9 AS BUILT DRAWINGS

Based on survey of executed construction works and performed installations, as built technical documentation shall be prepared by the Contractor and delivered to the Supervisor (in accordance with Clause 124, Law on Construction and Planning 72/2009).

10 TECHNICAL ACCEPTANCE

After completion of the works, Contractor is obliged to prepare all documentation for Technical acceptance, all according to Law on Construction and Planning 72/2009.

11 FINAL REMARKS

All works shall be done according to Main design and valid Building Permit. All ambiguities shall be resolved by the Supervisor in consultation with Beneficiary/Designer. During execution of the works qualified workers will be engaged and material used has to fulfil all local regulations, standards technical requirements from technical documentation- Main design. All mentioned works and instalments in Breakdown of Prices are to be understood as fully completed activities including preparatory, final and cleaning works, all necessary materials and tools, related transports, H&S measures and all other obligations according to local regulations.
The payment will be done according to instruction and unit rates specified for each item in Volume 4 – Bill of Quantities.

12 DESCRIPTION OF THE SPECIFIC WORKS

Primary goal of the solution for reconstruction and adaptation is functional and technical adjustment of the existing first floor level to its new purpose, with as less as possible changes in the external appearance of the facility and in the existing dimensions of the facility. Solution seeks for maximum occupancy of the existing capacities.
Having in mind how long ago the facility was constructed, including its initial purpose, the facility substantially does not meet current requirements regarding the level of technical equipment, fire protection conditions and requirements regarding good quality insulation of the facility.
Design for adaptation and reconstruction does not include the entire facility, but only a part thereof. In compliance with technical requirements and fire protection conditions, the design includes evacuation passage with stairs space, inlet wind screen and elevator. The design foresees replacement of complete covering of stairs and doors which close the stairs space along floors, replacement of elevator and extension for one exit station, including new wind screen.
Within the design for reconstruction and adaptation of the facility, a conceptual design is given (as a draft) for the inlet wind screen.
The biggest change was made on the first floor, because it is completely inappropriate regarding contents and organisation for the new function and concept of space solution. New design foresees removal of the existing contents from the first floor level and formation of new different contents in compliance with purpose and function. New space design of the first floor premises is formed so as to keep the existing functional units of sanitary blocks, elevator frame and staircase space.
At the level -1(level of technical central station) interventions include technical premises necessary for functioning of the new contents on the floor – such as room for hydrocel.

B

Intervention also foresees replacement of facade joinery at places where technical ducts come out on lateral facade, including dismantling of above-window straps of reflecting glass and replacement thereof with fixed jalousies.
Existing installations shall be replaced and improved; new and modern technologies shall be introduced, including replacement of the existing finishing coverings of the interior.
The design shall also improve the energy efficiency measurements in the first floor by placement of new layers of thermal insulation. All redesigned layers of thermal insulation shall be placed on the inside of façade walls.
Replacement of the elevator and extension with one new station is also foreseen, so that the elevator shaft can be formed within the space of technical floor. Exits from the elevator on the first, second and third floor shall be replaced in the staircase space.

12.1 PROVISIONS

All the works shall, unless otherwise specified, comply with the provisions of the related section. Where more detailed specifications are expressed in other sections of the specifications and/or on drawings, they shall take precedence over the regulations mentioned in section 3.

12.2 SYSTEM OF UNITS

The SI system of units shall be used throughout the Contract.

12.3 INTENT OF SPECIFICATIONS

Should anything be omitted from the technical specifications and other tender dossier documents which are necessary for a clear understanding of the works, or should it appear that various instructions are in conflict, the Contractor shall obtain written instructions from the Contracting Authority/Supervisor before proceeding with the works affected by such omissions or discrepancies. It is understood and agreed that the works shall be performed and completed according to the true spirit, meaning, and intent of the tender dossier.

12.4 STANDARDS AND NORMS

The Contract shall be executed in compliance with Serbian and international Standards and norms.
The requirements in Serbian Standards (SRPS) or other regulations shall be applied as a minimum of required quality for each type of the works.
Any standard, which fulfils the same functionality and describing the same quality level or better, can replace any of the listed standards.

12.5 CE-MARKING

The total installation and all parts of the plant shall be CE-marked in accordance with the Machinery directive and related directives, norms and standards. The CE marking shall include all required tasks as described in the directive included but not limited to:

- Technical dossiers
- Risk Assessments
- Declaration of conformities

12.6 CONTROL OF WORKS

12.6.1 CONTRACTOR'S EQUIPMENT

The Contractor shall furnish equipment which will be efficient and appropriate to secure a satisfactory quality of work and a rate of progress which will insure the completion of the works within the time stipulated in the Tender. If at any time such equipment appears to be inefficient, inappropriate, or insufficient for securing the quality of work required or for the rate of progress, the Supervisor may order the Contractor to increase the efficiency, change the character or hire additional equipment, and the Contractor shall conform to such order. Failure of the Supervisor to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the works and rate of progress required.

12.6.2 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

The Contractor shall assume full responsibility for the protection of all buildings, structures, and roads existing in the area of the construction site, public or private, whether or not they are shown on the drawings. Any damage resulting from the Contractor's operations shall be repaired at his expense.

12.6.3 HANDLING AND STORAGE OF MATERIALS AND PLANTS

All materials and plants to be incorporated in the work shall be handled and stored in a manner, which prevents injury of any kind whatsoever.
Any materials or plants which, in the opinion of the Supervisor, have become seriously damaged to be fit for the use intended or specified shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.

12.6.4 NO SPECIFIC PROVISIONS

Where no specific provision is made in the bill of quantities for work of a temporary nature, it shall be considered as covered by the unit prices entered in the bill of quantities.

12.6.5 APPROVAL OF SOURCES, MATERIALS AND PLANTS

Materials and plants incorporated in permanent works shall originate from the states mentioned in Volume 1, Instructions to Tenderers. The sources of materials shall be selected and representative samples submitted to the Supervisor for testing prior to use in the works. Material that originates from sources, which are not approved by the Supervisor, cannot be used for works.
Approval of a source does not mean that all material in the source is approved. The Contractor has to ascertain by continuous control check measurements that only material which complies with the requirements specified in the various clauses of these specifications will be used for the works.

12.6.6 INSPECTION, TESTING, START-UP AND DEFECT LIABILITY PERIOD

3

Test personnel shall be fully conversant with the particular equipment, which is being tested, and shall be fully competent in the required test procedures.
The Contractor shall submit a programme of tests, structured to facilitate attendance by the Supervisor, and to economise on time and travel/accommodation expenses.
The Supervisor shall be given two weeks notice in writing to attend works tests. The Supervisor may, at his discretion, forego the witnessing of any tests. In such instances, the Contractor shall have the required tests carried out, and shall supply test certificates to the Supervisor. The Supervisor's approval is required before shipment to site. Formal test certificates are required in triplicate in all cases. The Supervisor will give at least twenty-four hour's written notice of his intention to attend the tests.
The testing shall ensure that all materials are according to the specified quality and equipment functions correctly, performs and is supplied to Specification. Specific 'works' tests' are detailed in the relevant parts of this specification.
In general, testing shall be to the following requirements:

Inspection and factory acceptance test of the equipment
All mechanical and electrical equipment shall be tested (Factory Acceptance Test (FAT) and Site Acceptance Test (SAT)). The Contractor shall list all the mechanical and electrical equipment and propose for each component an inspection and testing procedure, to be approved by the Supervisor.
The Supervisor shall be given two weeks notice in writing to attend works tests. The Supervisor may, at his discretion, forego the witnessing of any tests. In such instances, the Contractor shall have the required tests carried out, and shall supply independently certified test certificates to the Supervisor. The Supervisor's approval is required before shipment to site. Formal test certificates are required in triplicate in all cases. The Supervisor will give at least eighty four hour written notice of his intention to attend the tests.

Inspection on delivery and during installation
All materials and equipment shall be visually inspected before installation to ensure that no damage has occurred during transit or storage. Labelling, warranty certificates, statements of conformity, etc. shall also be checked.
During installation, the Supervisor will visually inspect all materials and equipment to ensure:
- That it complies with the requirements of the Specification;
- That installation workmanship is acceptable, and in compliance with the Manufacturer's requirements.
- Warranty certificate;
- Statement of conformity.

Tests on completion
All civil, mechanical, electrical and control components and functions are finished, tested dry and wet, found in compliance with the contract conditions and accepted by the Supervisor for start of the Defects Liability Period. Remedy of defects shall be done according to the decision of the Supervisor before or under the DLP.

12.6.7 RESPONSIBILITY OF THE CONTRACTOR

Approvals from the Contracting Authority/Supervisor do not relieve the Contractor from his obligations or responsibilities under the contract. Before taking over can take place, all permits, certificates, and approvals from local Authorities shall be obtained by the Contractor.

13

13 CONCEPT AND FUNCTIONAL DESIGN

13.1 ACCESSES

Facility which is the subject of this design can be accessed by pedestrian road and car drive. Pedestrian access to the facility, which is placed over concrete plateau where appendage of the facility was located, is currently improvised and is not in compliance with regulations for fire protection of the facility.
Reconstruction and adaptation of the first floor includes some other interventions on the facility, such as:

- The design for adaptation and reconstruction foresees, within the new solution for the wind screen, facilitation of appropriate access to the facility and access for handicapped people via pedestrian ramp of 6% gradient;
- Since the facility is lifted above the terrain level for ~60cm, new staircase and platform shall be installed, both of which shall adjust difference in height and provide adequate access to the facility.
- The existing new substation for special gases has already got access directly from the terrain level.
- Drive access to the facility is available at the substation for special gases, by internal drive at the level of the facility basement.

13.2 FIRST FLOOR

(Floor level +7.66/112.23/Structure level +7.58/112.15)
The existing first floor is subject of the main intervention. Space that has been occupied so far by other department as office premises shall be redesigned into two functionally separated units, connected with shared part of corridor with sanitary block and horizontal and vertical communications (staircase and elevator).
Internal communication is foreseen for everyday use by employees and it also represents evacuation route in case of hazard.
Total net surface of the first floor where physics, chemical and toxicology laboratories shall be located is 491.59m^2.
Physics and chemical laboratories take 255.84m^2. Toxicological laboratories take 168.07m^2 and shared premises take 67.68m^2 of net constructed floor surface.
External size of the facility with certain changes on façade in machine installations function shall be kept by intervention.

13.3 SHARED PREMISES

Shared premises are occupied by two departments on the first floor. They include vertical communications and premises which are necessary for functioning of the first floor as a whole.
Staircase leads to shared corridor representing connection between two units of forensic laboratories and it is also a part of evacuation route. That part of corridor is separated on both sides by fire protection doors with fireproofing capacity of 90 minutes (F90). The doors are always open, by magnets, and they close automatically only in case of fire, via fire fighting station. Between these doors there is a dropped ceiling at height of 240cm, coated completely inside with 5cm thick promat, because this part of the corridor belongs to the evacuation route. This separated part of corridor is extended both on the left and on the right all the way to the entrance door of laboratories department.

3

On the right from the door, next to the staircase, a space for RACK cabinet is foreseen. That space shall be separated by double door for fire protection with fireproofing capacity of 90 minutes (F90). Left from the entrance stir landing, there shall be located chemical laboratory, and on the right toxicological laboratory.

FIRST FLOOR - SURFACES OF SHARED PREMISES						
no.	PREMISES	Surface (m^2)	O(m)	FLOOR	WALL	CEILING
1	STAIRCASE	17.32	18.34	granite tiles, slip-proof	skirting dispersion h=10cm	dispersion
1a	SHARED CORRIDOR	5.58	10.01	granite tiles, slip-proof	gypsum plasterboard, F120 skirting dispersion h=10cm	internal promat covering dropped gypsum ceiling semi-dispersion
1b	MUTUA CORRIDOR	6.84	11.46	granite tiles, slip-proof	skirting dispersion h=10cm	dropped gypsum ceiling semi-dispersion
1v	CORRIDOR	2.14	6.04	granite tiles, slip-proof	skirting dispersion h=10cm	dropped gypsum ceiling semi-dispersion
3	STORE ROOM FOR CHEMICALS AND TOXICOLOGY	5.38	17.44	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	semi-dispersion
4	SANITARY BLOCK - anteroom	6.35	12.44	ceramic tiles	ceramic tiles h=240cm	dropped gypsum ceiling semi-dispersion
34A	SANITARY BLOCK – trocadero	1.60	5.24	ceramic tiles	ceramic tiles h=240cm	dropped gypsum ceiling semi-dispersion
34B	SANITARY BLOCK – men	3.87	8.50	ceramic tiles	ceramic tiles h=240cm	dropped gypsum ceiling semi-dispersion
34B	SANITARY BLOCK – men	2.18	6.14	ceramic tiles	ceramic tiles h=240cm	dropped gypsum ceiling semi-dispersion
34V	SANITARY BLOCK – women	2.17	5.90	ceramic tiles	ceramic tiles h=240cm	dropped gypsum ceiling semi-dispersion
34V	SANITARY BLOCK – women	2.40	6.62	ceramic tiles	ceramic tiles h=240cm	dropped gypsum ceiling semi-dispersion
34G	SHOWER CABIN	1.58	5.09	ceramic tiles	ceramic tiles h=240cm	dropped gypsum ceiling semi-dispersion
NET SURFACE OF SHARED PREMISES		67.41				

Laboratories can be accessed through internal corridor via double glass door with controlled entrance. Shared storing space can be accessed from the part of corridor towards toxicology. From the corridor towards physics and chemistry department, shared sanitary block can be accessed.

3

13.3.1 SANITARY BLOCK

Within sanitary block, there are toilets for men and women with anteroom, shower cabinet for employees and maintenance room with trocadero.
Within sanitary block, there is installation manhole spreading over five floors of the facility. Installation manhole is currently closed only with interior partition and it can be accessed through door that opens into that space.
The design foresees part of the manhole to be walled-up with bricks and to facilitate access to the duct by double door. The door shall be aluminium interior solid door.

13.3.2 STORE ROOM

Within shared premises, the design foresees store room for chemicals (no.3) used by both forensic laboratories. It is treated as separated fire protection unit. For the safety reasons, reinforced concrete walls are designed towards laboratories. For the same reasons, fire protection door is facing the premises in order to prevent access in the event of hazard (explosion).
Since lower temperature is maintained in the store room, thermal insulation is foreseen towards ancillary premises.
Store room is ventilated artificially, and light comes in through the existing aluminium facade windows. Towards offices on both sides of the store room, there shall be fire protection partitions on the windows. Wall towards ancillary premises shall be covered with thermal insulation of 5cm thickness over which gypsum plasterboards and finishing shall be placed, depending on the premises' purpose.
Two fire protection zones are foreseen within the shared premises: store room and rack cabinet room.

13.4 FORENSIC LABORATORIES (PHYSICAL AND CHEMICAL)

From the corridor, left from the floor entrance, physical and chemical laboratories are designed.
Entrance door shall be glazed, with controlled access. This space includes two offices for head of the department and forensic experts, reception department with store rooms for object from laboratories: laboratory for fire and explosions, laboratories for amphetamines and narcotics, laboratorics for paints and fibres.

13.4.1 CORRIDOR

Corridor of physical and chemical department shall be one whole. Offices and laboratories can be accessed from there.
Dropped ceiling is foreseen for the corridor, and most of installations shall pass through it. On the left side of the wall, looking from the entrance, there shall be located the existing distribution cabinet for electric installations and automatics cabinet foreseen for the needs of the department.
At the bottom of the corridor, there shall be a small kitchen (item 19) for the employees' needs.

13.4.2 OFFICES

Left from the main entrance at the North-West facade, there shall be located chemical forensic experts' office (item 28). It can be entered into directly from the main corridor.

Next to it, there is an office for reception of cases (item 30) with store rooms for cases in progress, cases ready for forwarding and cases pending (items 31, 32 and 33). Entrance to this space has controlled access.

Second part of the office block shall be placed on the right side of the corridor, on the South-East facade. Those shall include expert's office (item 6) and office for the head of the department (item 5) which can be entered through assistant's office (item 4).
All offices shall have natural lighting and possibility to open windows.

13.4.3 LABORATORIES FOR FIRES AND EXPLOSIONS

Laboratories for fires and explosions are located on the right side of the corridor in the far left angle and they are coming out to the South-East and North-East facade.
They consist of entrance corridor (item 16), which enables access to chemical laboratory for fire and explosion, where samples are prepared (item 17), and room for instrumental methods of fire and explosion analysis (item 18).
Rooms 17 and 18 have natural light. Room 16 shall have artificial light. All windows are blocked and therefore they cannot be open, and all of them have proofing tapes. All entrance doors shall have full proofing capacity.

13.4.4 LABORATORIES FOR AMPHETAMINES AND NARCOTICS

Laboratories for amphetamines and narcotics are located on the right side of the corridor, next to the department entrance and they are coming out to the South-East façade. These laboratories can be entered into through double glass door in the refuge corridor.
Laboratory space consists of entrance corridor (item 7), rooms for measuring and sampling (items 8 and 9), rooms for sampling (item 10), and rooms for analytical scale (item 11) which can be entered into directly from the exit corridor.

TABULAR PERSENTATION OF CHEMICAL LABORATORY SURFACES

FIRST FLOOR – CHEMICAL DEPARTMENT						
no.	PREMISES	Surface (m^2)	O(m)	FLOOR	WALL	CEILING
2	CORRIDOR	26.56	35.81	granite tiles, slip-proof	dispersion of skirting h=10cm	dropped gypsum plasterboard semi-dispersion
4	OFFICE ASSISTANT	7.38	11.20	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
5	HEAD OF THE DEP.	4.37	5.22	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
6	CHEMICAL EXPERT OFFICE	18.87	18.66	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
7	ANTEROOM	5.43	9.38	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
8	MEASURING	2.95	6.94	antistatic PVC floor (Bfl,S1/Cfl, S1)	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion

9	MEASURING	2.85	7.16	antistatic PVC floor (Bfl,S1/Cfl, S1)	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
10	TRACE SAMPLING	3.47	7.66	antistatic PVC floor (Bfl,S1/Cfl, S1)	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
11	ANALYTICAL SCALE	3.70	7.84	antistatic PVC floor (Bfl,S1/Cfl, S1)	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
12	SAMPLE PREPARATION - AMPHETAMINES	8.45	11.82	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
12 A	SHOWER	1.49	4.78	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
13	SAMPLE PREPARATION - NARCOTICS	17.77	8.35	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
14	NARCOTICS INSTRUMENTAL METHODS	17.01	18.13	antistatic PVC floor (Bfl,S1/Cfl, S1)	gypsum plasterboard F120 ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
15	FTIR ROOM	7.78	11.19	antistatic PVC floor (Bfl,S1/Cfl, S1)	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
16	ANTEROOM	4.91	9.81	PVC floor	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
17	SAMPLE PREPARATION - EXPLOSIVES	12.45	14.26	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
18	EXPLOSIVES INSTRUMENTAL METHODS	6.82	10.59	antistatic PVC floor (Bfl,S1/Cfl, S1)	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
19	KITCHENETTE	3.55	7.55	ceramic tiles	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
20	SAMPLE PREPARATION - PAINTS	8.60	12.05	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
21	PAINTS INSTRUMENTAL METHODS	12.33	13.83	antistatic PVC floor (Bfl,S1/Cfl, S1)	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
22	FTIR ROOM	6.01	10.43	antistatic PVC floor (Bfl,S1/Cfl, S1)	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
23	ANTEROOM	3.52	8.77	PVC floor	skirting dispersion h=10cm	dropped gypsum plasterboard semi-dispersion
24	INSPECTION OF DISPUTABLE FIBRES	7.11	11.53	PVC floor	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
25	INSPECTION OF DISPUTABLE FIBRES	7.75	11.41	PVC floor	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
26	SAMPLE PREPARATION - FIBRES	7.45	11.25	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
27	FIBRES –	8.35	12.5	antistatic PVC floor	ceramic tiles	dropped gypsum

	INSTRUMENTAL METHOD		0	(Bfl,S1/Cfl, S1)	h=280cm	plasterboard semi-dispersion
28	CHEMICAL EXPERT OFFICE	12.31	17.7 1	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
30	RECEPTION OF CASES	7.91	16.2 0	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
31	CASES PENDING	3,72	7.84	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
32	CASES IN PROGRESS	3.14	7.31	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
33	FINISHED CASES	1.83	5.54	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
NET SURFACE		355.84				

Doors on these premises shall be glazed, including glazed walls between them with height parameter of 130cm. With this glazing, a visually bigger space shall be achieved, because these are small dimensions premises without direct light which shall receive the light through other laboratories with direct face light.
From the corridor, chemical laboratory for amphetamines can be entered into (item 12), including chemical laboratory for narcotics (item 13). These laboratories shall also have glazed doors with full proofing capacity. From the narcotics laboratory there shall be an entrance to the room for instrumental methods of narcotics analysis (item 14) and from it into FTIR room (item 15).

13.4.5 LABORATORIE FOR PAINTS AND FIBRES

Laboratories for paints and fibres are located on the right side of the corridor at the far angle and they are coming out on the North-West and North-East façade.
Laboratories consist of entrance corridor (item 23) from where premises for inspection of disputable fibres can be entered into (items 24 and 25), chemical laboratories for fibre analysis (item 26) and premises for instrumental methods of fibre analysis (item 27). Between the laboratories 24 and 25, a glazed wall is foreseen with parapet of 130cm.
Part of laboratory, which is dealing with testing of paints, consists of chemical laboratory for paint analysis (item 20), premises for instrumental method of paint analysis (item 21) and premises for FTIR (item 23). All of these premises shall be connected and therefore communication between them shall be enabled.
Room for FTIR (item 22) and chemical laboratory for fibre analysis (item 26) are connected with glazed partition with doors.
Most of these premises are coming out to façade and receive natural light. Premises that do not have natural light shall be lighted through glazed inter-walls. Wherever possible, doors shall be glazed with glazed fixed partitions. Parapet height of these partitions is 130cm, in order to enable work on desks without interruptions.
It is connected to corridor via rooms 22 and 23with single door, with full proofing capacity.
Entire space of chemistry department shall constitute one fire zone.

7

13.5 FORENSIC LABORATORIES FOR TOXICOLOGY

From the corridor, on the right side of the floor entrance, access to toxicology laboratories is designed, through doors with controlled access.
In this space, offices for department managers and toxicology experts are located, reception department with archives and the following laboratories: laboratory for preparation of bio-material samples and premises for instrumental methods of bio-material analysis.

13.5.1 CORRIDOR

Corridor of forensic department shall be divided in two parts, both of which have doors with controlled access.
From the first part of the corridor it is possible to access offices and premise for reception of samples. On the right side of the wall, looking from the entrance, there is the existing distributing cabinet for electric installations next to the counter for samples reception.
On the left side of the corridor a small kitchenette is foreseen (item 47) for this department employees' needs.

ʒ

TABULAR PRESENTATION OF TOXICOLOGY LABORATORY

FIRST FLOOR – TOXICOLOGY DEPARTMENT						
o.	PREMISES	Surface (m2)	O(m)	FLOOR	WALL	CEILING
35	CORRIDOR	11.24	16.58	granite tiles, slip-proof	skirting dispersion h=10cm	dropped gypsum plasterboard semi-dispersion
35 A	CORRIDOR	9.49	16.62	granite tiles, slip-proof	skirting dispersion h=10cm	dropped gypsum plasterboard semi-dispersion
36	FORENSIC EXPERT OFFICE	14.23	17.68	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
37	HEAD OF THE DEPARTMENT	13.69	17.46	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
38	INSTRUMENTAL METHOD	13.09	16.22	antistatic PVC floor (Bfl,S1/Cfl, S1)	dispersion	dropped gypsum plasterboard semi-dispersion
39	INSTRUMENTAL METHOD	16.73	16.26	antistatic PVC floor (Bfl,S1/Cfl, S1)	dispersion	dropped gypsum plasterboard semi-dispersion
40	WASHING OF LABORATORY DISHES	7.92	11.62	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
41	SAMPLE PREPARATION BIO-MATERIAL	32.51	23.53	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
42	SCALE ANALYISIS	3.72	7.77	antistatic PVC floor (Bfl,S1/Cfl, S1)	dispersion	dropped gypsum plasterboard semi-dispersion
43	ANTEROOM	4.14	8.14	acid resistant ceramic tiles	acid resistant ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
44	ARCHIVES	4.03	8.04	PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
45	SAMPLES RECEPTION	19.61	19.12	acid resistant ceramic tiles PVC floor	dispersion	dropped gypsum plasterboard semi-dispersion
46a	OFFICE LABORATORY TECHNICIANS	14.23	17.30	PVC floor	skirting dispersion h=10cm	dropped gypsum plasterboard semi-dispersion
46a	RACK	1.16	4.30	antistatic PVC floor (Bfl,S1/Cfl, S1)	dispersion	dispersion
47	KITCHENETTE	2.30	6.06	ceramic tiles	ceramic tiles h=280cm	dropped gypsum plasterboard semi-dispersion
NET SURFACE OF THE DEPARTMENT		168.09				

Laboratories can be accessed from the other part of corridor, which can be entered into through the door with controlled access. At the entrance to the laboratory item 39, there shall be automatics cabinet

13

which is intended for this department's needs. On the left side of the corridor, next to laboratories, item 38, a niche with door is foreseen for the laboratory needs.

Dropped ceiling is foreseen for corridors; most of the installations shall pass through the dropped ceilings.

13.5.2 OFFICES

Left from the main entrance, on the South-East façade, there is a toxicology expert's office (item 36). It can be entered into directly from the main corridor. Next to it there is an office of the toxicology department head (item 37).

Second part of office block is located on the right side of corridor at the North-West façade. There is also technicians' office (item 46) and office for reception of samples (item 45) with archives (item 44). On the wall between these two offices and the corridor there is a counter, for reception of samples, with glazed movable wings which can be opened by side sliding. This room shall have door with controlled entrance.

All offices have natural light and possibility to open windows on facade.

13.5.3 LABORATORIES

Left from the main entrance, at the bottom of corridor, there are toxicology laboratories, coming out on three facades.

On the left, there is a laboratory for instrumental techniques (item 38). It can be entered into directly from the main corridor.

At the bottom of the corridor, on the left, there is an entrance laboratory for instrumental techniques (item 39) and on the right an entrance to the laboratory for preparation of toxicology samples (item 41). These two laboratories are connected via room for washing of laboratory dishes (item 40).

Laboratory for preparation of samples is connected to the room for analytic scale (item 42) and room with shower and basins (item 43) which represents connection between laboratory and room for reception of samples, and it is intended for quick intervention in case of accidents during work, i.e. for rinsing of eyes and overalls.

All laboratories have natural light.

Entire space of toxicology department constitutes one fire zone.

13.5.4 SUBSTATION FOR SPECIAL GASES

For the needs of laboratory functionality, the following special gases are necessary: nitrogen, hydrogen, argon and compressed air.

Substation for special gasses already exists at the location and it is located at the angle of South-West and South-East façade, approximately five meters away from the facility. Distribution network of the substation next to façade spreads up to the second floor, and therefore the existing line should be shortened down to the first floor.

From the point of gas installation, line shall be conducted around the facility to appropriate laboratories. Laboratories which use gases are mainly located along facades.

Gas distribution hollow tie is part of jalousies mounted on façade instead of reflecting safety glass behind which should be hidden movable jalousies.

13

13.6 FINISHING WORKS

13.6.1 WALLS FINISHING

External walls
Existing reinforced concrete parapets and walls of 15.0cm thickness, shall be covered on the outside with anodized aluminium sheet metal of 2cm thickness, on substructure over 4 cm thick durisol. Columns are covered only with anodized aluminium sheet metal, which is 2cm thick.
Pursuant to Method statement on energetic efficiency, in order to improve thermal conditions, the redesign foresees adding of thermal insulation on the inside of the facility. Adding of thermal insulation shall be carried out by covering parapet walls, columns and solid wall façade canvas. Covering shall be carried out with 10 cm thick semi hard boards of mineral wool on parapets and walls, and with 5cm thick boards on columns. Thermal insulation shall be covered by gypsum plasterboard on substructure in parapets; on walls and columns it shall depend on whether finishing is done with single or double gypsum plasterboards on substructure.

Internal walls
Internal existing walls are made of solid brick 12cm thick and they are located at sanitary block, installation duct, elevator frame and staircase space. On premises which are ancillary to staircase space and installation duct, walls are covered with thermal insulation of 5cm thickness. Plasterboard shall be placed over thermal insulation on substructure.
Finishing of walls is different, depending on function of premises where they are located.

These walls can be determined by finishing method, as follows:

- painted on one side with dispersion, and on the other side covered with 1cm thick ceramic tiles;
- covered on both sides with ceramic tiles of 1cm thickness;

Walls in staircase space shall be finished by mortar of 2cm thickness and painted by dispersive colour.
Redesigned reinforced 14cm thick walls in store rooms (item 3) shall be covered towards ancillary rooms with thermal insulation of 5cm thickness, same as brick walls. Towards laboratories, walls shall be finished with ceramic tiles and therefore it is necessary to cover their thermal insulation with waterproof gypsum in the second layer.
Other redesigned partition walls are prefabricated walls with gypsum cardboard covering. Construction of walls consists of double gypsum cardboard plates 1,25cm thick, placed on both sides on of substructure of "CW" sections with insulating filling.

All of these walls have to be finished in the following way:

- painted on both sides with dispersion or semi-dispersion;
- painted on one side with dispersion or semi-dispersion, and on the other side covered with ceramic tiles of 1cm thickness;
- covered on both sides with ceramic tiles of 1cm thickness
- covered on both sides with acid resistant ceramic tiles

13.6.2 FLOORING

First floor
Along the entire surface of the first floor the existing floorings shall be removed from constructive reinforced concrete slab. Depending on the new premises' purpose, flooring finishing is also foreseen, but other layers of new flooring shall be same everywhere.
On the premises for which floor grids are foreseen, floors shall be done in drop towards grids.

3

Since the existing flooring height is 8cm therefore the new flooring shall be the same height, in order to prevent discrepancy in flooring height of staircase.

New layers of the flooring structure shall be:

- Existing AB slab – 15 cm
- Thermal insulation (elastic expanded polystyrene) – 3cm
- PE film
- Cement screed – 4-4.5cm (depending on the floor finishing)
- Hydro insulations – acid resistant epoxy coating glued with finishing.

Finishing of new floorings shall be:

- PVC floor – 0.5cm (premises 4, 5, 6, 7, 16, 23, 24, 25, 28, 20, 31, 32, 33, 36, 37, 44, 46) of 144.43m^2 surface;
- Antistatic PVC floor (Bfl, S1/Cfl, S1) – 0.5cm (premises 8, 9, 10, 11, 14, 15, 16, 21, 22, 24, 25, 27, 38, 39, 42, 45, 46a) of 100.57m^2 surface;
- Antistatic PVC floor (Bfl, S1) – 0.5cm (premise 18) of 10.59m^2 surface
- Acid resistant tiles on glue – 1cm (premise 3, 12, 12a, 13, 17, 20, 26, 40, 41, 43, 45) of 137.53m^2 surfaces;
- Ceramic tiles on glue – 1 cm (premises 19, 34, 34A, 34B, 34B, 34V, 34V, 34G, 47) of 26.38m^2 surface;
- Granite ceramics on glue – 1cm (premises 1, 2, 35, 35a) of 62.10m^2 surface;

Stainless steel strips shall be placed on junctures of different floor finishing.

Staircase

New design foresees removal of the existing stairs covering and finishing of the existing staircase space, along all floors, with granite ceramic tiles on glue. On high and low ground floor, excluding staircase space, the new floor covering shall be placed in corridor part belonging to evacuation route.

13.6.3 CEILING

Dropped ceilings

Dropped ceilings are foreseen for all premises on the first floor.

Height achieved by dropping of ceilings in operating premises shall be 280cm, and in auxiliary premises and corridors 240cm. Ceilings shall be made of monolith gypsum plasterboards.

In offices, dropped ceilings shall be made of monolith gypsum plasterboards on hangers.

In all premises, except in corridor, 3cm thick insulation shall be placed over concrete mezzanine ceiling as sound insulation towards premises on upper floor.

At places where ventilation ducts come out of premises into corridor and where they have to pass under beams, canted cascades will appear and they shall be used to hide installations. The same principle shall be applied on the duct outlet on façade of kitchenette in physics and chemical department and on premise for washing laboratory dishes in toxicology department.

Along the corridor, monolith gypsum ceiling is foreseen on substructure in order to facilitate passage of installations.

At the part of corridor which belongs to evacuation route, and which is located between fire protection doors, dropped ceiling space shall be completely filled inside with "promat" fire protection tiles of 5cm thickness, as installation duct.

Lights on all ceilings are prefabricated. Ceilings shall also have fire detectors, ventilation grates and inspection openings.

13.7 INSULATION

13.7.1 HYDRO INSULATION OF THE FACILITY

All premises and flooring shall be insulated with acid resistant epoxy coating. On premises with floor grids, hydro insulation shall be carried out carefully in order to prevent hazards and damages to lower floors.

13.7.2 SOUND INSULATION OF THE FACILITY

New design foresees placement of sound (thermal) insulation of 3cm thickness on all floors. After that, thermal insulation shall be placed in dropped ceiling zones, below upper floor slab, which will also contribute to sound insulation of the building.

13.8 JOINERY

13.8.1 FACADE ALUMINIUM PARTS

Existing aluminium parts on façade shall be kept. Windows in all laboratories shall be permanently closed. In offices, it will be possible to open windows.
Proofing of the existing aluminium façade joinery shall be carried out as follows: appropriate proofing tapes shall be placed on wing that can be opened, widows shall be closed, handles for opening shall be taken down and openings shall be closed with PVC plugs. Finally, all joints shall be permanently sealed with sealant.
Windows in kitchenette and room for washing of laboratory dishes shall be shortened per height on 100cm on one side and 90cm on the other side of lateral façade of the facility, especially on places where installations ducts come out of the facility and go into large duct on façade.

13.8.2 INTERNAL PARTITIONS

Internal aluminium joinery

Most of vertical partitions of interior consist of doors, materialization of which is made of aluminium sections without thermal interruption, double-walled, 40mm thick, with 3-sided fold (thick fold). Door wing shall be made of aluminium sections with filling of aluminium thermal sheet metal of 2cm thickness.
Difference between doors can be seen in thickness and material of the wall where they are installed, also in size, wing number, whether they have ventilation grid and light and whether they are glazed.
In addition to the above mentioned doors, the design foresees fixed glazed partitions of aluminium sections without thermal bridge glazed with pamplex glass of 2x5mm thickness. All glazed wings and joints shall be framed with EPDM packing.
Depth and quality of anodizing shall be determined by Supervisor. All elements which provide physical, thermal and aesthetical criteria shall be contractor's liability. Contractor shall be liable to place blind stocks before installation of respective item.
Contractor shall submit drawings of complete items including structural analysis for approved aluminium sections. As necessary and in compliance with structural analysis, selection of aluminium sections and iron reinforcements, to be placed in a section, shall be carried out. All elements have to be certified for full proofing.

Internal fire protection doors

3

Fire protection doors which shall be installed on the first floor within evacuation route shall be open all the time with magnets. Doors are connected to the system for automatic closing over fire protection station.
Fire protection doors shall be made of double steel sheet of 1.5mm thickness with fire protection insulation which shall meet fireproof capacity fromF60 to F90, depending on the zone where the door is located and on its thickness. Door-step shall be made of steel sheet section for installation of fire protection doors. Door frame shall be metal, fireproof and made with steel sheet section with inserted fireproof tapes. Installation of door frame in the wall shall be carried out in at least three places at height of the door frame and one at width of the door frame.
Wings shall be supplied with smoke packing. On the doors, there shall be tape which expands when in contact with flame thus sealing openings, preventing the smoke to pass through.
Door finish hardware shall be modern, of standard design with hook, cylinder, three keys and self-closing mechanism. Door wing shall be supplied with at least three hinges per height, depending on wing weight and required protection.
Fire protection doors shall not be only flame resistant, but they shall also be completely toxically safe.
Fire protection doors shall have compliance certificates for fire resistance testing in compliance with standard SRPS U.J1.160.

Evacuation route

Within the evacuation route of the facility, it is necessary to carry out additional interventions so that the facility meets fire protection regulations.
Since the staircase and elevator frame space foresee over-pressure, it is necessary to replace door that lead from staircase space to the floors, adapt the doors on the roof and carry out change in the wind screen space directions of moving and opening the doors.
It is also necessary to install additional fire protection doors on all three floors (basement, high and low ground floor) in order to separate evacuation route from the other part of the space.
For that purpose, new fire protection doors have been introduced to the parts of corridor which belong to the evacuation route. In those spaces floor and ceiling coverings shall be replaced. Also, parts of the walls that belong to that space shall be made as per requirements for the walls on evacuation route, where possible, new gypsum prefabricated walls shall be installed, and the brick walls shall be extended and additionally rendered on both sides. All walls which are on the evacuation route shall have fireproof capacity of F120mm.
In the staircase space on the high ground floor, the first, the second and the third floor, the existing glazed partition shall be replaced with aluminium smoke proof glazed partitions with double door. The door shall be made of aluminium sections without thermal interruption, glazed with pamplex glass of 2x5mm thickness. Door wings glazing shall be framed with EPDM packing and rounded strips.
In the door frame EPDM packing shall be installed.
Doors shall be supplied with smoke resistant brushes at the window bottom.
All elements of these partitions have to be certified for full sealing capacity.
Within staircase space on the facility roof, certain interventions shall be carried out on the existing doors of technical premises and on the doors that lead to the roof. It is necessary to install packing tapes on the door wings in order to provide appropriate proofing.
The existing entrance to the facility, with windscreen, is not in compliance with fire protection regulations, because the last point of the stairs with ramp is narrow, exit door is not wide enough and the exit stairs are angled against walking direction.
Suggested new entrance to the facility, with wind screen, is described in the Main design.

Elevator

3

There is an elevator in the facility which goes from the lower ground floor to the third floor. Elevator pit is at the basement level, and elevator bulkhead is on the flat roof within technical premises.
Elevator installations shall be completely replaced and new electric elevator shall be introduced.
Lowering down for one more floor is foreseen and therefore the basic station shall be in the basement.
From the higher ground floor to the third floor, elevator exits shall be moved from the corridor to the staircase space.
In the mezzanine ceiling of the basement towards level -1 new elevator pit shall be formed; details on the above stated are given in the Main design.
Design of the elevator facility is presented in the main design.

13.9 INSTALATION WORKS

The design foresees all installations necessary for the facility's functioning without interruptions.
All of those installations are separate part of the Main design.
For the needs of hydrant network, in order to achieve sufficient pressure at the first floor level, the design foresees constructing of room for hydrocel at the level -1, below the facility basement.
For the needs of machine installations – ventilation and air conditioning on lateral sides of facades and on canted canvases, installation ducts which conduct to the facility roof ventilation ducts of premises and equipment, shall be made. Ducts shall be made of boxy sections 100x100x5mm forming the ducts geometry which is to be fixed into concrete parapets and mezzanine structure. Towards windows on façade, for fire protection reasons, ducts shall be covered with façade fire protection trimo panels, and with aluminium grid on the front, along the full length of the roof.
Duct structure details are part of the main design.
On the facility roof, also, for the needs of machine installations, three bulkhead containers shall be placed for filter protection. Bulkheads shall be made of trimo panels on substructure of boxy sections. Roof shall also be made of panels with 10% inclination, including fascia.
The floor shall be made of sectioned sheet metal on metal substructure of boxy sections and "L" sections.
Bulkheads shall be placed on metal legs with possibility to adjust height. They are fixed to the roof slab.
In order to be able to access facility, there shall be several doors on each bulkhead, depending on possibility regarding ducts. Doors shall open into field and two grids are foreseen for each door, in the bottom or top zone of the wing, in order to achieve better ventilation of the premises.

13.10 FIRE PROTECTION

Reconstruction and adaptation of the facility also includes fire protection, safety and health at work issues.
Danger level has been determined in case of fire within the facility (or part of the facility constituting technical-security complex). Resistance adjustment against fire on construction elements has also been determined (walls, beams, roof construction, etc.), all in compliance with SRPS U.J1.240. Fire protection design defines materials for construction, which shall be fireproof, including level of its fireproofing capacity, division of the facility into fire sectors, fire risk assessment and characteristics of the floors, roof, doors, windows, evacuation routes and possibility to access the facility.

In compliance with the standard SRPS TP 21, the facility is designed so as to enable safe evacuation in the event of fire, i.e. evacuation routes for rescue of people and salvage of property; also, building construction shall preserve its integrity and load-bearing capacity even during fire fighting

/3

intervention, until its full engagement. Evacuation routes are defined, time for evacuation is calculated for persons that might be present in the building, including capacity of evacuation routes. Type of protection for electric devices and equipment is defined separately.
Fire protection design also defines protection of the facility against atmospheric discharge, protective grounding, alternate source of power supply and installations for automatic detection, fire alarms and fire extinguishers.
The design shows disposition of fire extinguishing equipment, lightning conductor, mobile fire extinguishing equipment, hydrants and evacuation routes.

14 STRUCTURAL CONCEPT

Facility is designed as business facility. Floors of the facility include two underground levels, basement and five above ground floors.
This design foresees adaptation and reconstruction of the first floor, including reconstruction of the existing elevator.
New purpose of the space has more requirements regarding ventilation. Air-ducts are drawn over the wall face. Steel structure is planned to be support to the ducts.

14.1 STRUCTURE

The facility is formed as frame structure, i.e. rigid reinforced concrete frame. Floor concrete slab is monolith plate floor supported by reinforced concrete beams placed over columns.
Elevator reconstruction foresees introduction of one more elevator station at the basement level. In order to form elevator pit, it is necessary to build new reinforced concrete plate at the depth of 1,5m from the floor slab of the last station, i.e. at the height of 5,14m from the ground of the next lower floor. Having in mind that the elevator frame is located in the field, a reinforced concrete beams are formed between the closets columns which shall support the new reinforced concrete beam.
Reinforcement of the new beams shall be drilled into the existing construction and grouted with epoxies or with eksmal. The existing columns shall be cleaned, at connection points with the new beams, made rough and coated with epoxies in order to connect new and old concrete, all of which shall be performed in compliance with manufacturer's instructions.
Steel structure at the wall face is designed to support ventilation ducts and sewage pipes, including plates for ducts shielding.
At the underground level there shall be room envisaged for hydrocel. The room shall be built with clay blocks 20cm thick, with all necessary horizontal and vertical columns in the walls – ring beams. Having in mind the height of the floor, a plate shall be placed at the height necessary to construct the room for hydrocel. The plate is made of easy mounting "fert" ceiling which is 20cm thick (4+16).

14.2 LOADS

Any permanent and variable useful loads are calculated per SRPS U.C7.121 – Loads due to use and occupancy in residential and public buildings and SRPS U.C7.123 –Action due to self-weight of constructions, non-structural elements and stored material used in structural design.
Loads due to elevator utilization shall be calculated in compliance with the data from the elevator detailed design.

14.3 MATERIAL AND EXECUTION

Concrete structure shall be constructed by casting on the spot. Concrete class is MB30 and reinforcement brand is RA 400/500. Blinders and secondary reinforcement of small sections are made of smooth reinforcement GA 240/360.
Mixing and curing of concrete shall be carried out in compliance with the Rules on Technical Standards for Concrete and Reinforced Concrete.
Steel construction is made of cold formed and rolled steel sections. Basic material for the steel structure is Ч0361 which is in compliance with SRPC U.B0.500.
Steel construction shall be made by welding in workshop, and all mounting joints shall be made by welding or with screws, in compliance with the Rules on Technical Measures and Requirements for Installation of Steel Structures.
System for protection of the steel structure against corrosion:

- two basic protective coatings
- two covering coatings, in compliance with the Rules on Technical Measures and Requirements for Protection of Steel Constructions Against Corrosion, FRY Official Gazette No. 37/70.

15 WATER SUPPLY AND SEWERAGE

The design of water supply and sewerage installations is completed based on the following background and data:

- architectural-construction design,
- design specifications and
- applied regulations and recommendations for such type of installations

The internal installations envisage the following installations:

- sanitary water supply network
- hydrant water supply network
- sewerage network

15.1 WATER SUPPLY INSTALLATIONS

Building water supply is executed via the existing connection. Central hot water heater is connected to the building sanitary water supply network, thus providing hot and recirculated water supply network in the building, apart from the cold water. Considering the fact that only the first floor will be renovated, only the water supply installation designed for this floor shall be described.
Three water supply risers for cold, hot and recirculated water supply network pass through the plumbing fixtures. Risers are all functional and made of PP-R pipes. Creating new connections under the second ground floor ceiling is envisaged for the needs of the first floor.
The main sanitary water distribution leads through the building corridor from where the water supply branch pipes are formed for all the supply spots in sanitary blocks, laboratories, offices and technical premises. Three parallel pipes lead through the main distribution – cold, hot and recirculated installations. Sanitary water supply network is designed of polypropylene water supply pipes and fittings with sufficient number of valves for easy maintenance of the system. All pipes should be thermally insulated with Armaflex or similar insulating material.

15.1.1 HYDRANT NETWORK

Fire-hydrant network is designed as a system independent of the sanitary water network. Hydrant network water supply is being executed via the existing joint connection where the installation splits in sanitary and hydrant networks after the pipe enters the building. Water supply connecting pipe diameter is Ø 80 mm and absolutely meets the needs of both sanitary and hydrant networks.
Considering the fact that there had been no PUC BWS conditions, the measurement within the water supply network had to be conducted. After the third floor measurement, the result on the last hydrant was 1.8 bars of dynamic which is 2.0 bars of static pressure (the Ministry of Interior report on completed measurements provided in the appendix to the technical description). This proves that there is no sufficient pressure in the hydrant network which is why it is necessary to build in the pressure raising unit. On the so-called technical station level building in of the pressure raising unit is envisaged as well as forming the new premises for the facility. The envisaged facility has the following characteristics H=30 m, Q=5.0 l/s and two pumps – the operational and the back-up one.
The existing hydrant network is made of galvanized steel pipes and fittings. Hydrant boxes are provided with Ø 52 angle valve, 15 m long trevira hose and a nozzle. The arrangement and number of hydrants meets the coverage conditions for the entire building area which is why it is not necessary to make any interventions regarding hydrant network except for building in the facility.

15.2 SEWERAGE INSTALLATIONS

Connection of the newly designed floor is to be made via the existing sewerage installation made of cast iron. It is necessary to switch to plastic – polypropylene.
No special type of technological sewerage system has been envisaged. The amount of technological waste water is insignificantly small and it was agreed to collect all the technological sewerage within the internal tanks and neutralize it prior to drainage and reach the sufficient PH value allowed for drainage. This section is to be followed by the internal protocol which to be controlled regularly (the employee report on drainage is provided in the appendix of the technical description).
Distribution of the used water on the first floor of the building is made through polypropylene pipes and fittings placed in the second ground floor suspended ceiling.

15.3 SANITARY BLOCKS

Sanitary fixtures and reinforcement of the first class as chosen by the Beneficiary are envisaged at the locations determined by the architectural-construction design. Each supply spot is provided with a globe valve and siphon.
The designed equipment is allowed to be altered by the Supervisor in agreement with the Contracting Authority provided that such alteration requires no interventions on the completed network.
All the works envisaged in the bill of quantities are to be executed by the professional stuff and in accordance with regulations applied for such works.

16 ELECTRICAL INSTALLATIONS

The design for reconstruction and upgrading of the electrical installations in the building is based on:

- Main Design
- Design specifications
- Applied technical regulations, rules and standards for such installations.

The building comprises three levels:

a. basement
b. first ground floor
c. second ground floor
d. 1^{st}, 2^{nd} and 3^{rd} floors

In respect of the all foreseen works, the Contractor shall be fully familiar with all Final Design details, as well as with all local regulations, international and local standards (SRPS), common practice of trade and circumstances for their execution.
The installations have to be executed in accordance with the design and applicable standards. For any modification the Contractor has to get approval.

16.1 POWER SUPPLY AND ELECTRICITY DISTRIBUTION

Power supply of the building is the existing one and is executed in such way that the building is supplied with electricity over TS 10/0.4 kV; 3x 1000 kVA located in the building area over the existing distribution.
In the basement there are two main switchboards GRT-1 and GRT-1; those are two-pole switchboards with generator and network sections. Rising lines are executed from the main switchboards to some upper floor switchboards with two poles (M+A)
Network supply cables from TC to GRT are type PP00 3x150+70 mm2 and the generator cables are PP00 3x70+35 mm^2, in the length of 120 m.
As the alternative power supply there is diesel generator with automatic switching control, for the supply of GRT (a) and consumers in case of network failure. Diesel generator (DEA) is in the same building as TC. With the calculation of newly designed load and inspecting the available capacities of the two aggregate units 2x250κVA with one being backup unit, it is determined that for the consumer's need on the first floor it is necessary to envisage the new container-type generator of 500κVA power.
With the new solution, one cable from the generator supplies GRO(a), cable NHXHX 3X150+75 mm^2/Fe180/E120, and supplies primary consumers over upper floor distribution boxes RT-1-A/I and RT-2-A/I, elevator and hydrocele. The second supply cable NHXHX 3X70+35 mm^2 /Fe180/E90 supplies RO-kot.
Newly designed generator has input power of 267kW.
The designed power input of the existing RT-1-M/I on the first floor is 25kW and of RT-2-M/I it is 17kW, meaning that the power on both switchboards is reduced (previously designed power input was 35kW on both switchboards). The existing supply network cables are kept for that reason.
Renovation and adaptation of electric installations in the building leave necessary cables that are to be uninstalled paying attention not to damage the existing rising lines.
Measuring of the electricity consumption is part of the Main Design.
Building classification in terms of the possibility of emergency evacuation is performed according to SRPS IEC 60364-5-51 and BD1-BD4. The building is labelled as BD-2 regarding evacuation in case of fire.
For the main corridors, offices and laboratories that are frequent and with good evacuation conditions, the class is BD2.
Installed equipment is specified and defined according to SRPS IEC 60364-5-51, what means that according to Class BD2 requirements the equipment must be made of materials that prevent spreading of fire, smoke and poisonous gases.

16.2 LOW VOLTAGE INSTALLATION

The energy distribution in the building is executed in such way that meets the terms defined by the disposition, purpose and power of a consumer.
In the first floor corridor in the building there are distribution boxes RT-1-M/I and RT-2-M/I, planned as three-part boxes: network, generator and constant supply (UPS) supplying lighting and technology equipment in the building.
Main distribution boxes are equipped with switches with a remote turning off option and on the doors of network and generator sections there are mushroom push buttons for break down turning off. The supply of distribution boxes from the main box is direct, thus providing higher energy reliability. When selecting supply lines the attention was paid to power input rate, method of placing cables, voltage drop and location for placing cables in full accordance with regulations and standards regarding the field and fire protection requirements.
Supply lines in corridors, below suspended ceiling, on buses are partly led over PCS supports FE 120, partly above the suspended ceiling with FE 120 flanges and in small section through PVC wall pipes. Part of the equipment is supplied with cables laid in floor protective pipes.
Mechanical protection rate for all distribution boxes is to be IP-54, according to single-pole schemes. The cabinets are to be made of steel sheet, coated with prime and protective paint of baked Polyester powder and secured with a door and a lock. Distribution boxes are planned to be wall mounted and set on the height of 1.2 m from the finished floor.
Electricity distribution from the main distribution boxes to the upper floor RT in the building is executed with cables type PP00 that are present, and the newly designed cables for aggregate supply are NHXHX-J of the appropriate size, according to the design.
The cabinets are to be made in full accordance with single-pole schemes provided in the design. Generator and UPS connection with the installed equipment is clearly separated. Distribution boxes for the aggregate and UPS supply must be physically separated from the network distribution boxes and properly marked.
All distribution boxes are supplied over high quality protective switches (similar quality to LEGRAND).
For the internal distribution there are cable-like conductors – installation conductors, type NHXHX-J and NHXHX Fe180/E90, with a number of wires and section specified in the design.

16.3 INSTALLATION OF LIGHTING AND OUTLETS

Installation of lighting has to be done according to the design, applicable RS standards and norms. All the switches are installed on the height of 1.5 m from the finished floor, unless otherwise specified in the design.
Anti-panic lighting is envisaged in case of the network voltage failure, and includes lights with incorporated accumulator batteries with work flow of minimum 3 hrs. Such lights are planned for corridors, stairs, at the exit and any other exit path used for safe passing and evacuation of people.
Anti-panic light circuits in the distribution box have to be specially marked.
There should be green marks on the lights labelled 'Exit' or an arrow '→' in the direction of evacuation.
Installation of lighting is executed with conductors NHXHX-J with section and number of wires specified in the design.
Lights in the plumbing fixtures are planned to be of IP44 protection rate, insulation class 2 (lights with insulated base). Lights must not be installed in the area 1. The light connection is installed at minimal distance of 60 cm away from the basin.
Number of connections is defined according to the requirements of the room purpose.

The entire electrical installation of laboratories and offices is supplied partly from UPS and generator and partly from the network supply (in accordance with the design), whereas the laboratory premises are entirely supplied via UPS (laboratory equipment).
Electrical installation has to be of high quality according to design and applicable standards.
Installation of outlet is envisaged for connecting the computer, thermal consumers as well as various mobile consumers. All outlets are provided with protective contact and are to be installed at the height of 50 cm from the floor level, unless otherwise specified by the design.
Parapet distribution in the laboratories is envisaged to be made underneath the desk work space at the height of 60 cm, whereas some devices and computers are supplied through the opening in the desk work board. All parapet distribution installed towards façade walls is envisaged to be built-in since in the area there are to be masks hiding the radiators. Parapet distribution is installed in the masks according to the design. On all internal walls, the parapet distribution is installed directly on gypsum cardboard wall underneath the desk work board.
Installation of single-phase outlets with grounding contact is to be executed with conductor type NHXHX-J 3x2.5 mm^2. Installation of three-phase outlets is to be executed with cable type NHXHX-J x 2.5 mm^2. In some laboratories with antistatic floor and in plumbing fixtures, the installation of a box with collector is envisaged for potential equalization. Cables passing through fire protection walls are coated with material which is provided with test certificate for being non-transmissible of fire for 2 hrs, on both sides of fire protection partitions, in the length of 1 m, and the penetration point itself is to be treated with the same material.
Details of sealing process are to be provided by the manufacturer who owns the fire resistance report issued by the authorized institution and according to own application method for the appropriate sealing materials.

16.4 INSTALLATION OF UPS POWER SUPPLY

For the needs of laboratories and computers there are two uninterruptible power supply devices of 40kVA and 20kVA located on the second floor with already installed UPS devices for the needs of other laboratories. Dimensions of the planned UPS devices are: for 40kVA – 150 cm height, 52 cm width, 82 cm depth; for 20kVA – 152 cm height, 35 cm width and 82 cm depth. Retaining time for standard parameters at nominal power input rate are 10 min. Input voltage is 3x380/220V and output voltage is also 3x380/220V. In case of need there is a possibility of expansion by adding new batteries.

16.5 GENERATOR POWER SUPPLY

In the building area there is generator power supply with two generators 2x250кVA with no backup for the consumer supply on the first floor and in the boiler room which is why the new container-like generator is envisaged in the building area next to the existing container-like aggregate.
The generator section power is PT-1-A/I = 75 кW and PT-2-A/I=92, which is 167 kW. The adopted generator has the power of 250 кVA (200kW) for the future consumers since the building is in deficit in generator energy.
Generator selection is made for the less convenient case which is the external air conditioning unit start mode. As the largest external unit power id 13.47 kW, there is no danger of high electricity start. The selected generator is, 250 kVA (200 kW, which may receive power input of 275 kVA (about 220 kW cosf = 0.8) in large consumer start mode and in the course of permanent operation it meets the needs of PmjGRO (a) = 167 kW (< 200 kW).Micro location of the newly designed generator is planned to be next to the existing 750 kVA aggregate serving for the needs of computer centre. Under the existing generator there is already reinforced concrete slab currently serving for the computer centre generator and would also serve for the new 250 kVA generator.

3

The generator is connected with the newly designed cable type XPOO 3 x 240 mm2 + 120 mm2 to the existing TC which is located in a separate box in the tunnel. The connecting of the cable from the generator to the distribution box TC has to be made. Cost for the cable connection to the generator is included in BoQ.
From the generator to GRO (a) (which is located together with rest of the cabinets for the network and generator), the cable type NHXHX 3 X 150 mm2 + 75mm2 /FE180/E120 is envisaged, placed partly over the existing PCS channels for the need of the existing generator, (floor PCS channels), and partly over OG flanges over the façade and through the room of the old cinema through wall to GRO (a), envisaged for the needs of NCTC. The new PCS channel /E120, dimensions 100x50 mm, is to be set in the premises of the old cinema and basement and to GRO (a). Boiler room is supplied over another cable NHXHX 3 X 70 mm2 + 35 mm2 /FE180/E120. Prior to commencement of works, it is obliged to adjust micro location of the newly designed generator and cable route with the IT installations.

Perforated cable supports (PCS) – racks
Number of cables is leading from the distribution boxes to the other locations. For leading such cables there are perforated cable supports (PCS) – racks envisaged PCS 400 for main routes and PCS 300 for sections with lower number of cables (8-16).
Perforated cable supports are installed on the original wall or plastic clamps.
Perforated cable support routes for the first floor are specified in the design.
When installing PCS – racks, rack routes are to be adjusted with rest of the installations (air conditioning channels, water distribution etc.), so installations containing water should pass underneath PCS-racks.

16.6 PROTECTION

Overvoltage contact protection is executed with TN-C-S system provided in the entire building. Connection of protective Pe and zero N conductors (rail) is made in KPK where special protective line leads from in connecting cables and of appropriate section, but necessarily of yellow-green colour. All metal cases of the equipment are connected to the specified screw on this protective conductor.
Break down protection is executed by installing the breakdown stop buttons which serve for turning off the entire power supply of the respective distribution box consumers in case of emergency.
In storage premises (3) where Ex executed installation is envisaged, the consumers are additionally protected over GFCIs 25/0.3A.
In the course of cable and rack penetration through fire protection walls and floors, provide protection from fire transmission with tested coating.

16.7 TESTING

After completion of electrical installation, testing is to be conducted on insulation resistance of the cables as well as the connection check. If everything is properly connected and the insulation resistance is satisfying, installation is powered and testing of the applied protective measures is to be conducted.
Record on testing is kept and certificate is provided. In cooperation with the contractor's mechanical engineer, the tested installation is put into operation and testing of some systems is conducted for the designed work conditions.
For successfully completed control of the systems, it is necessary to thoroughly read the manual when delivering all the systems for using.
The Contractor provides necessary certificates and warranties for all the installed equipment.

13

16.8 EXPLOSION HAZARDOUS AREAS AND PROTECTION

Electrical devices are divided into two basic groups:
Group I: devices for use in underground mines affected by mining gas and flammable dust, or surface mine devices affected by such atmosphere;
Group II: other devices operating on locations with a probability of explosive atmosphere.
Devices in compliance with ATEX 100a directive must be labelled as follows:

- Marking of conformity with the European CE regulative, CE marking
- Well known explosive Ex protection marking
- ATEX 100a declaration of conformity
- Name and/or mark of the accredited testing laboratory,
- Marking of the devicc group and category (Group I; M1 or M2; Group II; 1G/D, 2G/D, 3G/D)
- Marking EEx or Ex where EEx means that the device had been tested by the accredited laboratory and in compliance with the European standards whereas Ex is in compliance with thc national standard,
- Name and address of the manufacturer, as well as type, serial number and other relevant information,
- Device properties must also be provided separately, e.g. power, nominal voltage and/or electric current etc.

In explosive-working areas there is a possibility of areas endangered by hazardous gas materials and/or dust, and such areas are to be classified in accordance with the respective standards, and Serbian standards are SRPS N.S8.006 and SRPS N.S8.010. In terms of such standards, hazardous areas are defined as follows:
Hazardous area E0: - Area where the explosive turns to dust, evaporates, sublimates constantly, with a possibility of permanent contact between the explosive and electrical devices,
Hazardous area E1: - Area where the explosive turns to dust evaporates, sublimates only occasionally, and contact between the explosive and electrical devices may occur under unusual conditions only.
Hazardous area E2: - Area where the explosive does not turns to dust, does not evaporate, nor sublimes but there might be explosive initiation with electrical cause under special conditions only (e.g. storage of packed explosive for further transportation)
Area E0:
Usage of electrical devices in area E0 is generally avoided, unless necessary. However, if the installation is inevitable, there must be sufficient safety regarding surrounding effects such as thermal, mechanical, corrosive, electrical and electrostatic. Following types of protection may be used in treated rooms for electrical devices that might be the cause of firing in normal condition:

- Protection rate IP 65 (according to SRPS IEC 529), with all connections secured from loosening,
- In the protection ExdIIBT (non-flammable case – impervious shield) or higher with minimum dust protection rate of IP 54,
- In the protection ExpIIT with minimum water and dust protection rate of IP 54 or higher,
- In the protection Exm IIT.

Following types of protection may be used for devices that might be the cause of firing in unusual situation:

- Protection rate of IP 65 with all connections secured from loosening,
- In the protection ExdIIBT (non-flammable case – impervious shield) or higher with minimum dust protection rate of IP 54,
- In the protection ExpIIT with minimum water and dust protection rate of IP 54 or higher,
- In the protection Exm IIT,
- In the protection rate of IP 54 with all connections secured from loosening,
- In '*increased safety*' ExeIIT with protection rate of IP 54

-In self-secured execution Exib IIBT.

Lights must be made as already specified but with mechanical protection that meets the testing requirements according to 22.3.1 and 22.3.2 of the standard SRPS N.S8.011 with energy of 7J.
Hazardous areas of flammable substance storage:
Certain quantities of flammable liquid are stored in glass and possibly metal containers on shelves in the storage. After excluding certain amount of substances from larger packages, the opened package is closed and deposited in the cabinet for flammable substance storage (Safety box) next to the wall. Air conditioning in the room must be executed on the ceiling level. Flammable liquid substances, harmful chemical agents, corrosive and reactive chemical agents are to be stored in well closed packages. Since it is liquid with vapour heavier than air, air conditioning in this room needs to be executed with exhaust system from lower levels of the room. With that condition, hazardous area 2 is classified in this room up to 0.5 m from the floor level and at vertical and horizontal distance of 0.5 m around shelves where bottles and tanks with flammable liquid are kept, as well as the interior of 'safety boxes'.
Air conditioning needs to be secured from 10 envisaged exchanges of air to be exhausted from the lower levels of the room and air conditioning is always to be turned on. It is necessary to separate flammable substances from reactive materials on separate shelves.
Cables with plastic compound insulation are allowed to be set in atmospheric temperature conditions above +5° C. Cable must be specially tested for placing in areas below the specified temperature. Cables are selected as follows:

a. In cases, cabinets and pipe (conduit) system:
   - -Single-wired insulated lines or multi-wired insulated lines with no protective shield.

b. For fixed installations:
   - -Screened or shielded cables with plastic or rubber shield (SRPS N.C5.220)
   - -Cables with rubber or plastic shield (SRPS N.C5.220, SRPS C5.250)
   - -Single-wired cables with plastic shield (SRPS N.C5.220)
   - -Heavy workshop flexible cables with polychloroprene (SRPS N.C5.350)
   - -Mineral-insulated cables.

c. For movable and mobile devices
   - -Standard flexible cables with plastic or equivalent rubber shield (SRPS N.C3.502)
   - -Heavy workshop flexible cables with polychloroprene shield (SRPS N.C5.350)

When placing cables in canals, pipes, cable racks, measures for preventing flammable gases or vapours from transferring from one area to another are applied by sealing passages between the areas or by injecting the sand.
Protection from danger during those rare but possibly harmful situations includes providing fast and reliable failure removal; it is based on efficient and fast devices for short protection. Thus, system of the additional protection with GFCIs 25/0.03A is applied
Based on the above mentioned requirements regarding electrical installation and equipment in laboratories in hazardous zones, the following equipment is envisaged:
a) Installation of over ground lights type EXEN-236 of 2 x 36 W, according to the design, with explosive marking CE Ex II 3GD EX nA II T4/T5- Ex tD A22-IP 60 CORTEM or similar quality.
b) Installation of over ground anti-panic lights type EVF-18EX, explosive marking CE Ex II 3GD Ex nA II T4/T5 – ExtDA 22-IP-60, CORTEM or similar quality.
c) Installation of Schuko outlets type RY 216 V, of 16A, explosive marking CE 0772 Ex II 2GDEx dIIC T5 -Ex tDA 21, IP 66, CORTEM, or similar quality, according to the design.
d) Installation of socket inlets for the specified outlet type SPY 2116V, 16A, (1+N+E), explosive marking CE 0772 Ex II 2GDEx dIIC T5 -Ex tDA 21, IP 66, CORTEM, or similar quality, according to the design.

13

f) Placing cables in hazardous areas is envisaged to be completed with cables type NHXHX-J
Installing the electrical equipment or electromotive drive installation cables in hazardous areas is avoided in such way that there is no electrical equipment in such areas (hoods, safety boxes and technical gases). Mechanical equipment planned for the specified hazardous areas is to be in accordance with the specified analysis.
As envisaged by the mechanical design, in all exhaust pipes from the hoods and safety boxes there are fans located on the roof. Fans are envisaged in ex protection with the mechanical design. From the roof fans to fans in the hoods themselves or safety box devices, there are cables type NHXHX-J 3 x 1.5 mm2 over PCS channels where cables for electromotive drive are also placed.
Connecting of the specified cable to the hood or safety box device and on the side of their parallel fans is to be completed by the person who delivers the equipment or installs it and he is to provide the certificate.
There are two types of the hoods:
Hoods (of recent structure) with a possibility of pre-air conditioning, meaning that prior to being turned on and operating, the device itself turns on its own pre-air conditioning for a while to ventilate explosive vapours and substances and the device is ready for normal operation afterwards.
Hoods with no possibility of the function specified under clause 1 (devices of older structures), and that option is to be additionally provided. In this case, the electric scheme of providing the option of pre-air conditioning turning on is provided in the specified Analysis and graphics.
It is Contractor's responsibility to provide pre-air conditioning if it is necessary in the hood itself and to provide its test certificate.

17 PASSENGER ELEVATOR

In respect of the all foreseen works, the Contractor shall be fully familiar with all Final Design details, as well as with all local regulations, international and local standards (SRPS), common practice of trade and circumstances for their execution.
This elevator is designed for passenger transport between the basement level and the third floor of the office building. It is installed into the built driving shaft with concrete ring beams; drive unit placed at the top of the driving shaft and fixed to the rails, cab and counterweight guides and the driving shaft walls.
The existing elevator has to be reconstructed and adjusted to the needs of the future laboratories and requirements defined by valid RS standards and norms for such kind of premises.
The reconstruction of the elevator is done according to the design and the scope of works is defined in the BoQ.
When the elevator cab is at rest on the fully compressed buffers:

- there is a space in the pit shaft that can accommodate the size of a cube of at least 0.5 x 0.6 x 0.8 m, so that it lies on one of its surfaces
- free distance between the bottom of the driving shaft pit and the lowest point of the cabin is at least 0.5 m, and between the bottom of the pit and the lowest point of the cabin driving devices, parts of the grasping devices, protection sheet metal of the cab threshold cabins, more than 0.1 m.

When the elevator counterweight is at rest on the fully compressed buffers

- part of the way that left for the cabin to move in the upward direction must be at least 0.1m + $0{,}035v^2$;
- height of the security space above the cabin roof when the counterweight is at rest on the compressed buffers must be at least 1m + $0{,}035v^2$;
- free distance between the lowest parts of the driving shaft ceiling and the highest elements on the cabin roof must be at least 0,3m + $0{,}035v^2$;

13

- free distance between the lowest parts of the driving shaft ceiling and the highest point of the cabin driving device must be at least $0.1m + 0{,}035v^2$;

17.1 DRIVING SHAFT DOOR

- The driving shaft door is automatic, telescopic and consists of two wings and a frame.
- The driving shaft door (wings and the frame) is made of metal, resistant to deformation and constructed and fitted as to ensure proper operation of the door lock.
- Mechanical strength and firmness of the driving shaft door is such that the horizontal force of 300 N (acting normally to the surface of 5 cm"), at any point of the wing of the locked door, on one side or the other, does not deform it permanently or elastically by more than 15 mm and does not cause a disorder that will affect the proper operation of the door and lock.
- Light height of the driving shaft door is at least 2000 mm (- 50 mm).
- Light width of the driving shaft door equals to the width of the cabin entrance (max + 50 mm on each sides).
- At every access point to the driving shaft there must be a threshold able to bear all the loads at entry and exit of persons.
- Natural or artificial lighting, as measured on the floor, in front of the driving shaft door, must be at least 50 Lx.
- Elevator cabin will not run if the door of the driving shaft is not closed and locked.
- Lock of the driving shaft door operates when the door is closed before the cabin is moved from the station.
- Elements of the lock and elements for lock fastening are made of metal or metal-reinforced and impact resistant.
- The lock is protected from dust.
- In the event of a power failure in the network, landing to the first lower station and door opening is done automatically by power supply from the dry battery. In the event of fire, the cabin is automatically driven to the main station and turned off from further operation.

17.2 TECHNICAL SPECIFICATIONS OF THE ELEVATOR

Type and purpose of the elevator:	electrical passenger elevator without a machine room (MRL)
Drive transmission rate:	2:1
Payload mass:	Q = 400 kg/ 5 persons
Elevation height:	H= 17710 mm
Riding speed:	v = 1.00 m/s, with regulated drive VVVF
Number of stations:	6 (SU, NP, VP, 1, 2, 3)
Number of access points:	6 (2 from the same side and 4 at the 90 degree angle)
Elevator to be installed:	in the built driving shaft, with concrete ring beams
Control:	Simplex, collecting in both directions, microprocessor with a code card
Operation:	from the outside and from the cabin with use of buttons
"Power cut" mode:	the elevator descends to the first lower station and the door opens
Signalization:	in the cabin - confirmation of call reception, cabin position indicators, directional arrows for further ride, acoustic and visual overload indicator, alarm buttons for opening and closing the door, at stations - confirmation of call reception, cabin position indicators, directional arrows for further ride

2

Fire program:	in case of fire, the cabin is automatically driven to the main station and turned off from further operation
Driving machine position:	up, at the top of the shaft
Elevator to be installed:	in the built driving shaft, with concrete ring beams
Type of cabin:	metal, INOX coated, passing at 90 degree angle INOX registration box in the full height of the cabin, indirect lighting in the INOX suspended ceiling, INOX handrail in the back, half back side in mirror, floor prepared for installation of granite ceramics
Additional cabin equipment:	ventilator, necessary lighting, interphone - telephone
Cabin dimensions:	- width A = 950 mm - depth B = 1100 mm - height H = 2200 mm
Cabin door:	double, automatic, telescopic door, 800 x 2000 mm, INOX-coated wings
Driving shaft door:	double, automatic, telescopic door, 800 x 2000 mm, INOX-coated wings and frames
Cabin guides:	T 70x65x9
Counterweight guides:	T 50x50x5
Counterweight:	cast concrete with steel reinforcement
Drive cable wheel:	D = 240 mm
Carrying cables:	d= 6.5 mm
Number of cables:	z=6
Driving machine type:	Leroysomer, type Gearlessxaf 2M
Electro motor power:	P =2.7 KW
Driving machine position:	up, at the top of the shaft

17.3 ELECTRICAL INSTALLATIONS IN THE DRIVING SHAFT

In thc driving shaft, the channels for the main vertical distribution are fastened to the wall or the metal holders mounted on the cabin guides. Distance between two fastenings must not exceed 2 m. Exit of the conductor from plastic canals shall be done with use of plastic pipes. To connect the moving cabin to the rest of the installation, a distribution box with terminals is installed in the cab (marked according to the diagram) next to which a flexible multicore cable is installed. Cable length is selected so that when the cabin is in the end stations, it has a free arch and does not touch the cabin or parts of the driving shaft. Installation on the cabin is also performed through plastic channels and pipes, which are fixed.

On the cabin roof, part of the installation exposed to trampling by the installer is especially protected. Connection of conductors is done with terminals only or on places appropriate for that with use of clamping screws.

17.4 OPERATION

After works are completed, the following operational requirements have to be fulfilled:

Commands for the cab operation, in the cab and on all access points, are given electrically, with use of buttons. The buttons are installed so that no live part is accessible to a person in the elevator.

On the cabin roof, there is a device installed for service elevator operation.

Switching on the service operation device, external and cabin control of the elevator is turned off.

Service cabin ride can be achieved only by continuously pressing the button that is protected so that it cannot be accidentally pressed. Direction of the ride is clearly marked.
Service operation device has a "STOP" switch which is closer than 1 m from the driving shaft door.
When operating the elevator with use of the service device, speed of the cabin movement is not greater than 0.63 m/s, with none of the safety devices being turned off.
At the service ride, the cab cannot exceed the end stations.
During the service operation of the elevator, it is prohibited to bridge the safety contacts of the driving shaft door and turn off the end stations and end switches.
The driving machine must have a device for return ride, with which the cabin is driven to the nearest station if the force for manual operation of the cab with rated load in the upward direction is less than or equal to 400 N, and if the force is greater than 400 N, there must be a device for mechanical drive of the cab to the nearest station.
Switch with the "*STOP*" sign for emergency stop of the elevator is an electric safety device.
Re-operation of the elevator with use of the switch with the "*STOP*" sign is performed only by intentional action.
Switch with the "*STOP*" sign is made as a changeover.
With the activation of the switch with the "*STOP*" sign, during the collection operation, the external calls are not cancelled.
Switch with the "*STOP*" sign is clearly marked.
Easily visible and accessible alarm device is installed in the cabin of the elevator.
The alarm device is designed as a bell. Sound signal of the alarm device is clearly heard in the cabin and the main station.
There is a visible light signal of the direction of travel on each station.
At all access points to the driving shaft and in the elevator cabin with collection operation there are call buttons installed with signal of the call reception and execution of the command.
Electrical installations have to be predicted for dry and clean rooms.

17.5 SIGNS, NOTICES AND LABELS

All signs, notices and labels have to be noticeable, clear and understandable, made of durable material and permanently fixed.
In the elevator cabin and on the driving shaft door, there has to be a sign placed with the information about capacity in kg and maximum number of people. Company label has to be placed in the elevator cabin too.
Part for the activation of the switch with the "*STOP*" sign must be red, with durable inscription "*STOP*", with letter height at least 7 mm.
Button in the cab that activates the alarm must be yellow, with a permanent inscription "*ALARM*", with letter height at least 7 mm, or a symbol in the shape of a bell. This is according to SRPS M.D 1.591 standard.
Parts for giving commands in the cabin have to be uniformly marked with numbers, letters and symbols.
Upon completion of the works, the Contractor shall be liable to carry out all specified tests and measurements and submit written certificates in the form of attest to the Supervisor.

18 HEATING SYSTEM

In respect of the all foreseen works, the Contractor shall be fully familiar with all Final Design details, as well as with all local regulations, international and local standards (SRPS), common practice of trade and circumstances for their execution.

Elements for heating, cooling and ventilation of premises are defined according to architectural and design, including intended purpose of the premises with respect to the valid RS standards and regulations.
The existing installations, heating elements and networks have to be dismantled and new installation and equipment have to be installed.

18.1 RADIATOR HEATING SYSTEM

Laboratories shall be heated with hydroid, two-pipe installation of radiator district heating, with forced circulation of water. Temperature regime of internal installation is 90/70 °C. The existing radiators shall be removed and the new aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C. Radiators shall be installed in heating systems for temperatures of 100°C and for maximum operating pressure of 6 bars. The radiators shall not be painted. They shall be mounted on prefabricated brackets with appropriate supports. In order to avoid unpleasant sounds of thermal expansion, thermal dilatations in heating elements, radiators shall be mounted on plasticised brackets for support of radiator sections. Also, radiator valves shall be installed with pre-setting and installation of thermostatic head with remote controller, including installation of vents on all heating elements – automatic radiator vent valve of metal structure.
Heating elements shall be installed in covers, thus increasing heating capacity. For selection of heating elements, 20% increased capacity is accepted.
The existing risers shall be kept for the upper floors, while a new separate line shall be constructed for the first floor – horizontal line and riser. Water supply from heating substation to heating elements shall be constructed with steel pipes. Risers shall be insulated with mineral wool of 30mm thickness and covered with aluminium sheet metal of 0,55mm thickness. Connection to the existing installation shall be carried out in the substation and then the pipes shall be conducted to the basement ceiling to technical premises – ducts, wherefrom they shall be conducted vertically to the ground floor ceiling, then horizontally across the floor ceiling below laboratories. Connection to radiator shall be carried out from the flooring. Horizontal supply of pipe network and risers shall be visible and coated with 120°C resistant paint. On the other premises of the facility, the existing installation, without any change to it, shall be kept.
Air shall be discharged from the system through heating elements, i.e. highest points of the system.
Duplex automatic circulation pump shall be installed after distributor in the substation. The required pump shall be with the following features:

- volumetric flow rate V=2,8 m^3/h,
- required fatigue of the pump H=44,4 kPa,
- nominal rounds of engine 4000 r/min,
- 1~230 V, 50 Hz. , ZD 40/1-8 GG CAN PN 6/10,

Regulation shall be carried out with control valves for the left and the right part of the room.
Pipes network in the substation shall be insulated with steam vapour check resistant to 110°C.
Filling and draining of the system shall be done in the existing substation, through taps for that purpose.
Entire pipe network shall be made of steel pipes, diameter of which shall be in compliance with the amount of heat. Substation is part of the facility and it is located in the basement as part of the existing substation.

18.2 AIR CONDITIONING OF OFFICIES AND ALTERNATIVE COOLING SYSTEM

Air conditioning of offices and other laboratory premises shall be carried out with three VRF systems (Variable Refrigerant Flow). Basically, it represents a system with variable flow of refrigerant used as

a medium for transfer of thermal energy. The system consists of three outdoor and more indoor wall units. The dimensions of outdoor units shall be in compliance with the design.
The system is principally intended for cooling of rooms and heating during periods when district heating is not on, but it can be used for heating of rooms when outside temperature is down to -20°C in case of any breakdowns of the district heating system. The three systems defined by the design shall represent outdoor units providing for significant savings of energy during cooling and heating. Indoor units shall be wall devices compatible with the outdoor units, all according to the main design.
Outdoor units shall be located on the facility's roof, and connection between outdoor and indoor units shall be achieved by copper pipe line, through which the fluid is transported. The network shall be located in the dropped ceiling, and it shall be connected to the outdoor units through technical vertical line located on the toilet premises. Pipe network shall be two-pipe line for gas and liquid stage of refrigerant which shall be transported to the indoor units. Entire copper pipe network shall be thermally insulated with vapour check which prevents creation of condensates on the pipe network. Refrigerant type R410 A shall be operating medium which is nontoxic and fireproof, thus being safe for the employees and the environment. Also, this type of refrigerant is ecologically fully acceptable regarding environmental impact, i.e. degradation in atmosphere in case of leakages.
Three VRF systems for air-conditioning of premises will be used when laboratories are not in use. Each group of laboratories, including related offices, shall be connected to separate system. This shall be done in order to prevent formation of massive systems of outdoor units, including prevention of unnecessary consumption of electric energy.
All indoor units are foreseen as wall units. Refrigerant supply to them shall be conducted through dropped ceiling, and then vertical lines shall come all the way down to the indoor units. Indoor units operation shall be controlled by wireless remotes.
Condensation line shall follow the refrigerant installation and shall also be located in the dropped ceiling. Since the condensation line shall be placed above the level of the indoor unit, all indoor units shall be equipped with condensate drainage pumps which adjust height difference between indoor units and condensation line. Condensation line shall be made of plastic pipes. Drainage pipes shall be made in compliance with graphic documentation and they shall be conducted to sewage network through special sag pipes preventing transfer of bacteria and odours into condensation line.
Places where air-conditioning units are placed and their required capacities are defined in the design. At installation, condensate drainage line shall be foreseen.
In the room where RACK cabinet is located, due to increased heat dissipation, additional cooling system shall be installed. Split system units shall be installed. The Inverter can cool down a room when the outside temperature ranges from -15°C to 43°C. Due to lack of space, wall unit shall be installed. Automatics shall provide for alternate operating, in order to make the system work as equally as possible during the operation. These units shall be handled with wire controllers with installed temperature sensors. Selected unit has greater capacity (7.1 kW during cooling), compared to calculated gains, up to 30% during extremely low temperatures.
All systems of air conditioning feature high degree of thermal energy exploitation (COP and EER) which is over 4 when outside temperature is 7°C in the winter period and 33°C in the summer period, which classifies it as class A of cost-effectiveness.
Communication between outdoor and indoor units takes place through central controller which monitors the work of all air-conditioning systems and it is possible to connect it to central system for monitoring and control of the entire facility.

18.3 VENTILATION

All premises shall be ventilated through appropriate air-conditioning chambers foreseen for each laboratory separately. Amounts of air for ventilation are calculated based on required number of

3

exchanges, including required amount of heat for air-conditioning of a room. All air-condition chambers shall operate with 100% of air exchange, due to possible presence of risky substances in discharge duct and impossibility to mix with supplied air.

Composition of air-condition chambers in all laboratories shall be as follows:

- Inlet section with jalousie for protection against rain and with damper which prevents airflow when the unit is not running. Also, the dumper shall prevent inflow of cold air when the unit is started, i.e. until the air-condition unit reaches required temperature. Filter, class G3, shall also be installed as an integral part of inlet section, which shall prevent dust and small particles from coming into ventilation.
- Liquid heater section. This element shall be selected based on the amount of air flowing through the chamber, including necessary amounts of heat. It shall be connected via hose line to appropriate end in the substations. Temperature emitted by heater shall be regulated based on sensor located on the chamber and through valve for water temperature regulation.
- Heater refrigerant section. This section shall be directly connected to the heat pump, and refrigerant air shall deliver heat through alternator. Regulation shall be carried out through separate electronic-expansion valve which controls amount of refrigerant, including evaporating temperature when in cooling mode, i.e. condensation during heating mode. System for refrigerant regulation consists of electronic-expansion valve and temperature sensor which shall be placed at the inlet into cooler/heater and at the outlet from the cooler/heater, and on pipes for refrigerant, thus measuring refrigerant temperature at the inlet and outlet of exchanger. Appropriate automatics are an integral part of the entire system, which conducts operation of the system based on parameters given by sensors, i.e. opening and closing of electronic-expansion valve. Integral part of the system is also the temperature sensor which is located in the most representative room, i.e. room with highest requirements regarding temperature control. The system shall be selected pursuant to the air capacity and appropriate amount of temperature. The automatic system is used for controlling the operation of the expansion valve. Selected item must respect the origin, all according to PRAG requirements.
  Outdoor units are located close to air-condition chambers, on the facility's roof. Capacity of outdoor units shall be selected pursuant to ability to recover (in extreme events when VRV systems breakdown) complete heat gains and to support electric boiler in the event of extremely low temperature (event on main boiler breakdown). Outdoor units are divided in two groups with appropriate number of modules, in order to support to the system in case of breakdown of any unit from the system. In such case, one unit can operate and recover at least half of required capacity.
- Ventilation section with fan shall be selected pursuant to the amount of air and pressure drop in duct network. All fans on air-condition chambers shall have frequent controllers enabling minimum corrections of air amount, if necessary.

18.4 EMERGENCY VENTILATION

Emergency ventilation shall serve for removal of smoke from premises within less than 5 minutes. When emergency ventilation is started, primary and secondary ventilation stop working, including all devices and the fire-protection dampers shall be shut on primary ventilation and the air shall be extracted by fan, which is placed on the roof of the facility, roof ventilator for extracting the air in case of emergency ventilation-1000-9/8-5,5kW-F400-400V-50Hz. Ventilator has to be resistant to corrosion and temperature up to 400°C for 2h 16980m^3/h, 767Pa. Fan shall be equipped with frequent regulation because it can never be predicted how much a room is going to be contaminated or how big a fire will be.

All outlet connections have smoke-protection dampers with monitors connected to fire-protection station, i.e. gas-detection station. When gas concentration is increased or in case fire occurs, smoke-

17

protection dampers open and start discharging air from the premises. It is possible to turn on manually the emergency ventilation, in case of premises and people contamination. Therefore, rooms with shower cabins and devices for eyes flushing shall have a switch for turning on emergency ventilation independently from gas sensors or fire-protection station. Ducts shall be made of galvanized sheet metal and covered with fire protection gypsum cardboards, which shall have appropriate compliance certificates, fully in accordance with fire-protection design.
In order to provide for fresh air inflow and with a view to prevent occurrence of under-pressure on premises, openings with over pressure jalousies shall be installed on the walls openings shall open in case of emergency ventilation. On blocked premises, technical openings shall be constructed pursuant to technology, with diameter of Ø100mm and grilles, and this shall provide prevention of under-pressure on these premises.
Fan for emergency ventilation shall be located on the roof of the facility and shall have dimensions allowing it to discharge all air from the laboratory premises in 5 minutes time.
Emergency ventilation ducts shall be covered with promat boards, for fire protection purposes, in section which is going from the central part of corridor to the exit of the facility, i.e. from the beginning of the other fire zone.

18.5 SELECTION OF EQUIPMENT ON PREMISES

18.5.1 CHEMICAL AND TOXICOLOGY DEPARTMENT STORING ROOM (Room no.3)

To cover heat loses, heating elements with 3 sections, thermostatic valve and thermal head with remote controller 2m will be installed aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C . Selection of heating elements should be proposed in the offer.
Radiators shall be installed in heating systems for temperatures up to 100°C and maximum operating pressure of 6 bars. In order to avoid unpleasant sounds of thermal expansion, thermal dilatations in heating elements, radiators shall be mounted on plasticised brackets for support of radiator sections.
The ventilation system shall work constantly. Accepted required amount of air for ventilation is 250m^3/h, i.e. it shall provide for 5 exchanges of air during one hour. Supply of fresh air into chemical and toxicology store room shall be carried out through openings on façade of the facility where fixed jalousie shall be installed FJ 200x200mm. Sectional strips of jalousie shall prevent rain and snow from coming inside, while galvanized mash shall prevent birds, leaves and other insects from coming inside. Fresh air shall be supplied to the room via distributers installed on ceilings manemostat together with plenum box and flow regulator, square shape and side entry for air.
Air shall be extracted through ceiling diffuser with manemostat together with plenum box and flow regulator, square shape and side entry for duct. Duct shall be conducted from laboratory through corridor across side façade to the roof of the facility where fan is placed. Fan is centrifugal axial roof ventilator in EX protection.

Where ducts penetrate fire-protection wall, a fire-protection damper shall be installed, dimensions Ø250mm - fire-protection damper with electric engine drive, fireproofing capacity F120.
Ventilation of fire-protection cabinets for storing of chemicals and solvents (safety boxes), shall be carried out via axial duct fans, resistant to aggressive surrounding which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters. Each safety box has its own air extraction duct, made of resistant PVC pipes which go across façade to the roof of the facility and into filter units, where waste air is discharged in the environment. For heating of air during winter period an electric heater shall be installed on the inlet duct, power 2.1 kW, which is sufficient to warm up amount of air from -12 to 12°C.

18.5.2 SECRETARY OFFICE (Room no.4)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. They are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C.

Ventilation, including cooling of the room during summer months, shall be carried out with two ceiling diffusers and through its grilles fresh processed air shall be supplied (100 m (100 m^3/h), while on the other diffuser (100 m^3/h) air shall be extracted from the room. Additional cooling shall be provided with indoor unit with VRF system and required capacity pursuant to heat loses. Diffusers for air inlet are connected via duct systems into unique system of air-condition chamber KK-S2 size B-6. It has to be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and to be installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to the outside temperature, amount and temperature of air which shall be supplied inside. Selection of air-condition chamber elements is given in the design. Additional cooling of premises, in case that primary ventilation system does not work, shall be done with indoor wall unit VRF system with capacity in compliance with heat losses and gains.

18.5.3 HEAD OF THE CHEMISTRY DEPARTEMENT OFFICE (Room no.5)

To cover heat loses, heating elements with 12 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C.

To cover heat losses (2883W) wall split air condition devices shall be used – indoor unit (with cooling capacity 3.6 kW and heating capacity 4kW) within VRV system and the outdoor unit located on the roof of the facility. It has to have the origin required according to PRAG. The room shall not be ventilated.

18.5.4 CHEMISTRY EXPERT OFFICE (Room no. 6)

To cover heat loses, heating elements with 10 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C

To cool down premises in case of heat load of 3839W, wall split air-condition devices shall be used - indoor unit (with cooling capacity 3.6 kW and heating capacity 4kW) within VRV system and with the outdoor unit located on the roof of the facility. It has to have the origin required according to PRAG. The room shall not be ventilated.

18.5.5 CORRIDOR (Room no.7)

Ventilation of room no. 7 is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers with manemostat together with plenum box and flow regulator. The amount of air supplied in the room shall be 130 m^3/h. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.

Fresh air shall be supplied through shared air-condition chamber for rooms 7, 8, 9, 10, 11, 12, 13, 14, 15: KK-S2 size B-6. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and

4

3

they are installed on the roof of the facility. Supplied air temperature shall be 22°C during winter period and 20°C during summer period. This is the air temperature when it comes out of a grill. When it mixes with a room air, required temperature is achieved.
Fans shall be placed in one of air-condition chamber modules. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Selection of air-condition chamber elements shall be provided in attachment and it shall be made in specialised software by manufacturer of equipment.
Air shall be extracted (110m^3/h) through ceiling diffusers with manemostat together with plenum box and flow regulator characteristics as per design, square shape and side entry for duct. Difference in amount of supplied and extracted air shall provide for required over pressure in the room. Elements shall be placed in dropped ceiling.
Fans for extraction of waste air from the premises shall be installed according to the design with capacity of 1045 m^3/h 588Pa.
Besides cooling the corridor, due to heat load of 83W with air from primary ventilation, it is also possible to cool down the premises with wall split air-conditioning device – indoor unit within VRV (redundant air-conditioning system). This indoor unit shall have dimensions which will include influence of heat load of small ancillary rooms 8, 9, 10, 11. Operating of indoor units shall be handled with remote controllers. Condensation line follows refrigerant installation and is also located in the dropped ceiling. Since the condensation line is placed above the level of indoor unit, all indoor units shall be equipped with condensate drainage pumps which adjust the height difference between indoor units and condensation line. Condensation line shall be made of plastic pipes. Drainage pipes shall be made in compliance with graphic documentation and they shall be conducted to sewage network through special sag pipes preventing transfer of bacteria and odours into condensation line.

18.5.6 MEASURING (Room no.8)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C.
Ventilation of room no. 8 (measuring) is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers, in square shape, with manemostat and plenum box, flow regulator and side connection for air inlet duct (9 exchanges of air/h). Quantity of air supplied in the room shall be 100m^3/h. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through shared air-condition chamber for rooms 8, 9, 10, 11, 12, 13, 14, 15: KK-S2 size B-6 according to the design. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Supplied air temperature shall be 22°C during winter period and 20°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.
Fans shall be placed in one of air-condition chamber modules. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Selection of air-condition chamber elements shall be provided in attachment and it shall be made in specialised software by manufacturer of equipment.
Air shall be extracted (80m^3/h) through ceiling diffusers (with manemostat together with plenum box and flow regulator) as per design, in square shape and side entry for a duct. Elements shall be placed in dropped ceiling. Duct shall be conducted from the premises across the corridor and side façade to the

box for filtering of waste air, placed on the roof of the facility. Dimensions and calculation of the ducts are given in the design.
Fans for extraction of waste air from the premises shall be installed (1045 m^3/h, 588Pa).
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. The air shall be taken from the premises through ventilation valves 20m^3/h and extracted outside thorough PVC ducts and rain-protection grids (178mm x 178mm) installed on the exterior wall.
Ventilation system with air-condition chamber KK-S2 Vv=3040m^3/h shall be used for supply of 100% fresh air for rooms 8, 9, 10, 11, 12, 13, 14, 15. Entire system represents one whole.
Primary ventilation shall be turned on when ventilation system in the room gets activated by switch, and secondary ventilation shall stop working. Then the air-condition chamber KK-S2 shall switch on and the fresh air shall come into and be processed. Following processing with duct system (galvanized sheet metal and flexible hoses) the air shall be supplied to air distributer in a room. At the same time, fan for extraction of air CMPT/4 250 shall start working. Waste air shall be extracted through diffuser grilles, ceiling plenum and duct system after filtration on the roof of the facility.
Temperature sensor shall be installed in this room to control temperature of air that comes out of the air-condition chamber.

18.5.7 MEASURING (Room no.9)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C.
Ventilation of room no. 9 (measuring) is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers (with manemostat together with plenum box and flow regulator) into the room (8,5 exchanges of air/h). Quantity of air supplied in the room shall be 100m^3/h. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through shared air-condition chamber for rooms 7, 8, 9, 10, 11, 12, 13, 14, 15: KK-S2 size B-6. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Supplied air temperature shall be 22°C during winter period and 20°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, required temperature is achieved.
Fans are located in one of air-condition chamber modules. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Selection of air-condition chamber elements shall be provided in attachment and it shall be made in specialised software by manufacturer of equipment.
Air shall be extracted (80m^3/h) through ceiling diffusers (with manemostat together with plenum box and flow regulator) as per design, in square shape and side entry spigot. Elements shall be placed in dropped ceiling. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility.
Fans for extraction of waste air from the premises shall be installed (S&P type CMPT/4 250 or similar).
Fan for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. The air shall be taken from the premises through ventilation valves and extracted outside thorough PVC ducts and rain-protection grids installed on the exterior wall.

3

Ventilation system with air-condition chamber KK-S2 Vv=3040m^3/h shall be used for supply of 100% fresh air for rooms 8, 9, 10, 11, 12, 13, 14, 15. Entire system represents one whole.
Primary ventilation shall be turned on when ventilation system in the room gets activated by switch, and secondary ventilation shall stop working. Then the air-condition chamber KK-S2 shall switch on and the fresh air shall come into and be processed. Following processing with duct system (galvanized sheet metal and flexible hoses) the air shall be supplied to air distributer in a room. At the same time, fan for extraction of air CMPT/4 250 shall start working. Waste air shall be extracted through diffuser grilles, ceiling plenum and duct system after filtration on the roof of the facility.

18.5.8 TRACES (Room no.10)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Ventilation of room no. 10 (traces) is designed similarly to previously described rooms 8,9 where required amount of 100% fresh processed air shall be supplied through ceiling diffusers in square shape, with plenum box and side entry spigot (approximately 9 exchanges of air/h). Amount of air supplied in the room shall be 100m^3/h. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through shared air-condition chamber for rooms 7, 8, 9, 10, 11, 12, 13, 14, 15: KK-S2 size B-6. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Supplied air temperature shall be 22°C during winter period and 20°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.
Fans shall be placed in one of air-condition chamber modules. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Selection of air-condition chamber elements shall be provided in attachment and it shall be made in specialised software by manufacturer of equipment.
Air shall be extracted (80m^3/h) through ceiling diffusers item and features as per design in square shape, with plenum box and side entry spigot. Elements shall be placed in dropped ceiling. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Dimensions and calculation of the ducts are given in the Main Design.
Fans for extraction of waste air from the premises shall be installed (1045 m^3/h 588Pa).
Fan for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. The air shall be taken from the premises through ventilation valves 20m3/h, and extracted outside thorough PVC ducts and rain-protection grids 178 x 178 mm installed on the exterior wall.
Ventilation system with air-condition chamber KK-S2 Vv=3040m^3/h shall be used for supply of 100% fresh air for rooms 8, 9, 10, 11, 12, 13, 14, 15. Entire system represents one whole.
Primary ventilation shall be turned on when ventilation system in the room gets activated by switch, and secondary ventilation shall stop working. Then the air-condition chamber KK-S2 shall switch on and the fresh air shall come into and be processed. Following processing with duct system (galvanized sheet metal and flexible hoses) the air shall be supplied to air distributer in a room. At the same time, fan for extraction of air CMPT/4 250 shall start working. Waste air shall be extracted through diffuser grilles, ceiling plenum and duct system after filtration on the roof of the facility.

18.5.9 ANALYTICAL BALANCE (Room no. 11)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for $\Delta t=60°C$
Ventilation of room no. 11 is designed similarly to previously described rooms 8,9,10 where required amount of 100% fresh processed air is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot (approximately 8 exchanges of air/h). Amount of air supplied in the room shall be $100m^3/h$. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through shared air-condition chamber for rooms 7, 8, 9, 10, 11, 12, 13, 14, 15: KK-S2 size B-6, with operating principle as described above.

18.5.10 VENTILATION OF AMPHETAMINE LABORATORY (Room no.12)

To cover heat loses, heating elements with 10 sections with thermostatic valve and thermal head will be installed Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for $\Delta t=60°C$
Radiator shall be installed in heating systems for temperatures up to 100°C and maximum operating pressure of 6 bars. In order to avoid unpleasant sounds of thermal expansion, thermal dilatations in heating elements, radiators shall be mounted on plasticised brackets for support of radiator sections.
Ventilation (calculated $410m^3/h$ – inlet/outlet, approximately 16 exchanges) of laboratory 12 (amphetamine laboratory) is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers square shape with plenum box and side connection for supply of air into laboratories. Distributer shall be connected to galvanized duct with flexible connection. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises. Ceiling distributers shall meet the strict requirements for air supply and pleasant feeling on premises. They are intended for premises with large number of air exchanges during heating and cooling, and they are recommended for ventilation of laboratories.
Supply of fresh air for the entire system Vv=3470 m^3/h shall be carried out through air-condition chamber KK-S1 size B-6. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Selection of air-condition chamber elements shall be provided in attachment and it shall be made in specialised software by manufacturer of equipment.
Galvanized ducts shall be conducted from the air-condition chamber across the side façade along the corridor through ceiling diffusers' grilles into the room. Where ducts penetrate fire-protection wall, a fire-protection damper shall be installed, dimensions 500x315 mm -fire-protection damper with electric engine starter with fireproofing capacity F120. Inlet fan is specified as basic part of air-condition chamber and its features are presented with air-condition chamber.
Air-condition chamber shall be connected to heat pump Q=73/81,5 Kw, Qel=17,48/18,5 kW, I=29,4/31,3A, 3~3x400V. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.

Supplied air temperature shall be 22°C during winter period and 20°C during summer period. This shall be the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.
Ducts shall be hidden with "dropped ceilings" and insulated against heat losses and condensation with vapour-proof insulation class B1, hardly flammable.
Waste air shall be extracted through independent system which shall be synchronised with the system for air supply. Air shall be extracted through ceiling diffusers square shape, with plenum box and side entry for duct. Elements shall be placed in dropped ceiling. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Fans for extraction of waste air from the premises shall be installed (3910m^3/h 891Pa). They shall be chemically resistant and made of high quality polypropylene plastic. They have been selected so that their power can overcome any resistance in the duct network and resistance occurring in filter section.
Fan for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. The air shall be taken from the premises through ventilation valves and extracted outside thorough PVC ducts and rain-protection grids (178x178mm) installed on the exterior wall. Number of air exchanges for secondary ventilation shall be 2 exchanges per hour.
Ventilation of digesters shall be carried out via fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Ventilation of intake consoles shall be carried out via axial duct fans, which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Ventilation of fire-protection cabinets for storing of chemicals and solvents (safety boxes), shall be carried out via axial duct fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Each digester, console and box shall have its own duct for extraction of air, made of chemically resistant PVC pipes conducted across façade, to the roof and filter units, where waste air shall be discharged following filtration.

18.5.11 OPEARATING PRINCIPLE

Since aggressive agents and toxic substances are operated with in laboratories 12 and 13, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S1 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, fan for extraction of air starts working. Waste air shall be extracted through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.
Digesters, intake consoles and safety boxes shall be installed in the room 12. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room must have over pressure. In rooms 12 and 13, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation

(depending on number of connected consumers). Therefore, air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to VAV regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller placed in the room which shall, therefore, always have the required pressure.
This arrangement of grilles and engine drives on them provide for constant temperature on the premises.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.
As an alternative for cooling of the premises due to heat load of 1905W, wall split air condition devices shall be used – indoor wall unit (with cooling capacity 3.6 kW/ warming capacity 4kW) within VRV system and the outdoor unit located on the roof of the facility.

18.5.12 NARCOTICS LABORATORY (Room no.13)

To cover heat loses, heating elements with 17 sections with thermostatic valve and thermal head will be installed Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Primary ventilation (calculated 770m^3/h - inlet/outlet, approximately 14 exchanges) of laboratory 13 (narcotics laboratory) is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers square shape with plenum box and side entry for supply of air into laboratories. Distributer shall be connected to galvanized duct with flexible connection. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises. Ceiling distributers shall meet the strict requirements for air supply and pleasant feeling on premises. They are intended for premises with large number of air exchanges during heating and cooling, and they are recommended for ventilation of laboratories.
Supply of fresh air for the entire system Vv=3470 m^3/h shall be carried out through air-condition chamber KK-S2 size B-6. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Galvanized ducts shall be conducted from the air-condition chamber across the side façade along the corridor through ceiling diffusers' grilles into a room. Where ducts penetrate fire-protection wall, a fire-protection damper shall be installed, dimensions 500x315 mm, fire-protection damper with electric engine starter with fireproofing capacity F120. Inlet fan is specified as basic part of air-condition chamber and its features are presented with air-condition chamber.
Air-condition chamber shall be connected to heat pump Q=73/81,5Kw, Qel=17,48/18,5kW, I=29,4/31,3A, 3~3x400V. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Supplied air temperature shall be 22°C during winter period and 20°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.
Ducts shall be hidden with "dropped ceilings" and insulated against heat losses and condensation with vapour-proof insulation class B1, hardly flammable.

3

Waste air shall be extracted through independent system which shall be synchronised with the system for air supply. Air shall be extracted through ceiling diffusers, square shape, with plenum box and side entry spigot. Elements shall be placed in dropped ceiling. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Installed fans for extraction of waste air from the premises shall be chemically resistant and made of high quality polypropylene plastic. They have been selected so that their power can overcome any resistance in the duct network and resistance occurring in filter section.
Fan for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. The air shall be taken from the premises through ventilation valves and extracted outside thorough PVC ducts and rain-protection grids 178 mmx178 mm installed on the exterior wall. Number of air exchanges for secondary ventilation shall be two exchanges per hour.
Ventilation of digesters shall be carried out via fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Ventilation of intake consoles shall be carried out via axial duct fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Ventilation of fire-protection cabinets for storing of chemicals and solvents (safety boxes), shall be carried out via axial duct fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Each digester, console and box shall have its own duct for extraction of air, made of chemically resistant PVC pipes conducted across façade, to the roof and filter units, where waste air shall be discharged following filtration.
Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S1 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.
Digesters, intake consoles and safety boxes shall be installed in the room 13. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room must have over pressure. In room 13, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation (depending on number of connected consumers). Therefore, air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller placed in the room which shall, therefore, always have the required pressure. There shall be two grilles installed in the room 13, for extraction of air, and one of them shall be placed in the lower zone of the room pursuant to technology requirements, since the tested substances and their products are heavier than air, which

13

shall prevent contamination of the room lower zone. Pursuant to automatics request, another CAV regulator shall be installed on this grille in the lower zone. The same arrangement applies to supply and upper grille.
This arrangement of grilles and engine drives on them provide for constant temperature on the premises.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.
As an alternative cooling of the premises due to heat load of 3591W, wall split air condition devices shall be used - indoor unit within VRV system and the outdoor unit located on the roof of the facility.

18.5.13 ROOM FOR INSTRUMENTS (Room no.14)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Ventilation of room 14 (room for instruments) is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers square shape, product with plenum box and side entry for air supply. Quantity of air supplied in the room shall be 100m^3/h. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through shared air-condition chamber for rooms 8, 9, 10, 11, 12, 13, 14, 15: KK-S2 size V-6. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Supplied air temperature shall be 22°C during winter period and 20°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, required temperature is achieved.
Fans shall be placed in one of air-condition chamber modules. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises.
Air shall be extracted through ceiling diffusers positioned according to the design, square shape, with plenum box and side entry spigot. Elements shall be placed in dropped ceiling. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Fans for extraction of waste air from the premises shall be installed.
Fan for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. The air shall be taken from the premises through ventilation valves and extracted outside thorough PVC ducts and rain-protection grids 178 mm x 178 mm installed on the exterior wall. Number of air exchanges for secondary ventilation shall be two exchanges per hour.
Ventilation system with air-condition chamber KK-S2 Bv=3480m^3/h shall be used for supply of 100% fresh air. Flow regulators' positions on grille for air supply and discharge on these premises, shall be predetermined.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are located in the laboratory entrance.

3

In the room for instruments (14), GCMS and GC use technical gases (argon, synthetic air, helium and nitrogen). Number of 16 accepted exchanges shall enable good quality ventilation and shall prevent creation of explosive mixture, which is for hydrogen 4-75% of volume ratio between gas and air. Air shall be extracted from upper zones, i.e. ventilation opening shall be constructed at the highest point. So in case that hydrogen leaks out, it can come out of the building, since it is lighter than air.
Ducts that supply premises with are shall partly pass through corridor of the laboratory, which represents separate fire zone. Fire protection dampers shall be installed at all junctions with fire protection zones.
As an alternative for cooling of the premises due to heat load of 3733W, wall split air condition devices shall be used - indoor unit within VRV system and the outdoor unit located on the roof of the facility.

18.5.14 ROOM FOR INSTRUMENTS (Room no.15)

To cover heat loses, heating elements with 7 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Ventilation of room for instruments is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers, square shape, with plenum box and side entry for air supply. Quantity of air supplied in the room shall be 100m^3/h. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through shared air-condition chamber for rooms 8, 9, 10, 11, 12, 13, 14, 15: KK-S2 size B-6. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Supplied air temperature shall be 22°C during winter period and 20°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.
Installed fans are located in one of air-condition chamber modules. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Air shall be extracted through ceiling diffusers, positioned according to the design, in square shape, with plenum box and side entry spigot. Elements shall be placed in dropped ceiling. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Fan for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. The air shall be taken from the premises through ventilation valves and extracted outside thorough PVC ducts and rain-protection grids 178 mm x 178 mm installed on the exterior wall. Number of air exchanges for secondary ventilation shall be two exchanges per hour.
Ventilation system with air-condition chamber KK-S2 Bv=3480m^3/h shall be used for supply of 100% fresh air. Flow regulators' positions on grille for air supply and discharge on these premises, shall be predetermined.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.

3

Ducts that supply premises with are shall partly pass through corridor of the laboratory, which represents separate fire zone. Fire protection dampers shall be installed at all junctions with fire protection zones.
As an alternative for cooling of the premises due to heat load of 1440W, wall split air condition devices shall be used - indoor unit within VRV system and the outdoor unit located on the roof of the facility.

18.5.15 CORRIDOR (Room no. 16)

Rooms 16 (corridor), 17 (explosives preparation), 18 (explosive instruments) represent one separate system for ventilation. Ventilation is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S1 size B-3. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Air-condition chamber shall be connected to heat pump Q=50/56 Kw, Qel=11,87kW I=20/21,7A 3~3x400V. Capacitor/Evaporator in direct expansion shall be installed in one of air-condition chamber sections and connected with pipes to heat pump. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Ducts shall be conducted from air-condition chamber across side façade of the facility, then through the dropped ceiling towards premises. Fan, which is foreseen for this air-condition chamber, shall operate with frequent regulation.
Air shall be extracted through ceiling diffusers, square shape, with plenum box and side entry spigot. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Installed fan for extraction of waste air from the premises shall be handled via frequent regulator and pressure controller.
Temperature sensor for control of air temperature, which comes out of the air-condition chamber, shall be installed in this room.

18.5.16 PREPARATION OF EXPLOSIVES (Room no.17)

To cover heat loses, heating elements with 15 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Ventilation (inlet/outlet 770m^3/h, number of exchanges during one hour shall be 20) is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers. Diffusers, equipped with electric engine regulators) shall be selected so that the speed of air supply does not exceed the prescribed amount.
Fresh air shall be supplied through shared air-condition chamber KK-S1 size B-3. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition

13

chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises.
Air-condition chamber shall be connected to heat pump Q=50/56 Kw, Qel=11, 87/12,9kW I=20/21,7A 3~3x400V. Capacitor/Evaporator in direct expansion shall be installed in one of air-condition chamber sections and connected with pipes to heat pump. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Ducts shall be conducted from air-condition chamber across side façade of the facility, then through the dropped ceiling towards premises. Fan, which is foreseen for this air-condition chamber, shall operate with frequent regulation.
Air shall be extracted through ceiling diffusers, square shape, with plenum box and side entry spigot. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Installed fan for extraction of waste air from the premises shall be handled via frequent regulator and pressure controller.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. The air shall be taken from the premises through ventilation valves and extracted outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and positions of ventilation valves, ducts and fans is defined in graphic documentation.
Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S1 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.
Digesters and intake consoles shall be installed in the room 17, pursuant to the technology design and beneficiary's request. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room must have over pressure. In this room, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation (depending on number of connected consumers). Therefore, CAV air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to VAV regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller placed in the room which shall, therefore, always have the required pressure.
This arrangement of grilles and engine drives on them provide for constant temperature on the premises.
When ventilation system is off, secondary ventilation is on.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are located at the entrance of the room.

18.5.17 EXPLOSIVES INSTRUMENTS (Room no.17)

To cover heat loses, heating elements with 15 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C

Rooms 16 (corridor), 17 (explosives preparation), 18 (explosive instruments) represent one separate system for ventilation. Ventilation is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises. Air-intake diffusers shall be equipped with flow regulators with engine drive, thus regulating over pressure within prescribed limits.

Fresh air shall be supplied through air-condition chamber KK-S1 size B-3. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises.

Air-condition chamber shall be connected to heat pump Q=50/56 Kw, Qel=11, 87/12, 9 kW I=20/21,7A 3~3x400B. Capacitor/Evaporator in direct expansion shall be installed in one of air-condition chamber sections and connected with pipes to heat pump. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.

Ducts shall be conducted from air-condition chamber across side façade of the facility, then through the dropped ceiling towards premises. Fan, which is foreseen for this air-condition chamber, shall operate with frequent regulation.

Air shall be extracted through ceiling diffusers, square shape, with plenum box and side entry spigot. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.

Installed fan for extraction of waste air from the premises shall be handled via frequent regulator and pressure controller.

Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall taken the air from the premises through ventilation valves, and extracted outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in the design.

Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.

When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S1 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.

Digesters and intake consoles shall be installed in the room 17. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room must have over

3

pressure. In this room, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation (depending on number of connected consumers). Therefore, CAV air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to VAV regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller placed in the room which shall, therefore, always have the required pressure.
This arrangement of grilles and engine drives on them provide for constant temperature on the premises.
When ventilation system is off, secondary ventilation is on.
In room 18, connections for technical gases shall be installed (argon, synthetic air, helium and nitrogen). Number of 16 accepted exchanges shall provide for good quality ventilation and shall prevent interruption of work conditions, creation of special liquid gases and creation of explosive mixture, which for hydrogen is 4-75% of volume ratio between gas and air. Air shall be extracted from upper zones, i.e. ventilation opening shall be constructed at the highest point. So in case that hydrogen leaks out, it can come out of the building, since it is lighter than air.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.

18.5.18 EXPLOSIVE INSTRUMENTS (Room no.18)

To cover heat loses, heating elements with 10 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Ventilation 355 is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Quantity of supplied air shall be 355m^3/h, while quantity of extracted air shall be 315 m^3/h. It will provide required air over pressure for the room, including 14, 5 exchanges during one hour. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S1 size B-3. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises.
Air-condition chamber shall be connected to heat pump Q=50/56 Kw, Qel=11,87/12,9 kW I=20/21,7A 3~3x400V. Capacitor/Evaporator in direct expansion shall be installed in one of air-condition chamber sections and connected with pipes to heat pump. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Air shall be extracted through ceiling diffusers, square shape, with plenum box and side entry spigot. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.

Installed fan for extraction of waste air from the premises shall be handled via frequent regulator and pressure controller.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves, and extracted outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in graphic documentation.
Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S1 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.
In room 18, connections for technical gases shall be installed (argon, synthetic air, helium and nitrogen). Number of 14.5 accepted exchanges shall enable quality ventilation and shall prevent interruption of working conditions, creation of special liquid gases and creation of explosive mixture, which for hydrogen is 4-75% of volume ratio between gas and air. Air shall be extracted from upper zones, i.e. ventilation opening shall be constructed at the highest point. So in case that hydrogen leaks out, it can come out of the building, since it is lighter than air.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.

18.5.19 KITCHEN (Room no.19)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for $\Delta t=60°C$

18.5.20 PAINT PREPARATION (Room no.20)

To cover heat loses, heating elements - aluminium sectional radiators 690cm high with heating capacity Q=185W/section for $\Delta t=60°C$ with10 sections, thermostatic valve and thermal head will be installed with remote controller due to difficult access to the radiator which shall be installed in decorative protective cover.
Rooms 20 (paint preparation), 21 (paint instruments), 22 (instruments), 23 (corridor), 25 (inspection of disputable fibres), 26 (preparation of fibres), 27 (fibres instruments), 30 (reception), 31 (cases pending), 32 (cases in progress), 33 (cases ready for forwarding) shall have shared unique air-conditioning system – ventilation.
Laboratory ventilation is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate “flushing” of premises.
Fresh air shall be supplied through air-condition chamber KK-S4 size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises.

3

Air-condition chamber shall be connected to heat pump Q=50/56 Kw, Qel=11, 87/12, 9 kW I=20/21,7A 3~3x400V. Capacitor/Evaporator in direct expansion shall be installed in one of air-condition chamber sections and connected with pipes to heat pump. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.

Supplied air temperature shall be 22°C during winter period and 21°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.

Air shall be extracted through ceiling diffusers, square shape, with plenum box and side entry spigot. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Where galvanized duct penetrates fire-protection wall is (partition wall between rooms 25/28), a fire-protection dampers shall be installed, dimensions Ø200mm (fire-protection damper with electric engine starter Ø 200) E 200 with fireproofing capacity F120.

Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.

Installed fan for extraction of waste air from the premises shall be handled via frequent regulator and pressure controller.

Fans for secondary ventilation shall be installed in this room and shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves and extracted outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in the design.

Digester, intake console and safety box shall be installed in room 20.Ventilation of digester shall be carried out via fans (1320 m3/h –free Ø315) which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.

Ventilation of intake consoles shall be carried out via axial duct fans, used in chemical industry, made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.

Ventilation of fire-protection cabinets for storing of chemicals and solvents (safety boxes), shall be carried out via axial duct fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.

Each digester, console and box shall have its own duct for discharge of air, made of chemically resistant PVC pipes conducted across façade, to the roof and filter units, where waste air shall be extracted following filtration.

Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.

When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S4 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.

Digesters and intake consoles shall be installed in the room 20, according to the design. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room

13

must have over pressure. In this room, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation (depending on number of connected consumers). Therefore, CAV air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to VAV regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller placed in the room which shall, therefore, always have the required pressure.
This arrangement of grilles and engine drives on them provide for constant temperature on the premises.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.

18.5.21 PAINT INSTRUMENTS (Room no.21)

To cover heat loses, heating elements with17 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Laboratory ventilation is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers (anemostat together with plenum box and flow regulator) square shaped, with side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S4 size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises.
Ducts shall be conducted from air-condition chamber across side façade of the facility and then into dropped ceiling of the facility towards premises. Where galvanized duct penetrates fire-protection wall is (partition wall between rooms 25/28), a fire-protection dampers shall be installed, dimensions Ø250mm (fire-protection damper with electric engine starter Ø250mm) with fireproofing capacity F120.
Air-condition chamber shall be connected to heat pump Q=50/56 Kw, Qel=11, 87/12, 9 kW I=20/21,7A 3~3x400V. Capacitor/Evaporator in direct expansion shall be installed in one of air-condition chamber sections and connected with pipes to heat pump. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Supplied air temperature shall be 22°C during winter period and 21°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, required temperature is achieved.
Air shall be extracted through ceiling diffusers (anemostat together with plenum box and flow regulator) square shaped, with side entry spigot. . Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Where galvanized duct penetrates fire-protection wall is (partition wall between rooms 25/28), a fire-protection dampers shall be installed, dimensions Ø200mm (fire-protection damper with electric engine starter Ø200mm) E 200 with fireproofing capacity F120.

Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Installed fan for extraction of waste air from the premises shall be handled via frequent regulator and pressure controller.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves, and extracted outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in the design.
Digester, intake console and safety box shall be installed in the room. Ventilation of digester shall be carried out via fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Ventilation of intake consoles shall be carried out via axial duct fans used in chemical industry, made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Ventilation of fire-protection cabinets for storing of chemicals and solvents (safety boxes), shall be carried out via axial duct fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Each digester, console and box shall have its own duct for extraction of air, made of chemically resistant PVC pipes conducted across façade, to the roof and filter units, where waste air shall be discharged in the environment following filtration.
Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S4 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.
Digesters and intake consoles shall be installed in the room 21, pursuant to the technology design and beneficiary's request. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room must have over pressure. In this room, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation (depending on number of connected consumers). Therefore, CAV air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to VAV regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller placed in the room which shall, therefore, always have the required pressure.
This arrangement of grilles and engine drives on them provide for constant temperature on the premises.
In room for 21 connections for technical gases shall be installed (argon, synthetic air, helium and nitrogen). Number of 21 accepted exchanges shall enable quality ventilation and shall prevent interruption of working conditions, creation of special liquid gases and creation of explosive mixture,

43

which for hydrogen is 4-75% of volume ratio between gas and air. Air shall be extracted from upper zones, i.e. ventilation opening shall be constructed at the highest point. So in case that hydrogen leaks out, it can come out of the building, since it is lighter than air.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.
As an alternative for cooling of the premises due to heat load of 3829W, wall split air condition devices shall be used - indoor unit within VRV system with the outdoor unit located on the roof of the facility.

18.5.22 INSTRUMENTS ROOM (No.22)

To cover heat loses, heating elements with12 sections with thermostatic valve and thermal head with remote controller 2m will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Laboratory ventilation (430/380m^3/h, number of exchanges 23) is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S4. Air shall be extracted through ceiling diffusers (anemostat together with plenum box and flow regulator)..
Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Installed fan for extraction of waste air from the premises shall be handled via frequent regulator and pressure controller.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves, and extracted outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in the design.
Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S4 shall then turn on and fresh air shall come in the chamber. After being processed, the air shall be supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working. Waste air shall be extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.
As an alternative for cooling of the premises due to heat load of 2025W, wall split air condition devices shall be used within VRV system and the outdoor unit located on the roof of the facility.

18.5.23 CORRIDOR (Room no.23)

Ventilation is designed so as to provide for the required amount of 100% fresh processed air which is supplied through ceiling diffusers along the corridor.

3

Fresh air shall be supplied through air-condition chamber KK-S4 size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility.
Supplied air temperature shall be 22°C during winter period and 21°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.
Air shall be extracted through ceiling diffusers with plenum box and side entry spigot.

18.5.24 INSPECTION OF DISPUTABLE FIBRES (Room no.24)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
To cool down premises in case of heat load of 188W, wall split air-condition devices shall be used within VRV system with the outdoor unit located on the roof of the facility.
Ventilation through shared system is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Processing of fresh air shall be carried out through air-condition chamber KK-S4, size B-9.

18.5.25 INSPECTION OF DISPUTABLE FIBRES (Room no.25)

To cover heat loses, heating elements with12 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
As an alternative to cool down premises in case of heat load of 1825W, wall split air-condition devices shall be used - indoor unit within VRV system with the outdoor unit located on the roof of the facility.
Ventilation through shared system is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Where galvanized duct penetrates fire-protection wall is (partition wall between rooms 25/28), a fire-protection dampers shall be installed, dimensions Ø200mm (fire-protection damper with electric engine starter Ø200mm) E 200 with fireproofing capacity F120.
Processing of fresh air shall be carried out through air-condition chamber KK-S4, size B-6.

18.5.26 PREPARATION OF FIBRES (Room no.26)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
As an alternative to cool down premises in case of heat load of 188W, wall split air-condition devices shall be used - indoor unit within VRV system with the outdoor unit located on the roof of the facility.
Ventilation through shared system is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the

13

prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.

Fresh air shall be supplied through air-condition chamber KK-S4 size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Ducts shall be conducted from air-condition chamber across side façade of the facility and then into dropped ceiling of the facility towards premises.
Air-condition chamber shall be connected to heat pump Q=50/56 Kw, Qel=11, 87/12, 9 kW I=20/21,7A 3~3x400V. Capacitor/Evaporator in direct expansion shall be installed in one of air-condition chamber sections and connected with pipes to heat pump. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Supplied air temperature shall be 22°C during winter period and 21°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.
Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves and extract outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in the design.
Digester, intake console and safety box shall be installed in the room 26. Ventilation of digester shall be carried out via fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Ventilation of intake consoles shall be carried out via axial duct fans, used in chemical industry, made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Ventilation of fire-protection cabinets for storing of chemicals and solvents (safety boxes), shall be carried out via axial duct fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Each digester, console and box shall have its own duct for extraction of air, made of chemically resistant PVC pipes conducted across façade, to the roof and filter units, where waste air shall be discharged in the environment following filtration.
Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S4 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.

3

Digesters and intake consoles shall be installed in the room 26, pursuant to the technology design and beneficiary's request. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room must have over pressure. In this room, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation (depending on number of connected consumers). Therefore, CAV air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to VAV regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller placed in the room which shall, therefore, always have the required pressure.

This arrangement of grilles and engine drives on them provide for constant temperature on the premises.

The entire system is connected to automatics, and the system shall be turned on and off by switches which are in the room.

18.5.27 FIBRE INSTRUMENTS (Room no.27)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C

As an alternative to cool down premises in case of heat load of 1075W, wall split air-condition devices shall be used – indoor unit within VRV system with the outdoor unit located on the roof of the facility.

Ventilation through shared system is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.

Fresh air shall be supplied through air-condition chamber KK-S4 size B-9 equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Selection of air-condition chamber elements shall be provided in attachment and it shall be made in specialised software by manufacturer of equipment.

Ducts shall be conducted from air-condition chamber across side façade of the facility and then into dropped ceiling of the facility towards premises.

Air-condition chamber shall be connected to heat pump Q=50/56 Kw, Qel=11, 87/12, 9 kW I=20/21,7A 3~3x400V. Capacitor/Evaporator in direct expansion shall be installed in one of air-condition chamber sections and connected with pipes to heat pump. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.

Supplied air temperature shall be 22°C during winter period and 21°C during summer period. This is the air temperature when it comes out of a grille. When it mixes with a room air, the required temperature is achieved.

Filters for waste air shall be located on the roof and they shall consist of three filters connected into one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.

Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves 50m3/h, and extract outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in the design.
Since aggressive agents and toxic substances are operated with in laboratories, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S4 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working CMPT/4 250. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.
In room 27, connections for technical gases shall be installed (argon, synthetic air, helium and nitrogen). Number of 13 accepted exchanges shall enable quality ventilation and shall prevent both creation of special liquid gases and creation of explosive mixture, which for hydrogen is 4-75% of volume ratio between gas and air. Air shall be extracted from upper zones, i.e. ventilation opening shall be constructed at the highest point. So in case that hydrogen leaks out, it can come out of the building, since it is lighter than air.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are located at the entrance to the room.

18.5.28 EXPERT OFFICE (Room no.28)

To cover heat loses, heating elements with10 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
As an alternative to cool down premises in case of heat load of 1781W, wall split air-condition devices shall be used – indoor unit within VRV system and the outdoor unit located on the roof of the facility. The room shall not be ventilated.

18.5.29 RECEPTION (Room no.30)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
As an alternative to cool down premises in case of heat load of 466W, wall split air-condition devices shall be used – indoor unit within VRV system with the outdoor unit located on the roof of the facility.
Ventilation through shared system is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Processing of fresh air shall be carried out through air-condition chamber KK-S4, size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility.
Where galvanized duct penetrates fire-protection wall is (partition wall between rooms 25/28), a fire-protection dampers shall be installed, dimensions Ø200mm (fire-protection damper with electric engine starter Ø200mm) E 200 with fireproofing capacity F120.
Processing of fresh air shall be carried out through air-condition chamber KK-S4, size B-6.

3

18.5.30 CASES PENDING (Room no.31)

To cover heat loses, heating elements with 8 sections with thermostatic valve and thermal head will be installed .Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C

Primary ventilation through shared system is designed in compliance with technical requirements and fire zones and to provide for required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry for air which supplies (340m^3/h) and extracts (320m^3/h) air. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Processing of fresh air shall be carried out through air-condition chamber KK-S4, size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility.
Where galvanized duct penetrates fire-protection wall is (partition wall between rooms 25/28), a fire-protection dampers shall be installed, dimensions Ø200mm (fire-protection damper with electric engine starter Ø200mm) E 200 with fireproofing capacity F120.

18.5.31 CASES IN PROGRESS ROOM (No.32)

Room shall be ventilated via shared system of ducts, air-chamber designed in compliance with the design and fire zones. Air shall be supplied (100m^3/h) and extracted (80m^3/h) from the room through diffusers, in the same manner as previously described for other rooms. Due to small dimensions of the room and arrangement of ancillary rooms, heat losses are minimal and therefore the room shall not be equipped with heating elements.
Temperature sensor shall be installed in this room to measure the air temperature coming out of the air-condition chamber.

18.5.32 CASES READY FOR FORWARDING ROOM (No.33)

Primary ventilation shall be achieved through shared duct, air-chamber designed in compliance with the design and fire zones. Through elements for distribution of air 100m^3/h shall be supplied and 80m^3/h shall be extracted. This way required over pressure for the room shall be achieved.

18.5.33 SANITARY BLOCK (Room no.34)

To cover heat loses, heating elements with 3 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Ventilation of sanitary block shall be achieved by special system of ventilation valves and ducts which shall be connected to the existing ventilation system.

18.5.34 TOXICOLOGY EXPERT OFFICE (Room no.36)

To cover heat loses, heating elements with 10 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C

13

As an alternative to cool down premises in case of heat load of 2500W, wall split air-condition devices shall be used – indoor unit within VRV system and the outdoor unit located on the roof of the facility. The room shall not be ventilated.

18.5.35 HEAD OF TOXICOLOGY DEPARTMENT OFFICE (Room no.37)

To cover heat loses, heating elements with 8 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
As an alternative to cool down premises in case of heat load of 2558W, wall split air-condition devices shall be used – indoor unit within VRV system and the outdoor unit located on the roof of the facility. The room shall not be ventilated.

18.5.36 INSTRUMENTAL TECHNOLOGY (Room no.38)

To cover heat loses, heating elements with 8 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Shared unique air-conditioning and ventilation system shall be designed for rooms 38 (instrumental technology 1), 39 (instrumental technology 2), 40 (washing of laboratory dishes), 41 (preparation of toxicology samples), 42 (analytical balance), 43 (corridor), 44 (archive), 45 (reception).
Ventilation through shared system is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S3 size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises.
Ducts shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Fan shall be equipped with frequent regulator.
Air-condition chamber shall be connected to heat pump Q=73/81, 5 Kw, Qel=17, 48/18, 5 kW, I=29, 4/31,3A, 3~3x400V. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Supplied air temperature shall be 22°C during winter period and 27°C during summer period.
Air shall be extracted through ceiling diffusers, square shape, with plenum box and side entry for a duct. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility.
Filters for waste air shall be located on the roof and they consist of three filters connected in one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Due to difference between air supply of 780m^3/h and extraction of 735m^3/h while primary ventilation is working, there will be over pressure in the room.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves, and extract outside thorough PVC ducts and rain-

protection grids 178 mm x 178 mm installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in the design. Number of exchanges for secondary ventilation shall be 2 exchanges per hour.
System shall be turned on by switch located at the room entrance.
As an alternative to cool down premises in case of heat load of 3641W, wall split air-condition devices shall be used – indoor unit within VRV system and the outdoor unit located on the roof of the facility. The room shall not be ventilated.

18.5.37 INSTRUMENTAL TECHNOLOGY 2 (Room no.39)

To cover heat loses, heating elements with 10 sections with thermostatic valve and thermal head will be installed .Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Shared unique air-conditioning and ventilation system shall be designed for rooms 38 (instrumental technology 1), 39 (instrumental technology 2), 40 (washing of laboratory dishes), 41(preparation of toxicology samples), 42 (analytical balance), 43 (corridor), 44 (archive), 45 (reception).
Ventilation through shared system is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S3 size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Ducts shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. . Fan shall be equipped with frequent regulator.
Air-condition chamber shall be connected to heat pump Q=73/81, 5 Kw, Qel=17, 48/18, 5 kW, I=29, 4/31,3A, 3~3x400V. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Supplied air temperature shall be 22°C during winter period and 27°C during summer period.
Air shall be extracted through ceiling diffusers square shape, with plenum box and side entry for a duct. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility.
Filters for waste air shall be located on the roof and they consist of three filters connected in one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves and extract outside thorough PVC ducts and rain protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is defined in the design. Number of exchanges for secondary ventilation shall be 2 exchanges per hour.
Digesters, i.e. intake consoles, shall be installed in the room 39. Ventilation of digesters shall be carried out via fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.

Ventilation of intake consoles shall be carried out via axial duct fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.
Each digester, console and box shall have its own duct for extraction of air, made of chemically resistant PVC pipes conducted across façade, to the roof and filter units, where waste air shall be discharged in the environment following filtration.
Since aggressive agents and toxic substances are operated with, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.
When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S3 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working CMPT/4 315. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.
Digesters, intake consoles and safety boxes shall be installed in the room 39. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room must have over pressure. In the room, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation (depending on number of connected consumers). Therefore, CAV air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to VAV regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller placed in the room which shall, therefore, always have the required pressure.
In room 39, connections for technical gases shall be installed (argon, synthetic air, helium and nitrogen). Number of 23 accepted exchanges shall enable quality ventilation and shall prevent both creation of special liquid gases and creation of explosive mixture, which for hydrogen is 4-75% of volume ratio between gas and air. Air shall be extracted from upper zones, i.e. ventilation opening shall be constructed at the highest point. So in case that hydrogen leaks out, it can come out of the building, since it is lighter than air.
The entire system is connected to automatics, and the system shall be turned on and off by switches which are located at the entrance to the room.
As an alternative for cooling of the premises due to heat load of 5753W, wall split air condition devices shall be used – indoor unit within VRV system and the outdoor unit located on the roof of the facility.

18.5.38 WASHING OF LABORATORY DISHES (Room no. 40)

To cover heat loses, heating elements with 9 sections with thermostatic valve and thermal head will be installed .Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Ventilation through shared system is designed so as to provide for, at any time, required amount of 100% fresh processed air which is supplied through ceiling diffusers (anemostat together with plenum box and flow regulator). in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S3 size B-9 equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility.

Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Selection of air-condition chamber elements shall be provided in attachment and it shall be made in specialised software by manufacturer of equipment.
Ducts shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Fan shall be equipped with frequent regulator.
Air-condition chamber shall be connected to heat pump Q=73/81, 5 Kw, Qel=17, 48/18, 5 kW, I=29, 4/31,3A, 3~3x400B. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Supplied air temperature shall be 22°C during winter period and 27°C during summer period.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves and extract outside thorough PVC ducts and rain-protection grids 178 mm x 178 mm installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is shown in the design. Number of exchanges for secondary ventilation shall be 2 exchanges per hour.
As an alternative for cooling of the premises due to heat load of 1310W, wall split air condition devices shall be used – indoor unit within VRV system and the outdoor unit located on the roof of the facility.

18.5.39 PREPARATION OF TOXICOLOGY SAMPLES (Room no. 41)

To cover heat loses, heating elements with 15 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Primary ventilation is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S3 size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility.
Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Selection of air-condition chamber elements shall be provided in attachment and it shall be made in specialised software by manufacturer of equipment.
Ducts shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Fan shall be equipped with frequent regulator.
Air-condition chamber shall be connected to heat pump Q=73/81, 5 Kw, Qel=17, 48/18, 5 kW, I=29, 4/31,3A, 3~3x400V. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Supplied air temperature shall be 22°C during winter period and 27°C during summer period.
Air shall be extracted through ceiling diffusers square shape, with plenum box and side entry for a duct. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility.
Filters for waste air shall be located on the roof and they consist of three filters connected in one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.

3

Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves and extracted outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is shown in the design. Number of exchanges for secondary ventilation shall be 2 exchanges per hour.

Digester, intake console and safety box shall be installed in the room 41. Ventilation of digester shall be carried out via fans which are used in chemical industry made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.

Ventilation of intake consoles shall be carried out via axial duct fans used in chemical industry, made of solid polypropylene plastic and they can be applied for extraction of corrosive gases. Fans shall be installed on the roof of the facility, after filters.

Each digester, console and box shall have its own duct for extraction of air, made of chemically resistant PVC pipes conducted across façade, to the roof and filter units, where waste air shall be discharged in the environment, following filtration.

Since aggressive agents and toxic substances are operated with, therefore secondary ventilation shall be turned on all the time, until primary central ventilation is turned on.

When primary ventilation is turned on, secondary ventilation stops working. Air-condition chamber KK-S3 shall then turn on and fresh air shall come in the chamber. After being processed, the air is supplied to the ceiling air distributers through duct system and then supplied to laboratory premises. At the same time, air extract fan starts working CMPT/4 315. Waste air is extracted outside through diffuser grilles, ceiling plenum and duct system, after filtration on the roof of the facility.

Digesters, intake consoles and safety boxes shall be installed in the room 41. These devices take the air from the room, and when they are turned on, they disturb the air balance because the room must have over pressure. In room 41, automatic control of air amount shall be installed and it shall be designed pursuant to the amount of air which is to be extracted through digester and ventilation (depending on number of connected consumers). Therefore, CAV air flow regulator shall be mounted on the supply grill and it enables controller to measure the amount of air which is to be supplied. It serves only as control element and to give some parameter to VAV regulator which shall be placed on extract grille and which shall regulate damper position with electric engine drive, thus the amount of extracted air. This shall be done because laboratory premises need appropriate over pressure from 10 to 20 Pa. Dampers shall be handled by automatics pursuant to data provided by installed pressure controller installed in the room. In the room 41 there shall be two air extract grilles and two air supply grilles. On supply grilles and on one extract grille CAV regulators shall be installed pursuant to automatics requirements, and VAV regulator on the other extract grille.

This arrangement of grilles and engine drives on them provide for constant temperature on the premises.

As an alternative for cooling of the premises due to heat load of 4464W, wall split air condition devices shall be used – indoor unit within VRV system with the outdoor unit located on the roof of the facility.

Temperature sensor shall be installed in this room and it shall control temperature of air coming out of the air-condition chamber.

18.5.40 ANALYTICAL BALANCE (Room no.42)

To cover heat loses, heating elements with 5 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C

3

Primary ventilation is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S3 size B-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Ducts shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Fan shall be equipped with frequent regulator.
Air-condition chamber shall be connected to heat pump Q=73/81,5Kw, Qel=17,48/18,5kW, I=29,4/31,3A, 3~3x400V. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Due to difference between air supply of 180m^3/h and extraction of 160m^3/h while primary ventilation is working, there will be over pressure in the room.
Supplied air temperature shall be 22°C during winter period and 27°C during summer period.
Air shall be extracted through ceiling diffusers square shape, with plenum box and side entry for a duct. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility.
Filters for waste air shall be located on the roof and they consist of three filters connected in one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthiness of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves 20 m3/h, and extract outside thorough PVC ducts and rain-protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is according the design. Number of exchanges for secondary ventilation shall be 2 exchanges per hour.
As an alternative for cooling of the premises due to heat load of 3002W, wall split air condition devices shall be used – indoor unit within VRV system with the outdoor unit located on the roof of the facility.

18.5.41 CORRIDOR (Room no.43)

Primary ventilation is designed so as to provide, at any time, the required amount of 100% fresh processed air. Operating principle and selected elements for primary and secondary ventilation shall be the same as for the previously described room.

18.5.42 ARCHIVE (Room no.44)

Primary ventilation is designed so as to provide, at any time, the required amount of 100% fresh processed air. Operating principle and selected elements for primary and secondary ventilation shall be the same as for the previously described room.

18.5.43 RECEPTION OF SAMPLES (Room no.45)

To cover heat loses, heating elements with 13 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Primary ventilation is designed so as to provide, at any time, the required amount of 100% fresh processed air which is supplied through ceiling diffusers in square shape, with plenum box and side entry spigot. Diffusers shall be selected so that the speed of air supply does not exceed the prescribed amount. Speed on grille represents effective speed v_{ef}. Accepted grilles shall provide for required range of fresh air flow, including appropriate "flushing" of premises.
Fresh air shall be supplied through air-condition chamber KK-S3 size V-9. It shall be equipped with necessary heater/cooler, noise buffer with required automatics for regulation of air-condition chamber functionality during winter and summer periods and they are installed on the roof of the facility. Selection of heating and cooling section shall be carried out pursuant to outside temperature, amount and temperature of air supplied into the premises. Ducts shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility. Fan shall be equipped with frequent regulator.
Air-condition chamber shall be connected to heat pump Q=73/81,5Kw, Qel=17,48/18,5kW, I=29,4/31,3A, 3~3x400V. This heat pump consists of three modules. In case of compressor breakdown, any of those three modules can operate without interruptions for some time with remaining capacity.
Due to difference between air supply of 600m^3/h and extraction of 560m^3/h while primary ventilation is working, there will be over pressure in the room.
Supplied air temperature shall be 22°C during winter period and 27°C during summer period.
Air shall be extracted through ceiling diffusers square shape, with plenum box and side entry for a duct. Duct shall be conducted from the premises across the corridor and side façade to the box for filtering of waste air, placed on the roof of the facility.
Filters for waste air shall be located on the roof and they consist of three filters connected in one filter section. First shall come cassette filter class G4, 48mm thick, behind it there shall be cassette filter with active oil, 292mm thick, and at the end absolute filter, class H13. Differential pressure controller shall control filthincss of filters, and it shall signal time for replacement of filters pursuant to pressure drop in the duct.
Fans for secondary ventilation shall be installed in this room and it shall be turned on for 24 hours and turned off when primary ventilation is turned on. Accepted fan for secondary ventilation shall take the air from the premises through ventilation valves and extracted outside thorough PVC ducts and rain protection grids installed on the exterior wall. Arrangement and position of ventilation valves, ducts and fans is according to the design. Number of exchanges for secondary ventilation shall be 2 exchanges per hour.

18.5.44 TECHINICAN OFFICE (Room no.46)

To cover heat loses, heating elements with 12 sections with thermostatic valve and thermal head will be installed. Radiators are aluminium sectional radiators 690cm high with heating capacity Q=185W/section for Δt=60°C
Premises shall be cooled in case of heat load of 2032W with wall split air-condition devices – indoor unit within VRV system and the outdoor unit located on the roof of the facility. The room shall not be ventilated.

18.5.45 TOILET VENTILATION

Toilet ventilation shall be supplied through ventilation system connected to the system for extraction of air from the toilet. All cabins and anterooms shall have aero-valves for extraction of waste air. Ducts shall be made with spiral tubes, the diameter of which shall be as per design. Extraction fan shall be the existing one on the roof of the facility. Air shall be recovered through grille on the door. Cabin doors shall be lifted above the floor so as to enable free flow of air between premises and towards parts of the room with over pressure.

18.5.46 OVER PRESSURE VENTILATION ON STAIRCASE AND IN ELEVATOR WELL

Staircase and elevator space shall have over pressure intended to prevent inflow of contaminated air while laboratories are working, and in case of fire or unforeseen situations due to spillage of chemicals. Emergency ventilation shall be provided by axial fans which are placed at the attic and shall supply staircase and elevator space directly with air.

18.5.47 TECHNICAL GASES

Technical gases which are kept in specially built facility next to the building shall be applied for devices used for analysis such as gas chromatograph mass and infrared spectrometer. For the needs of laboratory, gases such as hydrogen, nitrogen, argon, synthetic air and helium shall be applied according to the valid RS standards, norms and approved Main Design. The scope of works and quantities will be presented in the BoQ.
Upon completion of the works, the Contractor shall be liable to carry out all specified tests and measurements and submit written certificates in the form of attest to the Supervisor.

19 INSTALLATION OF ELECTROMOTOR DRIVE AND AUTOMATIC CONTROL

With respect to all the foreseen works, the Contractor shall be fully familiar with all Final Design details, as well as with all local regulations, international and local standards (SRPS), common practice of trade and circumstances for their execution.
Electrical installation of electromotive drive and automatic control for the air-conditioning and heating system between seasons as well as cooling the building has to be installed in accordance with the mechanical design of thermal-technical installations and according to SRPS IEC 60364-5-51. The building is labelled as BD-2 regarding evacuation in case of fire.

HEATING, COOLING AND AIR CONDITIONING SYSTEM

Heating, cooling and air conditioning system comprises the following sections:
- The existing EL fuel oil boiler room
- Newly designed networks for radiator heating system of laboratories and upper floor
- Newly designed networks for hot water supply of the air conditioning compartment
- Air conditioning VRV system as well as heating system between seasons until the main boiler room is put into operation as well as for summer procession of air to be transferred to the laboratories
- Air conditioning compartments for primary air conditioning of 4 laboratories including the office premises