

***JOINT SCHOOL "RAMAZAN KARAJ", NIKEL***

**BUILDING MATERIAL SPECIFICATIONS / CIVIL WORKS,  
FIXTURES AND FITTINGS**

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## SECTION 1 GENERAL SPECIFICATIONS

### 1.1 General Specifications

#### 1.1.1 Units of Measurements

In general, the units of measurements to be used in connection with this contract are metric units of mm, cm, m Km, N (Newton), Mg (1000 kg) and degrees Celsius (C°). Decimal points are written as “.”

#### 1.1.2 Programmed for the Execution of the works

The Contractor shall submit to the engineer a fully detailed programme showing the order, the procedure and method by which he proposes to carry out the construction and completion of the Works. The information to be supplied to the engineer shall include drawings showing the general arrangement of the temporary offices and any other temporary buildings or structures which he proposes to use, together with details of the constructional plant and temporary works, and all other devices which he proposes to adopt for the construction and completion of the whole of the works and, in addition, details of the labor strength, skilled and unskilled, and supervision arrangements. The manner and the order in which it is proposed to execute the permanent works is subject to adjustment and approval by the Engineer, and the Contract price shall be held to include any necessary adjustment required by the Engineer during the course of the work.

#### 1.1.3 Faulty works

Any work, which fails to comply with these Specifications, shall be rejected and the Contractor shall, at his own expense, repair any defects, as directed by Engineer satisfaction.

#### 1.1.4 Advertising, Boarding, etc.

No advertising material whatever will be permitted to be displayed on the site except that:

The contractor shall construct two boards, carrying information supplied by and erected in the locations specified by the Employer. The wording shall be presented in such a way as to be legible at a distance of 100 meters. The cost of these boards will be included in the Contractor's rate in Bill of Quantities.

#### 1.1.5 Safety and work coordination plan

##### - **Legal framework regarding Security and Coordination at Work.**

- 1) Law no. 8417, dated 21.10.1998 "On the Constitution of the Republic of Albania".
- 2) Law no. Dated 18.02.2010. Pursuant to Articles 78 and 83, point 1 of the Constitution, on the proposal of the Council of Ministers.
- 3) Law no.7961 dated 12.07.1995, "On the Labor Code in the Republic of Albania" amended by law no. 8085 dated 13.03.1996, and law no. 9125 dated 29.07.2003.
- 4) Law no. 7147 dated 30.10.2003 "On the Ratification of Convention No. 155 of the International Labor Organization on" Occupational Safety, Health and Workplace 1981.
- 5) Law No. 9148 dated 30.10.2003 "On the ratification of the Protocol of 2002 of the Convention No. 155 of the International Labor Organization on" Safety at Work, Health and the Workplace 1981.
- 6) Decision of the Council of Ministers no. 692 dated 13.12.2001 "on special measures for insurance and protection of health at work" amended by Decision of the Council of Ministers no. 742 dated 06.11.2003.
- 7) Decision of the Council of Ministers no. 207, dated 09.05.2002 "On the determination of difficult or / or dangerous works".
- 8) Decision of the Council of Ministers no. 461, dated 22.02.1998 "On the register kept by the employer for accidents at work and occupational diseases".

- 9) Any other legal provision applicable in this case. Taking individual and collective protection measures at work is mandatory because it helps protect the health of employees and guarantees safety at work.
- a) **Geographical position of the project area**  
The project is located in the Municipality of Kruja, Administrative Unit Nikel.
- b) **Plan area of the project area**  
The layout extends over the existing track of the "Ramazan Karaj" school.

**Manual for Safety and Coordination at Work.** For the implementation of the Safety and Coordination Plan at Work, a manual for Security and Coordination at Work is drafted by the Employee. The employee must prepare this manual which will be implemented based on the above legal framework in all civil constructions and assembly and especially in underwater works of a high difficulty. Below are the main articles of this manual which should be taken into account when drafting the PSK manual that will be drafted by the Employer at the beginning of the work for the implementation of this project.

## GENERAL PROVISIONS

### CLAUSE 1

**Objective:** The purpose of this manual is to define measures aimed at ensuring the safety and health at work of employees.

**Measures:** The company in the capacity of employer will take all measures that can be implemented technically and that experience has shown that they are necessary to prevent accidents at work or occupational diseases related to the nature of work, based on Article 68 of the Code of work.

### CLAUSE 2

#### Payment of Damage:

1. The company must pay the difference between the damage and the compensation received by the employee from the social insurance, when the accident or occupational disease is a consequence of the serious guilt of the employer.
2. When the Company has not registered the employee in social insurance, he must bear all the expenses incurred by the employee as a result of accident or occupational disease as well as all damages as a result of non-registration.

### CLAUSE 3

**Technical Security Rules:** The company to prevent accidents at work must clearly define the rules of technical insurance. The employee is obliged to verify if the scaffolding is in good technical condition for starting work, if the employee notices that the scaffolding is not suitable is not done within the proper parameters and endangers the life of the employee, he is obliged not to start work but to notify the persons responsible for the condition of the scaffolding.

### CLAUSE 4

**Signals:** The company will place distinctive signals in each workplace that poses a risk to the life and health of employees.

### CLAUSE 5

**Medical Examination:** Taking into account the special risks that may come from the nature of work, the Company will organize periodic medical examinations of employees at least once a year.

### CLAUSE 6

**Medical Report:** Employees working in the production sector of the Company must be provided with a medical report before being employed.

### CLAUSE 7

**Determining the place of work:** The company to protect the life and health of employees at work, decides its employees according to:

- a) Professional skills
- b) Health condition based on the medical examination performed by the company doctor, before hiring.
- c) Age.
- d) Gender.

### CLAUSE 8

**Hygiene and relevant measures:** The company will explain to employees exposed to risk, the need to implement technical safety and hygiene measures.

**I- MANDATORY USE OF TECHNICAL SECURITY EQUIPMENT**

Pursuant to CLAUSE 24 point 1 and 2 of the Labor Code, the employee is obliged to use the clothing and technical security tools at work as follows::

- a. The employee carefully performs the work assigned to him
- b. The employee must use according to certain rules the tools, equipment, tools of the employer and the equipment made available to him.

**CLAUSE 9**

**Organization of the technical branch of the company:** The Administrator assigns to the persons in charge of the assembly groups various rights and obligations, always in accordance with the instructions of the Company, as well as the obligation to maintain insurance and prevent accidents at work.

Technical security engineers should provide guidance on security measures, inspect and report problematic cases that may occur during the performance of the work. Any uncertainty will be reported to the company administrator who may then take punitive action.

**CLAUSE 10**

**The rights and obligations of the employer:**

- a. Drafting and notifying the procedures for organizing and securing the workplace.
- b. Compilation of documents in insurance procedures
- c. Analysis and completion of all forms related to accidents at work and other dangerous events related to them
- d. Coordination of staff training

**The rights and obligation of the employee:**

Workers must use personal safety equipment at all hours of work. Mandatory use of personal safety equipment by employees should be as follows:

- a. Wearing the Vest
- b. Fastening the seat belt during assembly
- c. Wear safety shoes against slipping
- d. Putting on the helmet at any time
- e. Use of gloves
- f. Putting on glasses

Employees have the duty during working hours to use clothing and technical security tools, especially when working on scaffolding in the installation of exterior facades (in cases of non-compliance with this order will be penalized responsible persons.)

The employee has the:

1. To request the fulfillment by the employer of the conditions that define the regulation of the technique of insurance and protection at work.
2. Not to carry out the orders given or the tasks assigned to him when he sees that there is a risk of an accident and the preventive measures to avoid it are insufficient
3. During the installation of doors, windows, windows on the external facades must be installed respecting the rules of technical safety, at any time the worker must have placed the above equipment.
4. It is forbidden to leave the elements of the facades without being finally fixed or without taking measures for reinforcement.
5. In cases of working at height, workers who install glass facades must be provided with seat belts and must be kept constantly fastened.
6. It is strictly forbidden to place windows and facade elements in open windows without security support.
7. Installation of windows to be done in place by scaffolding
8. Workers who have to transport the windows to the workplace must be provided with gloves
9. Workers working on facades in high buildings must be equipped with seat belts and helmets

10. It is forbidden to leave working tools on the floors of scaffolding, small tools to be kept in special cassettes while the averages, templates, etc., are left horizontally on the scaffolding floor but without impeding movement
11. During welding workers must be provided with protective size
12. Employees should report any problems they may encounter on site.

#### **CLAUSE 11**

##### **THE DUTIES AND RIGHTS OF THE TECHNICAL SECURITY ENGINEER ARE AS FOLLOWS**

1. Supervision of the performance of the work process and verification of compliance with the legislation in force related to insurance and what the employer requires.
2. Giving advice to employees on maintaining insurance in the workplace
3. Meetings with the director and managers in order to inform the latter about the insurance regime
4. Control of the performance of the work process, conducting occasional site visits and reporting of possible violations
5. Providing personal safety equipment to employees
6. Report of all irregularities observed during the work process, accompanying them with proposals for remedial action
7. Each supervisor shall be responsible for providing appropriate guidance to the employees under his supervision and control, as well as for the safe conduct of the work process related to them.
8. In case any employee refuses to perform a job or use any tool or equipment, this refusal will be reported immediately to the responsible person.
9. The responsible person or any of the other competent persons who will deal with such reporting shall immediately proceed to the investigation of the case.
10. Ensure immediate and delayed adjustment of any unsafe working circumstances, or
11. If the above procedures do not resolve the issue and any of the employees continue to refuse to perform any work, the responsible person will investigate the matter in the presence of the employee to formulate the report.

#### **CLAUSE 12**

##### **Safety and meeting checks**

1. During the performance of the work process, the person in charge should hold several meetings in which all key staff members should attend, in order to be informed about all problems pertaining to insurance.
2. The purpose of these meetings organized by the security engineer is coordination and exchange of views with key staff and the compilation of relevant documents related to them which is signed by all participants.
3. The security engineer or liability officer should conduct periodic inspections in order to verify whether or not the conduct and actions are in accordance with all insurance rules. If the security engineer or group leader confirms cases and misconduct a meeting will be held in order for them to be analyzed and decisions made to correct the situation, if during the inspection after the meeting the Security Engineers or the person in charge of the group confirms that the decisions taken for correction have not been implemented then reports it immediately to the administrator.
4. The lawyer has the right to go for periodic inspection at the construction site to follow the progress of technical implementation, if during the inspection the lawyer finds violations of security rules, the latter keeps a record which is signed by the parties. It will then be decided to impose punitive measures on the responsible persons.

#### **CLAUSE 13**

##### **Reporting Disagreement**

1. In case the performance of the work process is confirmed in violation of the insurance rules, the insurance engineer must prepare and sign a "Disagreement Report" in which he will describe where the disagreement lies and will define the actions required for the correction of situation. Submits this report to the administrator.
2. It will have to take immediate action necessary to rectify the situation. The security engineer, assembly lawyer or any of his associates, will assess and check if the actions in question have been performed to



rectify the situation, then will mark the relevant deadlines for rectifying the situation in the disagreement report.

3. In the event of an accident, it must be reported to the insurance engineer, this report must be made on the day it was caused, in order to carry out proper research. Once the work process is completed, the security engineer should be informed of the entire work process performed.
4. A statistical report can be compiled regarding accidents caused during the performance of the work process. The general manager and the heads of the sector responsible for the completion of the work process performed and to keep a copy of the above reporting in order to formulate a methodology for the prevention of accidents at work.
5. All relevant safety documents must be completed and reviewed. All accidents must be analyzed, while the report must be submitted to the relevant commission for trial in order to further review and make relevant decisions.

#### **CLAUSE 14**

##### **Inspection Within the Company**

1. Periodic inspections of all workplaces on site, including those of buildings, structures, tools, machinery and equipment or work practices, shall be carried out from time to time.
2. Mechanisms, tools and elements of equipment are inspected according to construction advice or as otherwise defined by legal requirements. Special inspections will take place when a case of injury or accident occurs. If during these inspections it is proved that the working conditions are unsafe or pose risks, then they are changed or replaced immediately.
3. In case anyone finds working conditions or bad or dangerous actions, then they should report to the group leader as soon as possible. The head of the group that receives this report, takes measures to ensure and immediate implementation of corrective measures.
4. In the event that urgent action is required to remedy a circumstance that constitutes a direct source of risk to employees, this risk will be faced only by those employees who have the appropriate training and who have received instructions for the regulation of hazardous working circumstances .

## **II- WORKPLACE ENVIRONMENT**

The company must ensure that all of the following conditions are met in relation to the workplace environment.

#### **CLAUSE 15**

1. In all workplaces, safe places of entry and exit shall be indicated which shall be appropriate to the circumstances prevailing in the workplace and employees in those workplaces shall not use in any other way any entry or exit that may pose a risk.
2. Risk entries will be indicated for each workplace when an abnormal performance of the work process is likely to provoke direct risk to employees and where common means of exit may be dangerous or unsafe.
3. In case of danger, places for quick and safe exit from a certain place will be appropriately designed and which should be easily recognized by the employees.

#### **CLAUSE 16**

##### **Workplace conditions and possible repairs**

1. The workplace in all its components must be adapted to the nature of the work to be performed there.
2. The surface and volume of the workplace must be sufficient for the employee to be able to perform the work in complete safety and without obstructing the circulation in the environment.
3. The employer must ensure that the facility is strong, stable and in good condition. They must be kept clean at all times in order to ensure the cleanliness, prevention and fire protection of employers and other people from any kind of infection. Their control and maintenance should be done periodically.
4. The facility should be inspected periodically to eliminate and replace parts that pose a risk to the life and health of employees, machinery or finished products.
5. The company makes available to employees all the necessary manual and mechanical tools to facilitate the carrying of heavy weights. The company will not allow a single employee to carry a weight heavier than 50 kg.

#### **CLAUSE 17**

##### **Surrounding environment**

1. Passages, corridors, doors and exits in case of danger must be free from any obstruction of materials or objects that impede the movement of people in case of fire.
2. Areas or gaps which pose a risk of falling persons or equipment will need to be specially covered.
3. Workplaces located on floors or underground must always have stairs of sufficient width with supports or handrails.

#### **CLAUSE 18**

##### ***Duties rights and responsibilities for technical security and protection at work.***

##### **Engineer, Facility Technician**

1. Organizes the work in full compliance with the technique of job security in the facility.
2. Controls himself and in special cases with a commission set up by him; scaffolding, ladders, lifting equipment constructions, machinery, tools, and work equipment and allows them to be put into use only if they comply with the requirements of occupational safety regulations.
3. For each newly started work process (assembly) remind the protection measures cited above.
4. Has the right not to start work or to order its prohibition in the facility, when it is noticed that its continuation poses a danger to the life of employees from the lack of protective equipment.
5. Responsibility for providing and distributing the individual protective equipment necessary for the performance of the task without risk.
6. Does not allow difficult and high risk work processes to be performed with less than two workers.
7. Continuously informs the administrator about the difficulties and problems encountered during the implementation of the regulation of technical security and protection at work.
8. In facade works at height, the work of workers is prohibited without passing medical examinations.
9. When covering the facades, it is categorically forbidden to leave them without any security connection.
10. When working at higher altitudes, it is mandatory that the scaffolding has safety belts and be covered.
11. When the works are carried out on scaffolding on several floors, it is forbidden to work with two or more workers in the same vertical.
12. Workers and specialists when appearing on the work front must have with them work tools and simple measuring instruments in accordance with the task to be completed. The team leader should check the work tools of specialists and workers before starting work and not allow it to start in case they are absent.
13. Work tools and equipment used by workers and specialists must be in order and in accordance with technical conditions or production standards, in case they are damaged, unsuitable and out of standards should be removed from use.
14. It is forbidden to work with mechanical equipment on improvised scaffolding.
15. The body of electrical equipment must be earthed when working in humid places and in the vicinity of earthed metal structures.
16. When working with electrical equipment, the user must have gloves and galoshes or must work on insulated flooring.
17. When welding works are performed at height hanging scaffolding and safety belts should be used.
18. In case of carrying out work at height without scaffolding, workers must be provided with safety belts, rubber shoes and special bags for left tools.
19. The assembler and the technical manager must have technical materials on the lifting capacity of the assembly located in the assembly site (cranes, pulleys, pulleys, precasts, as well as other tools that serve in the assembly of ropes, chain chains, etc.) in order to use what fits the weight he has to lift.
20. It is strictly forbidden for cables or electrical conductors to lie on the floor. They should rise above 2 m from the ground.
21. Ascent of workers through scaffolding also and descent as well as by means of ropes and work on rope is prohibited, in any case stairs must be used.
22. During the working hours in the hanging cradles, people are forbidden to stay in the cradle and all the passageways, below them to be surrounded, are closed.

*The employer is obliged to comply with the requirements of the relevant manual for safety and health at work.*

#### **1) Terms of the Manual for Technical Safety and Health at Work.**

They are mandatory and employees must abide by these terms and strictly adhere to the prescribed procedures. Failure to comply or non-compliance with any terms of any technical and health insurance procedure shall oblige the employee to be punished in accordance with the penalties provided for in the Company's Rules of Procedure and shall be subject to the importance of violating the terms in the exclusion penalty.

#### MANDATORY FOR USE

- The use of a protective helmet at work is mandatory.
- The use of anti-slip safety shoes are mandatory their use during work processes.
- The use of seat belts is mandatory when performing work at height on scaffolding.
- The use of vests is also very important during work processes.
- The use of gloves is mandatory for employees during the work processes with iron and concrete to have no contact.
- Use headphones in case there is noise during work processes because it may cause hearing damage.
- Work uniforms as they are combined are important because they distinguish on-site employees from people who may be casual passers-by, it is important and mandatory for employees to have a certain uniform.



## 1.2 Submissions to the Engineer

### 1.2.1 Written Authority

"Order in writing" shall mean any document or letter signed by the Engineer and posted or delivered to the contractor and containing instructions, guidance or directions to the contractor for the execution of

the Contract. Whenever the word approved, directed, authorized, required, permitted, ordered, instructed, designated, considered, necessary, prescribed, or words (including nouns, verbs, adjectives and adverbs) of like important are used, it shall be understood that the written approval, direction, authority, requirement, permission, order, instruction, designation, prescription, etc. of the engineer is implied unless another meaning is plainly intended

#### 1.2.2 *Submissions to the Engineer*

The contractor should submit to the engineer every additional work; a detailed drawing and the work should begin only after Engineer approval.

The contractor should sign proposals, details, sketches, accounts, informations, materials, test certificate, whenever requires by Engineer. The engineer will accept every submission and if appropriate will be answered to the contractor in accordance to any proper clause of contract conditions. Every submission should be done due to dates agreeing with engineer and referring the approved program and necessary time that the engineer needs to submit those works.

#### 1.2.3 *Samples*

The contractor should provide samples, labeled due to all fittings, accessories, and other issues might be asked from the engineer for inspection. The samples should be submitted to the Engineer's office.

#### 1.2.4 *The drawings of implemented works and measurement hand-book*

The contractor will prepare and submit to the Engineer three groups of work documentations due to the project. This material should contain a drawing set of the implemented project, the additional drawings made during work implementation approved by the engineer, and the measurement handbook per each work volume.

## SECTION 2 SITE CLEARANCE AND DEMOLITION

### 2.1. Clearance of site

#### 2.1.1. *Clearance of site*

At the commencement of the contracts, unless otherwise specified or directed, the Contractor shall remove all vegetation and all objectionable organic material from the construction area, and burn or dispose of all such debris in tips to be provided by the contractor.

#### 2.1.2 *Scaffolding*

Large excavation including top soil removing, executed by hand or machine in terrain of whatever nature, compactness, or degree of saturation (shaley even if compact, sandy, gravelly or rock terrain), including the cutting and removing of roots, stumps, rock and materials with a dimension not exceeding 0,30 m3, including allowance for the protection of underground structure such as drains, pipelines, etc, and including the location resulting material within the work site.

#### 2.1.3 *Removal of trees and stubs higher than 1.5m*

Generally should be taken care, during clearance works not to damage those trees, which do not obstacle in rehabilitation and construction of a new building. In case when their removal is necessary, should be taken adequate precaution in order that during their falling down they will not damage persons or the objects around. So, for the trees higher than 10 m, their cut should be done parted into 3 m. The cut part

should be tied with a rope or balanced cable and should be trailed by rope or balanced cable from the part where the personnel or objects are safe.

#### **2.1.4 Removal of structures, fences etc.**

The Contractor shall carefully take down and clear only such buildings, or other structures directed by the engineer. The components shall dismantled, cleaned and stacked in separate heaps. Materials, which in the opinion of the Engineer are not fit for re-use shall be removed from the site to a tip, provided by the contractor. Materials, which are re-usable, shall remain the property of the Employer and shall be preserved and protected by the Contractor until removed by the Employer or until the expiration of the Contract.

#### **2.1.5 Protection of cleared site**

The contractor must enclose with appropriate nets fixed in vertical elements the entire construction site, the entrance to the construction site will be made only from the entrance gate equipped with protective barriers, in order to prevent unauthorized entry of persons or damage to materials at the construction site, as well as to keep under control the territory where the works will be carried out.



Example of site enclosure with sandwich panels or metal

#### **2.1.6 Temporary accommodation**

The contractor must provide on site with the supply of electricity and water throughout the construction period for the process of repair works and the accommodation needs of its staff and supervisor. This means the creation of 2 offices, one for the contact staff and one for the supervision staff, taking care to have joints for sanitary needs.



Cabins for engineering staff and workers

#### **2.1.7 Placement of tables**

The contractor must provide on site the entire period of construction of the building as well as information tables and those of risk protection.

## SECTION 3 EARTHWORKS, EXCAVATIONS AND FOUNDATIONS

### 3.1 Earthworks

#### 3.1.1 Formations prepare

Formations prepare includes these works:

- Introduction and precision of installed net underground as i.e.: water supply pipes, outlet pipes, electric and telephony cable etc.
- Terrene measurement and soil testing.
- Deforestation and roots removal from terrene.
- Soil removal by humus and its transport or re-using.
- Whole foundation digging up to the necessary deepness.

#### 3.1.2 Sloping elaboration.

In cases of sloping terrene are used three following methods:

- Slope leveling according the lowest terrene point.
- Terrene backfilling by surplus material, up to highest terrene point
- Digging and backfilling according the average point.

Each of these cases will be used depending on soil type, on support ability terrene and of building loading will be construct in that terrene.

#### 3.1.3 Soil works drenaging

Drainage can be a drainig net or only a drain. As drainig net materials might be used plastic pipes, concrete pipes or clay pipes. The pipes should be placed through open drains, leveled and presses as required. The pipes should be placed after drain opening and gravel backfilling of a layer at least 7 cm. After pipes placing should be thrown gravel or sand 4/32 of a layer 10 cm in order to protect the pipe. After that the drain will be backfilled by the soil left from digging.

The drainage by drains is realized by opening first the drains and then filled by gravel. The drains according the request should have one of this surfaces: 20x30, 30x40 ose 30x60 cm. The distance between drains should be determined according to ground filter coefficient.

#### 3.1.4 Protection of earthworks

In earthworks, on the one hand, people who are not involved in the construction of the project should be protected, and on the other hand, the people involved in the realization of the project should be protected. Also, the open pit for the foundations must be protected.

The protection of uninvolved people should be done in such a way that the fence (with fence, gabiant net, etc.) is made which does not allow them (especially children) to be endangered. Also, a warning sign should be placed prohibiting the passage of the fence by persons not working on the project. The pit and the people who are working on it must be protected against collapse. The mound rate of each pit should depend on the quality of the soil per min. 45 degrees to max. 60 degrees. If the soil contains minerals, which in contact with water lose stability, then the soil and especially the mulch should be protected from rain by reinforcing it with supporting armatures according to KTZ.



### 3.1.5 Soil works during frost periods

Soil works can be executed during winter period as well, where the temperatures are under 0° C.

## 3.2 Excavations for foundations and basis

### 3.2.1 Excavations

Excavations for foundations or underneath works of 1,5 m thickness from earth basis, in whatever kind of ground and consistence, dried or moistened (of argil and if is compacted, sand, gravel, stones etc,) including cutting and extraction of the roots, stumps, stones, and parts of a volume till 0.30 m<sup>3</sup>, obligations accomplishments regarding underground constructions as waste drainages, drainages in general etc.

### 3.2.2 Fillings

Stone layer and selected brick masonry peaces, in well-compacted layers, without dust, render and organic materials, that result by described demolitions in the above-mentioned articles. The Supervisor will first check all materials that result from demolitions, and he will authorize their utilization.

### 3.2.3 Utilization of Excavated material

Suitable material and the material recovered from temporary work shall be utilized for backfill. Any surplus material shall be disposed of any shortfall made up with suitable fill.

### 3.2.4 Backfilling around structures

The material shall be placed simultaneously on both sides of an abutment, wall or pier. The backfilling shall be carried out with an approved material in horizontal layers not exceeding 150mm in depth after compaction.

## 3.3 Standards foundations

### 3.3.1 Concrete foundations

Foundations executed in concrete type – 100 in dosage per m<sup>3</sup> and poured in thick layers well vibrated, with dimensions and shape as indicated in the relevant drawings, including the scaffolding, formwork, propping and all requirements to complete the works in a first-class manner.

## 3.4 Foundations ancillaries

### 3.4.1 Waterproofing of foundations

#### 3.4.1.1 Foundation waterproofing in buildings without basement

In buildings without basement waterproofing of the upper horizontal level in foundations will be in plinth altitude by mortar, concrete, sand 1:2. mortar will be added as needed to the cerezit. This waterproofing layer should be connected to floor waterproofing and to external vertical side of foundations, which is in the middle of plinth level.

#### 3.4.1.2 Waterproofing manner

Before waterproofing foundation works and other sub-terrenean structures, the place should be cleaned from scaffoldings, which creates obstacles in waterproofing layers.

During waterproofing of foundation horizontal sides to be followed these conditions:

- a) Leveling of foundation surface;
- b) Before putting polished cement layer, will be its moisturizing;
- c) Mortar should be prepared by 1 part cement and 2 part cleaned and rough sand (taken in volume) and polish to be built in thickness 20 – 30 mm and leveled. In places by dense humidity to be added to cement quantity, 8 up to 10 % waterproofing solution.

Vertical sides of basement masonry will be waterproofed by bitumen (primer), bitumen-waterproofing membrane etc. Due to project forecast, in accordance to the level of sub-terrenean waters and terrene conditions.

Waterproofing will be from downside to upside. Waterproofing layer by bitumen-waterproofing membrane or bitumen (primer), should be protected due to project notes usually by brick masonry of thickness 12 cm. Outside protection masonry will be placed clay in wideness 30 – 50 cm, well pressed. Waterproofing-bitumen membrane layers are placed horizontally, considering overlapping and non-accordance of layers.

#### 3.4.2 Perimeter and superficial drainage

The perimeter drainage shall be realised along the foundations, but not on them. This drainage is composed of ring line with out let pipes and control traps.

If under the building floor there is a capillary layer, then it is needed ring drainage with tubes as in the figure No.1.

In cases when the drainage is realised under the foundation basis, the foundation basis should be deeper.

The pipes shall be laid from the lowest to the highest point, straight sloped, on a gravel filtering layer 15 cm thick and shall be covered about 25 cm with the same filtering material. Also, should be considered that the tube basis should be min. 20 cm under floor level, in order that water gets away easily from the capillary layer.

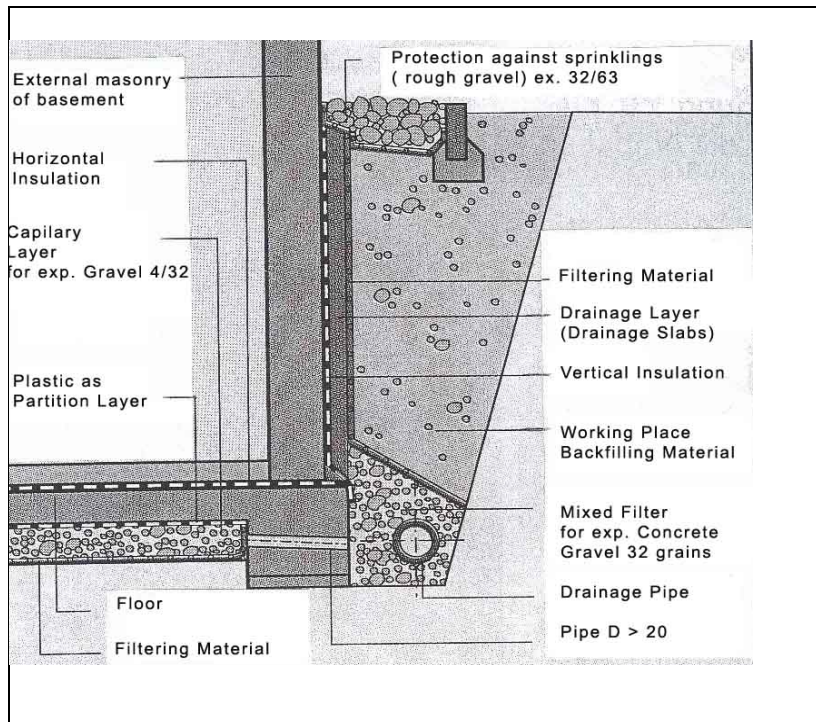
Pipe dimensions should be min. 50 mm; the gravel that shall be used for filtering layer should be of grains not smaller than 3.2 mm.

Except the perimeter drainage, big role in the foundation drying has played the superficial drainage, which shall be realised as following.

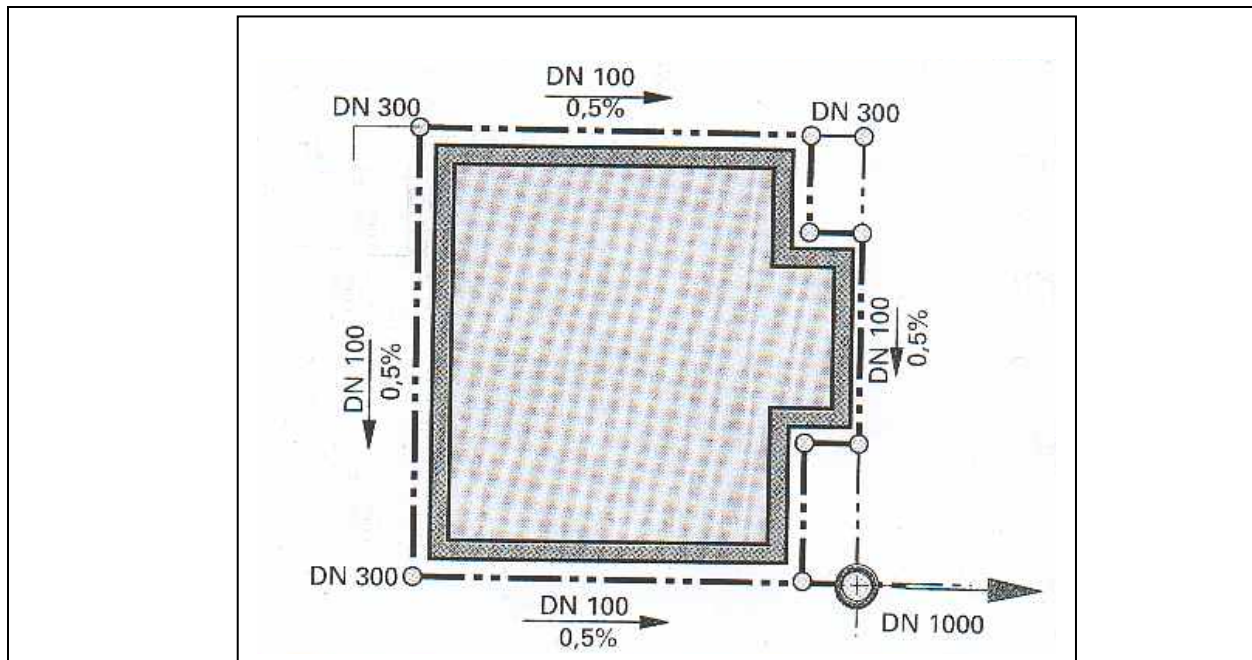
In the whole floor surface shall be realised a drainage layer and on it shall be laid a partition layer in order to avoid the floor concrete intrusion into the drainage layer. If for the drainage process shall be used gravel for concrete 3,2 mm then the drainage layer thickness should be min. 30 cm thick and if it will be used gravel 4 – 32 mm, the bedding shall be realised casting only 10 cm in the whole surface. Under the drainage bedding shall be laid drainage pipes. The diameter and distance between them is depending by the water quantity. The drainage pipes shall be encircled with gravel filtering layers and connected to the perimeter drainage pipes.

In the figure No. 2 is presented a laying manner of drainage pipes





Drawing No.1



Drawing No. 2

## SECTION 4 CONCRETE, FORMWORKS AND REINFORCEMENT

### 4.1 In situ-concrete

#### 4.1.1 General requirements for concrete

Concrete aggregate shall consist of sharp sand or crusher dust, crusher gravel and other solutions for propping, water penetration and to enable the work in low temperatures according technical requirements of the project.

#### 4.1.2 Materials

- Concrete elements

Concrete elements shall consist of sharp sand or crusher dust, or mixture of these, and hard durable crushed locally occurring stone. All aggregates shall be free from clay and all other impurities. The coarse part of the aggregate shall be roughly cubical in shape and not spherical. The grading of the aggregate shall have the certificate of the place where they are taken from.

- Cement

The contractor shall supply with each consignment of cement a copy of the invoice stating the quantity delivered, the maker's name and also the maker's certificate showing that each consignment has been tested and analyzed and conforms to the Standard. The cement shall be subject to such Standard test as the Engineer may deem necessary and he may reject any cement, which proves unsatisfactory notwithstanding the maker's certificate.

For more details regarding the cement type that shall be utilized for concrete production, see 4.1.4, because for different concrete types shall be utilized different cement types.

- Water for concrete

The water that shall be used for the concrete production should be free of substances that damage it, such as: acids, alkalis, clays, lubricants and other organic substances. In general, the water of population supplying system (potable water) is recommended for utilization in concrete production.

#### 4.1.3 Storage of Materials

The storage of materials that shall be used in concrete production should fulfill the following conditions:

- The cement and its ingredients should be stored in order to be divided from the other materials, which are not suitable for concrete production and damaged its quality.
- The cement should be stored in dried spaces which keep it away from water rain moistening.

#### 4.1.4 Classification of concrete

4.1.4.1 Concrete type 100, with aggregates all-in: 240-kg cement (concrete type 300); 1,05 m<sup>3</sup> gravel; 0,19-m<sup>3</sup> water.

4.1.4.2 Concrete type 100 slump 3 – 5 cm. aggregates max. size 20 mm, clean sharp sand (2,6 mod.): 240 kg cement (concrete type 300); 0,45 m<sup>3</sup> sand; 0,70 m<sup>3</sup> aggregate; 0,19 m<sup>3</sup> water.

4.1.4.3 Concrete type 150 slumps 3 – 5 cm. aggregates max. size 20 mm, clean sharp sand (2,6 mod.): 260 kg cement (concrete type 400), 0,44 m<sup>3</sup> sand, 0,70 m<sup>3</sup> aggregate, 0,18 m<sup>3</sup> water.

4.1.4.4 Concrete type 200 slump 3 – 5 cm. aggregates max. size 20 mm, clean sharp sand (2,6 mod.): 300 kg cement (concrete type 400), 0,43 m<sup>3</sup> sand, 0,69 m<sup>3</sup> aggregate, 0,18 m<sup>3</sup> water.

4.1.4.5 Concrete type 250 slump 3 – 5 cm. aggregates max. size 20 mm, clean sharp sand (2,6 mod.): 370 kg cement (concrete type 400), 0,43 m<sup>3</sup> sand, 0,69 m<sup>3</sup> aggregate, 0,18 m<sup>3</sup> water.

4.1.4.6 Concrete type 300 slump 3 – 5 cm. aggregates max. size 20 mm, clean sharp sand (2,6 mod.): 465 kg cement (concrete type 400), 0,38 m<sup>3</sup> sand, 0,64 m<sup>3</sup> aggregate, 0,195 m<sup>3</sup> water.

#### 4.1.5 Concrete production

The concrete of the defined type should be prepared by the designer and according to the mixture recapture of materials in support of the rules given in KTZ 37 – 75 “Concrete design”.

During the concrete preparation should be followed the rules given in chapter 6 “Concrete preparation” of KTZ 10/1-78, paragraphs 6.2, 6.3 and 6.4.

#### 4.1.6 Placing of concrete

Placing of concrete produced in work shall be realised according to possibilities and conditions when it shall be placed. Generally, to this aim shall be used fixed cranes placed in the object and truck mounted concrete pump. Very important during the concrete layer is the duration from producing to laying, which shall be as short as possible. Also, during the concrete laying is very important a best possibly vibration, during this process.

#### 4.1.7 Construction joints

Construction joints shall be used without interruptions, if it is possible. In cases when this is not necessary or obligatory, then shall be taken all precautions to realise the joining of both construction joints in different periods.

The interruption of construction joints works is to determined due to the possibilities, realising:

- Iron sheet in a width of 10 cm and thickness of 4 mm, from which 5-cm in the fresh concrete and concreted, while other 5-cm serve for the next concrete casting.
- Eaves line, which should be laid according to producer specifications.

#### 4.1.8 Protection

Fresh concrete should be protected against these influences:

- Rainfall and humidity, covering the concreted surface with plastics and other waterproof materials.
- Frost (during the producing process, augmenting solutions against low temperatures, which enable the concrete casting till zero temperature.
- High temperatures. The concrete shall be protected against high temperatures, sprinkling it with water, in order to avoid possibly cracklings.

#### 4.1.9 Adverse weather conditions

The concrete producing and placing is not recommended in adverse weather conditions.

The concrete producing and placing is prohibited in cases of torrential rainfall, because the big volume of water in the concrete layer removes the cement and so the concrete loses the requested concrete type.

In cases of low temperatures - 4° C, it is recommended to avoid the concrete casting, but if this is necessary, then shall be taken the precautions that during the process of concrete producing shall be also augmented the solution against frost in appropriate quantity, recommended by the producer of this solution.

Concrete production and elaboration in high temperatures can influence negatively the chemical reaction of the cement to other concrete elements. For that reason, it shall be protected against high temperatures. Protection way against high temperature can be done in such a way that fresh concrete be protected

against sunshine, covering it with plastics, sawdust, sprinkling with water. Another contribution for concrete elaboration in high temperatures is coloration in white of the water reservoir and continuously sprinkling with water.

#### 4.1.10 Pipes and Conduits

Pipes and various drainage that make possible building supply (water, wastewater, electricity, etc.) if possible shall not be concreted, to enable the homogeneity of the concrete parts, which are designed as scaffolding, concrete elements. In cases when, this condition cannot be fulfilled, then shall be consulted the constructive engineer. In cases when it is needed to pass through masonry or other concrete slabs, then during the designing phase, it is necessary the considering of these exits and planning/accounting by the constructive engineer and their insulation. Also during the concrete placing it is needed the preparation of these exits, throughout will pass through the pipes and other supplying drainage.

#### 4.1.11 Testing of concrete

When the concrete is produced, it shall be tested if it fulfils the criteria according to the project requirements. After producing and placing, it shall be taken a concrete sample to make the labour testing and the results shall be delivered to the Supervisor.

### 4.2 Concrete elements and sub-elements

#### 4.2.1 In – situ Lintels

Lintels for the width of the wall allowing for a seating of 25 cm both sides, of thickness according to the width of opening, appropriately reinforced, within a height of 4 m, cast in concrete type 200 with dosage per m<sup>3</sup>, including scaffolding, formwork, propping, steel reinforcing and all requirements to complete the work in a first class manner.

#### 4.2.2 In –situ Beams

Concrete beams appropriately reinforced, within a length of 4 m, formed from concrete type 200 with dosage per m<sup>3</sup>, including scaffolding, formwork, propping, steel reinforcement and all requirement to complete the work in a first class manner.

#### 4.2.3 Ring Beams

Ring beams to the full width of the wall with a height of 15 cm and 20 cm, suitably reinforced according to KTZ and STASH, realised with concrete (type 150 of 200) poured in thin layers well vibrated, including scaffolding, formwork, propping, steel reinforcing and all requirement to complete the work in a first class manner.

#### 4.2.4 Columns

Concrete columns, suitably reinforced and according to the indications of the drawings, within a height of 4 m, formed from concrete (type 200) poured in thin layers well vibrated, with dosage per m<sup>3</sup> as indicated in 4.2.4, including scaffolding, formwork, propping, steel reinforcing and all requirement to complete the work in a first-class manner.

#### 4.2.5 Structural slab in reinforced concrete

Structural slab in reinforced concrete poured in concrete (type 200) according to project, in thin layers well vibrated, including steel reinforcing, formwork, propping, scaffolding and all requirements to complete the work in a workmanlike manner.

#### 4.2.6 *In situ reinforced concrete stairs*

Stairs for each floor shall be realised with ramps, with toothed sloped elements, with respective landing and support beams. The banisters shall be concreted at the same time with the ramp. Concrete type 200 to 250, including formwork, propping, scaffolding, foundation diggings, reinforcement iron, and all other requirements to complete the work in a workmanlike manner.

#### 4.2.7 *Reinforced concrete structure*

Building part in reinforced concrete structure, constructed separately from masonry, foreseeing a technical eaves in a height of over 40 m. Reinforced concrete structure shall be formed of beams, columns, foundation pillars, stairs connected to one other skeleton; and realised: monolithic, in concrete type 200 to 250. These structures shall be realised commencing from the basements.

### 4.3 Formwork and concrete finish

#### 4.3.1 *Preparation of formwork*

Formworks shall be prepared of wood or steel and are ready or shall be prepared in the object. Surfaces of formwork that are to be in contact with fresh (wet) concrete shall be so treated as to ensure easy release and non-adhesion of concrete to formwork during stripping. Before reuse, all formwork shall be reconditioned and all form surfaces that are to be in contact with the concrete shall be thoroughly cleaned without causing damage to the surface of the formwork.

#### 4.3.2 *Removal of formwork*

Formwork shall not be removed before the concrete has attained sufficient strength to support its own mass and any loads that may be imposed on it. This condition shall be assumed to require formwork to remain in place, after placing of the concrete, or the appropriate minimum period of time given in Table 4.4.1, unless the contractor can prove to the satisfaction of the Engineer that shorter periods are sufficient to fulfil this condition. Minimum period before striking formwork using ordinary Portland cement

Minimum period before striking		
Type of formwork		
Surface temperature of concrete	16°C	7°C
Vertical formwork to column,	3 days	5 days
Walls and large beams	2 days	3 days
(Lateral formwork)		
Soft formwork to slabs	4 days	7 days
Props to slabs	11 days	14 days
Soft formwork to beams	8 days	14 days
Props to beams	15 days	21 days

Note:

The Engineer may allow a shorter period, when using Rapid Hardening Cement. For cold weather periods should be increased by  $\frac{1}{2}$  day for each day the temperature falls between 7°C and 2°C, and one day for each day on which the temperature drops below 2°C. Formwork shall be removed carefully so that chock and damage to the concrete are avoided.

#### 4.3.3 *Surface classification of concrete elements*

Classes of finishes are divided in two groups:

- Leaving the concrete surface after formwork removal in the same statement as after the concrete casting process.
- Concrete surface elaboration with plastering or coating.

Regarding the first group it might be considered that during the formwork placing, they should be polished and levelled and oiled with special oil for the formwork, in order that after the formwork removal, the concrete surface is polished. Also, during the concrete laying it should be uniform vibrated. Regarding the second group, the process is similar with masonry surfaces.

### 4.4 Reinforcement

#### 4.4.1 *Materials*

Steel works for all reinforced concrete structures and metal components, that are to be produced in site, by considering steel that complies all the requirements and without rust presence, in sizes and shapes according to the indications of drawings and technical legal standards for bending, joints and taking into consideration the providing with certificates from labs to verify that the steel fulfils the verified conditions to be used for the concerned work and including all other requirements not specified.

#### 4.4.2 *Storage*

Steel storage in site shall be made in such a way, in order to avoid its damage (shall be distorted, because this would extend the duration of the pre-stressed reinforcement) impediment of the works or of other construction materials.

#### 4.4.3 *Bending of reinforcement*

- a) Reinforcement shall be bent to the dimensions shown on the bending schedules.
- b) Except as allowed for below, all bars shall be bent cold and bending shall be done slowly, a steady, even pressure being used. Hot bending is not allowed.
- c) No flame cutting of high tensile bars shall be permitted except with the approval of the Engineer. Bars already bent may not be straightened and re-used.

#### 4.4.4 *Placing and fixing*



Reinforcement shall be positioned as shown on the Drawings and maintained in this position throughout concrete casting operations. It shall be secured by tying at intersections with 1,25 mm or greater diameter annealed wire or by the use of clips.

#### 4.4.5 Cover

The term cover in this context shall mean the minimum clear thickness of concrete between the surface of the reinforcement and the face of the concrete.

The minimum cover shall be according to the KTZ norms.

#### 4.4.6 Splicing

Splicing or joining of reinforcing bars shall be made only as and where shown on the Drawings or as shown drawings approved by the Investor.

The length of the overlap in a splice shall not be less than that shown on the working Drawings.

### SECTION 5 CONSTRUCTION STRUCTURE

#### 5.1 Masonry and wall partition

##### 5.1.1 Mortar for masonry in dosage per 1 m<sup>3</sup> shall be realised of:

5.1.1.1 Lime mortar type 15 with river sand (which porosity of 40% and water content with relevant increasing of volume by 20%) mixed in proportion of cement: lime: sand = 1: 0, 8: 8. 110 lt hydrated lime, 150 kg cement (type 300), 1.29 m<sup>3</sup> sand.

5.1.1.2 Lime mortar type 25 with river sand (which porosity of 40% and water connect with relevant increasing of volume by 20%) mixed in proportion of cement: lime: sand = 1: 0,5: 5,5. 92 lt hydrated lime, 212 kg cement (type 300), 1,22 m<sup>3</sup> sand.

5.1.1.3 Lime mortar type 15 with clean sharp sand (to have a porosity of 35%) mixed in proportion of cement: lime: sand = 1: 0,8: 8. 105 lt hydrated lime, 144 kg cement (type 300), 1,03 m<sup>3</sup> sand.

5.1.1.4 Lime mortar type 25 with river sand (to have a porosity of 35%) mixed in proportion of cement: lime: sand = 1: 0,5:5,5. 87 lt hydrated lime, 206 kg cement (type 300), 1,01 m<sup>3</sup> sand.

5.1.1.5 Lime mortar type 1:2 with clean sharp sand (to have a porosity of 35%) mixed in proportion of cement: sand = 1:2. 527 kg cement (type 400), 0,89 m<sup>3</sup> sand.

##### 5.1.2 Clay brick specifications

The brick as construction element shall fulfil the following conditions for anti-seismic constructions:

- Resistance during pressing, which shall be for bricks 75 kg/cm<sup>2</sup>; for hollow bricks 80 kg/cm<sup>2</sup>; for red bricks for ceiling 150 kg/cm<sup>2</sup>
- Resistance during cutting, which shall be: for all hollows brick 20 kg/cm<sup>2</sup>.
- Inter spaces percentage, which shall be: for brick 0-25 %; and for all the hollow bricks 25-45 %
- The thickness of perimeter and internal parapet for bricks shall not be lower than 20 mm and for all the hollow bricks; the thickness of perimeter parapet shall not be lower than 15 mm and of the internal meat, not lower than 9 mm.

- The surface of a hole shall be max. 4.5 cm<sup>2</sup>.
- Hygrophilicity in percentage shall be from 15 – 20 %.

#### 5.1.3 Internal hollow brick masonry (12 cm)

Hollow brick masonry in (6 divisions) with a thickness of 12 cm and lime mortar (type 25) with the following dosage per m<sup>3</sup>: n.177 hollow bricks, 0,10 m<sup>3</sup> lime mortar, 14 kg cement (type 400) and water, including any requirement of materials for toothing, edges, vertical openings, off-sets, scaffolding and all requirements to complete the work in a workmanlike manner. On ground floor bedding, shall be levelled a cement mortar layer 1:2, 2 cm thick minimum.

#### 5.1.4 Internal hollow brick masonry (20 cm)

Masonry in hollow brick (24 divisions) with a thickness of 20 cm and lime mortar (type 25) with the following dosage per m<sup>3</sup>: n.172 hollow bricks, 0,12 m<sup>3</sup> lime mortar, cement type 400 and water, including all details and requirements for toothing, vertical openings, edges, off-sets, scaffoldings and anything else necessary to complete the masonry. On ground floor bedding shall be levelled a cement mortar layer 1:2, 2 cm thick minimum.

#### 5.1.5 Double brick masonry (30cm)

Masonry in hollow brick (24 divisions) with a thickness of 30 cm and lime mortar (type 25) with the following dosage per m<sup>3</sup>: n.340 hollow bricks, 1.24 m<sup>3</sup> lime mortar, cement type 400 and water, including all details and requirements for toothing, vertical openings, edges, off-sets, scaffoldings and anything else necessary to complete the masonry. On ground floor bedding shall be levelled a cement mortar layer 1:2, 2 cm thick minimum.

#### 5.1.6 Ventilated Facade

Ventilated facade is a complex system that works by combining different physical and technical principles resulting in a number of benefits that are difficult to deal with a traditional facade system:

- Improved indoor climate

The building will be more comfortable for its occupants if the surface temperature of the interior walls remains close to that of the room for as long as possible. The benefits of external insulation are twofold: in winter, the walls retain heat so that the internal temperature of the room remains high. In summer, the amount of heat accumulated from the perimeter walls drops dramatically, so the heat due to the effects of sunlight is greatly reduced.



- “Soundproofing” - Ventilated facade increases the insulation strength of (external) walls.

If we compare the noise reduction coefficient in a wall of a given building and again in the same wall covered with a ventilated facade, we will see an improvement in its ability to eliminate noise up to 10-15 dB. This is because the multilayer system is able to absorb more noise and the facade walls eliminate acoustic pollution.

- Improved appearance

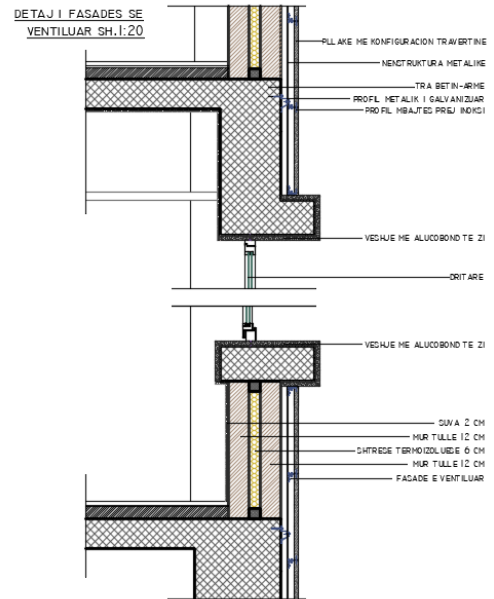
The exterior of the ventilated facade we used contains tiles with high quality travertine configuration and with an aesthetically very attractive appearance for the building. There is innumerable potential for customizing the final solution, for example using a range of sizes, creating a pattern with knots or colors and tile finishes. This ultimately stimulates the creativity of designers and architects, who are often asked to revitalize buildings using this type of intervention.

- Elimination of condensation

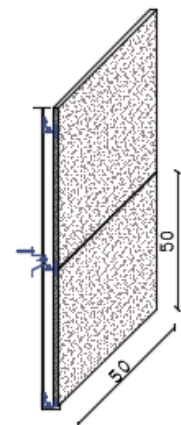
When two environments, separated by a wall, have a different temperature and relative humidity, steam tends to migrate towards the surface of the wall facing the environment with the lowest current pressure. Condensation will form if the current pressure decreases faster than the saturation pressure during this migration after the temperature decreases. Effectiveness and saturation pressure curves will never pass if insulation is placed on the outside of the wall and thus condensation will never form. Internal humidity through large "breathing" channels is also quickly eliminated by natural ventilation before it can penetrate the walls and inside the building.

- Rain protection

The outer surface of the ventilated wall protects the perimeter walls from all weather conditions, keeping them dry and eliminating the risk of moisture separation and penetration. The system is usually equipped with open joints, varying in size between 8 and 5 mm, depending on the shock systems, in order to improve air circulation and withstand the expansion pressure of the tiles. This is a very small space and only a negligible percentage of water can pass through it, most of which is lost in the air duct between the façade and the wall. The small part that manages to reach the outer surface of the insulation layer dries quickly from the effect of ventilation.



PILAKA ME KONFIGURACION  
TRAVERTINE



- Elimination of the phenomenon of overheating of the building

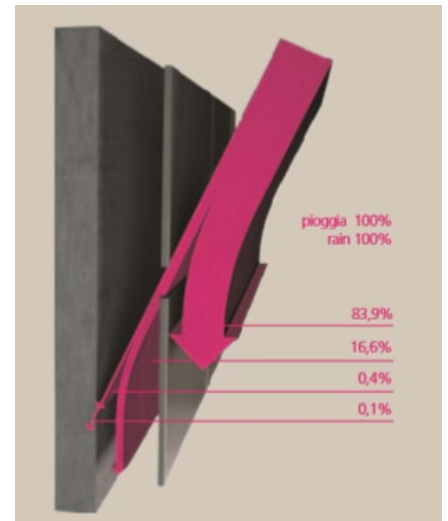
A modern building is characterized, due to the shapes and materials used in its construction, by the obstruction of air circulation leading to its overheating. On the other hand this leads to an uneven distribution of temperature with a negative impact on the climate inside and promotes the formation of water condensation and mold. A continuous layer of exterior insulation protects it in a more uniform way and it is only the outer layers of the facade that face the sunlight. This reduces thermal instability and improves the energy performance of the building.

- Cost effective installation

The metal support structure is lightweight, modular and fully dry-mounted, shortening the time required to fit in place and making it much more cost-effective than traditional insulation.

- Ease of maintenance

Although the exterior is made using strong materials with exceptional technical specifications, the substructure has a modular design so that each individual tile can be replaced immediately if damaged.



## 5.2 ROOFING

### 5.2.1 New terraces

#### Thermo insulation

Thermo insulation shall be realised using thermo insulating materials (penoconcrete or polisterol) sloped in the areas of the hydro insulating layers.

Cover with mortar layers sloped as requested, in a width of minimum 3cm, realised with cement mortar (type 1:2), levelled for the installation of the insulating layer.

#### Hydro insulation

Hydro insulation shall be laid on a dried surface, previously levelled, including vertical surface covered with bituminous layer as first coat. On this layer shall be laid two bituminous sheets, with mineral fibber, each in a width of min. 3 mm, spliced with fire, with overlapped membranes placed in the suitable edges, on sloped or vertical surface, ensuring that the coverage of the joint elements is 12 cm.

The protection of the waterproof membrane for plane, vertical or sloping surfaces, will be executed with a cement slab 3 cm thick (cement mortar type 1:2), slabs or cement mortar layer be realised in square form 2 x 2 m, construction joints spaced at 2 cm, shall be bitumen, according to the indications in the drawings.

The installing of copying with incorporated water drips, in concrete appropriately reinforced, prefabricated or cast in situ, according to the indications in the drawings, concrete (type 200) in dosage per m<sup>3</sup> as indicated in 4.1.4, including formwork, propping and all requirements to complete the terrace in a workmanlike manner.

In cases when the terrace hydro insulation is executed when the bitumen waterproofing membrane layer has no cement polish, then shall be installed a layer of 5 cm, spherical gravel of 32 mm –64 mm, which serves for the protection of bitumen waterproofing membrane.

### 5.2.2 Vertical and horizontal roof guttering

#### Horizontal roof guttering

Shall be realised giving a slope of 1% towards a gutters. Horizontal roof gutters are made of PVC or of galvanised sheet iron. Roof gutters in galvanised sheet with a minimum thickness of 0,8 mm, formed from pressed elements with a minimum overlap of 5 cm and suitably soldered, with the outside edge formed 2 cm lower than the internal edge, complete with appropriate accessories. The type of roof guttering shall be in accordance to indications in the drawings and shall be fixed using galvanised wire and gutter fixings positioned at a maximum of 70-cm. In the objects with terrace can be used also concrete gutters. All the concrete gutters shall be insulated with guano in their internal edge. Where the guttering is positioned between a parapet and the roof will be of galvanised iron sheet, according to indications in the drawings.

#### Vertical Gutters

They serve for the unloading of roof and terrace waters, and in cases of bad functioning they should be dismantled and replaced with new ones.

Vertical gutters for unloading of roof and terrace waters shaped in galvanized steel by a minimum thickness of 0.6 mm and diameter of 10 cm, meanwhile vertical gutters of PVC with dimensions from 8 till 12 cm will serve a roof area from 30 up to 60 m<sup>2</sup>.

**Each gutter will collect the waters of roof or terrace in no greater than 60 m<sup>2</sup>.**

The gutters will be positioned at the external face of the building using galvanized steel pipe, covered by hot-fixed bituminous membrane 3 mm thick, placed within the sections of the wall parapet, giving a slope of 1%, towards a galvanized rain-head, in accordance to indications in the drawings.

The lower part of the gutter to a height of 2 m will be realized by PVC heavy pipes with his final part by bending at 90°, well fixed to the wall by appropriate accessories in galvanized steel.

## 5.3 METALIC STRUCTURES

### 5.3.1 General Informations

By steel projection constructions, should be considered the requirements of work features construction, throughout respective instructions in accordance to these technical conditions.

Steel construction solidity and resistance should be warranted during exploiting process, and during transport and mounting.

### 5.3.2 Production

Steel production should be of licensed companies and they should warranty steel quality (chemical compound, power/ weight, etc).

The steel using in support constructions, should fit the respective standards requirements and should give warranty regarding limit flowing and max. compound of sulfur and phosphor; meanwhile for welding construction, for max. compaund of carbon as well.

Cutting, welding and steel elements binding will be executed by contractor company site and they can be carried into site or be executed inside work place (in object).

In any case the works before element welding should be revised by Supervisor and should be protocolled.

### 5.3.3 *Welding*

Welding prepare includes the final shape of details before welding. The surface sides of welding parts should be prepared according welding procedures and the shapes given in table 6,7,8 of K.T.Z. 206-80 or in any other European norm/standard.

After welding, the details should be thermically treated, in order to reduce the internal partitions, to avoid cracks and to improve physical-mechanical features.

During work implementation for steel welding should be held a technical document with dates for used materials certificate, work diary, etc.

### 5.3.4 *Bolt binding*

Steel elements can be bind/spliced throughout bolts.

Bolt binding should respond the contemporan norms and standards (EC 3 or a similar norm).

Bolts quality is very important and the last one as well, they should fit the above-mentioned norms and standards. The fulfilling of resistance conditions for bolt binding is very important. The type of pressure situation and binding group, should fulfill the required/necessary conditions, from norms/standards are these:

- Pulling
- Cutting
- Pressing

During work implementation for steel bolt binding should be held the technical with dates for the certificate of used material, work diary etc.

The way of binding (welding or bolting) should be decided by the constructor engineer as required.

### 5.3.5 *Erection*

The erections of steel material are executed due to architect/engineer projects. The engineer should supervise the erection work. The staff hired should be of the right experience in this field

### 5.3.6 *Protection from atmospheric agents*

Steel protection is realized in two ways:

- Steel painting in some layers, which are used as anti-corrosion. This is realized by painting, diving or by sprinkling into layers. One of layers is the basis; the other one is used as element decor and might be of different colors.

Before placing the layers, the material under them should be elaborated dust free, oil free and rust free.

- Metal layer: this layer is permanent. The steel should be dived into hot zinc (450 °C) and its surface should be dust free, oil free and rust free. Another layer can be used as steel element decoration (as color).

**It is strictly forbidden steel oil painting for concrete casting.**

## SEKSIONI 6 FINISHES

### 6.1 Wall finishes

#### 6.1.1 *Internal plastering in new constructions*

Preparations of walls and ceilings with a first rough-cast of render, using a fluid cement mortar for improving the adherence of the render and to reinforce the surface, including scaffolding and all requirements not specified for the satisfactory completion of the work.

Plastering composed of one layer of lime mortar (type 25) 2 cm thick with the following dosage per sqm: 0,005 m<sup>3</sup> clean sharp sand; 0.03 m<sup>3</sup> lime mortar, (type 1:2), 6.6 kg cement (type 400), water, with the appropriate profiles and guides (mortar beam of 15 cm thickness every 1 till 1,5 m) applied to walls and ceilings and trowel finished to a smooth surface, including scaffolding, and all requirements to complete the work in a first class-manner.

#### 6.1.2 *External plastering in new construction*

Preparation of walls and ceilings with a first rough- cast of render, using a fluid cement mortar for improving the adherence of the render and to reinforce the surface, including scaffolding and all requirements not specified for the satisfactory completion of the work.

Plastering composed of one layer of lime mortar (type 25) 2 cm thick with the following dosage per sqm: 0,005 m<sup>3</sup> clean sharp sand; 0.03 m<sup>3</sup> lime mortar, 7.7 kg cement (type 400), water, with the appropriate profiles and guides (mortar beam of 15 cm thickness every 1 till 1,5 m) applied to walls and ceilings and trowel finished to a smooth surface, including scaffolding, and all requirements to complete the work in a first class-manner.

#### 6.1.3 *Fine lime plaster on walls*

Fine lime plaster on walls, with appropriate lime on wall surfaces previously plastered and leveled, with dosage: fine lime 3 kg per sqm. The height of lime plaster for corridors and offices is to be decided by the engineer including all other necessary requirements to consider the fine lime plastering completed in a first class manner and ready for painting with synthetic enamel.

#### 6.1.4 *Color wash painting in New Constructions*

The contractor shall submit to the engineer for approval the brand and quality of the paints be proposes to use.

All paints shall be products that have satisfactory field service. The mixing of different brands before or during application will not be permitted. Mixing and applications of paint shall be in accordance with the manufacturers specifications concerned and to the approval of the engineer. Ironmongery and accessories, machine surface, plates lighting fixtures and similar items in place prior to cleaning and painting, which are not intended to be painted, shall be removed or protected prior to painting operations and repositioned upon completion of painting work as directed. Cleaning solvents shall be of low toxicity. Cleaning and painting shall be so programmed in a way that dust and other contaminates from the cleaning process will not fall on wet or newly painted surface. Brushes, pails, kettles etc used in carrying out the work shall be clean and free from foreign matter. They should be thoroughly cleaned before being used for different types or classes of material.

The staff hired for painting, should be experienced in this field and should follow all technical conditions of painting due to KTZ and STASH.

#### 6.1.5 *Painting of steel works*

Filling and fine-coating timber or metal surfaces with appropriate filler to prepare the surface ready for enamel painting.

All metal surfaces shall be pre-treated with a single coat of lead primer or suitable oil-based anti-rust with the dosage of 0.08 kg per sqm.

Timber, metal surfaces or the walls will be painted with synthetic enamel with dosage 0.2 kg per sqm for each coat giving a perfect finish and all requirements to complete the work in workmanlike manner.

#### 6.1.6 *Wall covering with slabs of granulated stone, of marble, of stone, etc.*

Regarding wall covering with different tile material should be considered the wall type. Walls are external and internal.

It should be considered as well the wall material (rigips, concrete, masonry wall, etc.). According to the constructive wall materials and its surface, wall-tiling methods are classified into two groups:

- Slab splicing by mortar (for unlevelled surfaces)
- Slab splicing by compo (for levelled surfaces)

Regarding splicing of different types of slabs by mortar, the work should follow these conditions:

The basis, in which different slabs type will be spliced, should be cleaned from dust and static.

Mortar composition is equal as described above in point 6.2.1. Mortar thickness should be no less than 15 mm. When mortar is used in external wallpapering it should be frost resistant and water-drawing coefficient in percentage should be less than 3 %. The mortar should fulfill, heating isolation and resistance criteria notice.

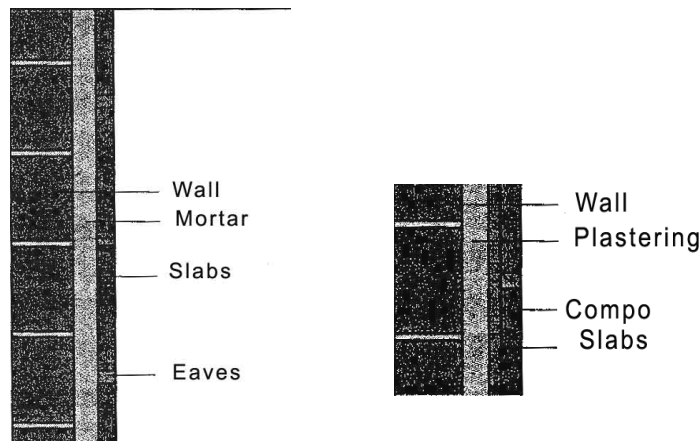
Slabs splicing by compo, is realized when basis surface is levelled. Compo can be used as needed in thickness of 3 mm up to 15 mm. All the above-mentioned mortar criterias are valid for compo as well.

After mortar or compo is dried, the planned gaps should be fulfilled by a special material (soil cement). Edge gaps and wall link should be filled by an elastic solution (as silicon). Per each surface of 30 m<sup>2</sup> papered by different slabs, it is necessary mobile gaps placing.

Work criterias in gress slabs should follow the criterias mentioned in point 6.2.4 and 6.2.5.

All the slabs should be frost resistant and be of a high resistance as well.

Slabs' covering is explained in the following drawing.



## 6.2 Floor finishes

### 6.2.1 Ceramic tile flooring

The location and extent of ceramic tile floor shall be under these conditions:

- The tiles should not be spliced at the temperatures under 5 °C or in humidity cases. There should not be used freezing materials, when the temperature is under 5 °C or the spliced tiles on frozen surface. Fabricator's instructions, regarding material requirements in high or low temperatures should be observed.
- The construction joints tiles should be parallel to building walls. The cutting of tiles should be done near the wall, and the cutting tiles should be as big as possible.
- Layer tiles should be of bastard mortar of 2 cm thickness. After tiles are placed onto mortar layer, and after being dried up for no less than 24 hours, the gap should be filled with a special material (soil cement). After construction joints are filled between the tiles they should be cleaned from dust and construction joints material.
- Layer tolerances should meet these conditions. It is allowed a divergence of max height +/- 3 mm in a distance of 2 m.

### 6.2.2 Flooring in Gres Tiles

Tile classification will be done due to these criterias:

- The manner of tile shaping
- Water drawing
- Tile dimensions
- Surface qualities
- Chemical features
- Physical features
- Safety against frost
- Weight/surface load
- Sliding coefficient

The following tables describe some of these criterias.



Water taking in % of tile dimension	
Class	Water-drawing (E)
I	$E < 3 \%$
II a	$3 \% < E < 6 \%$
II b	$6 \% < E < 10 \%$
III	$E > 10 \%$

Loadings classes/ load		
Class	Load	Using area, i.e.
I	Very light	Bedrooms, bathrooms
II	Light	Sitting-rooms, except kitchens and halls
III	Medium	Sitting-rooms, balcony, hotels, bathrooms
IV	Heavy	Offices, halls, shops
V	Very heavy	Gastronomy, public buildings

Considering the needs and criterias to be met, tile should be chosen for each space. The above-mentioned criterias and tables might be useful for their choice.

For schools and kindergartens, the tiles should be of V Classes, by rough surface, in order to provide a safe walking without sliding.

By humidity surroundings (WC, bathrooms and showers) tiles of 1 class should be placed to provide a water-drawing coefficient  $< 3 \%$ .

For this reason before the work begins, the contractor should represent to Supervisor some tile samples, with their production certificate and only after his approval it is allowed the lay them due to, the technical conditions and producer recommendations.

### 6.2.3 Skirting and floor junctions accessories

Vertical skirting due to the floor laying are:

- Ceramic, for the floor by ceramic tiles. They are of dark color or the same to the tiles laid on the floor, of height 8 cm and thickness 1.5 cm, spliced by mortar or compo. The mortar for skirting should be in a dosage per sqm: cleaned sand 0.005 m<sup>3</sup>; cement 400, 4 kg and water including plastering, cleaning and any other obligation for the completion of the work in a first class manner.
- By wooden float for parquetry floor. Wooden floats are of the same material with parquet, fixing should be done carefully after placement, leveling; plastering and wood polish using special transparent color.
- With PVC float road for PVC or linoleum floor. The placing manner should be done due to the producer's recommendations and by an experienced staff



#### 6.2.4 Waterproofing for flooring

The waterproofing is to be laid on a dry surface, previously leveled, and including the vertical surfaces, treated with a first layer by bituminous primer coat and layer composed of two membranes bitumen reinforced with mineral fibbers, each with the thickness of 3 mm, fixed by torch, with the membranes placed at right angles to each other on plane, sloping or vertical surfaces, ensuring that the cover of joints has a minimum of 10cm and also to be raised vertically in the sidely walls of min 10 cm.

### 6.3. Stair Finishes

#### 6.3.1 Concrete steps in marble or local stone

For concrete steps in marble should be foreseen these works:

First the concrete steps should be well cleaned and the place should be leveled. Then the concrete steps should be painted by cement milk, which enable the splice of marble steps.

Marble tiles can be spliced by mortar or compo in cases of leveled concrete tiles. Marble steps splicing does not change from tiles splicing in wall, which is thoroughly described in point 6.1.6.

#### 6.3.2 Metallic banisters (handrails)

Handrails perform various functions in the constructions. They offer support and security while walking on the stairs. They also play a special role in the beauty and the architectonic view of a construction. Handrails have to be at least 100 cm high. In cases when the length of the stairs is more than 12 m, handrails must be 110 cm high. The range 100/110 cm shall also depend on the space of the resting ground.

Handrails are mounted on or by the sides of the stairs. They must be properly fixed in order to guarantee their stability and firmness. The handrails shall be either covered with wooden elements or secured with wooden or metal bars. The space between them must be less than 12 cm.

In cases when the stairs are wider than 100 cm, in order to secure a safe walk, it is necessary that handrails be mounted at the walls on the other side of the stairs. The handrails on the stairs shall not be lower than 75 cm and higher than 110 cm. In the cases of schools those shall be placed at a hight of 80 cm. These handrails shall have a distance of at least 4 cm from the walls.

Handrails should be made of a material and shape as to allow a gentle and harmless touch. It is recommended that they be made of wood in order to avoid the cold impression created by the steel rails.

A sample of metal banisters can be seen in the following pictures.



### 6.3.3 Skirting and other accessories

Skirting according to the type of stairs coating will be as follows:

- Ceramic tile skirting for stairs with ceramic tiles. With 8cm high and 1.5cm thick dark colour tiles or with tiles of the same colour as those of the stairs, installed with cement mortar 1:2 or with grout, including grouting, cleaning/washing and all requirements to complete the work in a first-class manner.
- Skirting strips for the stuck timber floors will be of the same material as that of the floors. The wooden skirting strips must be polished and coated with a varnish layer, after being properly fixed.
- PVC skirting for stairs with PVC or linoleum. The installation shall be performed in accordance with the producer's recommendations and by an experienced staff.

Marble skirting for marble coated stairs. The marble skirting tiles shall be 8 cm high and 2cm will be installed (fixed) with cement mortar 1: 2 or with grout.

## 6.4 Windows and Doors

### 6.4.1 General information

The window is part of the building and houses. They will provide the light for the internal surface of them. Their sizes vary; depend by architectural composition, size of the internal surface and other requirements of the Designer.

They should be 80 - 90 cm on the floor, depending of the requirement of the Designer.

The windows panels can made in wooden, aluminium, PVC, etc

The windows main parts are:

- the sub-frame to be fixed to the wall by mean of proper steel clamps before plastering;
- the frame to be screwed to the sub-frame after plastering and painting. Following the window design shown in Technical Drawing, the frame will be provided by hinges and lock anchors;
- opening glassed panels complete with hinges and handles fixed by mean of solid strips and transparent sylicon mastic.

#### 6.4.2 Components

**The wooden windows** in seasoned Pine, treated with a coat preservative, will be composed by:

- a wooden sub-frame (width 3 cm, large as the window subframe) to be fixed to the wall by mean a proper steel before plastering
- a wooden frame (section 7 x 4 cm min.) to be screwed to the sub-frame after plastering and painting. Following the window design shown in Technical Drawing, the frame will be provided by hinges and lock anchors for sash-windows, casement-windows, garret- windows, highlight, etc
- opening glassed panels complete with: hinges, handles, glass panels (4cm thick when transparent and 6 cm thick when wirenet reinforced), fixed by mean of solid wooden strips and transparent silicon mastic, windows-stays by chain or hook.
- Finishing with solid wooden strips all around the window perimeter, internal when supplied by "pature", internal and external when lacking in "pature".

**The windows made up in aluminium alloy profiles are:**

- Vertical opening
- Horizontal opening
- Slippery are composed by:
- The aluminium fix frame (depth 61-90 mm) to be fixed to the wall by mean a proper steel before plastering. They are provided with elements for fixing and anchorage to wall structures as well as jutting parts enabling the sliding of sashes.
- The sashes to be screwed to the frame after plastering and painting.
- Water collecting pits
- Accessories
- Slide rollers and blind frame;
- Galvanised steel reinforcement
- Gasket grooves
- Handles and lock anchor
- Glass panels (4cm thick when transparent and 6 cm thick when wirenet reinforced). They will be fixed to the metal frames by mean of aluminium strips and transparent sylicon mastic.

**The PVC windows** will be composed by:

- the PVC frame (width 58 mm) to be fixed to the wall by mean a proper steel before plastering. The PVC Frame will be provided by hinges and lock anchors
- the sashes to be screwed to the frame after plastering and painting.
- Opening glassed panels (4cm thick when transparent and 6 cm thick when wirenet reinforced) will be hinged to the window by the three point anchored lock and handles.
- Water collecting pits
- Slide rollers and blind frame;
- Galvanised steel reinforcement and other accessories
- Gasket grooves
- Handles and lock anchor
- Special wool pile fin seals for insulation

### 6.4.3 Aluminium Windows

Supplying and fixing of windows as described in the Technical Drawings and which dimensions will be taken by the Contractor, made up in aluminium alloy profiles according to European Standards EN 573 - 3 and duly pre-painted. Colour will be according to the request of investor.

The fix frames will have a depth of 61-90 mm. They are provided with elements for fixing and anchorage to wall structures as well as jutting parts enabling the sliding of sashes; profile shape is tubular in order to house assembling accessories. Frame profiles will fit with a cover profile overlapping the wall by 25 mm. Mobile frame profiles have a depth of 32 mm and a height of 75 mm with flat or ornamental solution.

Both fix or mobile frames are designed to build thermal break windows and are made up of two aluminium profiles which are joined one another by means of two 15 mm insulating lists made of plastic materials. Thermal break is obtained by inserting 15 mm long and 2 mm thick polyamide strips strengthened with fibre glass.

The profile is designed with a hollow central part for the insertion of the corner joint bracket (with space for 18 mm high glass housing) and the trolleys for their sliding.

Seal is assured by brushes with stiff central fin. The characteristics of seal against atmospherically agents obtainable by these sections must be provable by the certificate of testing affected by the window frame manufactures or by the profiles producer.

The aluminium sections will be painted by a bake lacquering process. The temperature must not exceed 180 degree, the baking time will be less than 15 minutes. The lacquering thickness should be at least 45 mm. The powders used will be made up of high quality acrylic resins or linear polyesters

A solid sub-frame will be carefully fixed with steel clamps to the walls by means of cement mortar (no screw sockets). The fixing must preferably have a distance from the frame corners of no more than 150 mm and between them of no more than 800 mm. The fixed window frame will be screwed to the sub-frame when all plastering and painting works finished. Opening glassed panels will be hinged to the window frame and will be supplied by a three point anchored lock and handle. Using plastic-elastic materials, after having filled any gap with insulating materials, will carry out the sealing between the cases and the building context. Between the inside of the steel frame support and the outside of the aluminium fix frame it is preferable to keep an installation tolerance of 6 mm, considering a protrusion of the fixing spacers of about 2 mm. Dimensional tolerance and thickness will be according to EN 755 – 9.

Glass panels (4 mm thick min when transparent and 6 mm thick when reinforced by wire net) should be included. They will be fixed to the metal frames by mean of aluminium strips. All works of bricklayer and all requirements to complete the work in a first-class manner are included. Sample of the proposed items will be submitted to the Supervisor for a previous approval.

### 6.4.4 Doors-General Information

The doors are part of the building and houses. They will provide the communication for the internal and external surface of them. Their size vary, depend by architectural composition, size of the requirements of the designer. The doors can be made in wooden, metal and aluminum etc.

The doors main parts are:

1. the sub-frame to be fixed to the wall by mean of proper steel clamps before plastering;(the sub-frame can be in wooden, metal or aluminum)
2. the frame to be screwed to the sub-frame after plastering and painting

3. the door can be in wooden, metal and aluminum or PVC supporting by mean of solid strips or steel and other accessories including steel clamps, hinges, lock anchors, screws, handles.

#### 6.4.5 Doors - components

The parts of door are depending by the kind and material of doors. The parts of doors will be for each type of doors as follows:

**Internal seasoned Pine wooden Door**, treated with a coat of wood preservative, composed by:

- A wooden sub-frame with seasoned Pine wooden (width 3 cm), treated with a coat preservative to be fixed to the wall by mean of proper steel clamps before plastering
- A wooden frame to be screwed to the sub-frame after plastering and painting. Following the doors design shown in Technical Drawing, the frame will be provided by hinges and lock anchors for all kinds of doors.
- Opening wooden panels that are made up in wooden case ( minimum size 10 x 4 cm) and horizontal and vertical parts every 40 cm. In under part of doors, the panels will be minimum 20 cm over the under part of doors. The seasoned Pine wooden panels (thickness 3cm) and treated with a coat of wood preservative should be provided by three hinges with minimal length  $l = 16$  cm
- A metallic lockset with three copies of keys type Yale or similar, door handles and push handle

**Internal aluminium Door** composed by:

- a fixed aluminium sub-frame, type tubes profile, with depth 61-90 mm to be fixed to the wall by mean of proper steel clamps. A cover that will be 25 mm from the walls will cover the fixed profile of subframe.
- a moving aluminium frame with depth 32 mm and height 75 mm to be screwed to the sub-frame after plastering and painting. Following the doors design shown in Technical Drawing, the frame will be provided by hinges and lock anchors for all kinds of doors.
- opening glassed panels should be transparent ( minimum thickness will be 4 mm) < They will have a reinforced grid ( minimum thickness will be 6 mm). Also, There can be used the wooden laminate cover with minimum thickness  $t = 1$  mm
- A metallic lockset with three copies of keys type Yale or similar, door handles and push handle

#### Exterior revolving doors

- Automatic revolving door with Push & Go function, is suitable for high entry frequency. Capacity increases when the diameter of the door system increases (up to a maximum of 3600 mm). The automatic revolving door is activated by pushing the rotating leaf. The door is automatic, the propulsion system accelerates and then rotates at an adjustable automatic speed. The door is suitable for facilities with a constant number of visitors who are familiar with the activation of the revolving door, usually in cases in official buildings as well as administrative buildings.

- Automatically-rotating door

The fully automatic door with motion detectors is suitable for high frequency entry. These door systems can be manufactured up to a maximum diameter of 3600 mm.

The door is activated via inside and outside motion detectors. After activation the door accelerates and rotates at automatic speed. Thus the revolving door offers a high comfort.

The automatic speed is adjustable and the function after rotation can be freely adjusted in two modes of operation:

- mode of operation "wine" (rotation continues after passing through the door)
- "winter" mode of operation (rotation does not continue after passing through the door)
- As a further option, there is a "button for people with different abilities" can be installed inside and outside the door. By doing so the rotational speed is reduced in order to allow wheelchair users. Once passed through it, the revolving door reduces speed in all modes of operation. Stop in the final position, where the door leaf closes supported on the side walls, not allowing disturbing factors (environmental, atmospheric, human factors) coming from outside to affect the interior.

- Revolving door made entirely of glass

The glass revolving door offers higher transparency. The propulsion system and control system are installed on the floor. The high quality surface of aluminum profiles which are reduced to a minimum with soft edges means elegance. Door systems with three and four doors with a passage height of up to 3000 mm, diameters from 1800 - 3300 mm can be realized.

#### 6.4.6 Doors - INSTALLATION

The installation of door should be made in accordance with technical condition of installation. The installation is depending by the kind and material of doors. The installation way of doors will be for each type of doors as follows:

**Internal seasoned Pine wooden Door**, treated with a coat of wood preservative, will be installed as follows:

- a wooden sub-frame with seasoned Pine wooden (width 4 cm), treated with a coat preservative to be fixed to the wall by mean of proper steel clamps before plastering
- a wooden frame to be screwed to the sub-frame after plastering and painting. Following the doors design shown in Technical Drawing, the frame will be provided by hinges and lock anchors for all kinds of doors. There will be fixed all wooden cover and safety band and lockset. The total thickness of doors will be minimum 4,5 cm.
- A metallic lockset with three copies of keys type Yale or similar, door handles and push handle

**Internal aluminium Door** will be installed as follows:

The installation of internal aluminium door will be in accordance with Technical drawings. For their installation, will be used the installation of aluminium profiles according to european standards EN 573 - 3. Both part of door (fixed and moved) should be with two aluminium profiles that will be jointed with another aluminium part by two water insulation plastic band.

A solid case should be carefully fixed with iron screws to the wall and inside the cement mortar. The fixing must have a distance from the corners not more than 150 mm and between the fixing parts not more than 800 mm. Fixed door frames will be joined to the frames after plastering and painting is completed. Filling the gaps is done with elastic plastic material and then their skating is done using skating grout.

The glass shutters will be placed on the door frame and will be fastened to three hinged anchor points. Metal or duralumin locks and handles will also be fitted. The filling between the frame and the wall of the building will be done using plastic-elastic material after it is filled with the appropriate waterproofing



material. Between the inner case support and the duralumin outer part it is preferable to maintain an installation tolerance of 6 mm, considering the fixing space about 2 mm.

#### 6.4.7 The doors frames

The doors frames are depending by door type and materials that are used for their production. They could be metallic, wood or aluminum. For each doors types, the frames are as follows:

**The internal doors by pinewood**, treated with wood protective cover, placed in case by pine wood beam 7 x 5 cm and pressed board (with thickness 4 cm) dimensioned according the wall width (considering the increase by wall cover). The frames is well fixed in the wall with screws, iron cramp and covered with lime cement mortar.

**The internal doors by aluminum** placed in stable frames in the form of tubular profiles by aluminum with dimensions 61-90 mm, which is to be provided by special elements for the fixing and nailing in the walls structure. Stable profiles of frames will be with a cover, which is 25 mm inside the wall.

**The outside metallic doors** will mount in metallic frame, which is fixed in wall through the steel cramps of concrete casting in the wall before the plastering.

The metallic frame should be painted with metallic color against corrosion, before it will be mounted in object. Its size is depending by wall thickness, where it will be placed. The leaf thickness of case steel should be minimally 1,5 mm. The width of lateral parts of case should be minimally 10 cm while the width is depending by wall width and door type. The steel leafs of frame should welled according to Technical Requirements of Implementation and should be painted with enameled color before the door fixing.

All the works regarding the installation and placing of door cases in object should be done according the supervisor's and project technical requirements.

#### 6.4.8 Internal Doors

##### a- Internal Doors in solid wood

Supplying and fixing of doors, which dimensions will be taken by the Contractor, in seasoned Pine, treated with a coat of wood preservative, composed by:

- a sub-frame in seasoned pine wood (thickness 3 cm) treated with a coat of wood preservative, dimensioned according to the width of the wall (increased of the various wall coating) strongly anchored to the wall by mean of steel clamps (every meter) and cement mortar.

- A wooden frame to be screwed to the sub-frame after plastering and painting.

Following the door design shown in Technical Drawings, the frame will be provided by hinges and lock anchors for sash- doors, casement-doors, garret-doors, highlight, etc.

- Timber door opening made up by a solid wood frame (10 x 4 cm min. section) with horizontal and vertical members of the same section every 40 cm. In the bottom part the lowest horizontal member will be 20 cm height. Panels of seasoned Pine (3cm thick) treated with a coat of wood preservative and inserted between the wooden members complete the door panel structure which will be provide by 3 hinges 16 cm long min.

- A metal lock and Yale type key in 3 copies, brass door handle and push-plate.

- All works of bricklayer and all requirements to complete the work in a first class manner are included.

As above but with glass panels as described in the Technical Drawings. The glass panels could be transparent (4mm thick min) or wire-net reinforced (6mm thick min.)

As above but for air conditions spaces: In the bottom part of the door panel, a small opening, supplied by a proper grating, aluminium made, is required for the air conditioned system working.

As above but with highlight. The upper part of some of the internal doors to the corridors where indicated in Technical Drawings will have highlight openings, supplied by glass panels reinforced by wire-net.

Sample of the proposed items will be submitted to the Supervisor for a previous approval.

#### **b- Internal Doors "light core"**

Supplying and fixing of doors, which dimensions will be taken by the Contractor, in made up by:

- a sub-frame in seasoned pine wood (thickness 3 cm) treated with a coat of wood preservative, dimensioned according to the width of the wall (increased of the various wall coating) strongly anchored to the wall by mean of steel clamps (every one meter) and cement mortar.
- A wooden frame to be screwed to the sub-frame after plastering and painting. Following the door design shown in Technical Drawings, the frame will be provided by hinges and lock anchors for sash- doors, casement-doors, garret-doors, highlight, etc.
- door opening made up by two melamine laminated panels and intermediate solid wooded strips provided by a security lock. The two laminated panels will be 8 mm thick, all door border will be protected by a solid wooden strip and the total thick of the doors will be 4,5 cm min.
- A metal lock and Yale type key in 3 copies, brass door handle and push-plate.
- All works of bricklayer and all requirements to complete the work in a first class manner are included.

As above but with glass panels as described in the Technical Drawings. The glass panels could be transparent (4mm thick min) or wire-net reinforced (6mm thick min.)

As above but for air conditions spaces: In the bottom part of the door panel, a small opening, supplied by a proper grating, aluminium made, is required for the air conditioned system working.

As above but with highlight. The upper part of some of the internal doors to the corridors where indicated in Technical Drawings will have highlight openings, supplied by glass panels reinforced by wire-net.

Sample must be submitted to the Supervisor for a previous approval before fixing.

#### **c- Internal doors aluminium made**

Supplying and fixing of aluminium doors as described in the Technical Drawings and which dimensions will be taken by the Contractor, made up in aluminium alloy profiles according to European Standards EN 573 - 3 and duly pre-painted. Colour will be according to the request of Investor.

The fix frames will have a depth of 61-90 mm. They are provided with elements for fixing and anchorage to wall structures as well as jutting parts enabling the sliding of sashes; profile shape is tubular in order to house assembling accessories. Frame profiles will fit with a cover profile overlapping the wall by 25 mm. Mobile frame profiles have a depth of 32 mm and a height of 75 mm with flat or ornamental solution.

Both fix or mobile frames are designed to build thermal break door and are made up of two aluminium profiles which are joined one another by means of two 15 mm insulating lists made of plastic materials. Thermal break is obtained by inserting 15 mm long and 2 mm thick polyamide strips strengthened with fibre glass.

The profile is designed with a hollow central part for the insertion of the cornier joint bracket (with space for 18 mm high glass housing) and the trolleys for their sliding.



Seal is assured by brushes with stiff central fin. The characteristics of seal against atmospherically agents obtainable by these sections must be provable by the certificate of testing affected by the window frame manufactures or by the profiles producer.

The aluminium sections will be painted by a bake lacquering process. The temperature must not exceed 180 degree, the baking time will be less than 15 minutes. The lacquering thickness should be at least 45 mu. The powders used will be made up of high quality acrylic resins or linear polyesters

A solid sub-frame will be carefully fixed with steel clamps to the walls by means of cement mortar (no screw sockets). The fixing must preferably have a distance from the frame corners of no more than 150 mm and between them of no more than 800 mm. The fixed door frame will be screwed to the sub-frame when all plastering and painting works finished. Opening glassed panels will be hinged to the doorframe and will be supplied by a three point anchored lock and handle. Using plastic-elastic materials, after having filled any gap with insulating materials, will carry out the sealing between the cases and the building context. Between the inside of the steel frame support and the outside of the aluminium fix frame it is preferable to keep an installation tolerance of 6 mm, considering a protrusion of the fixing spacers of about 2 mm. Dimensional tolerance and thickness will be according to EN 755 – 9.

Door opening made up by standard aluminium profiles and internal by- laminated wooden panel 100 mm thick min.

A metal lock and Yale type key in 3 copies, brass door handle and push-plate.

As above but with glass panels as described in the Technical Drawings. The glass panels could be transparent (4mm thick min) or wire-net reinforced (6mm thick min.)

As above but for air conditions spaces: In the bottom part of the door panel, a small opening, supplied by a proper grating, aluminium made, is required for the air conditioned system working.

As above but with highlight. The upper part of some of the internal doors to the corridors where indicated in Technical Drawings will have highlight openings, supplied by glass panels reinforced by wire-net.

Samples must be submitted to the Supervisor for a previous approval before fixing.

#### 6.4.9 Door Locks

Supply and fixing of secret type steel locks, according to the descriptions in the Technical Drawings. Their main components are:

- Protective cover
- Coupling cartridge and its screws
- Steel chassis
- Keys
- Handles.

Locks can be:

- 1) Tubular type lock,
- 2) Lock with tubular type lever,
- 3) Cylindrical type Lock,
- 4) Cylindrical type lever lock.

1- If the Contractor will install Tubular type Locks. Their technical data should be as follows:

- Steel chassis and connecting cartridge case, mounted on a galvanized part for corrosion protection.
- Locks warranty over 150,000 life cycles

- The neck must be made of stainless steel or bronze. Two round handle by standard,
- Locks must be locked with a special screw to improve door security,
- Locks should be lockable in a simple combination and easy to use,
- Locks should be easy to install.
- The thickness of the protective cover should be 1 mm and its size in dimensions 45mm x 57 mm,
- The depth of the connection cartridge should be 60 - 70 mm,
- Handle must be fully reversible on the left or right side of the door,
- The thickness of the door should be 35 mm - 50 mm according to the standard or in special cases 50-70 mm,
- Applicable to secret keys by default, but may also apply to other key options.

Tubular type locks can be used for entrance doors, bathroom doors or for doors that do not need to be locked.

For the front doors we will have:

- Locking cartridge for special locks
- Lock or handle with locking and unlocking
- Returning the inside of the key pin or key will close both handles. Turning in the opposite direction will unlock the handles.

For bathroom or other doors:

- Each handle operates with the special locking screw when the lock is made by turning the inserted pin.
- An inserted and turned metal part for emergencies will unlock the door from the outside.

For doors that do not need to be locked we will have:

- No handle operates with the lock cartridge at all times.
- Suitable for use in children's living rooms, kitchens or bedrooms

2- If the Contractor will install locks with Tubular type levers (They are especially useful for children and the disabled), their technical data must be as follows:

- Steel chassis and locking cartridge case mounted on a galvanized part for corrosion protection.
- Locks warranty over 150,000 life cycles
- The neck should be made of zinc with cathodic protection or solid bronze.
- Locks must be locked with a special screw to increase the security of the door,
- Locks should be lockable in a simple combination and easy to use,
- Locks should be easy to install.
- The thickness of the protective cover should be 1 mm and its diameter should be 67 mm,
- The depth of the connection cartridge should be 60 - 70 mm,
- Handle must be fully reversible on the right side of the door,
- The thickness of the door should be 35 mm - 50 mm according to the standard
- Applicable to standard Yale keys but may also be applicable to other key options.
- The reversible part should be suitable up to 60 -70 mm.

Tubular lever locks can be used for front doors, bathroom doors or doors that do not need to be locked.

For the front doors we will have:

- Special locking cartridge
- Keys or gloves with the thumb locked and unlocked inside and outside the locking knob

- Returning the inside of the key pin or key will close the knob. Turning in the opposite direction will disconnect the knob.

For bathroom or other doors:

- The outer and inner pins act with the special screw for connection when the connection is made from the return of the inserted nail.
- A metal part inserted and turned for emergencies will unlock the door from the outside.

For doors that do not need to be locked we will have:

- The outer and inner edges act with the locking cartridge all the time.
- Suitable for use in children's living rooms, kitchens or bedrooms

3- If the Contractor will install Cylindrical type locks, their technical data must be as follows:

- Steel chassis and connection cartridge case mounted on a galvanized part for corrosion protection.
- Locks warranty over 150,000 life cycles
- The knob must be made of stainless steel or bronze.
- Locks should be locked in the group to improve the appearance,
- Locks should be lockable in a simple combination for families and easy to use,
- Locks should be easy to install.
- 5-pin cylinders, brass socket with three nickel-plated brass keys.
- The thickness of the protective cover should be 2 mm and its size should be 28 x 70 mm,
- The thickness of the door should be 35 mm - 50 mm according to the standard or in special cases 50-70 mm.
- Applicable to standard Yale keys but may also be applicable to other key options.
- The reversible part should be suitable up to 60 -70 mm.

Cylindrical type locks can be used for entrance doors, bathroom doors, doors that do not need locks or living rooms.

For the front doors we will have:

- Special locking cartridge
- Push button on inner handle key outer handle
- Always active outer handle
- Return the inner handle or key and unlock the locking cartridge
- Each handle operates on the cartridge unless the outer handle is closed from the inside

For bathroom or other doors:

- Each handle operates with the special locking screw without the outer handle which is closed by pushing the button inwards.
- inner handle always active
- An inserted and turned metal part for emergencies will unlock the door from the outside.
- Internal push button on the outer handle.

For doors that do not need to be locked we will have:

- Each handle operates with the locking cartridge at all times.
- Suitable for use in living rooms, kitchens or children's bedrooms

For use in the doors of living rooms, hotels and exit doors we will have:

- The locking cartridge operates with the inner handle and key on the outside.
- Inner handle always active
- the outer handle is always rigid

4- If the Contractor will install Brave with Cylindrical type lever, their technical data must be as follows:

- Steel chassis and coupling cartridge case mounted on a corrugated part for corrosion protection.

- Locks guarantee over 150,000 life cycles
- the neck should be made of zinc with cast iron or solid bronze plate.
- Locks must be locked with special locking screws to increase safety,
- Locks should be easy to install.
- 5-pin cylinders, brass socket with three nickel-plated brass keys.
- The thickness of the protective cover should be 2 mm and its size should be 28 x 70 mm,
- The depth of the connection cartridge should be 12.5 mm,
- Handles must be fully reversible on the right or left side of the door,
- The thickness of the door should be 35 mm - 50 mm according to the standard.
- Applicable to Yale type keys as standard but may be applicable to other key options as well.

Cylindrical lever locks can be used for front doors, bathroom doors, non-locking doors or living rooms. All installation work must be done according to the requirements for the completion of a high quality work. An example of the lock to be used should be given to the Supervisor for prior approval prior to fixation.

#### 6.4.10 Hinges

Supplying and fixing of hinges, as described in the technical drawings, made up in steel and covering with brass layer will be in accordance with quality standards OTLAV's. The steel material should provide high resistant of hinges against mechanical shooting, elasticity, long working life (180 000 life cycle).

The hinges should be composed by:

- Matchstick made up in steel and covered with brass layer, type male with file;
- Matchstick made up in steel and covered with brass layer, type female;
- Four steel screw. They will be used for installation of hinges in object.

The size and Form of parts should be given in Technical drawings.

Two above matchstick will be moved in their part in a way that the doors to move in a easy way at their case. The matchstick will be painted with oil to eliminate the sound during their works.

The hinges that will be used for doors should be composed by two above matchstick and four steel screw. The diameter of matchstick with file, type male should be 14-16 mm. The length of matchstick is  $L1 = 60$  mm and length of file will be minimum  $L2=40$  mm. This matchstick will be fileted with door case in accordance with technical drawings. The head form of matchstick will be in same with chess piece. Metallic matchstick, type female will be installed to other part of door by 4 metallic screw

The hinges that are installed in under part of door should be minimum 25 cm over the under part of door case.

The hinges that will be used for windows should be composed by two above matchstick and four steel screw. The diameter of matchstick with file, type male should be 12-13 mm. The length of matchstick is  $L1 = 50$  mm and length of file will be minimum  $L2=30$  mm. This matchstick will be fileted with door case in accordance with technical drawings. The head form of matchstick will be in same with circular form. Metallic matchstick, type female will be installed to other part of window by 4 metallic screw. The hinges that are installed in under part of window should be minimum 15 cm over the under part of window case.

Three hinges will be installed in three anchor points of door and window in minimum distance between them as follow:

$L_{min} = 50$  cm for door

$L'_{min}=30$  cm for window.

The quantity of hinges will be in accordance with project requirement. They will be depending by kind and size of door or windows.

All works of installation and fixing of them in the object should be perfect and in accordance with the project and Supervisor's technical requirements.

A sample of hinge with their quality certificate, origins certificate and warranty certificate must be previously submitted to the Supervisor for initial approval before installation on the object.

#### 6.6.2 Door handle

##### General

All door/window handles should be of a similar type all over the school area. In order to meet this requirement all door handles should be of such a design that can be used both in dried and humid environments.

##### The criteria that should be met

All door/window handles should be:

- a) With a high level of usage security (longevity while being frequently used)

Handle's durability depends mainly on the materials, that they are made of and also on the way of the handle's connection with the other elements (cylinder, lock) etc.


For this reason a handle produced from a strong and resident material (for example, stainless steel) has to be chosen.

- b) With guarantee period for resistance against all charges (it should guarantee durability in all mistreatment cases: hanging, hits, crashes etc)

Considering users of those handles, they should have high resistance coefficients in charges; handles should also resist a child hanging on it.

Due to the European Norms (DIN) there are two resistance levels.

The following table presents the charges for these two levels. We would suggest the level ES2.

Properties	Requirements		
	ES1	ES2	
Concentric Tensile Loading	25 kN	40 kN	
Tensile Loading of the Barrel	15 kN	17 kN	
One Side Tensile Loading	15 kN	20 kN	

- c) It should not cause any physical damage during the usage.

Regarding this item it could be said that, since these handles will be fixed in doors and windows of kindergartens, elementary schools, secondary schools and high schools, and therefore will be partially used by children, these handles should be chosen appropriately in order not to cause any physical damage to the child. The handle model presented in the following figure meets all the requirements by its part from inside of the classroom, since this part frequently used, especially in emergency cases, for the door is opening from inside of the classroom to outside.

### Fixing

All handles before being fixed should be checked by the engineer (supervisor) and only after his approval to be fixed.

The handle fixing should be done in such a manner in order to meet the above-mentioned criteria.

The instructions given by the handle producers must be correctly applied while handle fixing.

## 6.5. Ceiling Finishes

### 6.5.1 Drop ceilings

#### Specifying ceilings

Ceilings are customarily set out so that the cut panels at the perimeter are equal or greater in width than  $\frac{1}{2}$  full tile module. They should be cut to a good fit.

On 600mmx1200mm items and plank items the direction of installation should be indicated on the ceilings plans. It is recommended practice to install products with directional face patterns in square modules, with the direction of the pattern alternating from tile to tile.

The grid is primarily intended to support the distributed load of 4 to 6.5 kg/m<sup>2</sup> from ceiling tiles or panels. This will ensure a deflection of the grid, between points of support, which is visually undetectable. On no account should point loads be placed on reduced height or lightweight cross tees and only very lightweight fittings, of 3 kg or less, should be supported on the grid flanges. Main runners or cross tees which bear on a perimeter trim should be suspended within 600mm so that excessive loads are not transferred into it. However, this dimension may need to be reduced to 450 mm or less if additional loads overlays or service fittings are installed.

#### Installation conditions

The required stability of site conditions is only likely to be achieved if the building is weatherproof, dried out, fully glazed, and during the winter months some form of dry heating is provided. Increased ventilation should be used to reduce excess heat build up during the day caused by solar heat gain.

Controlled ventilation should be used to disperse moisture-laden air. Mechanical de-humidifiers are designed to reduce the moisture content in the air within the building. The direct burning of fossil fuels such as butane or propane gas is not recommended as these liberate approximately 2.2 liters of water for every 500 g of fuel burnt. It is better to use dry heat such as electricity or indirect hot air and to use de-humidifiers only to reduce the % RH created by moisture emitting from structure.

## Maintenance and cleaning

Maintenance on suspended ceilings should only take place after the effect of such work upon the technical functions of the installation (in particular the fire and acoustic performance), has been fully considered. If in doubt, please consult the internal technical sales.

However, when maintenance is necessary, certain procedures should be followed to ensure continued high performance and attractive appearance.

## Cleaning

First remove surface dust from the ceiling using a soft brush. Pencil marks, smudges etc. may be removed with an ordinary art gum eraser. An alternative method of cleaning is with a moist cloth or sponge dampened in water containing mild soap or diluted detergent. The sponge should contain as little water as possible. The ceiling must not be made wet. After washing, the soapy film should be wiped off with a cloth or sponge lightly dampened in clear water.

- Abrasive cleaners must not be used.
- Ceramaguard ceilings are unaffected by moisture and can be made damp with no adverse results.
- Parafon Hygien and ML Bio Board can be repeatedly washed and will withstand mild detergent and germicidal cleaners.
- Specialist contractors offer cleaning services using chemical solutions. Where these methods are employed, it is recommended that a trial operation is first carried out so that the result and overall effect can be assessed. It is best in this case to conduct such a test in a non-critical area of building.

## 6.6 Ceiling Finishes

### 6.6.1 The Glass moulds (glass surface)

The supply and fixing of glass surfaces are described in technical specifications that are given by Contractor. They will be made up to aluminium material with profile in accordance with European standards EN 573-3. The profile will be painted before their installation on the wall. Their colour will be according to the requirement of Investor (usually, can be used the white colour).

The fixed case of them will have the dimensions that are given in the Technical drawings. They will have the elements that will be used for the fixing and anchoring of glass surfaces on the walls. The forms of profiles are tubular. The dimensions of glass surface profile will be 25 mm biggest that main profile.

The dimensions of moving case profiles are 32 mm x 75 mm (depth is 32mm and height is 75 mm)

Both part of door (fixed and moved) should be with two aluminium profiles that will be jointed with another aluminium part by two-water insulation plastic band with width 15 mm.

A solid sub-frame will be carefully fixed with steel clamps to the walls by means of cement mortar (by me tapa me filete). The fixing must preferably have a distance from the frame corners of no more than 150 mm and between them of no more than 800 mm. The fixed doorframe will be screwed to the sub-frame when all plastering and painting works finished. Opening glass shutters shall be fixed by hinges to the glass frame and shall be furnished with handle and lock anchor. The sealing between the cases and the building context will be carried out, using elastic-plastic materials, after having filled any gap with insulating materials. Between the inside of the steel frame support and the outside of the aluminium fix frame it is preferable to keep an installation tolerance of 6 mm, considering a protrusion of the fixing spacers of about 2 mm. Dimensional tolerance and the thickness shall be according to the European standards. Glass panels shall be fixed in the metallical frame by aluminium beat in the metallical profiles of the glass and supported by



gums. All the works related to the masonry and all the requirements to complete the work should be realised in workmanlike manner.

#### 6.6.2 Elements with sandwich panels

Element with sandwich panels will consist of:

- Metal support
- Insulation
- The rubber of the element itself
- Adhesive

1-Metal support:

- Iron galvanization is done according to the norms of EN 10147/10142;
- Pre-painted iron with a coating system provided according to studies, meeting all requirements;
- Galvanized iron with plastic coating layer;
- Aluminum;
- Pure copper and other

2-Isolation:

Use of polyurethane or polyisocyanurate thermal insulation materials, flame-retardant, permeating a perfect adhesion to the metal support and allowing the fire reaction to be obtained, if required, in accordance with ISO time standards.

- Average density: 35 - 40 kg / m<sup>3</sup>
- Thermal coefficient: 0.0195 Kcal / mh degrees Celsius
- Closed cells:> 95% (non-hygroscopic)

3-Dimensional Tolerance:

- Rib height: + 1 mm;
- Width (1000 mm) + 2 mm;
- Length: + 10 mm;
- Squareness Deviation: <= 0.5% of usable width
- Bending in length: <= 2 mm / meter
- Camber: <= 1 of length
- Peak swell: + 2 mm at 500 m;
- Panel thickness: + 2 mm of nominal thickness over the entire surface;

4-Plain:

Light corrugation, especially for thin metal supports or supports with aluminum material, will not be considered a defect,

As long as they would not be included in the panel function.

5- Adhesion:

Some areas of non-adhesive sheets, up to 0.5% of the entire panel surface will not be considered a defect.

Panel element thickness load capacity, type of support (iron or aluminum) and spaces. (See Tables 1 & 2)

Table 1 (Load capacity kg / m2 steel)

Thicknes mm	Weight Kg/m2	Space ( 2 m )	Space ( 2,5 m )	Space ( 3 m )	Space (3,5 m)	Space ( 4 m )	Space ( 5 m )
25	9,64	180	105	68			
30	9,83	220	140	85	50		
35	10,02	240	170	115	70		
40	10,21	260	200	130	86	60	
50	10,59		250	180	120	85	
60	10,97		280	220	160	115	62
80	11,73			270	215	170	100

Table 2 (Load capacity kg / m2 aluminum)

Thicknes mm	Weight Kg/m2	Space ( 2 m )	Space ( 2,5 m )	Space ( 3 m )	Space (3,5 m)	Space ( 4 m )	Space ( 5 m )
25	4,54	90	50				
30	4,73	120	60				
35	4,92	150	80	50			
40	5,11	180	100	60			
50	5,49	210	140	85	60		
60	5,87	230	180	115	74		
80	6,63	280	230	160	100	70	

### 6.6.3 Horizontal wall protection

Supplying and fixing the cover of walls described in technical specification given by administrator contractor.

Cover of walls are composed by woods material and these are pre-painted profile before fixing on the walls. Color of cover of walls depend on investor requirement.

Cover of walls have a size 10 - 15 x 2 cm and their length is depened from the room dimensions. Thickness of profile is 2 mm on each side of profile should be a strip form with wide 2 cm from each side or it should be with holes with d = 6 - 8 mm. The hole is using to fix the cover of walls in a first-manner class work. In this case the cover of wall is fixed on the wall before plastering. During plastering two sides of covers are foiling with protection papers.

Horizontal wall protections should be placed in a height of funksion of chair height.

Cover of walls are ensuring with elements that serve for placing and anchoring on wall structure.

The sealing between cover of wall and wall will be carry out by using plastic-elastic materials, after having filled any gap by plastering.

We can use the wooden cover of walls in seasoned pine, treated with a coat preservative. In this case the thickness of profiles will be 3-5 mm and size will be 150 x 3 x 3 cm. Joining of two wooden strips will be carry out with small nails and after that it has to plaster and paint. On part of joining the wooden strips has to cut with an angle 45 grades.

All works of installation and putting of cover on the angle of walls should be perfect and in accordance with the project and Supervisor's requirements.

A sample of horizontal wall protection with their quality certificate, origin certificate and warranty certificate must be previously submitted to the Supervisor for approval before installation on the object.