHP1-E– item no. 11.04 – 3 units

* P=62W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by the communication cable. The control will be by remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

5. Provision for power supply of the interior channel unit

MMD-AP0096BHP1-E– item no. 11.05 – 1 unit

* P=43W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

NOTE: Internal channel units in individual apartments will be connected to the common fuse in accordance with the installed power input of all equipment in the apartment. Establishment of separate electricity breakdown for channel units in apartments.

Equipment no. 12 – Cooling of offices in the 1st underground floor, 1st upper floor, 3rd upper floor, and conference room in the 3rd upper floor

1. Provision for power supply of the exterior VRF unit

MAP2206HT8P-E 22PS– item no. 12.01- 1 unit

* P=23200W
* I = 35.6A
* Fuse 3x50A
* (3~ 400V/ 50Hz)
* The interior units and the exterior unit will be connected by the communication cable (to be installed by the ventilation technicians).

2. Provision for power supply of the interior channel unit

MMD-AP0076BHP1-E– item no. 12.02 – 6 units

* P=38W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

3. Provision for power supply of the interior channel unit

MMD-AP0056SPH1-E– item no. 12.03 – 1 unit

* P=38W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

4. Provision for power supply of the interior channel unit

MMD-AP0156BHP1-E– item no. 12.04 – 3 units

* P=62W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

5. Provision for power supply of the interior channel unit

MMD-AP0096BHP1-E– item no. 12.05 – 1 unit

* P=43W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

6. Provision for power supply of the interior channel unit

MMD-AP0186BHP1-E– item no. 12.06 – 5 units

* P=62W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

7. Provision for power supply of the interior channel unit

MMD-AP0126BHP1-E– item no. 12.07 – 1 unit

* P=43W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

Equipment no. 13 – Cooling of representative premises on the 1st upper floor, 2nd upper floor

1. Provision for power supply of the exterior VRF unit

MAP2206HT8P-E 22PS– item no. 13.01- 1 unit

* P=23200W
* I = 35.6A
* Fuse 31x50A
* (3~ 400V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. (to be installed by the ventilation technicians)

2. Provision for power supply of the interior channel unit

MMD-AP0076BHP1-E– item no. 13.02 – 1 unit

* P=38W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

3. Provision for power supply of the interior channel unit

MMD-AP0156BHP1-E– item no. 13.03 – 3 units

* P=62W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

4. Provision for power supply of the interior channel unit

MMD-AP0186BHP1-E– item no. 13.04 – 4 units

* P=85W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

5. Provision for power supply of the interior channel unit

MMD-AP0246BHP1-E– item no. 13.05 – 2 units

* P=115W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

6. Provision for power supply of the interior channel unit

MMD-AP0276BHP1-E– item no. 13.06 – 2 units

* P=115W
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. The control will be by a remote, or by a wall-mounted controller. (to be installed by the ventilation technicians)

Equipment no. 14 – Cooling of the server room on the 1st underground floor

1. Provision for power supply of the exterior condensing unit:

RV-SP 564ATP-E item no. 14.01– 2 units:

* P=1700W
* I = 15.0A
* Fuse 1x16A
* (1~ 230V/ 50Hz)
* The interior units and the exterior unit will be connected by a communication cable. (to be installed by the ventilation technicians)
* The condensing unit will be powered by two mutually independent power sources (to be installed by the Electricians)

5.4 Requirements for Heating

For the equipment 3.01 and 6.01 on the 5th upper floor, installation of a water heating circuit with a minimum content of 15% propylene glycol (up to -5°C) taking into consideration frost protection of the ventilation water exchangers during the inactivity of the equipment.

Provision for supply of a mixing node of the water heater of the ventilation equipment with heating water:

Equipment no. 2– Ventilation of premises on the 2nd underground floor

1. Provision for power supply of mixing node of the water heater of the recuperation unit

DUPLEX 2500 Multi Eco, item no. 2.01 – 1 unit:

* QUK= 2.0 kW
* Temperature gradient: 70/50°C
* The mixing node will be included in the supply of the ventilation equipment

Equipment no. 3 – Ventilation of the large kitchen and relevant premises

1. Provision for power supply of mixing node of the water heater of the recuperation unit

DUPLEX 10100 Basic, item no. 3.01 – 1 unit:

* QUK= 26.0 kW
* Temperature gradient: 70/50°C
* The mixing node will be included in supplied ventilation equipment

Equipment no. 4 – Ventilation of premises on the 2nd underground floor, 1st underground floor, 1st upper floor, 2nd upper floor

1. Provision for power supply of mixing node of the water heater of the recuperation unit

DUPLEX 12000 Roto, item no. 4.01 – 1 unit:

* QUK= 16.0 kW
* Temperature gradient: 70/50°C
* The mixing node will be included in the supplied ventilation equipment

Equipment no. 5 – Ventilation of sanitary facilities on the 1st underground floor

1. Provision for power supply of mixing node of the water heater of the recuperation unit

DUPLEX 1100 Flexi RD5, item no. 5.01 – 1 unit:

* QUK= 1.2 kW
* Temperature gradient: 70/50°C
* The mixing node will be included in the supplied ventilation equipment

Equipment no. 6 – Ventilation of conference room and kitchen on the 3rd upper floor, corridor and kitchen on the 4th upper floor

1. Provision for power supply of mixing node of the water heater of the recuperation unit

DUPLEX 800 Multi Eco, item no. 6.01 – 1 unit:

* QUK= 1.0 kW
* Temperature gradient: 70/50°C
* The mixing node will be included in the supply of the ventilation equipment

Equipment no. 7 – Ventilation of the boiler room on the 2nd underground floor

1. Provision for power supply of mixing node of the water heater

item no. 7.01 – 1 unit:

* QUK= 3.8kW
* Temperature gradient: 70/39°C
* The mixing node and its regulation will be included in the supply of the ventilation equipment. The central heating technicians will undertake assembly and regulation.
* The secondary circuit of the water heater is supplemented with a pump to compensate for the thermal losses of the heater, but not of the primary circuit of the boiler.

6. Overview of Installed Outputs

Overall power input of designed equipment:

Equipment no. 1 – 00.92 kW

Equipment no. 2 – 05.00 kW

Equipment no. 3 – 18.64 kW

Equipment no. 4 – 10.80 kW

Equipment no. 5 – 00.80 kW

Equipment no. 6 – 00.80 kW

Equipment no. 7 – 00.17 kW

Equipment no. 8 – 00.41 kW

Equipment no. 9 – 00.42 kW

Equipment no. 10 – 00.32 kW

Equipment no. 11 – 13.43 kW

Equipment no. 12 – 24.05 kW

Equipment no. 13 – 24.23 kW

Equipment no. 14 – 03.40 kW

Total 103.39 kW

Overall heating output of proposed equipment:

Equipment no. 2 – 02.00 kW

Equipment no. 3 – 26.00 kW

Equipment no. 4 – 16.00 kW

Equipment no. 5 – 01.20 kW

Equipment no. 6 – 01.00 kW

Equipment no. 7 – 03.80 kW

Total 50.00 kW

Overall cooling output of proposed equipment:

Equipment no. 3 – 19.40 kW

Equipment no. 11 – 40.00 kW

Equipment no. 12 – 61.50 kW

Equipment no. 13 – 61.50 kW

Equipment no. 14 – 10.60 kW

Total 193.00 kW

7. Fire Protection of the Building

In a pipe traversing various fire protection sections and their cross-section is larger than 0.04 m² or in pipes with a smaller cross-section and a mutual distance of less than 0.5m, will be mounted fire flaps by a wet installation process. In the event of fire in any fire protection section the fire protection flap will prevent the fire spreading to other fire protection sections. The fire flaps will be of a basic design, i.e. with a spring-activated mechanism with a melting fuse set to 74°C and with manual control. The assembly apertures will be made pursuant to the operational instructions of the flap supplier. A plaster or mortar mixture will be used for sealing the gap between the fire protection partition and the fire closure. The traverses of the ventilation pipe in the fire partition structure must be sealed with a sealing binder with fire durability or pursuant to the instructions of the fire flap producer.

In rooms with a provided fire ventilation grille, the grille will be mounted in the fire protection partition such that the axis of blades is always horizontal. The assembly apertures will be made pursuant to the operational instructions of the supplier. A plaster or mortar mixture will be used for sealing the gap between the fire protection partition and the grille frame. The fire ventilation grille will be of a basic design, i.e. with a spring-activated mechanism with a melting fuse set to 74°C.

The fire flaps must be installed, operated and inspected pursuant to the Installation, Operation and Inspection Manual of the fire flap producer. Access to the flaps must be provided to allow their inspection.

Fire flaps must be marked pursuant to Section 7, Clause 1, Decree of Ministry of Interior of the Slovak Republic no. 478/2008 Coll. on the properties, specific conditions for operation and provision for regular inspection of a fire closure with a conformity sign and accompanying data in a readable, clear and difficult to remove manner. Pursuant to Section 7, Clause 5 Letter d) and Clause 9 of Decree of Ministry of Interior of the Slovak Republic no. 478/2008 Coll. the position of a fire resistant flap must be marked “FIRE FLAP” with a minimum height of the letters of 30 mm, or by a pictogram pursuant to the Annex no. 3 to Decree of Ministry of Interior of the Slovak Republic no. 478/2008 Coll. The marking of the installation position of a fire flap must be placed pursuant to Section 7, Clause 8 of Decree of Ministry of Interior of the Slovak Republic no. 478/2008 Coll. on the fire closure - fire flap or in close vicinity to the fire partition structure with the installed fire closure - fire flap. The contractor must also submit the accompanying documentation for the installed fire closures - fire flaps pursuant to Section 8, Clause 1 of Decree of Ministry of Interior of the Slovak Republic no. 478/2008 Coll., i.e.:

a) certificate or declaration of conformity issued by the producer of the fire closure (fire flap) or by the authorised representative of the producer of the fire closure if this was, or is, required pursuant to a special regulation,

b) guidance for its assembly, commissioning, recommended method of use, including limitation of the usage environment, identification of warnings, instructions for maintenance and scope of other data if this is required in the interest of consumer protection, issued by the producer of the fire closure,

c) operating journal for the fire closure.

A declaration of conformity or the certificate, instruction for operation and operating journal must be retained pursuant to Section 8, Clause 9 of Decree of Ministry of Interior of the Slovak Republic no. 478/2008 Coll. during the operation of the fire closure.

For the assessment of fire resistance of new construction products and materials with requirements imposed from the point of view fire safety must be submitted certificates for conformity assessment or declaration of conformity of used construction products and materials which must comply with requirements on the requested fire resistance.

8. Assembly, Operation and Maintenance of Equipment

Rectangular zinc coated pipe SK1 circular pipe, type SPIRO will be used. Attention must be paid by the installation of pipes to the finishing of joints to minimise air losses due to leakages in the piping. All piping has prescribed joints sealed by sealing tape and sealing with a binder. The piping will be installed using steel fasteners, and screw rods of combined screws every 2 to 3 m. Pipes in suspension must be flexibly embedded through rubber pads to prevent transmission of vibrations in the construction structure. The assembly of the equipment can be performed in an area which is prepared from the construction point of view, i.e. plastered, whitewashed, and with a rough floor. The assembly has stated the necessity to repair the primer damaged by the transportation, storage and assembly. Consoles and auxiliary structures must be painted with primer and upper paint. The user of equipment is obliged to be acquainted with operating regulations and other documentation which will be supplied with the supply of the equipment. It is recommended before the commissioning of the equipment after the assembly or repair to perform an inspection of all the equipment and to check the following: proper functioning of the running of equipment (fans, filters, flaps…), remove from equipment foreign elements, condition and setting of regulation flaps and ventilation elements, tightness of joints and pipes.

The environment of the technical equipment must be accessible for inspection and maintenance. The user will provide for the regular revision of the equipment. The air conditioning equipment must be operated by technically trained personnel and maintained by qualified technicians. The recommended interval of inspection and service handling is twice a year.

9. Occupational Safety and Health

Rotating parts of equipment must have protective covers and may not be arbitrarily removed or damaged.

The electrical installation must be performed technicians pursuant to valid STNs.

The cooling systems work with the ecological coolant R410A.

# 10. Care for the Work and Life Environment

1. Based on the Decree of the Ministry of Labour, Social Affairs and Family of the Slovak Republic (MPSVR SR) no. 508/2009, cooling equipment is technical gas equipment and they are classified in the following way:

Equipment no. 11 – Cooling on the 4th upper floor

Equipment no. 12 – Cooling of offices on the 1st underground floor, 1st upper floor, 4th upper floor, and conference room on the 4th upper floor

Equipment no. 13 – Cooling of representative premises on the 1st upper floor, 2nd upper floor

is technical gas equipment of group A, equipment working with hazardous gases  - designated for cooling and freezing with an amount of gas for cooling above 25 kg. The technical inspection by an inspection technician must be performed before the commissioning. The inspection will be performed after the pressure and functional test and before the commissioning for continuous operation.

Equipment no. 14 – Cooling of the server room on the 1st underground floor

is technical gas equipment of group C -  technical equipment working with hazardous gases not classified in Group A or Group B (amount of gas for cooling below 3 kg). The technical inspection by a person appointed by the operator will be performed before the commissioning. The inspection will be performed after the pressure and functional test before the commissioning for continuous operation.

2. The establishment of maximum filling of coolant pursuant to STN EN 378-1+A2 for individual systems is as follows:

Equipment no. 13 – Cooling of representative premises on the 1st upper floor, 2nd upper floor

Equipment no. 14 – Cooling of the server room on the 1st underground floor

This system is a direct system, occupancy is of category A for equipment no. 13, C for equipment no. 14 – Occupancy with supervision. The compressor and the fluid collector are located in a free area. In the system is used the coolant R410a with a critical concentration of 0.44 kg/m3. This critical concentration of the coolant is in compliance for the size of the assessed room.

Equipment no. 11 – Cooling on the 4th upper floor

Equipment no. 12 – Cooling of offices on the 1st underground floor, 1st upper floor, 4th upper floor, and conference room on the 4th upper floor

These systems are direct systems, occupancy is of category A – Occupancy with supervision. The compressor and the fluid collector are located in a free area. In the system is used the coolant R410a, whose critical concentration may not exceed 0.44 kg/m3 in the room. There are rooms in the area under consideration that do not comply with this criterion. These are rooms smaller than 29.5 m2 for equipment no. 11 and rooms smaller than 32 m2 for equipment no. 12, where interior cooling units are located. Equipment no. 11 and 12 will therefore be supplemented by a TOSHIBA System Leak Detection & Isolation System. The system consists of a sensor detecting coolant leakage in rooms that do not comply with the required criteria, of insulation valves on the coolant distribution network located in front of such a room and of a control system in the relevant room. The sensors will be installed in rooms at a location prescribed by the producer of the system, i.e. 150 mm above the floor and as close to the interior cooling unit as possible. The system will be in emergency status in the relevant room in the event of a leakage of coolant. The relevant insulation valves will close in the coolant system, the specific interior cooling unit will switch off, error L30 will be displayed on the wall-mounted control panel and the alarm signal will start. The users of the relevant rooms must be informed that such a system is installed in the room and in the event of a leakage of coolant it be required that people leave the room and inform the relevant service technician. The affected room can be reused after thorough ventilation, but the cooling system may only be used after checking and removal of the fault by a person competent to undertake this. During emergency status of any of the interior equipment, the remaining cooling system will operate without restrictions.

11. Conclusion

The proposed equipment ensure optimum comfort in the environment during the maximum performance of its operation. The equipment will work properly provided the installation is undertaken by a technically qualified company pursuant to the project and the technical documentation supplied by the producers of designed equipment.

Elaborated by: Ing. Marek Blaho 9/2018

**15. Public health engineering, SO 07 Water Connection,**

**SO 08 Sewerage Connection**

## TECHNICAL REPORT

1. IDENTIFICATION DATA

Title of site: Major Overhaul of the Building of the Slovak Embassy in London

Location of site: London, 25 Kensington Palace Gardens, UK

Project level: Implementation Project

Building object: SO 07 Water Connection

SO 08 Sewerage Connection

SO 01 - E.15. Public health engineering

General designer REMING CONSULT a.s.

Trnavská cesta 27, 831 04 Bratislava

General Manager: Ing. Slavomír Podmanický

Design of investment project: Ing. arch. Pavol Hanzalík

Redesign of investment project:Ing. arch. Ján Pavúk, PhD.

Responsible Designer: Ing. Norbert Jókay

1. INPUT DATA

The subject of the solution of the project is the water supply, and outlet for sewerage and rainwater from the building.

The building will be supplied by water from the public mains through the proposed water connection DN50 (D63x5.8), length 9.71 m to the investor’s plot. The sewage and rainwater from the building will flow to the existing revision duct eRŠ and then by the existing uniform connection DN200 to the duct on the neighbouring lot of the Embassy of the Czech Republic.

The base for the draft solution were:

* Design documentation of the construction part.
* Requirements of elaborators of other parts of design documentation.

Selected related standards and technical regulations:

* STN EN 12056 Gravity drainage systems inside buildings
* STN 73 6760 Sewerage in buildings
* STN 73 6620 Water piping
* STN 73 6655 Calculation of water piping in buildings
* STN 73 6660 Inner water piping.
* STN EN 1717 (75 5205) Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow.

1. BALANCE

*Calculation of water requirement* amount is elaborated pursuant to Decree no. 684/2006 of the Ministry of Environment of the SR, dated 14.11.2006:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Operation* | | *Number of persons* | *Cold water* | | | | *Hot water* | | |  |
| *Qp* | *Qmax* | *Qhour* | *Qs* | *Qpt* | *Qmt* | *Qht* | *Qrs* |
|  | *l/person/day* | *l/day* | *l/day* | *l/hour* | *l/sec.* | *l/day* | *l/day* | *l/hour* | *m3/year* |
| Residents in apartments | 145 | 11 | 1,595.00 | 2392.50 | 209.34 | 0.058 | 638.00 | 957.00 | 83.74 | 415.00 |
| Administrative workers | 60 | 13 | 780.00 | 1170.00 | 102.38 | 0.028 | 312.00 | 468.00 | 40.95 | 203.00 |
| White collar employees | 60 | 7 | 420.00 | 630.00 | 55.13 | 0.015 | 168.00 | 252.00 | 22.05 | 109.00 |
| Food serving | 25 | 10 | 250.00 | 375.00 | 32.81 | 0.009 | 100.00 | 150.00 | 13.13 | 65.00 |
| Total: |  |  | 3045.00 | 4567.50 | 399.66 | 0.11 | 1218.00 | 1827.00 | 159.86 | 791.70 |

*Amount of rain water* periodicity p = 0.2; rainfall intensity q = 180 l/s/ha

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | area (m2) | | | Qmax (l/s) | | | | *Qyear*  *(m3/year)* |
| *green*  *roofs* | *roofs* | *reinforced areas* | *green roofs* | *roofs* | *reinforced areas* | *total flow l/s* |
|  | 680.00 | 255.00 |  | 11.02 | 4.13 | 15.15 | 589.05 |
| Total: | 0.00 | 680.00 | 255.00 | 0.00 | 11.02 | 4.13 | 15.15 | 589.05 |

1. SO 07 WATER CONNECTION

The public water mains is located in the adjacent road Palace Gardens Mews DN100 (4“). The supply of the building with potable water and water for extinguishing fires will be from the proposed water connection D63 from HDPE with a length of 9.71 m, which will be built from the public mains. The connection will include a prefabricated water gauge shaft 1200\*900\*1800mm where a gauge system with invoicing water meter will be mounted.

After the water gauge shaft, the water piping will run in the ground - HDPE D63\*5.8 pipe, min. 1.2m below the surface.

Along the whole water connection will be mounted a locating Cu wire with a cross section of 10 mm2 - copper with black HMPE insulation. The wire will be fixed to the pipe at the connection point to the transition piece to the welded screw M8, to eye between two copper pads and covered with asphalt. At the end of the water pipe, the wire will run to the cover of the closure.

Compliance with provision of Article 18 (1) (b) of Act no. 657/2004 Coll. on thermal power – sealing of stipulated gauges against unauthorised intervention.

Compliance with provision of Article 8 and 9 of Act no. 142/2000 Coll. on metrology – compliance with technical requirements on products (certificate, declaration of conformity, initial verification).

*Earthworks*

The piping in the ground will be laid in a gradient on the bottom of a dry trench on a reinforced levelled sand bed with a thickness of 150 mm. The pipe will be covered with sand up to 300 mm above the top of pipe. The covering of the pipe will be evenly reinforced in layers with 150 mm thickness. There will be no reinforcement directly above the pipe. The trench will be covered with excavation material and the covering will be reinforced in layers. During the assembly of the pipe, the trench will be cased by attached casing for a trench depth above 1.5 m.

*Material of water mains*

* water connection, water pipe in the ground: plastic pipes for potable water from HDPE (PN16)

1. SO 08 SEWAGE CONNECTION

The outlet for sewerage and rainwater from the building is after the agreement with the administrator of the neighbouring building - Embassy of the Czech Republic, will be mounted in the existing revision duct eRŠ on the investor’s lot. Wastewater will subsequently run into the uniform sewage system DN200 into the mount in the existing revision duct on the neighbouring lot. The sewage pipe will be reconstructed along the original route. The connection of the uniform sewerage from the neighbouring lot runs into the public sewerage in Kensington Palace Gardens street.

The area sewerage DN200 will outlet wastewater from the building. The area rainfall sewerage DN200 will outlet rainwater from the roof of the building and from the reinforced area of the entrance. On the area sewerage will be installed control ducts ø600 mm at a max. distance of 50 m. Sewerage ducts will be from plastic produced by the company REHAU, access to ducts will be via cast-iron venting ducts (class D400) secured against hammering by a rubber seal. The sewage pipe will run in the ground, min. 1.0 m below the surface and the rainfall pipe will run in the ground, min. 0.8 m below the surface.

The original drainage pipes for drainage of the green roof above the garage will be replaced in the original route in the same dimensions. At the border of the lot, the newly built drainage pipe will run to the existing drainage system of the neighbouring lot. Rainwater from the drainage system runs into the public sewerage in Palace Gardens Mews street.

*Earthworks*

The sewage pipe in the ground from sewage socket pipes from PVC will be laid in a gradient in a dry trench on a reinforced levelled sand bed with a thickness of 150 mm. The pipe will be filled with sand up to 300 mm above the top of pipe. The covering will be evenly reinforced in layers with 150 mm thickness. There will be no reinforcement directly above the pipe. The trench will be filled with excavation material and the covering will be reinforced in layers. During the assembly of the pipe, the trench will be cased by attached casing for a trench depth above 1.5 m. In the event of the occurrence of groundwater the trench excavation will be drained by a drainage.

*Material of the sewerage*

* horizontal (downcoming) sewerage in ground: sewage pipes and form pieces from PVC

1. SO 01 - E.15. PUBLIC HEALTH ENGINEERING
   1. INTERIOR POTABLE MAINS

The cold water pipe will lead to the building through the outer wall of the 1st underground floor in the room -101 Cloakroom/Staircase. The entry of the pipe from ground into the building must be sealed against groundwater and connected to the hydro-insulation in coordination with the proposal for the construction part.

The main water closure DN50 will be mounted after the entry of pipe into the building. The cold water pipe will continue under the ceiling of the 1st underground floor in room 210 Boiler Room on the 2nd underground floor.

Due to the low pressure in the public mains identified by the investor in the room -210 Boiler Room at the 2nd underground floor is mounted an automated pressure station (ATS) GRUNDFOS Hydro MPC-E 3 CRIE3-4 (weight: 125 kg, flow: 2.60 l/s, discharge head: 20 m) with a pressure vessel REFIX DT100, vessel 100 litres. The pressure station ATS must be supplied from two independent power sources. The power supply must be secured for at least 45 minutes – Article B.7 of Annex 7 of STN 92 0201-3.

The main horizontal water piping will lead under the ceiling of the 2nd underground floor above the lower ceiling. The riser pipes of the mains will run in ducts, installation walls or freely in front of the wall with sufficient covering. The connection pipes will run above each other in installation walls, freely in front of the wall or in slots in walls.

Closure valves with discharge will be mounted on cold and hot water branches of pipes from the main piping. A discharge valve and thermoregulation valve will be mounted on the circulation.

Hot water will be prepared in room -210 Boiler Room on the 2nd underground floor in a storage water heater VITOCELL 100-V type CVA with a volume of 500 litres, which is part of the central heating supply.

The water heater will be connected to the mains pursuant to STN 060830 and STN EN1717. The following will be mounted on the cold water pipe: 2x closure valve DN50, water meter DN40, filter DN50, controllable return valve EA RV 277 DN50, safety valve DN20, pressure meter, expansion vessel Refix DD 33/10 with Flowjet fitting and discharge valve DN15. A ball valve GK DN32 will be mounted on the hot water pipe. A closure valve DN50 and discharge valve DN15 will be mounted on the hot water pipe.

The hot water piping will be equipped with forced circulation with circulation pump, type GRUNDFOS UPS 25-60 N180. The following will be mounted on the circulation pipe: 3x closing valve DN25, return valve DN25, discharge valve DN15 and circulation pump.

Cold and hot water consumption will be measured for each apartment separately. Water metering sets with a secondary water meter will be installed in apartments.

The inner mains will be deareated through outlet fittings, and drained through the lowest situated fittings.

The water pipes will be insulated along their whole length. All pipes will be fixed to construction structures by fixing elements with rubber lining against noise transmission. The horizontal pipes will be fixed to the ceiling by hinges with sockets with rubber lining. The fittings will be located such that they can be easily accessed, checked and replaced.

A pressure test of water manifolds will be performed after the assembly of potable mains pursuant to STN 73 6660. Flushing and disinfection of the whole distribution and a test of water quality will follow. Pipe disinfection may be performed with a maximum concentration of chlorine in water of 1.0 mg/l. Minutes will be prepared on tests and water quality.

* 1. INTERIOR FIRE WATER MAINS

Hose reels with semi-rigid hose DN25/30 m, with a minimum flow of 1.1 l/s will be located in the building pursuant to the requirements of the fire protection designer. The fire water mains will be from the potable mains separated pursuant to STN EN 1717. In the boiler room will be mounted on pipe after ATS 2x closing valve DN50, filter DN50 and a back pressure valve BA 295S-2“. The closing valve will be sealed in an open position to prevent unauthorised handling.

The main horizontal fire water piping will lead under the ceiling of the 2nd underground floor above the lower ceiling. The riser pipe will run in ducts or freely in front of the wall with sufficient covering. The hose reels connections must be in DN32 dimension. A closing valve DN32 will be mounted before each hose reel at a height of approx. 1.3 m above the floor.

Pursuant to Article 5.12.1 of STN 92 0400 in protected escape route, type “Au” of the building must be a standpipe mounting in each floor to hydrant cabinets with DN 52 (C 52) sockets without equipment and equally mounting at the front of the building (with access for mobile fire fighting technology!!!), where it will end pursuant to Article 5.12.1 STN 92 0400 with a closing and discharge valve, return valve and coupling DN125 with cover. The required pressure will pursuant to Article 5.12.1 STN 92 0400 be sufficient for the fire fighting technology. The vertical piping for the standpipe consists of a riser pipe DN 125.

The water pipes will be insulated along their whole length. Pipes will be fixed to construction structures by elements with rubber lining against noise transmission. The horizontal pipes will be fixed to the ceiling by hinges with sockets with rubber lining.

A sealing and strength test of the pipe will be performed after the assembly of the mains pipe pursuant to valid regulations of STN 73 6660.

*Material of water mains*

* potable cold water distribution (from entry in the building to the anti-fire water, distribution of anti-fire water: pipes from stainless steel (quality 1.4401), joined with pressed connections (system GEBERIT Mapress)
* water distribution in building - cold potable water, hot water circulation, hot water, multi-layer plastic-aluminium pipes -plastic pipes, joined with pressed connections (system GEBERIT Mepla)
* standpipe distribution – zinc coated seamless steel pipes (heavy duty class A1), connected with flexible coupling
* thermal insulation for hot water: foam insulation hoses from PE, joints are to be sealed pursuant to technological regulations of the producer (e.g. Tubolit)
* insulation against condensation of water vapour on cold water pipe: foam insulation hoses from synthetic rubber, joints will be sealed pursuant to technological regulations of the producer (e.g. AF/Armaflex)
* water proof passage of the piping (ext/int): system of anticorrosive sealing rings for traversing pipes with optional installation of “permanent shuttering” from stainless steel (system ACO Aplex)
  1. INTERIOR SEWERAGE

The interior sewerage will outlet wastewater from the building to the proposed area sewerage DN200. The wastewater will be outlet by gravity surge pipes running under the ceiling of the 1st underground floor.

The wastewater from equipment items in the 1st underground floor will be outlet via pumping stations GRUNDFOS Multilift MD.12.1.4. The pumping stations are deployed in rooms -114 and -116 close to equipment items of the room WC women and WC men.

In rooms -205 and -224 are deployed proposed pumping stations GRUNDFOS Multilift MD.22.3.4 for outlet of wastewater from equipment in the 2nd underground floor and partially in the 1st underground floor.

The delivery from pumping stations Multilift will run into sewerage under the ceiling of the 1st underground floor. Closing valves will be mounted on the delivery pipe. Return valves are part of the pumping equipment.

The wastewater from the safety valve and back pressure valves BA295 will be outlet in the collection vessel located at the storage heater. In boiler room in the collector vessel will be installed a submerged pump GRUNDFOS Unilift KP 350 AV1. The wastewater from water treatment equipment for central heating and neutralisation vessel will enter the pumping equipment GRUNDFOS Conlift2. The wastewater from equipment on the 2nd underground floor in the WC and bathroom will be outlet via pumping equipment GRUNDFOS Sololift2 type C-3 and WC-3. The pumping equipment will be located directly behind toilet bowls or under washbasins.

The delivery from the pumping equipment and submerged pump will run under the ceiling of the 2nd underground floor and then enter the gravity pipe of the sewerage ø110, running under the ceiling. The pipe ø110 will subsequently enter the pumping station in room -205.

The wastewater from the sink in room -217 on the 2nd underground floor will be pumped by the equipment GRUNDFOS Sololift2 type C-3 located directly under the sink. The delivery from equipment will run under the ceiling of 2nd underground floor and subsequently enter the pumping station in room -224.

On delivery pipe of all pumping equipment will be mounted closing valves and return valves of relevant dimension if they are not already built into the equipment.

Waste pipes and connecting pipes of the sewerage will run in walls, installation walls or freely in front of the wall with sufficient covering. The connection pipes will be mounted with a minimum gradient of 3%. The condensate outlet pipes will be mounted with a minimum gradient of 1%. All sewerage pipes will be fixed to construction structures by elements with rubber lining against noise transmission.

The proper function of gravity sewerage will be provided by a venting pipe running above the roof and ending at the plastic venting head (HL810, HL807). Waste pipes that cannot be vented above the roof will be equipped with a deareation valve (HL900N, HL900NECO) mounted under the ceiling with suction through a grid. Connection pipes longer than 3 m will be areated through an aeration valve (HL904, HL905) mounted before the first connected equipment item on the vertical pipe. The cleaning of waste pipes will be via cleaning pieces ended by a closing threaded cover, mounted at a height of 1 m above the floor and accessible through a door.

For the connection of the washing machine and dishwasher is proposed an odour closure behind plaster (HL406, or an odour closure on wall (HL410). The outlet of condensate from interior air conditioning units, rising venting pipes and the outlet pipe in the kitchen will be connected to the sewerage through water odour closures (HL136N, HL136.3) or a funnel with odour closure (HL21). The outlet of condensate from venting units will run on the floor under the unit and the pipes will subsequently enter the plastic floor inlet (HL310NPr, HL310N.2). The condensate pipe in the 5th upper floor will be equipped with heating cable against freezing. The floor inlet will also be equipped with a heating assembly (HL82). The drainage of the floor under the condensing units in the 5th upper floor will be in roof inflows in walking finishing with electrical heating (HL62B.1). The floor inlets and roof inflows will be connected to the hydro-insulation layer in coordination with the hydro-insulation system pursuant to solution of the construction part.

The drainage of the ramp and floor in the garage in the 2nd underground floor is not the subject of design documentation, as the original condition of the floor and its drainage will be maintained.

The entry of the pipe from ground into the building must be sealed against groundwater and at the entry point will be a fixed point (see technological rules of the pipe producer). All changes in direction of the sewerage pipe will be mounted with a maximum angle of elbows of 45°.

Sealing test will be performed after the complete assembly of interior sewerage pursuant to valid regulations of STN 73 6760 and STN EN 12 056 Part 5. Minutes will be prepared on performed tests.

* 1. INTERIOR FAT SEWERAGE

The wastewater from the kitchen in room -224 on the 2nd underground floor will be outlet by a separate fat sewerage. The sewerage will end at mobile fat separators, type ACO Eo-Mobil-0,3v, in rooms -205 and -224. The fat separators will be cleaned once per week or as required. The wastewater will subsequently end in the pumping equipment. In rooms -205 and -224 are proposed pumping stations GRUNDFOS Multilift MD.22.3.4. The delivery from the pumping equipment will end in sewerage under the ceiling of the 1st underground floor. A closing valve will be mounted on the delivery pipe. A return valve is a part of the pumping equipment.

Areation valves will be mounted on connection pipes of the fat sewerage (HL904). They will be mounted before the first connected equipment item on the vertical pipe.

Waste pipes and connecting pipes of the fat sewerage will run in walls or freely in front of the wall with sufficient covering. The connection pipes will be mounted with a minimum gradient of 3%. All sewerage pipes will be fixed to construction structures by elements with rubber lining against noise transmission. All changes in direction of sewerage pipe will be mounted with a maximum angle of elbows of 45°.

Tests pursuant to STN 73 6760 will be performed after the completion of interior gravity sewerage.

* 1. INTERIOR RAINFALL SEWERAGE

The interior rainfall sewerage will outlet rainwater from the roof of the building to the proposed area rainfall sewerage DN200.

The rainwater from the roof will be outlet through plastic roof inlets (HL62.1), whose structure will be adjusted to the composition of the roof. The roof inlets will be electrically heated. Waste pipes will run in ducts or in installation walls. The rainwater from the building will be outlet by gravity surge pipes running under the ceiling of the 1st underground floor ceilings above the lower ceiling.

The rainfall sewerage pipes will be insulated along their whole length.

The entry of the pipe from the ground into the building must be sealed against groundwater and at the entry point will be a fixed point (see technological rules of the pipe producer). All changes in direction of sewerage pipe will be mounted with a maximum angle of elbows of 45°.

Tests pursuant to STN 73 6760 will be performed after the completion of interior gravity sewerage.

*Material of the sewerage*

* horizontal (downcoming) sewerage in the building, waste and connection pipes: sound insulation system, pipes and form pieces for interior sewerage from high density polyethylene, connected by welding and electrical couplings (system GEBERIT Silent-db20)
* insulation against condensation of water vapour on rainfall sewerage: foam insulation hoses from synthetic rubber, joints will be sealed pursuant to technological regulations of the producer (e.g. AF/Armaflex)
* water proof entry of the piping (ext/int): system of anticorrosive sealing rings for traversing pipes with optional installation of “permanent shuttering” from polymeric concrete (system ACO Aplex)

1. EQUIPMENT ITEMS

The specification of the builder must be respected with regard to the selection of equipment. The position of the outlet sewerage and mains will be adjusted on site pursuant to the selected equipment items. Standard equipment with a valid certificate will be used. The exact types of equipment items will be specified by the end user or by the investor in collaboration with the architect.

The connection, position of sewerage outlet and mains for the equipment items which are part of the supply of technology for the catering operation must be adjusted and coordinated pursuant to the kitchen project.

1. COMMON TERMS AND CONDITIONS
   1. Passage of pipes through fire partition structures

Each entry of a mains pipe or sewerage from the neighbouring fire section will be fitted with a fire closure with fire durability pursuant to the project of fire protection of buildings, considering the type of used pipe and partition structure. Fire closures must be certified and labelled pursuant to valid regulations after the assembly.

* 1. Earthworks

Existing underground and above ground equipment must be respected during the implementation. All existing underground lines must be identified by their administrator. Conditions of STN 736005 must be complied with regard to crossing and convergence of the proposed pipe with existing infrastructure. Manual excavation must be performed at crossing points of the piping with existing infrastructure and at points where there is potential for damage to them.

* 1. Notes

The assembly of sanitary equipment may only be performed by organisation authorised for such activity and trained personnel, which complies with the terms and conditions of professional competence for the performance of the subject assembly works. Records in site journal must be maintained on the course of construction and assembly work.

The used construction materials and products must be compliant with the terms and conditions of the Act on Construction and Act on Construction Materials. The assembly work will be performed pursuant to valid technical standards and technological regulations of producers of construction materials and products in compliance with valid safety regulations.

Bratislava, 09/2018 Elaborated by: Ing. Norbert Jókay

**16. CENTRAL HEATING**

# 1. General

The project for the implementation of the site was elaborated on the basis of a structural solution and the requirements of the investor.

Heat losses were calculated pursuant to STN EN 128 31 for an ambient temperature of 0°C.

The heating system has a forced circulation with a heat drop of 70/50°C basic - hot water and with regulation of the central heating medium depending on ambient air temperature.

2. Original situation:

The building was heated by a central gas boiler room and the exhaust gas was vented to the existing chimneys.

The existing piping and radiators will be dismantled in the whole building.

3. Proposed situation

3.1. New situation: boiler room

The boiler room will be situated in the 2nd underground floor – boiler room category III.

calculated ambient temperature................................................-0°C

heat drop of the system .............................................. 70/50°C

heating system: hot water, double pipe with forced circulation of heating medium

heat loss of the building..............................................Q ch = 195.0 kW

required output of heat supply for domestic hot water (DHW) preparation.........Q DHW = 33.0 kW

required output for ventilation (Vent)...........................................Q Vent = 45.1 kW

Overall required heat output of the boiler room: Q k = 0.8\*Q CH + 1.0\*Q DHW + 0.8\*Q Vent

Q k = 0.8 \* 195.0+ 1\*33 + 0.8\*45.10 =225.080 kW

Q k = 1.0\*Q CH + 1.0\*Q Vent

Q k = 1.0 \* 195.0+ 1\*45.1 =240.1 kW

Calculation of annual heat and fuel consumption for the central heating (CH):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Annual heat consumption |  |  |  |  |  |
| HEATING | Qyear CH= | 263.42 | MWh/year | 948.0 | GJ/year |
| DHW | Qyear DHW= | 12.80 | MWh/year | 46.0 | GJ/year |
| Venting | Qyear Vent= | 60.59 | MWh/year | 218.0 | GJ/year |
| TOTAL | Qyear = | 336.81 | MWh/year | 1212.0 | GJ/year |
|  |  |  |  |  |  |
| Annual gas consumption | Qp = | 35.90 | th.m3/year |  |  |
| Gas consumption in winter (Win) | Qpwin = | 32.1 | th.m3/year |  |  |
| Gas consumption in summer (Sum) | Qpsum = | 3.8 | th.m3/year |  |  |
|  |  |  |  |  |  |
| Purpose of gas usage | Heating | 77.9 | % |  |  |
|  | DHW | 4.2 | % |  |  |
|  | Venting | 17.9 | % |  |  |

## Nominal output

3x condensing gas boiler, e.g. VITODENS 200W 30-100kW with a modulated output of 18.1-91 kW 80/60°C each, efficiency 107,4 – 110,5 %, 2,0 kPa, gas consumption 9,83m3/hour. Combined heat output 273 kW.

The boiler room has boilers dependent on indoor air, and the nominal output of the boilers is above 50 kW. It Pursuant to STN 07 0730, Article 28, SÚBP (Slovak Office for Safety at Work) no. 25/84 Coll. and supplementary regulation, it is category III boiler room with a sum of boiler outputs up to 0.5 MW – no demolishable area is required (blow-out wall).

3.2. Technical conditions

* design pressure of fittings 0.6 and 1.6 MPa
* design pressure of pipe 0.6 MPa
* design temperature of pipe 200°C
* opening pressure of safety valves 400 kPa
* filling up the system 2.10 bar
* operating pressure – 2.10 bar
* dynamic pressure 0.5 bar
* static pressure 1.5 bar
* operating temperature of medium 70/50°C - with regulation
* gas pressure = 2.0 kPa
* NOX emissions 20 mg/kWh,
* gas calorific value 34,000 kJ/m3
* pursuant to STN EN 12828/2003, (72 hours) performing operating, dilatation tests and adjustment of the system
* implementation and operation must comply with Decree of SÚBP (Slovak Office for Safety at Work) and SBÚ (Slovak Mining Office) pursuant to Decree no. 147/2013 Coll., as of 1.7.2013.
* implementation of work (construction, assembly) pursuant to Act no. 124/2006 Coll., as amended.
* regular inspection of the heating system pursuant to requirements of Act no. 314/2012 Coll. must be provided during the operation in the building by an authorised person, which is also Technická inšpekcia a.s. (Technical Inspection, joint stock company)

4. Piping

The pipe is from: steel, seamless pipe 11 353.0 in technical room – boiler room.

The pipe in the building from the boiler room to radiators is from stainless steel Geberit CrNi, in the floor, under the ceiling of the 1st ground floor, 2nd ground floor, 3rd ground floor, connection pipe to radiators and floor convectors.

The pipe runs under the ceiling in the technical rooms, in identified gradients on type suspension. Drainage of condensate from boilers of the boiler room and chimneys - plastic.

The highest parts of the piping are equipped with venting (automated), the lowest with discharge. A filter will be mounted before the boilers on the return pipe.

All residential rooms will have measured heat consumption by radiators and floor heating. The measurement will be under the ceiling of the 3rd ground floor: ultrasound heat meter Siemens Ultraheat UH50 will be on the piping of each apartment. There will be a service aperture in the ceiling for the mounting and dismounting of the heat meter.

# 5. Proposed situation for the boiler room:

# 5.1. Boiler room

In the boiler room will be installed 3 gas condensing hot water units, type e.g. Vitodens 200-W -100 with a MAX OUTPUT OF 91.0 kW, gas consumption 9.83m3/hour, for natural gas combustion with a safety valve – opening pressure 400 kPa and 3 units CONNECTION SET OF HEATING CIRCUIT WITH THE CIRCULATION PUMP AND SAFETY VALVE 4bar (7501318), VI Steam 25/1-12, input 310W.

The hot water system and gas boilers / building are secured by expansion vessels, 3 units 100/6. The system will be topped up from the water network - by top up equipment WATER TREATMENT e.g. AQUASET 500-N (7511786), REGENERATION SALT 25kg (7419725), AUTOMATIC FILLING FITTING FULLCOMBI BA 6628 DN20 (9566931).

The forced circulation for heating of the warm water is provided by the proposed electronic pump, type MAGNA1 25-60, 1x230-240V/9-92W/0,74A-motor protection is required.

The forced circulation of central heating is provided by the proposed electronic pumps, type MAGNA3, 1x230-240V-motor protection is required and proposed electronic pumps ALPHA2, 1x230-240V/-motor protection is required.

Between the boilers and the COMBINED MANIFOLD AND COLLECTOR for six HEATING CIRCUITS - type M 120, length 3500mm is mounted a hydraulic dynamic pressure equalizer, TYPE 200/120, flow 12.9m3/hour.

The regulation of the central heating circuits is equithermic – EQUITHERMIC CASCADE REGULATION VITOTRONIC 300-K MW2B - supply item. 1 ENLARGEMENT FOR 2nd AND 3rd HEATING CIRCUIT (7164403). Vitotronic 200-H type HK3B, Order no.: Z009463, communication module LON for regulation Vitotronic 300-K type MW1/MW2, Ordering no: 7172174 and 7172173, communication module LON Order no.: 7172173.

The hot water preparation is in a storage water heater for DHW VITOCELL 100-V TYPE CVA Volume 500L , Qch=33kW, Mhw=1324 l/hour, from 10°C to 60°C .

On the return pipe to boilers and on the return pipe from the building is mounted a horizontal weld-on sludge removing device DN65, Ordering no.: 9143278.

Pressure meters on the safety pipe at a uniform height - STN EN 12828/2003, pressure meters on the piping and safety pipe at a uniform height STN EN 12828/2003 - for each branch.

## Size of expansion vessel – STN EN 12828, see Annex no. 1.

## 

Size of safety valve – ON 134309 – 3x boiler – 91.0 kW each

Calculation of safety equipment :

Calculation of safety valves:

 - opening pressure of safety valve 400 kPa

-boiler output P=91 kW

Ge = 91 x 3600=148.90 kg steam/h

2200

The safety valve will be sufficient for this output and opening pressure of 400 kPa and is mounted as a part of CONNECTION SET OF HEATING CIRCUIT WITH CIRCULATING PUMP.

Calculation of safety pipe:

for 1 boiler 91 kW: dp =1.4x +15=28.35 mm - DN 32

## Safety measures in the boiler room:

1) The boiler room must form a separate fire section

2) Boiler room walls must be plain, light coloured and washable up to 1800 mm

3) Passage width 600 mm

4) Escape ways 1200 mm

5) Door from inflammable material opening in the escape direction with the heading "Gas Boiler Room – No Access Allowed”

6) The flooring must be inflammable, with surface allowing for proper cleaning and not slippery

7) Equipment for detection of presence of carbon monoxide - detection pipes

8) Hydrant piping

9) First aid kit

10) Lighting of boiler room min. 300 Lx

11) Connection of portable lights to secured voltage must be provided in the boiler room

12) Air inlet and outlet

13) Operator - temporary - will be stipulated by the user

14) Rules of Operation of the Boiler Room – User

5.1.1. Air inlet, air outlet and exhaust of gases

5.1.1.a Air inlet and air outlet is in unforced way.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Amount of air for combustion | |  |  |
| Fuel | Natural gas | 1 |  |
| Boiler output | Q | 297 | kW |
| Air surplus | n | 1.3 |  |
| Calorific value of fuel | Hu | 34.5 | MJ/m3 |
| Standardised efficiency level | ni | 106.5 | % |
| Stoichiometric air amount | Vmin | 8.72 | m3n/m3n |
| Fuel consumption | B | 34.29 | m3/hour |
| Amount of air for combustion | Vi | 427.58 | m3/hour |
|  |  |  |  |
| 2. Amount of air for boiler room venting | | |  |
| Volume of boiler room | V | 74.23 | m3 |
| Air exchange multiple | n | 3 | 1/hour |
| Amount of air for venting | Vn | 222.69 | m3/hour |
|  |  |  |  |
| 3. Volume flow of air inlet | | |  |
| Amount of air for combustion and boiler room venting | Vc=Vi+Vn | | m3/hour |
| Vc | 650.27 | m3/hour |

The venting of boiler room area is undertaken by the venting system.

5.1.1.b Exhaust gases:

From each boiler, exhaust gases are vented by a separate pipe with circular cross-section φ110mm-plastic material PPs, which will be connected to the common flues - set of flue gas cascade from three boilers DN 200 - plastic material PPs and outlet by pipe, type ICS DN250 in chimney duct and running from the 1st underground floor above the roof of the building, length of the chimney pipe 4.0 and of the chimney body 23.50m.

Exhaust gases DN 250 pipe ICS DN250 run in a chimney duct, max. temperature of flue gas 76 °C, height 23.50m in chimney duct.

Outlet of condensate from condensation boilers and flues will be through the neutralisation equipment NEUTRALISATION OF CONDENSATE- NEUTRALISATION EQUIPMENT in the sewerage.

5.1.2. WATER TREATMENT

The loss of circulation water due to leakages of the heating system is supplemented for by treated water from a water treatment equipment, e.g. AQUASET 500-N.

The anti-corrosive protection of the inner surface of the heating system requires that the system will be filled up with an agent with inhibition influence on the soaked surface of used metals with anti-corrosive effect and with an agent preventing corrosion. The acidity of the water must be maintained in a pH range of 5.8 - 9.

# 5.1.3. Insulation, paint

The pipe will be insulated by insulation pipes with a thickness of 20 mm up to DN 20 and with a thickness of 30 mm up to DN 40 and with a thickness of 50 mm up to DN 80.

The connection pipe from the main riser pipe to the radiator will run in the flooring and in the wall and will have a thickness of 13 mm.

The manifold, collector and equalizer of dynamic pressures will be insulated by insulating bands with a thickness of 50 mm.

Fittings as of DN 50 will be insulated.

Parts of the pipes in the exterior will be protected by an electrical resistive wire with automated switching by a decrease of ambient temperature below +2°C. This is applicable for piping under the ceiling of the 2nd underground floor, 2nd floor and 5th floor.

All technology of the boiler room will be painted with a double primer. On this primer will be applied paint with 1x enamel. Supplementary structures will be painted with double primer and upper enamel. Synthetic paints will be used.

5.1.4. CIRCULATION OF HEATING MEDIUM

Heating branches leading from the boiler circuit of the central heating will be equipped with a circulation pump. The water temperature in the heating circuits will be regulated pursuant to the ambient air temperature up to a max. of 80°C. In the technical room, the proposed pipe will be connected to the pipe under the ceiling or above the floor.

###### 6. Heating system

###### 6.1. Heating elements

The main riser pipes will run from the boiler room below the ceiling and in the wall.

Piping for heating elements and floor convectors will run under the ceiling of the lower floor and in the central riser pipe.

Piping running under the ceiling will be suspended on sockets by means of ceiling suspensions. They will have a downward gradient of 0.3% to the boiler room. The deareation will be through automated deareation valves mounted on manifolds and in the boiler room.

In rooms in underground floors, will be mounted heating elements, type VALVE COMPACT. They will be connected to the heating piping by means of connection fittings for a double-pipe system - RADIATOR VALVE DIRECT, CLOSING, WITH DISCHARGE. Thermostatic heads will be mounted on radiators.

In rooms in upper floors, will be mounted floor convectors without fan and in corner rooms will be convectors with a fan. They will be connected to the heating piping by means of radiator valves DIRECT, WITH CONTINUOUS PRESETTING, on return pipes will be connected ADJUSTABLE CLOSING RADIATOR CONNECTORS DIRECT.

For the control of the floor convectors will be used:

* ROOM THERMOSTAT WITH AUTOMATED SPEED CHANGE, WITH WEEKLY PROGRAMME TYPE PER 06, BOKI , VOLTAGE 230V/50Hz, POWER CONSUMPTION max. 8VA, IP 30, dimensions 86x86x14mm (w x h x l)
* TRANSFORMER type PAT-01-M-02 IN ASSEMBLY BOX, e.g. BOKI VOLTAGE 230V/12V,

POWER CONSUMPTION max. 40VA, dimensions 170x170x71 (w x h x l).

###### 6.2. Floor heating.

Floor heating of low system. e.g. RAUTHERM SPEED plus renova was proposed. Heating areas are connected to a secondary manifold and a collector located in a steel cabinet. The control of each circuit will be performed on a flow meter installed on the manifold.

For apartments in manifold cabinets will be mounted heat meters for heat consumption.

In apartments, there will be one room thermostat for the control of floor heating. In each office there will be one room thermostat for the control of floor heating.

The piping from the boiler to secondary distribution boxes will be insulated with PE.

Floor composition and height for floor heating, e.g. RAUTHERM SPEED plus renova height 21mm:

* treading layer (ceramic flooring, or wood parquets),
* concrete screed 19mm,
* heating coil RAUTHERM SPEED d=10.1x1.1 mm- RAU-PE-Xa,
* min. thermal insulation 2mm
* existing screeding concrete.

Heating areas must be separated from walls by an edge tape. Heating areas must be separated from each other by dilatation tape. Pipes passing elongation points must be run in protection pipe with min. 500mm.

1. SUSPENSION AND COMPENSATORS

The pipe will be suspended on type hinges. The dilatation of horizontal pipes will be compensated for by "U" form compensators. Axial forces will be by dilatation absorbed by fixed points.

###### 9. OCCUPATIONAL SAFETY AND HEALTH

Implementation must be undertaken pursuant to Act no. 367/2001 (i.e. 330/1996+95/2000+158/2001) on occupational safety and health and Decree of the Government of the Slovak Republic no. 387/2006 Coll. on minimum requirements usage of labelling, symbols and signals for providing for occupation safety and health pursuant to Annexes no. 1 to 9.

Pursuant to §6 Article 2 of Act no. 367/2001 non-avoidable hazards and non-avoidable threats that resulted from the piping design must be assessed and actions proposed.

Heat equipment will be designed, implemented and operated pursuant to the Decree of MPSVaR SR (Ministry of Social Affairs and Family of the Slovak Republic) no. 508/2009 Coll.

Boilers are within the competence of provisions of Decree of MPSVaR SR no. 508/2009 Coll. and §3 a Annex no. 1 as reserved pressure equipment of Group B.

The pressure vessel within the competence of provisions of Decree of MPSVaR SR no. 508/2009 Coll. and §3 a Annex no. 1 as reserved pressure equipment of Group A.

The equipment of the boiler room will be arranged such that access is provided to equipment requiring operation and maintenance. The surface of all equipment in the boiler room with a temperature above 50°C (except for closing fittings), will be equipped with thermal insulation. The thermal insulation is dimensioned for a contact temperature of <50°C to prevent burn injuries.

An emergency switch will be mounted at the entrance door to the boiler room which will interrupt the power supply to burner automation.

The following warning sign will be mounted on the boiler room door:

GAS BOILER ROOM – "ACCESS TO UNAUTHORISED PERSONS FORBIDDEN!"

The boiler room will be equipped with the following:

1. local operation rules

2. appropriate fire extinguishing equipment pursuant to the fire protection project

3. foam device for leak check of joints

4. first aid kit

5. battery

Welding work may only be performed by welders with authorisation pursuant to STN 05 0705, STN 05 0710 and STN EN 287-1 (050711).

10. OPERATION OF BOILER ROOM

The boiler room will be equipped with I&C that allows temporary operation by regular rounds, i.e. min. 1x every 12 hours check and number of employees will be 1.

The operation of the boiler room will be undertaken by persons complying with the Decree of SÚBP (Slovak Office for Safety at Work) no. 25/84 Coll. on temporary operation and provisions of Decree of MPSVaR SR (Ministry of Social Affairs and Family of the Slovak Republic) no. 508/2009 Coll.

For a nominal output of the boiler of 100 k W, the boilerman must have a certificate and above 100 kW a boilerman license.

With regard to I&C, the boiler room may be operated by round operation, by data transmission to the central control room. The following must be observed:

- Decree no. 25/1984 Coll. as amended by Decree no. 75/1996

- provisions of Decree of MPSVaR SR (Ministry of Social Affairs and Family of the Slovak Republic) no. 508/2009 Coll. . § 17/3 and § 20

- STN 69 0012, Annex, Article 6 and 7

- STN 07 0711 chemical water treatment equipment.

* regular inspection of the heating system pursuant to the requirements of Act no. 314/2012 Coll. must be provided during the operation in the building by an authorised person, which is also Technická inšpekcia a.s. (Technical Inspection, joint stock company)

11. HEATING TESTS:

Pressure and heating tests pursuant to STN 06 031 will be performed after the completion of the assembly of the central heating equipment. The pressure test will be performed pursuant to Article 134a) with a maximum static pressure in the heating system. The heating tests will run pursuant to Article 140 for 144 hours during the heating period. The heating system will be regulated during the heating test by setting all regulation fittings.

▪ Note:

All equipment and premises which could be hazardous for human health must be equipped with warning stickers and signs.

The hand over of technological equipment to the user will be preceded by individual tests, complex tests, handing over, operation and trial operation.

It is recommended to pour inhibitor in the system for softening the water before filling up the heating water in the system. The inhibitor amount should be dosed and supplemented pursuant to the producer guide.

Any change from this project must be consulted with the designer.

The heating system hydraulics must be regulated such that in the event of a halved heat supply all heating elements will start evenly.

The central heating piping must be marked out before the assembly of the interior elements, thresholds and other equipment installed in the flooring.

Note:

The technical and economical assessment of the proposed equipment is based on requirements and economic feasibility of the investor and is in compliance with valid STN, EN decrees and laws,

Occupational safety and health rules (B1, B3-B6) pursuant to relevant legal regulations must be complied with during construction and assembly work.

*The designer is not liable for errors resulting from non-compliance of the content and instruction in this design documentation. All changes must be consulted in advance with the designer.*

*The design documentation was elaborated pursuant to the requirements of the investor.*

The design documentation was elaborated for the purpose of documentation for the implementation of the site.

REQUIREMENTS ON THE CONSTRUCTION part:

## Safety measures in the boiler room:

1) The boiler room must form a separate fire section

2) Boiler room walls must be plain, light coloured and washable up to 1800 mm

3) Passage width 600 mm

4) Escape ways 1200 mm

5) Door from inflammable material opening in the escape direction with the sign "Gas Boiler Room – No Access Allowed”

6) The flooring must be inflammable, with surface allowing for proper cleaning and not slippery

7) Equipment for detection of presence of carbon monoxide - detection pipes

8) Hydrant piping

9) First aid kit

Correction of chimney termination - one chimney for flue gas and the other for venting!

12) for air inlet apertures in doors

and for air outlet and for puncture of wall in chimney duct

REQUIREMENTS FOR THE ELECTRICIAN:

- connection of I&C to 230V

- connection of floor heating box to 230V

- CONNECTION OF NEUTRALIZER IN BOILER ROOM TO POWER SUPPLY, ( to socket )

- connection of gas boilers VIESSMANN in boiler room to 230V

- connection of pumps in boiler room for heating branches and of pumps under the boiler

- Lighting of boiler room min. 300 Lx

- Connection of portable lights to secured voltage must be provided in the boiler room

- CONNECTION OF TOP UP EQUIPMENT "no. 16" TO ELECTRICAL AUTOMATIC FILLING FITTING FULLCOMBI BA 6628 DN20 (9566931)

* On 2nd underground floor, 2nd upper floor and 5th upper floor electrical heating of pipe

- interconnection of Ta and Tb by cable to 230V/50Hz- Electrical supply

- connection of Tb by cable to 230V/50Hz from electrical cabinet - Electrical supply

* - connection of Tb by cable to 12V to floor convectors - Central Heating supply

REQUIREMENTS ON I&C, or Electrical:

- connection of I&C controller with Viessmann – EQUITHERMIC CASCADE REGULATION VITOTRONIC 300-K MW2B - supply item. 1 ENLARGEMENT FOR 2nd AND 3rd HEATING CIRCUIT (7164403)

- mounting of main switch for the boiler room, in the event of power loss only lights will be on

- connection of the control of three-way valve with the I&C regulation

19. Vitotronic 200-H type HK3B, Ordering no.: Z009463, communication module LON for regulation Vitotronic 300-K type MW1/MW2, Ordering no: 7172174 and 7172173, communication module LON Ordering no.: 7172173

Date: 09/2018 Elaborated by: Ing. Norbert JÓKAY

**17. fire protection**

1. Introduction:

The subject of the fire protection plan is the assessment of the reconstruction of the existing building - Embassy of the Slovak Republic located at Kensington Palace Gardens 25 in London.

The existing five-storey building with two underground floors was for several decades used as the administrative premises of the Embassy of the Slovak Republic in the UK. The reconstruction under consideration will upgrade and modernise the embassy area, which will also be used as an Embassy after reconstruction.

The assessment, ie the fire protection plan incorporated in the design documentation of the building site is implemented pursuant to Article 9 Section 3 Letter a) of Act of the National Council of the Slovak Republic (NR SR) no. 314/2001 Col. on fire protection, and other valid legal regulations and binding STNs on fire protection.

As the original design documentation of the existing building was elaborated before the effectiveness of STN 73 0802, the current reconstruction can be assessed in conjunction with STN 73 0834 and in conjunction with STN 73 0802 pursuant to existing valid regulations, mainly STN 73 0834 and STN 73 0802, without application of the Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 94/2004 Coll. and related standards STN 92 0201-1 to 4.

2. Construction and architecture solution:

The existing building is from the point of view of fire safety assessed in detail by applying the special requirements of fire safety resulting from STN 73 0834 and STN 73 0802 and from PBS other standards (Fire Safety of Sites).

The building is thus assessed in conjunction with STN 73 0834 as a change of a Group II site by applying the special requirements of fire safety resulting from STN 73 0834 and STN 73 0802 and from PBS other standards (Fire Safety of Sites), as pursuant to STN 73 0834 the current reconstruction will result in a partial change in the usage of the building due to an increase of the random fire load pn (e.g. storage rooms, etc.), an increase in the value of ratio an (e.g. day rooms), revaluation of number of persons pursuant to STN 92 0241 in conjunction with STN 73 0834 (e.g. persons in apartments), i.e. due to a change of the relevant design standard; but there will not be an enlargement of bearing structures of ceilings due to the extension, building in or addition beyond the framework of Article 7 Letter ab) STN 73 0834 - i.e. more than 30% of the original area of ceilings - as the original area of ceiling structures will change due to the reinforcement or total replacement of original unsuitable ceiling structures from the point of view of statics by approx. 20 % – there is no clear change to a Group III site for the reconstructed building.

The currently addressed fire protection sections of the building of the Embassy were created so as to alter the existing fire safety plan of the building (implemented before the reconstruction) in the least possible scope regarding investments, but in compliance with all requirements of legal and technical regulations applicable to the fire safety of buildings.

The maximum overall height of the building of the embassy is +13.500 m, which is the height difference between the 5th utility floor (in architecture identified as 4th above-ground floor) and the level of the 1st above-ground utility floor (in architecture identified as the 1st underground floor).

The 1st utility underground floor (in architecture identified as 2nd underground floor) in conjunction with STN 73 0802 has a maximum height of -3.500 m against the zero height of the 1st above-ground utility floor (in architecture identified as 1st underground floor). The building has thus five above-ground utility floors and one underground utility floor.

The sixth non-utility floor (in architecture identified as 5th above-ground floor) is pursuant to Article 3.1.7 STN 73 0802 not considered as a utility floor.

The floors of the site are subsequently only defined on the basis of the their classification from the point of view of fire protection.

The existing vertical and horizontal bearing structures of the building are walled. The finishing of walled structures was performed from the outside by a thin masonry layer with is = 0.000 mm/min.; inside by lime and stucco plaster.

The existing non-bearing and newly-proposed structures of partitions of the building will be from ceramic brick, or will be from plasterboard sandwich structure systems wrapped with GKF or RF boards with a thickness of 12.5 mm (fire durability of such partitions is pursuant to the tests performed in an accredited testing facility between 30 and 90 minutes).

The external finishing of walls of the building will be coloured superior plaster, and internally two-layer stucco plaster with is = 0.000 mm/min., (flammability level A pursuant to STN 73 0823).

Original horizontal structures of ceiling of the building are from reinforced concrete.

Horizontal structures are reinforced concrete with demonstrable fire durability in above-ground floors of 45 minutes for III. SPB (fire safety level) and 60 minutes for IV. SPB (fire safety level) in above-ground floors and 60 minutes for III. SPB (fire safety level) and 120 minutes for V. (fire safety level) in the 1st underground floor.

The existing communication staircases of the building consist of monolithic reinforced concrete and stone structures. The fire protection unseparated steel bearing parts of the original and also newly-proposed staircases, that do not form a part of protected escape route “A” and are for more than 10 “standardised” persons, must be protected for the required fire durability of max. 15A minutes by fire protection coating systems, or fire protection cladding, with a demonstrated conformity of features, issued by the relevant authorised person.

The bearing structures of roofs above the building under consideration are wooden, partially reinforced with steel profiles, with thermal insulation from rock wool layers (flammability level "B" pursuant to STN 73 0862). *All wooden and steel bearing elements of roofs under which is a random fire load (i.e. roofs located directly above operating rooms, technical and technology rooms, etc.), must be on the bottom side protected by integral, continuous and uninterrupted plasterboard lower ceiling (flammability level "A" pursuant to STN 73 0862) from boards with a thickness of 2 x 12.5 mm or 1 x 15 mm (the demonstrable fire durability of such a separately fire durable lower ceiling is a min. of 30 minutes pursuant to results of tests performed in an accredited test facility) – the required fire durability is a max. of 30 minutes for the III. SPB (fire safety level).*

*The bearing structures of unused areas of roofs without a random fire load (e.g. technical or technological equipment, accommodation rooms, storage, etc.), which are located above integral horizontal fire protection ceilings,  do not need to comply with fire resistance requirements.*

*Passages of lights, ventilation pipes and other technical wiring or piping passing separately fire resistant plasterboard or rock wool lower ceilings must be protected as follows:*

*- lights must be on the interior side cased by separately fire resistant plasterboard or rock wool “box” cladding with a fire durability of 30 minutes pursuant to technical requirements of the specific vendor of separately fire resistant lower ceilings in such a way that the fire protection partition function of the ceiling is not disrupted,*

*- Ventilation pipes or other wiring/piping passing separately the fire resistant lower ceiling in the direction of the under roof area must be insulated against fire along the whole passage by wooden or steel structures of the roof, i.e. by fire protection cladding with a required fire durability of a min. 30 minutes pursuant to STN 73 0872-1). For ventilation pipes (with a cross section area larger than 0.04 m2), such pipes can alternatively be equipped at the passage point pursuant to Article 18 to 25 STN 73 0872 with fire flaps with the highest required fire durability of 30 minutes (fire protection cladding of the pipe along the whole passage will not be required).*

The roof of the building will be from ceramic roof tile (it is considered pursuant to STN 73 0823 to be non-flammable).

Fire bands in outer walls of the building pursuant to STN 73 0834 do not need to be assessed, as during the current reconstruction the flammability level of the exterior surface of outer walls will not be increased and the original width of fire bands of the Embassy building will not be reduced by e.g. increasing the original window or door openings.

The outer walls of the building will however at the height of window parapets, i.e. at the points of contact of most of the fire protection ceilings and outer walls, in a minimum width of 900 mm comprise pursuant to STN 73 0802 above standard non-flammable horizontal fire bands (composition: thermal insulation layer exclusively from NOBASI, supplemented with thin masonry layer with is = 0.000 mm/min. and reinforced by glass fibre fabric - all materials forming the fire band must have flammability level "A" pursuant to STN 73 0823).

The outer walls of the building will similarly at the points of contact of most of the fire protection walls and outer walls, in a minimum width of 900 mm (alternatively in a spread width of 1200m) comprise pursuant to STN 73 0802 above standard non-flammable vertical fire bands (composition: thermal insulation layer exclusively from NOBASI, supplemented with a thin masonry layer with is = 0.000 mm/min. and reinforced by glass fibre fabric - all materials forming the fire band must have flammability level "A" pursuant to STN 73 0823).

Window and door openings of the object are original and newly-proposed wooden and steel - flammability level "C2" and A pursuant to STN 73 0823.

All used fire protection coatings or fire protection cladding must have valid certificates for fire resistance and minimum durability issued by the relevant state testing facility of the Slovak Republic.

Columns are partially resolved from steel. All steel structures of columns equipped with fire protection coating must remain throughout the usage of the building uncovered by other construction structures (for a problem-free refurbishment of the coating after their lifetime). *However, if the lifetime of the fire protection coating is unlimited or is equal to the lifetime of the building (which has valid certificates for fire resistance and minimum durability issued by relevant state testing facility), renewal of the fire protection coating need not be considered.*

The current fire durability of construction structures of the fire sections under consideration pursuant to Table 12 of STN 73 0802 must in the full extent comply with the required fire durability specified pursuant to individual levels of fire safety.

The investor in the building under consideration should be informed that the body performing the state fire supervision may during the take-over proceeding require certificates of proof of conformity of fire and technical characteristics (i.e. current fire durability, levels of flammability (for the existing part), classes of reaction to fire (for new constructions), current index of flame spread) of all construction structures and construction products in the buildings under consideration (i.e. walled, reinforced concrete, steel, wooden and other construction structures, products and materials), i.e. pursuant to Act of the Slovak National Council no. 133/2013 Coll. on construction products and on changes and amendments of some acts.

3. Assessment of fire safety:

The premises of the building of the Embassy under consideration are pursuant to STN 73 0802 and STN 73 0833 split into fire sections while respecting the requirements of STN 92 0201-1 for limit size of fire sections and requirements for fire durability of construction structures and construction elements located in proposed fire sections, i.e. pursuant to Table 12 of STN 73 0802.

Fire sections without a demonstrated fire risk in the calculation part or without specification are fire sections of installation shafts (I.Š.), elevator shafts (V.Š.) and protected escape routes type “A”:

- Fire section:

- Determined calculated fire load:

- Required level of fire safety:

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Fire section CHÚC A: fire section of and protected escape routes type "A", i.e. interior escape staircase

Fire load : fire section without fire risk not determined by calculation - fire sections are created pursuant to STN 73 0802

SPB (fire safety level). I. SPB - fire durability will be determined pursuant to levels of fire safety of adjacent fire sections and Table 12 of STN 730802– min. III. SPB (fire safety level)

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Fire section of I. Š.: vertical fire sections of installation shafts

Fire load : not determined by calculation - STN 73 0802 and STN 73 0834

SPB (fire safety level). II.SPB\*; fire sections created pursuant to STN 73 0802 - the fire durability will be determined pursuant to Table 12 of STN 73 0802

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\* Note: Installation shafts pursuant to STN 73 0802 comprise a separate fire section and the lowest level of fire safety is determined pursuant to levels of fire safety of adjacent fire sections and pursuant to the nature of wiring/piping as follows:

- electric wiring and gas piping with cross-section up to 10 cm2 in installation shafts - min. II. SPB (fire safety level).

- ventilation, sewerage and water piping in installation shafts - min. II. SPB (fire safety level).

If the installation passages of individual wiring/piping will be sealed at the level of fire protection ceilings pursuant to STN 73 0802, the above fire limitation for installation shafts is not required. However, the above solution is not applicable for wiring/piping in CHÚC (Protected escape route) "A", where they must be separated from the escape route non-flammable structure with a covering layer with a fire durability of at least 30 minutes. In CHÚC (Protected escape route) "A" this will be solid partitions with mounted opening fire protection inspection openings EI S 30D1 without self-closing.

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Fire sections V.Š.: vertical elevator shafts of the assessed building of the Embassy

Fire load: not determined by calculation pursuant to Article 131 STN 730802

SPB (fire safety level). I. SPB pursuant to Article 131 STN 73 0802, fire durability will be determined pursuant to item 10 ab) Table 9 of STN 73 0802

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All installation passages of individual wiring/piping of electrical part, sanitary installation and ventilation must be sealed in the building under consideration at the level of fire protection ceilings and walls pursuant to STN 73 0802. Installation cores with ventilation pipes with cross-sections larger than 0.04 m2 must form separate fire sections and can also be sealed around exterior metal sheet cladding of pipes above standardly by reinforced concrete or  gypsum filler with a thickness of min. 50 mm.

The complete detailed calculation part of the fire safety plan of the Embassy building together with the output values form a part of the design documentation.

Types of required fire closures resulting from the calculation part of the fire safety plan are marked in this part of the design documentation in the graphic part of the fire safety plan for the building.

At the division point of the fire sections are installed a fire closure in EW finishing except for fire sections ending in a protected escape route type "A", which will prevent the spread of fire - EI and will be equipped with self-closing equipment.

However, if an area without fire risk is in front of the fire closures of openings to CHÚC (protected escape route) "A", such fire closures can be proposed in EW finishing, i.e. limiting heat spread. They will be similarly equipped with self-closure equipment.

Such a procedure allows the fulfilment of the criteria of STN 73 0802, (i.e. construction structures of partitions separating corridors without fire risk are produced from non-flammable or not easily burning substances with fire durability of at least 15 minutes. An exception from the requirements for 15-minute fire durability pursuant to the above STN have all closures in such structures, as the area of such door openings will not exceed 25 % of the area of separating structures).

The doors on escape routes of the building under consideration will open pursuant to STN 73 0802 in the escape direction (except for doors from a room or functionally integrated group of rooms where the escape route starts at the door to such a group of rooms - STN 73 0802 and except for exit doors to an open air area, unless more than 200 evacuated persons will pass through them).

Fire closures of doors with required fire resistance, installed in the building under consideration, will either be fire protection wooden closures certified by the relevant state testing facility of the Slovak Republic, or for existing wooden closures, they can be entrance doors with full wooden wings with a min. thickness of 27 mm with a half groove which has in such a finishing pursuant to STN 73 0834 a demonstrable fire resistance EI 30D3. Existing single-cladding door from steel sheet with a thickness of at least 1 mm has pursuant to STN 73 0834 a demonstrable fire resistance EW 15D1. All fire closures of openings must be equipped with self-closures.

4. Provision for evacuation, evacuation radio:

With regard to provision for safe escape from the premises of the building under consideration of the Embassy, the width of staircase arms - i.e. unprotected escape routes, as well as the width of staircase arms - i.e. protected escape route of type “A”, and the width of corridors comply with the designed number of persons increased by 30 % (pursuant to STN 73 0834).

The designed width of door openings on the escape routes of the building also comply with requirements of the STN 73 0802.

The escape of persons from the 1st underground floor to the 5th above-ground floor of the building under consideration of the Embassy is provided mainly by a protected escape route, type “A” without fire risk (i.e. by an interior staircase limited by fire protection – fire protection on I. SPB (fire safety level) without fire risk) and additionally by an unprotected escape route unlimited by fire protection leading through fire sections of the building under consideration of the Embassy.

The proposed number of persons for fire sections of the building under consideration of Embassy was assessed in detail pursuant to STN 73 0834 and STN 92 0241. The limit number of persons determined by a calculation evacuated through individual escape routes is not affected by the number of persons proposed for the building under consideration - see the calculation of the fire risk.

The limit lengths of unprotected escape routes of the building of the Embassy were prolonged pursuant to STN 73 0802 and actual lengths of unprotected escape routes are fully compliant. The above procedure is described in detail in the calculation part of the fire safety plan.

The length of escape routes from the building of the Embassy was measured from the axis of the exit (normally from the door or other limiting construction structure) from the room or functionally integrated group of rooms up to 100 m2 and up to 40 “standardised” persons, for which the escape route starts at the door to such a group of rooms – pursuant to STN 73 0802.

The lighting of unprotected escape routes of the building (i.e. corridors and the current rooms of fire sections) is provided by daylight and artificial light.

We require in all escape communications in the building, above standard emergency orientation lighting – i.e. lights with a back-up power source allowing for lighting of escape routes for a minimum period of 30 minutes - produced pursuant to STN 34 1060 (also produced pursuant to STN EN 60598-2-22). The emergency lighting will be proposed such that it illuminates escape exits and indicates the escape direction.

The ventilation of protected escape route, type “A” in the object is proposed as follows:

- ventilation of staircase of CHÚC (protected escape route) “Ap” (situated in neighbouring building) with the possibility of unforced ventilation must be provided by ventilation openings with an overall area of a min. of 2 m2 (i.e. fully opening window and door), in the staircase under consideration. However, the window or door opening to the full cross-section may not narrow the passage of the CHÚC (protected escape route) “Ap” with the required width of min. 1100 mm.

- ventilation of corridors of CHÚC (protected escape route) “Au” must be provided pursuant to STN 73 0802 by forced pressure ventilation with 10 times air exchange per hour, with air supply for at least 30 minutes and air outlet through ducts or by overpressure mechanical or electrically controlled breathing flaps situated at the highest point of such a staircase,

- forced ventilation of CHÚC (protected escape route) “Au” must be independent from other ventilation of the building under consideration and must be supplied from two independent power sources - two independent sources pursuant to STN 73 0802 means a connection to the distribution network by a “loop” or a connection to a grid network or a connection to UPS accumulators. The power supply must be provided for a minimum of 30 minutes for CHÚC (protected escape route) “Ae” (also the entrance hall Up).

The fire ventilation of artificially ventilated staircases of CHÚC (protected escape route) “Au” (and the entrance room Up) will be started manually by emergency buttons, i.e. from all floors of such artificially ventilated protected escape route of type “Au”.

For the building will be mounted local UPS accumulators and a central battery system which will provide for electrical equipment in operation during a fire (i.e. for lights of emergency lighting, for fire ventilation of CHÚC (protected escape route) “Au” and for the arrival of elevators at the entry stations) a permanent power supply by cables with stipulated properties.

Elevator shafts of the building of Embassy must form separate fire sections without any fire risk - fire closures of elevator doors will have the required fire durability EW 30D1+C.

Pursuant to STN 73 0802, there is no need to install a radio with forced listening for the provision of problem-free evacuation of persons.

5. Clearing distances:

The subject of the building under consideration are views from all of its sides. As there is no change in the purpose of utilisation of the building and facade elements will also not change, there will be no change to clearing distances and therefore there is no further assessment of this.

6. Access road:

The existing road and servicing access can be considered as the access road to the building, which is fully compliant with the requirements of STN 73 0802, i.e. has a min. width of 3.0 m, is located in the close proximity of the building under consideration of the Embassy and is dimensioned for a min. load of 80 kN, which represents the effect of a loaded axis of a fire truck.

Access and approach roads to the building and the attack area (the building has pavements at the front and areas for pedestrians with a min. width of 3500 mm) are currently compliant with STN 73 0802.

In conjunction with STN 73 0802, there is no requirement for an interior attack road in the building under consideration. Fire-fighting action can be initiated from the front and from the sides of the building of the Embassy.

7. Supply with fire water:

The fire water demand was stipulated in total for the originally proposed fire sections of the building “Embassy of the Slovak Republic in London” in the original fire safety plan incorporated in design documentation for the construction permit and it is not adversely affected by the current reconstruction.

Design of interior fire water mains:

Pursuant to Article 5 STN 92 0400, a part of fire water demand for the building under consideration will be provided by interior hose equipment - i.e. by hose reels 25/30 with dimensionally stable hoses with a minimum flow of 1.0 l/s, i.e. deployed pursuant to Article 5.5.2 of STN 92 0400 so that fire fighting can be undertaken in any fire section with one jet 25/30.

The hose equipment will be embedded in the wall and will be stainless steel with a dimension of 700/700/200mm with full doors, with a powder coating in a white colour - RAL 9003 (e.g. FLORIAN fire extinguishing equipment).

The overpressure in the hydrant network of interior fire water mains will be at least 0.20 MPa ( Pursuant to Article 10, Section 4 of Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 699/2004 Coll. ).

The interior water connection must provide for the most exposed extraction of 1.0 x 3 = 3.0 l/s water (i.e. activity of three hose equipment above each other).

Vertical fire water mains must be from non-inflammable steel pipe.

8. Portable fire extinguishers:

For quick intervention against fire are proposed in the building powder fire extinguishers with a min. filling of 6 kg of ABC powder. The detailed specification of the number of portable fire extinguishers, their type and deployment is subject of the graphic part of this fire safety plan. There must be permanent free access to portable fire extinguishers.

We consider CO2 to be the most suitable extinguishing substance (in portable fire extinguishers) for extinguishing computer equipment fires in the building, as this is the only substance of this type which will not damage sensitive parts of computers not affected by fire. In addition it is produced in the Slovak Republic.

The equivalent amount of extinguishing substance was stipulated pursuant to Article 5.2.1 STN 92 0202-1 by calculation: Mc = 1.2 (S . p1)1/2 > 6

For the proposed number of portable fire extinguishers is applicable the condition of the relationship defined in Article 5.4.1 STN 92 0202-1, i.e. Mc < Σ (n . m . ή)

*The following principles are to be complied when deciding on the location of portable fire extinguishers:*

* the deployment of portable fire extinguishers stated in the fire safety plan must be complied with, all portable fire extinguishers (covering the calculated minimum amount of extinguishing substances) are classified as powder with a weight of 6 kg of ABC powder,
* there is permanent free access to portable fire extinguishers.
* portable fire extinguishers can be replaced for extinguishing computer equipment fires by CO2 fire extinguishers with a min. weight of extinguishing substance of 5 kg. When replacing a portable powder ABC 6 kg fire extinguisher with a 5 kg CO2 fire extinguisher, one 6 kg ABC fire extinguisher must be replaced by two 5 kg CO2 fire extinguishers,
* the same portable fire extinguishers may be counted in the overall required number for neighbouring fire sections at whose borders such fire extinguishers will be deployed. However, the even deployment of fire extinguishers in individual fire sections must be considered, so that the mutual distance between portable fire extinguishers eligible for any fire section will be a maximum of 30 meters.

Powder fire extinguishers will be stainless steel (e.g. Safelincs Stainless Steel 6kg Dry Powder Fire Extinguisher).

9. Fire alarm system, voice signalling of fire and fixed fire extinguisher:

The fire alarm system is required in the building under consideration based on the requirements of the investor and UK standards.

The current Fire Alarm System (EPS) provides pursuant to Clause P.6.2 of Annex no. 6 of STN 73 0831 for the protection of persons, i.e. for early evacuation of persons.

The Fire Alarm System (EPS) comprises automated fire detectors and button fire detectors in the original approved project for construction permit, or for the change to the site. The deployment of the original Fire Alarm System (EPS) detectors must, in connection with the layout changes to the building, be in the new design documentation for the Fire Alarm System (EPS) reassessed or evaluated so that in all premises with a fire risk will be installed automated Fire Alarm System (EPS) detectors and on all escape routes from the rooms of the building will be deployed button detectors of the Fire Alarm System (EPS).

The Fire Alarm System (EPS) comprising automated optical smoke detectors, or heat detectors and button fire detectors is proposed in the building pursuant to Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 726/2002 Coll. and pursuant to STN 34 2710.

For a general alarm signalled by the Fire Alarm System (EPS) in the building are proposed technical and organisational measures which will in the maximum possible extent mitigate panic and above all:

- will provide for orientation of persons in the area and their navigation to escape routes – which will be implemented by pictograms indicating the direction of escape and by emergency lighting,

- will calm persons by reproduction of prepared instructions - which will be implemented by equipment having priority by controlling the radio with forced listening from the area of the Fire Alarm System.

The voice signalling of fire is in the building of the Embassy of the Slovak Republic in London based on the requirements of the investor and UK standards.

Fixed extinguishing equipment is only proposed in the garage and this assessment does not affect or address it.

10. Electric equipment and lightning conductors:

The electrical installation and electrical equipment of the building must be proposed pursuant to provisions of STN 92 0203, Decree of MPSVR SR (Ministry of Social Affairs and Family of the Slovak Republic) no. 508/2009 Coll. and pursuant to Decree Ministry of Interior of the Slovak Republic (MoI SR) no. 94/2004 Coll. as amended.

For electrical installations and electrical equipment of the building, the user must archive the technical design documentation and accompanying technical documentation pursuant to § 2, § 6, Annex no. 2 and Annex no. 3 of Decree of MPSVR SR (Ministry of Social Affairs and Family of the Slovak Republic) no. 508/2009 Coll.

Electrical installation and electrical equipment of the building must be inspected before commissioning pursuant to § 13 of Decree of MPSVR SR (Ministry of Social Affairs and Family of the Slovak Republic) no. 508/2009 Coll.

Electrical installation and electrical equipment of the building must be regularly inspected and operated pursuant to § 8, § 9, § 11, § 13 and § 16 of Decree of MPSVR SR (Ministry of Social Affairs and Family of the Slovak Republic) no. 508/2009 Coll.

Protection against shock must be performed pursuant to STN 33 2000-4-41, i.e. for LV by protection measures by automated disconnection in the event of a fault through double or reinforced insulation and basic protection by basic insulation of live parts, prevention or covers and/or supplementary protection by current protector RCD and /or supplementary protection by connection. For HV, the protection of persons in the event of touch of exposed parts is by earthing, for touch of live parts by covers and insulation, against atmospheric electricity pursuant to STN EN 62 305-1 to 4 by lightning conductors (for active lightning conductors pursuant to STN 34 1391) and from effects of static electricity pursuant to STN 33 2030 and STN 33 2031.

The user must ensure that electrical installations and electrical equipment of the building is operated in such a way that they do not cause fire. Movable inlets and lines on the floor will be deployed and secured in such a way that there will be no possibility for damage of the sheath, insulation or core of the movable inlet during normal use and they do not obstruct the escape of persons from the given area.

Electrical installations and wiring of fire technical equipment, equipment for the evacuation and equipment for the extinguishing of fire must be implemented with cables with the specified properties with functional durability of cable routes of PS determined pursuant to Annex A of STN 92 0203 and the electrical connection of such equipment on the main primary LV inlet to the building must be made at a place between the main metering of the object and the main electrical distributor of the building. Fire technical equipment, equipment for the evacuation and equipment for the extinguishing of fire must have its own electrical installation and wiring and own electrical distributors with separate fuses (fully independent from electrical installations and wiring and from electrical distributors of other electrical equipment of the building).

The secondary connection of fire technical equipment, equipment for the evacuation and equipment for the extinguishing of fire must also have a back-up or emergency power supply (i.e. to central accumulator room of UPS, to local UPS accumulators), must be (except for equipment with own built-in UPS accumulators) implemented with cables with specified properties with functional durability of cable routes of PS determined pursuant to Annex A of STN 92 0203.

Electrical distributors of fire technical equipment, equipment for the evacuation and equipment for the extinguishing of fire and back-up or emergency power supply - i.e. central accumulator room of UPS, local UPS accumulators, must be deployed in a separate room comprising a fire section compliant with requirements on requested fire durability equal to functional durability of routes of individual cables (PS) designated for permanent supply of electricity pursuant to Annex A of STN 92 0203, or such electrical distributors and back-up or emergency power supply must be protected by fire protection box cladding or by fire protection shielding from plasterboard panels or rock wool panels, e.g. KNAUF, RIGIPS, PROMAT, ORDEXAL, etc. which, pursuant to tests performed in an accredited state testing facility, comply with requirements on requested fire durability equal to functional durability of routes of individual cables (PS) designated for permanent supply of electricity pursuant to Annex A of STN 92 0203. The fire protection box shielded electrical distributors and back-up or emergency power supply must have, to allow regular inspection, lockable fire protection inspection closures EI without self-closing which comply with requirements on requested fire durability equal to functional durability of routes of individual cables (PS) designated for permanent supply of electricity pursuant to Annex A of STN 92 0203.

Note: Central Accumulator Room of UPS, local UPS accumulator is equipment or a system accumulating and storing electricity, which provides a continuous supply of electricity for equipment, which cannot be unexpectedly switched off. Other expressions used are: back-up power supply, emergency power supply, reserve power supply, uninterrupted power supply, but mainly - continuous power supply source.

Note: Local UPS Accumulator is equipment or a system accumulating and storing electricity which provides a continuous supply of electricity for equipment, which cannot be unexpectedly switched off. Other expressions used are: backup power supply, emergency power supply, reserve power supply, uninterrupted power supply, but mainly - continuous power supply source.

Cable systems of fire technical equipment, equipment for the evacuation and equipment for the extinguishing of fire (i.e. power cables, insulated conductors, installation cables and conductors for telecommunication and equipment for data processing, buses, cable channels, coating, paint and shielding of connection elements, bearing structures, holders and clamps) must be implemented with cables with specified properties with functional durability of cable routes of PS determined pursuant to Annex A of STN 92 0203 and pursuant to Table 1 of STN 92 0205, they must have a class of functional durability E 30 and E 60 minutes. For each structure element used in the safeguarding of the functional durability of the whole cable system, the producer will issue a certificate in which the conformity of such an element with the protocol on testing pursuant to Clause 10 and 11 STN 92 0205 is confirmed. Cable ducts, ladders, holders with longitudinal support, individual holders, riser routes, anchoring and suspension systems, common structures of the buildings (e.g. lower ceiling plates, plaster) used for the mounting of functional cables, and all other construction structures deployed above the functional cable systems and any other installation pipes and wiring which are not defined as functional cable systems and are deployed directly above installed functional cable systems must also be of a class of functional durability E 30 and E 60 minutes pursuant to Clause 2 to 4 of STN 92 0205, or in fire durability R 30 and R 60 minutes pursuant to STN 92 0201-2. Functional cable systems may only run in a common route with cables without requirements on functional durability provided that the overall weight of “non-fire” cables and functional “fire” cables, i.e. the overall capacity of cables laid in the route does not exceed the permitted capacity of the bearing systems of ducts, ladders and other structures and elements used for mounting of cables, where if this was exceeded it would result in a reduction or total loss of stability and bearing capacity, i.e. the loss of the required fire or functional durability of the cable systems.

Passages of central heating pipes, gas pipes, passages of cooling pipes, passages of ventilation pipes and passages of electrical heavy current and light current wiring, and bundles and ducts in the building through fire ceilings and fire walls must be sealed with soft fire bushings with required fire durability between EI 30 minutes and EI 90 minutes.

Passages of plastic sewage pipes through fire ceilings and fire walls in the building must be sealed with soft fire bushings with required fire durability between EI 30 minutes and EI 90 minutes. Sewage pipes must be additionally supplemented by sealing fire sleeves with required fire durability between EI 30 minutes and EI 90 minutes. Sleeves of vertical pipes must be located and anchored from the bottom of horizontal fire ceilings of the building and sleeves of horizontal pipes must be located and anchored from both sides of vertical fire walls of the building.

Passages of wiring through fire partition structures in the building must be sealed with construction materials of the same type as the fire partition structures they are passing through, i.e. pursuant to requirements of STN 92 0201-2, STN 92 0205 and Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 94/2004 Coll. as amended – e.g. fire bushings HILTI, Intumex, fire sealing concrete binders, etc. A sealed passage must comply with requirements on fire durability of the specific fire partition structure it is passing through (between EI 30 minutes and EI 90 minutes).

The fire sealing systems used in the building under consideration must have valid conformity certificates issued by an authorised person from which above all the achieved or current fire durability of such systems must be apparent.

Pursuant to § 40 of Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 94/2004 Coll. as amended:

- The fire durability of fire partition structures may not be due to their reduction or at non-closing fire openings and passages of technical equipment lower than the stipulated fire durability.

- Openings in fire walls and openings in fire ceilings must have a fire closing.

Passages of wiring and installations through fire partition structures with an area of the opening of more than 0.04 m2 must be pursuant to § 40 Section 4 and Section 5 of Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 94/2004 Coll. as amended marked with a label directly on the sealed construction element, or in its close vicinity.

The label for marking the sealing of the passage must be on one side of fire partition structure in visible, readable, accessible and difficult to remove way. The label for marking the sealing of the passage must include mainly the following information:

a) the word PASSAGE,

b) symbols of criteria and numeric value of the fire durability,

c) title of sealing system of the passage,

d) month and year of manufacture,

e) name and address of the manufacturer of the fire structure.

TABLE 1

Requirements on functional durability of routes of individual cables (PS) for permanent supply of electricity pursuant to Annex A of STN 92 0203:

a) with regard to fire controlled fire closures, switching off of electricity and operating ventilation in the event of fire and controlled elevators during a fire moving to entrance stations, opening of sliding doors - functional durability is specified for a minimum of 30 minutes;

b) lighting of protected escape routes (CHÚC) - functional durability is specified for a minimum of 30 minutes;

c) emergency lighting - functional durability is pursuant to STN EN 1838 specified for a minimum of 60 minutes;

d) lighting of access for rescue services - functional durability is specified for a minimum of 60 minutes;

e) equipment for ventilation of protected escape routes (CHÚC) or access for rescue services - functional durability is pursuant to Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 94/2004 Coll. as amended and STN 92 0201-3 is specified for a minimum of 30 minutes for the staircase of CHÚC “A”;

f) evacuation radio as a part of voice signalling of fire pursuant to STN EN 60849 and STN EN 54-16 - functional durability is specified for twice the evacuation time, and for a minimum of 30 minutes; in protected escape route “Au” minimum 30 minutes

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Explanation notes:

PS – class of functional durability of electric cable system in the event of fire from the Annex A of STN 92 0203 – (originally functional during fire for the required time – PH).

TABLE 2

Requirements for electrical cables under STN 92 0203:

A. Equipment in operation during fire Cable type pursuant to

a) home (evacuation) radio B2ca

b) emergency lighting, safety and orientation

lighting B2ca, s1, a1

c) lighting of protected escape routes

and intervention ways B2ca, s1, a1

d) ventilation of escape routes (CHÚC “A”) B2ca, s1, a1

e) in the event of fire controlled fire closures, switching off of the electricity

and operating ventilation in the event of fire,

controlled elevators in the event of fire moving to entrance

stations, opening of sliding doors B2ca, s1, a1

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Note:

If the electrical cables of the above equipment

are deployed in fire sections with rooms pursuant

to Clause B of this Table, such electrical cables

must also comply with the supplementary classification of class of reaction

to fire pursuant to the specific area, through which

their routes run

B. Fire sections with premises Cable type pursuant to

1. buildings for accommodation of more than 20 persons

1.1 rooms with accessories B2ca, s1, d1, a1

1.2 common areas (hall, reception, dining room,

restaurant) B2ca, s1, d1, a1

2. protected escape route of type “Ae” B2ca, s1, d1, a1

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Explanation notes:

B2ca – class of reaction to fire (originally resistance against flame spread – ZO), amount of released heat when testing the burning of cables in bundle

s1, d1, a1 – supplementary classification of class of reaction to fire (originally halogen-free with low smoke density by burning – BH), s1 – overall amount of smoke development and current amount of released smoke, d1 – no burning drops, a1 – conductivity

PS – class of functional durability of electric cable system in the event of fire from Annex A of STN 92 0203 – (originally functional during fire for the required time – PH).

In the event of an electrical power cut, the operation of fire technical equipment, equipment for the evacuation and equipment for the extinguishing of fire located in the building will use built-in UPS accumulators in selected equipment and a central battery system.

Electrical wiring of the building must be proposed and produced pursuant to Article 4.3.1 of STN 92 0203 to ensure safe switching off of power supply for operating electrical equipment in the building or its part (zone), including electrical equipment which must remain in operation during a fire.

The control element CENTRAL STOP serves pursuant to Article 4.3.1 of STN 92 0203 for the provision for safe switching off of power supply for operating electrical equipment in the building, or its part (zone), including electrical equipment which is not electrical equipment in operation during a fire. The site must be equipped with the control element CENTRAL STOP.

Using the control element TOTAL STOP can be pursuant to Article 4.3.3 of STN 92 0203 switched off the power supply for operating electrical equipment in the building (i.e. in all its parts - zones), including all electrical equipment which must remain in operation during fire. The site must be equipped with the control element TOTAL STOP.

The area from which will in the event of fire be switched off the power supply in the building or its part (zone) must be pursuant to Article 4.3.4 STN 92 0203 in the event of a fire accessible from the exterior, from a protected escape route or from an interior or exterior access route for rescue services, or from the area of permanent operation. The control of switching off of electrical distributors of operating electrical equipment and electrical distributors of electrical equipment which must remain in operation during fire, i.e. fire technical equipment, equipment assisting the evacuation and equipment for the extinguishing of fire – i.e. the buttons CENTRAL STOP and TOTAL STOP must be located in room no. -107 in the 1st utility floor of the building (see graphic part of this fire safety plan).

|  |  |  |
| --- | --- | --- |
| Number | Name | Graphic sign |
| 3.1 | Control element *CENTRAL STOP* |  |
| 3.2 | Control element *TOTAL STOP* |  |
| 3.3 | Limitation of zone 1) |  |
| 1)  If the building is split into zones, instead of the letter “n” in its graphic symbol will be stated its sequential number | | |

The switching off of the elements CENTRAL STOP or TOTAL STOP must be pursuant to Article 4.3.5 of STN 92 0203 protected against unauthorised or accidental usage.

Cable routes must be pursuant to Article 4.4.1.1 Letter a) to Letter c) of STN 92 0203 proposed and made to comply with all technical requirements for the criterion of functional durability, so that during the functional durability pursuant to Annex A of the above STN, they will in the event of a fire not be damaged by surrounding elements or systems of the building, e.g. by other installations in equipment (e.g. ventilation equipment etc.).

Pursuant to Article 4.4.1.8 of STN 92 0203 all cable routes will be pursuant to Article 4.4.1.1 Letter a) and Letter b) of STN 92 0203 proposed and implemented to run above the level of other electrical and non-electrical installation wiring in the area where the route is passing or secured in another way, to make and fix such other wiring so that in the event of a fire they will not damage the cable route by falling of their parts or by their deformation during the minimum required time of functional durability of the cable route pursuant to Article 4.4.1.1 Letter a) and Letter b) of STN 92 0203 .

 Cable routes pursuant to Article 4.4.1.1 Letter a) and Letter b) of STN 92 0203 may only be fixed and anchored in such construction structures which comply with the requirement on fire durability of the relevant fire section, which is passed by the route and their statics allows the fixing of cable routes for fire protection. The above must be compliant with Article 4.4.1.7 of STN 92 0203.

Above cable ducts with functional electrical cable systems designated for the power supply of fire technical equipment, equipment for the evacuation and equipment for the liquidation of fire may be located thermal insulation or acoustic insulation materials (or other installation pipes and lines), if the certified fire durability of the material (or pipe and line), including anchoring elements is at least equal to the class of functional durability of electrical cables, i.e. between E 30 and E 90 pursuant to Clause 2 to 4 of STN 92 0205, following the Annex A of STN 92 0203.

If the thermal insulation or acoustic insulation materials (or other installation pipes and lines) do not comply with requirements on functional durability of the cable route, anchoring of ducts of the cable route must be reinforced so that they will statically transfer any additional load from the weight of insulation materials (or installation pipes and lines) which may due to the effect of fire fall or spontaneously separate e.g. from a reinforced concrete ceiling board or wall. The fulfilment of the above requirement will prevent the tearing away of ducts with functional electrical cable systems due to unexpected subsequent additional load from insulation materials (or from installation pipes and lines).

The emergency lighting of the building will comply with the requirement for power supply from a central power supply system pursuant to STN EN 50171 from batteries and must be equipped with an automated testing system for emergency powered from batteries pursuant to STN EN 62034 at least of P type.

The emergency lighting must illuminate escape exits and show the escape direction. Pursuant to STN 92 0201-3, Article 18.5, it is recommended to deploy emergency lighting devices at a height of 2,000 mm to 2,500 mm above the floor level of the escape route. Lights must be deployed above the exits to the open air area and along the escape routes.

11. Heating and ventilation:

The heating in the building is proposed by central heating with hot water. The heating system and heating elements - central heating sources must be installed pursuant to STN 92 0300.

Central heating sources - i.e. gas boilers are deployed in a separate technology room which forms a separate fire section N 4.02.

The boilers must be vented, pursuant to § 8 of Decree Ministry of Interior of the Slovak Republic (MoI SR) no. 401/2007 Coll. stipulating technical conditions and requirements of fire safety for the installation and operation of fuel appliances, electric heat appliances and equipment of central heating and for the construction and use of stacks and chimneys, to the atmosphere via chimneys and stacks.

The temperature of flue gas flowing in operating regime from each boiler is due to their structural design close to the dew point of water vapour, which from the point of view of fire safety does not impose any requirements on the safe distance of surface of boilers and chimneys and stacks from built-in flammable substances, as the temperature of every chimney in the operating regime of the central heating source is close to a max. value of 72 C° (pursuant to the regulation for testing ZP 3/1992) – and as a minimum the safe distance of 200 mm in a direction from the surface of each appliance and stack to flammable substances and 50 mm for each cladding of chimney towards wooden structures must be complied with.

Fuel appliances for gaseous fuel must be connected to a fixed gas pipe. The gas inlet must be installed such that no fuel appliance for gaseous fuel will cause an increase of its surface temperature above 40 0C. There will be no rooms on site where the above temperature could occur under normal operating conditions. In the assessed area where the boilers will be deployed, there will be no environment with a hazard of fire or explosives, explosion of flammable gases and vapour and fire of flammable fluids, which is fully compliant with requirements on installation of fuel appliances for gaseous fuel pursuant to Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 401/2007 Coll. .

Gas appliances must be placed on a non-inflammable base. Flammable material must only be stored at a safe distance from each appliance. Appliances and stacks will be deployed on non-inflammable construction structure or a wall which is of D1 type with non-inflammable finishing.

The safe distance is stipulated by the producer of each appliance. If it is not stipulated, flammable materials can be placed at a minimum safe distance of 200 mm in all directions from each fuel appliance for gaseous fuel (pursuant to Annex no. 1 of Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 401/2007 Coll.). A min. safe distance of 50 mm with regard to the cladding of each chimney from wooden or flammable structures must also be complied with. The distance of cladding of the body of chimney from wooden or flammable structures may be reduced pursuant to § 14 Section 8 of Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 401/2007 Coll. to 10 mm, but such an area must be filled with a non-inflammable insulation substance (e.g. rock wool) pursuant to Annex no. 7 of the above Decree.

Flue gas from gas boilers will be vented through a metal sheet double casing stacks and multi-layer chimneys passing the building directly to the atmosphere pursuant to Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 401/2007 Coll. . Stacks must be installed pursuant to Decree of Ministry of Interior of the Slovak Republic (MoI SR) no. 401/2007 Coll. and set up so they will not be spontaneously released. Pipes without secured joints must be pushed in each other to at least 0.4 times the pipe diameter, but at least in 80 mm.

The structure of multi-layer chimney (certified by TASÚS - Building Testing and Research Institute Bratislava) for venting of flue gas from a central heating source - i.e. boilers for gaseous fuel, must be tested before handing over for use by a person with professional competence pursuant to § 11 Section 9 of Act of the SNR (Slovak National Council) no. 314/2001 Coll. on fire protection as amended.

The system of air ventilation pipes in the building was assessed in connection with STN 73 0872. Air ventilation pipes with a cross-section area of not more than 0.04 m2 pass fire partition structures without fire closures; their mutual distance is at least 0.5 m. The overall area of passages of air ventilation pipes that cannot be closed against fire is a maximum of 1/200 of the area of the fire partition structure of the design element which will be passed by the ventilation pipes.

All ventilation pipes (with a cross-section area larger than 0,04 m2) passing fire partition structures in the building must be equipped pursuant to Article 18 to 25 of STN 73 0872 with fire flaps with the highest required fire durability of 30A(D1) minutes, or the ventilation pipes must be protected pursuant to Article 18 to 25 of STN 73 0872 along their whole length by fire insulating substances with demonstrable fire durability of 30A(D1) minutes (e.g., by attested lining from rock wool or plasterboard).

Local ventilation units serving exclusively for one fire section or local ventilation units (including installation core) for ventilation of the protected escape route (CHÚC) “Ae” pursuant to Article 131 of STN 73 0872 may be part of such a fire section without further measures.

12. CONCLUSION:

When proposing the split of the reconstructed building under consideration of the Embassy into fire sections, which is documented in this technical report, was taken into consideration a simple and safe escape from any fire section, a minimum scope of damages in the event of fire, quick and efficient access for fire fighting crews, fire separation of areas with high fire risk, limitation of the number of passages through fire partition structures, and overall investment costs related to the split of the building and the newly-designed extension to the building into fire sections and in general with their complex provision from the point of view of fire safety, and criteria taking into consideration the overall functionality of the building and its individual operations in relation to the required split by fire partition structures.

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