TECHNICAL SPECIFICATIONS OBJECT:

MULTIFUNCTIONAL CENTRE

FOR PEOPLE IN NEED - BILISHT

DEVOLL

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SECTION 1 GENERAL SPECIFICATIONS

1.1 General specifications

1.2.2 Units of measurement

In general, units of measurement in Contracts are metric units in mm, cm, m, m², m³, Km, N (Newton), and degrees Celsius. Decimal points are written as "**.**".

The Contractor shall give the supervisor a complete schedule showing the order, procedure and methodology he/she proposes to execute the works from the beginning until the end of the construction.

The method and rules proposed to execute these permanent works shall be regulated and approved by the supervisor, while the contract price shall include any necessary adjustments demanded by the supervisor during the execution of works.

1.1.3 Non-compliant works

Any work that does not comply with these specifications shall be rejected and the contractor shall repair any defect at his/her own expenses, according to the project.

1.1.4 Warning signs

No warning signs shall be installed, except:

The board prepared by the Contractor, which contains information provided by the Supervisor and which shall be placed in areas designated by the latter. Words should be readable at a distance of 50 m. The written language shall be in Albanian.

1.2 Handovers at the Supervisor

1.2.1 Written authorizations

"Written rules" shall refer to document and letters signed by the Supervisor and sent to the Contractor, which contain instructions, guidance or orientations for the Contractor, to enable the latter to execute this contract.

1.2.2 Handovers at the supervisor

For each additional work, the Contractor shall submit to the Supervisor a detailed drawing and such works shall commence only upon approval by the Supervisor.

The Contractor must sign proposals, details, sketches, calculations, information, materials, test certificates, whenever required by the Supervisor. The Supervisor shall accept any delivery and, if they are considered appropriate, shall respond to the Contractor in accordance with the relevant clauses of the contract terms. All deliveries must be made on the dates agreed with the Supervisor and referring to the approved program and the necessary time it takes for the Supervisor to approve such deliveries.

1.2.3 Samples

The Contractor shall provide samples labelled in accordance with all the adjustments, accessories and other topics that may be rightfully required by the Supervisor for inspection.

Samples shall be submitted at the Supervisor's office.

Drawings of executed works and booklet of measures

The Contractor shall prepare and submit to the Supervisor three sets of works documentation according to the Project. This material shall contain a set of drawings of executed works, additional drawings made during the execution of works approved by the Supervisor, and the booklets of measures for each work item.

SECTION 2 CLEANING WORKS

2.2 CLEANING WORKS

2.2.1 Work safety

The Contractor shall ensure that the work place and the equipment are:

a) Of an appropriate type and standard referring to the place and type of work to be executed

b) Ensured by a competent and experienced technician

c) Preserved in good conditions during operation

SECTION 3 CONSTRUCTION OF THE NEW ROOF

3.1 General data

The roof will be constructed using binary wood elements, in the shape of a local roof**.**The material to be used shall be seasoned pine wood. The slope of the roof is based on the climate and rainfalls in the area. The covering will be made using Canadian roof tiles.

The wood material used shall be coated with anti-insecticides. The colour of the roof tiles shall be selected by the investor.

SECTION 4 FINISHES

4.2 Walls finishes

4.1.1 Interior plastering

Adjustment where necessary of surfaces requiring plastering of imperfections by filling them with multi-layer bastard mortar and pieces of bricks for small areas if necessary, as well as any other need to complete the plastering.

Prior to coating, the surface which requires plastering should be soaked with plenty of water. Coating of walls and ceilings for clean walling with liquid cement mortar for improving the adhesion of plaster and the reinforcement of walling, including the service scaffolds and every other need to fully complete the coating.

Guided plastering achieved through a coating with a thickness of 2 cm of bastard mortar M-25. One m^2 of such bastard mortar contains the following elements: 0.005 m^3 washed sand, 0.03 m^3 limestone mortar M - 1:2, 6.6 kg of cement 400; water, applied through pre-instalment of wall guides (15 cm thick mortar strip every 1 to 1.5 m) and finished with trowel, including the service scaffolds and every other need to fully complete the plastering.

4.1.4 Exterior plastering

Grouting and adjustment where necessary of surfaces requiring plastering of imperfections by filling them with multi-layer bastard mortar and pieces of bricks for small areas if necessary, as well as any other need to complete the plastering.

Prior to coating, the surface which requires plastering should be soaked with plenty of water. Coating of walls and ceilings for clean walling with liquid cement mortar for

improving the adhesion of plaster and the reinforcement of walling, including the service scaffolds and every other need to fully complete the coating.

Plastering achieved through a coating with a thickness of 2 cm of bastard mortar m-25, each m^2 containing: 0.005 m^3 washed sand; 0.03 m^3 bastard mortar; 7.7 kg of cement 400; water, applied through pre-instalment of wall guides (15 cm thick mortar strip every 1 to 1.5 m) and finished with trowel, including the service scaffolds and every other need to fully complete the plastering.

4.1.5 Plastic painting

Painting of interior areas with plastic paint

The painting process of interior walls with plastic paint shall undergo through three phases, as follows:

1- Preparation of the area to be painted.

Prior to starting the painting process, the surface shall be cleaned, small holes or damaged parts on wall shall be repaired using synthetic material stucco, in order to prepare the area for pre-painting. In the case of pargeted surfaces, they should be carefully cleaned before starting the painting.

The areas that will not be painted (doors, windows etc.) shall be covered prior to starting the painting process by using protective papers.

2- Pre-painting of the interior cleaned area.

The fully cleaned surfaces are pre-painted with diluted vinavil (plastic primer), prior to the painting process. The pre-paint solution is made with 1 kg of vinavil mixed in 2.5-3 litres of water. The surface shall be pre-painted only once with the prepared mixture.

The usage quantity is 1 litre of vinavil and water mixture which should be used for a surface of 20 m2.

3- Painting of interior areas with plastic paint.

The first step is the preparation of the plastic paint mixture, which is packed in 5 litre boxes. The liquid paint is diluted with water at 20-30%. Pigment is added to the mixture until we obtain the desired colour, which should be approved by the work supervision team and then we start painting the surfaces. The paint is applied in two coats.

The usage quantity is 1 litre of diluted plastic paint which should be used for a surface area of 4-5 m^2. This quantity depends on the roughness of the surface to be painted.

Painting of exterior areas with acrylic paint

The areas that will not be painted (doors, windows etc.) shall be covered prior to starting the painting by using protective papers.

The fully cleaned surfaces are pre-painted with diluted vinavil (plastic primer), prior to the painting process. First the primer is prepared by mixing 1 kg of diluted vinavil with 3 L of water. The surface shall be pre-painted only once with the prepared mixture.

1 litter of diluted vinavil should be used for a surface area of 20 m^2.

Afterwards the acrylic paint is applied. Compared to the plastic paint, this one contains different oils which make the paint resistant to sun exposure, rain humidity, etc.

The mixture of the acrylic paint with water is prepared first. The liquid paint is diluted with water at 20-30%. Pigment is added to the mixture until we obtain the desired colour. Then, we start painting the surfaces. The paint is applied in two coats. 1 litre of diluted acrylic paint should be used for a surface area of 4-5 m^2(depending on the roughness of the surface to be painted).

The personnel performing the painting shall have experience in this area and shall follow all the painting technical conditions defined by KTZ and STASH.

The joints in corners and between walls shall be filled with an elastic compound (such as silicone).
For each surface area of 30 m², covered in different tiles, it is necessary to install movable joints.

4.2 Floor finishes

The floor shall be constructed on the R/C slab, on a concrete levelling layer. This layer shall determine the necessary slope of the floor, shall cover the electrical, hydro-sanitary and HVAC installation, and shall allow the paving of the floor with tiles, laminate, parquet etc. This flooring material shall by decided by the architect/supervisor and the client.

The new floor may be placed upon the old cement and it can be composed of different materials: gress tiles, linoleum or PVC flooring and parquet flooring. The new floor shall be selected based on the necessity, investor's request and KTZ technical conditions.

4.3 Doors and windows

4.3.1 Windows/general data/requirements

Windows are an important architectural and functional part of the building. They provide lighting for the interior area of the building. Their size (i.e. dimensions) varies and depends on the architectural composition, interior surface area and other designer requirements. The windows shall be placed 10 cm above the floor level, depending on the designer requirements. The windows can be made of aluminium. The main parts of windows shall be: The window frame, which is attached to the wall using steel elements before plastering. The casing of the window shall be screwed to its frame after plastering and painting. Based on the window sketch displayed in the technical design, the window frame shall have include different types of hinges and locks, installed in it. Openable sash windows, fitted with hinges, fixed handles and transparent silicone glue, as well as fixed sashes.

4.3.2 Components

Aluminium profile windows shall be equipped with:

- Vertical opening
- Horizontal opening

Sliding sash and are composed of:
Fixed aluminium casing (with dimensions 61-90 mm), which shall be fixed to the wall through steel bed-plates installed before plastering. The windows shall be equipped with elements that serve for anchoring and fixing them on the wall as well as the sliding sections that make possible the sliding of the window.
The window sash, which is screwed on the window casing after the plastering and painting works.
Water collection gutters
Accessories
Wheels that enable their sliding and shades casing
Steel fastener
Rubber gutter
Installed handles and locks
Openable glass panel (4 mm thick in case of transparent glass, 6 mm thick in case of windows reinforced with wire mesh or double glass windows). They will be fastened to metal frames with aluminium laths and transparent silicone glue.

The are two types of window sills: internal and external sills. They may be of casted granite, marble or coloured granite slabs and equipped with water drainage lines, pursuant to the technical design or instructions of the Supervisor. The window sills shall be equipped with sharp angles and shall fulfil all other criteria related to the completion of the project.

4.3.3 Aluminium windows

The supply and installation of windows as described in the technical specifications with the dimensions provided by the contractor are made of aluminium material, which profiles are in compliance with the European Standards EN 573-3 and painted prior to installation in the building. The window colour will be as per the request of the investor.

All the works related to the walling and all the other requirements for the completion of the job should be carried out carefully. The Supervisor shall revise a model of the proposed materials for a preliminary approval.

4.4 Doors - General data

Doors are a very important part of buildings. They enable access at interior areas of the building. Depending on their function, doors may be interior or exterior. They have different sizes (i.e. dimensions) depending on the architectural composition, project and Investor requirements. Doors can be manufactured with wood, MDF, metal, aluminium, plastic etc. The main parts of doors shall be:

1. The door frame, which is fixed to the wall and fastened by hooks and steel screws before plastering;
2. The door casing, which is attached to the frame using relevant screws upon plastering and painting;
3. Door fold, which can be made of wood, metal, aluminium or reinforced PVC pursuant to the relevant material and door accessories, including hinges, handles, keys, tightening screws etc.

4.4.1 Doors – Installation in the building

The installation of doors in the building should be done according to the technical conditions for their assembly defined by national standards. Their way of installation depends on the type of the door and material used for their manufacturing. For each type of door, installation in the building should be done as follows: **Interior wooden doors** that are made of a protective wooden cover, shall be installed as follows:

- the wooden frame made of seasoned pine tree (4 cm thickness) or a double frame with dimensions 7 x 5, dimensioned pursuant to the wall width, (also considering the increase in width due to the cover of the wall) shall be strongly fixed to the wall using steel hooks or screws (per meter) and cement mortar;
- the wooden case fixed to the wooden frame upon plastering and painting. The case shall be attached with hinges and key anchors for all types of doors (wooden frame doors, frameless double doors, lighted on top etc.). The protective wooden covers and safety strips, made of strong wood and secured by a safety lock, shall be attached to this case. The total thickness of the doors shall be at least 4.5 cm.
- the metal lock with three secret-type key copies and the door handle.

In the case of wooden doors, the closure shall be made using solid wooden strips, which are mounted around the door perimeter. This work should be of the highest quality, pursuant to all requirements.

All works related to the installation and mounting of the doors in the facility shall be completed pursuant to technical requirements.

In the case of interior aluminium doors that will be used in bathrooms, they shall be installed in fixed aluminium frames in the shape of aluminium tubular profiles with dimension 61-90 mm, which are secured with

special elements that allow them to be attached at walls structures. The fixed frame profiles shall have a 25 mm cover within the wall.

SECTION 5 ELECTRICAL WORKS

5.2 Special electrical specifications

5.2.1 Accessories (general)

The accessories of electrical installations shall be specified in details in the following points of this section.

This section provides general requirements and implementation technical conditions that must be fulfilled by these accessories and by electrical installations in general.

The electrical installations in general shall be complete at all aspects (installation and material point of view) as provided in the projects and designs, and as described in the designer's specification or instructions.

The installation shall include the supply with electricity for all defined and provided electric appliances, as well as for appliances provided and installed by other parties.

The equipment supply unit should be the supply terminal box in the equipment or the closest shutoff (isolating)/opening device.

The position of all points in the drawings is approximate and shall be confirmed by the contractor, referring to the regulations for the special premises in the latest project drawings.

The specification is a completion of the project drawings. In case of conflict between the drawings and specifications, the commissioner (bidder) should require a (written) clarification or an interpretation from the designer before submitting its bid (tender). If such clarification is not required, the interpretation of the site (workplace) engineer shall be final. The contractor shall visit (inspect) the site prior to evaluate the scope (field, area) of work.

5.2.2 Wires and cables

All wires and cables shall bear the approval certificate from the respective local authorities, along with the factory certificate.

The wires shall be regular copper conductors, isolated (coated) with a single PVC coat, in order to be inserted in pipes and lines.

The isolation of wires and the cover shall be coloured, in order to identify the live and neutral wires.

In all situations, when PVC cables end in a fuse panel, electrical devices, etc., a reasonable amount of slack cable should be allowed for future stripping and reconnection of terminals, without having to pull such cables.

The cables for each installation section shall be closed into pipes and in the collective enclosing box systems for the specific section. The cables shall be installed using the loop system.

The stripping of isolation from PVC isolated cables shall be carried out using an appropriate stripping tool instead of a knife.

Wires shall be coloured in order to be identified. Black shall be used for neutral conductors, green/yellow for earthing conductors and red/blue and yellow for live conductors. The same colours shall be used for connections in the same live conductors. The same colours shall be used for connections in the same supply phase for all installations.

All cables shall be installed in a way that displays the label and seal of the producer on their side or other proofs of origin and the Contractor shall obtain permanent manufacturer tests certificates if required by the engineer.

The number of cables to be inserted in pipes should allow the easy and damage-free insertion of the cables and shall in no circumstances occupy more than 40% of the space. The installation shall be in compliance with KTZ in Albania.

5.2.3 Channels and accessories

The electrical installations may be carried out in two ways:

Under the plastering, inside flexible PVC pipes Above the plastering, in PVC channels (addressed in paragraph 8.1.7)

The accessories for installations under the plastering are:

Flexible PVC pipes of various dimensions, depending on the dimension and number of wires enclosed in them

Junction boxes (addressed in paragraph 8.1.5) Boxes for attaching the sockets and switches (addressed in paragraph 8.1.13 and 8.1.14).

All of the above are installed before the plastering process.

The following work order shall be observed for electrical installations under the plastering:

Opening of wall channels of appropriate dimensions so that the flexible pipe is inserted freely and at such a depth that it does not emerge over the final plaster level.

Insertion of PVC flexible pipes and boxes which are temporarily attached with stucco (plastering mortar is then applied to close the channels). After the plastering has been completed, the wires and cables are inserted through the appropriate guide. They should enter freely and a sufficient space should be allowed for connections and installations.

The channels and the placement of PVC flexible pipes should be done in a distance of 0.4 m lower than the ceiling level in a straight horizontal line and the deviations to the switches or sockets shall be vertically straight instead of angled or curved.

5.2.4 Junction boxes

Depending on the system to be used, junction boxes may be installed under or above the plastering. Therefore, their installation is performed using stucco or screws with wall plugs.

They shall have the same material and technical characteristics as flexible pipes mentioned in above paragraphs.

The dimensions of junction boxes vary depending on the situation and need. They may be circular, square or rectangular and they are equipped with different colour closing lids.

It is important that wires/cables within junction boxes are connected using joining or end clamps.

5.2.5 Flexible connections

Flexible connections are mainly used in laboratories. Using a junction box the power supply line is brought close to the appliance and then a flexible connection is used outside the wall, from the junction box up to the appliance that shall be connected. Therefore, the cable going out of the junction box shall be stable, isolated and in compliance with the technical conditions. The cable shall be isolated with two isolation layers and shall be inserted in flexible pipes. It shall be connected to the respective clamps of the appliance.

5.2.6 Lamps and lights

Lights shall be positioned as shown in the draft-drawings of the electrical engineer. The lighting shall be installed using PVC isolation cables, type NYN, which pass through the PVC flexible pipe. Usually, these pipes are hidden within the plastering or inside wire gutters (channels), when the channels system is used. Cables shall have a minimal section of 1.5 mm², to comply with the circuit load, necessary tolerance, in order to ensure voltage drop limit for final sub-circuits. In all cases, a separate earthing wire shall be installed. No more than three lights can be placed on the same pipe. Lights shall be safely attached to the ceiling and depending on the type of the light and recommendations provided by the manufacturer, they may be pendant lights or ceiling lights. (Neons, along with the lights, shall be installed by the Contractor).
In areas of suspended ceilings, where neons must be installed, the final connections of each neon shall be performed using an appropriate flexible three-wire heat resistant cable, through an outlet ceiling rose, connected to the cable box or line. The visual and light distribution characteristics of all neons shall be in compliance with the detailed information provided in this specification. The neons shall be designed and manufactured in order to prevent excess temperature at light globes and holders, prevent constant temperature loss.

5.2.7 Fluorescent lamps

All neon lights shall be equipped with a hot cathode, except in areas where there is no continuous voltage.

The characteristics for general use shall be as follows and all lamps shall have equivalent outputs to the ones provided in the table. All lamps shall have the same colours and wattage as specified in the following table:

Characteristics

Nominal length in mm	Wattage (Watt)	Light influx after 2000 hours	Colour Temperature	Lamp diameter in mm
1500	58	4500	White	26
1200	36	2800	3600	26
600	18	1100	Degrees	26
300	8	420	K (Kelvin)	26

Control device.

The control device for fluorescent lights shall be equipped with a choke engineering circuit with electronic inductive injection to minimize losses, which shall not exceed 8 watt for a 1200 mm lamp and 10 watt for a 1500 mm lamp. The electronic switch on shall be asymmetric in order to avoid the possibility of saturation that might occur when the lights are switched on during high voltage. The visual and light distribution characteristic of neon lights shall comply with the information provided in the drawings. All fluorescent lights shall be equipped with a power factor correction that shall correct the power factor by at least 0.9 lagging. The harmonic distortion within the lamp circuit shall not exceed 17%. Lamp shades and other auxiliary equipment shall be in compliance with C.E.E 12 and every

adjustment shall be made using a safety receptacle in the compartment gear, which shall not be calibrated more than 5 ampere.

If corrosions are identified in neon lights metallic parts, such parts shall be immediately coated using zinc chromate and afterwards they shall be painted using synthetic smalt white paint.

Unless otherwise detailed, they shall be attached in a straight position at the cable entry boxes or lighting line. In addition, they shall be safely attached in order to sustain the weight of neons. The lights shall be installed upon completing all the construction and panting works. Damage to neons, especially from rust, is a results of early installation. In these cases, the supervisor may request the removal and replacement of the employer, without costs. The control equipment and other auxiliary equipment shall be relocated within each unit to allow the spreading of heat within their temperature limits.

Each light shall have a fixed collector block to clearly identify the live, neutral and earthing entry cables. This collector block shall have such dimensions as to hold within 2.5 mm² cables in each connector. The live cable of each neon shall have an appropriate fuse that can be easily replaced.

5.2.8 Light switches

The location of light switches is shown in the project and drawings of the electrical designing engineer. Generally, the light switches of the entire building should be appropriate for levelled installation (under the plaster). The levelled switch units inside the building should be as specified below:
Playbus Range GW 30011,1P-16A, colour is decided by the architect. The switches shall be “quick make slowbreak” switches, designed for AC power network. They should be of a minimum range of 10 ampere.
The switches shall be of broad rocker type, in order to provide multiple range switch units, required until the specifications change. The switches should be installed in an electrical network to provide the appropriate layout when the metal cable boxes are fitted in line with the wall plaster .There are also some types of switches that may be installed in the plastered surface. These types of switches are commonly used when the electricity distribution system is installed using channels. It is also recommended in wood and metal work stations, and also in the transformer and generator rooms. Depending on the location they will be used and the switching method, switches are categorized in:

- Single-pole switches
- Double-pole switches
- Deviation switch
- Signal lamp and time switches

Single-pole switches are mainly used in small premises, with a small number of lights (1 or 2).
Double-pole switches are mainly used in premises with a high number of lights, which may be partially switched on, for e.g. In classrooms with two rows of lights, where only one or both rows can be switched on.
Deviation switches are used in those premises that have both an entry and exit point, because they switch on lights in one entry/exit point and switch off lights in the other entry/exit point, or may be used in hallways. Signal lamp and time switches are used in stairways, hallways etc.

5.2.9 Sockets

A fully completed system with socket units should be provided according to the project and designs prepared by the designing electrical engineer.

All sockets to be installed in schools/kindergartens should be earthed and ensure child protection. Similarly to switches, there are sockets that may be installed under or above the plastering.

Based on the function they perform, the sockets are divided in:

- One-phase, two-phase or three-phase voltage sockets
- LAN system and telephone sockets
- TV sockets

All sockets, until another specification is made, should be of 2-slot 16 Amp type and emerged on the surface. They should be installed horizontally and should have a colour matching with the clips of the lightning switches.

All sockets should be of similar types as specified below: Playbus Range, 250v safety separator, 2P-16A.
Playbus Range, 250v safety separator, 2P-16A.

Also, the other electrical accessories such as push button switches, flat installation boxes, etc., should be in compliance to the general catalogue of 2000 GEWISS, or similar..

The above socket is a 16 A, 380 V earthed socket, therefore the cable supplying it is a 5-wire cable with dimension of 2.5 mm². If more powerful three-phase equipment or machineries are provided to be used

then based on the equipment power, the electrical engineer shall calculate the supply cable dimension and the socket amperage. LAN system and telephone sockets are the same and they are explained in details in paragraphs 8.6 and 8.7. TV plugs shall be coaxial, equipped with direct protection.

5.2 **Earthing system**

All equipment or their parts that are not solidly earthed, shall be connected to a single earthing system, pursuant to an approved method, using powerful conductors attached by flanges. When parts of the equipment are attached to a water, gas or fuel line, the equipment shall be connected to the line using a tinned copper tape, with dimension 20 mm x 1.5 mm or using a PVC isolator earthing system. A separate protective conductor shall be installed throughout the line installations and pipes, which shall be attached to an earthed end line in any box of accessories and pipes, and which shall be installed within flexible pipes of any length.
However, the installation of a separate protective conductor and the installation of pipes in the main line shall be performed following the same standard as if they are the only separate protective conductors.

It is necessary to select galvanized iron earthing electrodes, with an L-shape, with dimensions 50x50x5 mm (or zinc-coated earthing electrodes), inserted at a minimum depth of 2 meters. The number of earthing electrodes depends on the type of soil and the value of Rt (earthing resistance), which must be lower than 4 Ω. Accordingly, once the electrodes are installed, their values should be measured using an Rt measuring equipment and afterwards a report must be drafted, which shall be presented to the Supervisor. If the Rt is higher than 4 Ω, it is necessary to add the number of electrodes until the requested value is achieved. The electrodes shall be installed in a rectangular, triangle or square shape based on their number but at all cases, at a distance of 1.50 m from each other. The electrodes shall be connected using a zinc-coated tape, with dimensions 40 mm x 4 mm, through welding or tightening screws. The electrodes connection point shall be a permanent rust proof connection. The 40 mm x 4 mm zinc-coated tape shall go out from the last connection point and shall enter the transformer room, in the potential rail, and from there it will go at all the equipment in the transformer room by extending an earthing cable with a minimum diameter of 25 mm ². The detection action or calling point shall start when:

The light on top of the alarm equipment head or at the calling point turn on

SECTION 6 MECHANICAL, HYDRAULIC AND SANITARY INSTALLATIONS

6.2 Clean water supply system

6.1.1 Piping

Water shall be supplied through a drill well in the territory of the school, at a depth of 20 m, while with regards to the water supply system of the building, PPR (polypropylene) plastic pipes may be used, provided that they fulfil all the quality requirements pursuant to the ISO 9001 and DIN 8078 standards (pipe quality and testing requirements) or galvanized pipes may be used, provided that they comply with the above standards on pipe quality and testing. It is important to emphasize that PPR pipes are almost 15 times lighter than steel pipes.

Water supply pipes shall be resistant to corrosion and highly resistant to chemical agents, light weighted, easily repaired and transported, easily and quickly adhered, shall have a lifespan of more than 30 years and shall be resistant to hot water.

PPR pipes shall have the following properties:

PPR material density	0.9 g/cm3
Adhesion point	146 degrees Celsius
Thermal conductivity at 20 degrees	0.23 W/mK
Linear thermal expansion coefficient	1.5 x 0.0001 K
Elasticity module at 20 degrees	670 N/mm2
Flow stress at 20 degrees	22 N/mm2
Rupture stress at 20 degrees	35 N/mm2

The pipe diameters shall depend on the calculated amount of potable water and flow speed. During calculations, the flow speed shall be estimated within the interval of 0.8-1.4 m/sec.

The pipe length shall be 6-12 m, while their diameter and lining shall be in accordance with the data provided in the technical drawings. Data on the pipe's external diameter, pressure, name of manufacturer, reference standard, year of manufacture etc., shall be stamped in each pipe.

The water supply pipes shall be installed in the shape of columns, throughout the entire height of the building, in points where there are several sanitary equipment and, if possible, as close as possible to points providing potable water. They shall be installed inside the wall. If the pipes shall be extended at a considerable height, it is necessary to use simple elbows or omega type expansion bends.

Water supply pipes shall be connected to the sanitary equipment or group of equipment located at the ground floor using delivery pipes. The delivery pipes shall connect to the discharge columns using three-way joints (wye/tee) or elbows. To reduce the number of columns, sanitary equipment shall be grouped and aligned on each and every floor of the building. The water supply vertical columns shall have the same diameter throughout the entire building height, and such diameter should be lower than the diameter of the main supply pipe but, in all cases, it should not be lower than the diameter of the largest potable water delivery pipe supplying the equipment.

The main water supply horizontal lines shall have a minimum ascending slope of at least 2%, in the same direction of the water flow. The distance between the sewage pipes exiting the building and the water supply pipes shall be at least 1 m on a horizontal plane and these pipes shall always be at a higher quota than the wastewater pipelines.

The PPR pipes are adhered through the electro-fusion method, using the relevant electro-fusion welding equipment. This type of adhesion guarantees a secure, homogeneous and lasting connection. The electro-fusion process lasts very few minutes.

In the case of galvanized pipes, they shall be connected by threading. When connecting such pipes, the threaded part shall be coiled with hemp threads and coated with rust-proof paint or paste to avoid leakage.

All works related to the installation and mounting of the pipes in the facility shall be completed pursuant to the technical requirements of the Supervisor and the project.

The model of the water supply pipes to be used, along with the quality certificate, certificate of origin, pipe testing and warranty certificate shall be reviewed and approved by the Supervisor before they are installed in the facility. The Supervisor may perform complementary tests on the physical-mechanical-thermal properties of the pipes, potential leakage and endured pressure (The pressure test shall be performed using a pressure 1.5 times higher than the operating pressure).

6.2.2 Fittings for potable water pipes

With regards to the building's water supply system, when PPR (Polypropylene Random) plastic pipes are used, the respective fittings shall be PPR that fulfil the quality requirements as per the ISO 9001 and DIN 8078 standards (quality and testing requirements) while in the case of galvanized pipes, the fittings shall also be galvanized.

The fitting used in this line shall be:

Simple 45 and 90 degrees elbows
Metallic thread male and female elbows;

Simple and threaded three-way joints;
Four-way joints (cross)
Simple joints (coupling/union)
Metallic thread female and male joints;
Different pipe reducers;
Dutch type fittings;
Supports;
Crosses;
Omega-type compensator;
Plugs.

The types of fittings to be used in each case shall be provided by the designer in the technical drawings.

Fittings that will be used for the supply of water shall be perfectly resistant to corrosion and highly resistant to chemical agents, light weighted, easily repaired and transported, easily and quickly adhered, shall have a lifespan of more than 30 years and shall be resistant to hot water.

The diameter and lining shall be in accordance with the respective pipes and shall comply with the technical drawings and technical conditions (the fittings lining shall withstand a pressure 1.5 times higher than the pipes operating pressure). Data on the fittings' external diameter (elbows, three-way, joints, reducers etc.) pressure, name of manufacturer, reference standard, year of manufacture etc., shall be stamped in each element.

The PPR fittings are adhered through the electro-fusion method, using the relevant electro-fusion welding equipment. This type of adhesion guarantees a secure, homogeneous and lasting connection. The electro-fusion process lasts very few minutes. During this process, pipes shall be cut, heated and connected to their and their respective PPR fittings using special equipment.

In the case of galvanized pipes, they shall be connected to the respective fittings by threading. In this case, all fittings shall have metallic threads. When connecting them, the threaded part shall be coiled with hemp threads and coated with rust-proof paint or paste to avoid leakage.

All works related to the installation and mounting of the pipes in the facility shall be completed pursuant to the technical requirements of the Supervisor and the project.

A model of the appropriate fitting to be used in the water supply pipes, along with the quality certificate, certificate of origin, pipe testing and warranty certificate shall be reviewed and approved by the Supervisor before they are installed in the facility. The Supervisor may perform complementary tests on the physical-mechanical-thermal properties of the fittings, potential leakage and endured pressure upon installation (The pressure test shall be performed using a pressure 1.5 times higher than the operating pressure).

6.2.3 Valves

Valves are special equipment that shall be used to control water flow in the pipeline. Valves adjust the amount of water sent to the rest of the pipe or may completely interrupt the flow of water.

Valves may be made of bronze, cast iron or PPR. There are different types of valves, such as ball or gate valves, coupling, threaded or flange valves. Depending on how valves are attached to pipes they are categorized in: flange and threaded valves. In the case of flange valves, a rubber seal should be placed on the attachment point while in the case threaded valves, it is necessary to use hemp threads and rust-proof paint or paste, to prevent leakage.

Valves use in a pipeline shall withstand a pressure 1.5 times higher than the operating pressure. The shall withstand a minimum pressure of 10 atmosphere.

Valves shall be perfectly resistant to corrosion, resistant to chemical agents, light weighted, easily repaired and transported, easily and quickly adhered, shall have a lifespan of more than 25 years and shall be resistant to mechanical shocks.

In special cases, when requested by the project or the Supervisor, check valves may be used, which allow the water to flow in only one direction. The shall be installed in the pump suction pipe or supply pipe.

Also, they may be installed at the entrance of each building to prevent water from going in.

All works related to the installation and mounting of the pipes in the facility shall be completed pursuant to the technical requirements of the Supervisor and the project.

A model of the appropriate valve to be used, along with the quality certificate, certificate of origin, testing and warranty certificate shall be reviewed and approved by the Supervisor before installed in the facility. The Supervisor may perform complementary tests on the physical-mechanical-thermal properties of the fittings, potential leakage and endured pressure upon installation (the pressure test shall be performed using a pressure 1.5 times higher than the operating pressure).

6.4 Hydro-sanitary equipment

6.4.1 Toilet and tank

It has been provided that toilets shall be installed in bathrooms or restrooms. They shall be porcelain toilets and shall comply with the international technical standards, which should be defined in the project by the designer. They may be oriental or French design toilets. In the case of schools, it is recommended to use*oriental design toilets,*which are installed directly on the floor and are attached using cement mortar pursuant to the instructions provided by the Supervisor.

French design toilets shall be used in kindergartens and by the teaching staff or people with disabilities, and they are attached to the floor or wall using brass clamps, screws and threaded plugs, without removing the wall tiles. Before installation, they shall be connected to the water discharge pipes. There are two types of toilets: bottom outlet toilets or side outlet toilets, on the rear part of the toilet. In side outlet toilets, the outlet pipe shall be 19 cm above the floor.

At the lowest part of the toilet bowl, there is a hole with a minimum diameter of 90 mm. The upper part of the toilet shall have an oval or round shape, depending on the criteria of the project, and also on the type and model of the toilet. The French design toilets have a height of 38-40 cm and are installed pursuant to the criteria defined by the project and Supervisor. The horizontal distance of toilets from other hydro-sanitary equipment (sinks, bidet etc.) shall be

at least 30 cm.

The toilet shall ensure high water circulation, resistance towards mechanical shocks, water-proof isolation, resistance against corrosion and chemical agents, and shall be easily installed or repaired.

The toilet is connected to the water discharge pipes using the siphon pipe. The pipe connecting the toilet with the discharge pipes shall be a PVC pipe and shall have the same technical characteristics as the water discharge pipes. Their diameter shall depend on the toilet outlets (usually 100-110 mm long).

The toilet shall be connected to the water supply system through its tank, which may be installed directly above the toilet or it may be attached to the wall, separately from the toilet. This shall depend on the type of these equipment. The toilet tank is mounted at a height of approximately 1.5 m above the floor (when the toilet and tank are separate elements). It can be made of porcelain, metallic or plastic. The type of material shall be defined in the project. The discharge pipe shall be mounter at the wall using strong galvanized clamps, screws and threaded plugs, every 50 cm.

All works related to the installation of the toilet shall be completed pursuant to the technical requirements of the Supervisor and the project. The toilet pipes shall be adhered to the discharge pipes using appropriate glue for PVC pipes, recommended by the pipes manufacturer.

A model of the appropriate toilet to be used, along with the quality certificate, certificate of origin, testing and warranty certificate shall be reviewed and approved by the Supervisor before installed in the facility. The technical data of the toilets, including their model, name of manufacturer, reference standard, year of manufacture etc., shall be provided in the respective catalogue accompanying the goods. The Supervisor may perform complementary tests on the physical-mechanical-thermal properties of the toilets.

6.4.2 Sinks

It has been provided that bathrooms or restrooms shall always be equipped with the respective hydro-sanitary equipment (sinks), which shall be used by children to wash their hands and face. Sinks may be made of porcelain, metal, plastered brick wall and covered in tiles or installed in the building. The type of material shall be defined in the project by the designer.

Sinks shall ensure high water circulation, resistance towards mechanical shocks, water-proof isolation, noise elimination, resistance

against corrosion and chemical agents, and shall be easily installed or repaired.

The porcelain sinks shall be supported and attached to the wall using brass clamps, screws and threaded plugs, without removing the wall tiles. Upon attaching the sink to the wall, it is necessary to install chromed-brass water taps and attach the sink to the siphon pipes and water discharge pipes. The sink shall also be equipped with its own metal drain. The drain shall be located at the lowest part of the sink bowl, where there is a hole with the drain dimensions. The sink has a bowl with dimensions 40/60 x 36-45 cm, depending on the selected type and model. The dimensions of the sink shall depend on its type and model. Sinks shall be installed at a height of 75 - 85 cm pursuant to the requirements of the project and Supervisor. The horizontal distance of sinks from other hydro-sanitary equipment (sinks, bidet etc.) shall be at least 30 cm

The sinks shall be connected to the water discharge pipes through the drain and PVC siphon pipe. This connection can be made using three-way joints at an angle of 45 or 60 degrees. The connecting pipe shall be a PVC pipe and shall have the same technical characteristics as the water discharge pipes. These pipes shall have a length of 20 - 40 cm. Their diameter shall depend on the drain outlets, where they have been mounted.

Sinks shall connect to the water supply system through two flexible pipes with lengths 30 - 50 cm and a diameter of 1/2". These pipes shall connect the water tap with the hot and cold water supply pipes. Appropriate seals shall be placed at the connection point between the water tap and the sink, to prevent leakage.

All works related to their installation and mounting in the facility shall be completed pursuant to the technical requirements of the Supervisor and the project. The sink shall connect to the discharge pipes using appropriate pipes and appropriate glue for PVC pipes, recommended by the pipes manufacturer.

A model of the appropriate sink to be used, along with the quality certificate, certificate of origin, testing and warranty certificate shall be reviewed and approved by the Supervisor before installed in the facility. The Supervisor may perform complementary tests on the physical-mechanical-thermal properties of the toilets.

6.4.3 Water taps

Taps are special equipment that are used to control water flow in the pipeline. They shall be installed in the respective hydro-sanitary equipment (sinks, kitchen sinks or bidets) and may be simple taps (used for potable water) or mixer taps (used for cold and hot water systems). With regards to simple taps, you may refer to item 95 (Valves). Taps may be used to change the amount of water coming out of the hydro-sanitary equipment or to adjust the water temperature. Taps may be made of bronze, cast iron or nickel-coated. There are different types of taps, such as ball or gate taps.

Taps shall be perfectly resistant to corrosion, resistant to chemical agents, presentable, easily repaired, durable and resistant to mechanical shocks. Taps shall withstand a pressure 1.5 times higher compared to the line pipes. The should withstand a minimum pressure of 10 atmosphere. All works related to the installation of taps in hydro-sanitary equipment shall be completed pursuant to the technical requirements of the Supervisor and the project.