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TECHNICAL SPECIFICATIONS
HYDROTECHNICAL DESIGN

FOR THE CONTRACT
PREPARATION OF DESIGN AND SUPERVISION FOR REPAIR AND RETROFITTING OF:

ISMET NANUSHI JOINT HIGH SCHOOL

LOT I
MUNICIPALITY OF DURRES

CLIENT **CONSULTANT**

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Water supply system

1.2.1 Pipes

For the water supply system of buildings can be used plastic pipes PPR (Polypropylene) that meet all quality requirements according to ISO 9001 and DIN 8078 (requirements for quality and testing of pipes) or can be used xingato pipes that conform to the standards. above for their quality and testing. We emphasize that PPR pipes are about 15 times lighter than steel pipes.

Water supply pipes must provide corrosion resistance, high resistance to chemical agents, light weight, easy repair and transportation options, simple and fast mounting, lifespan over 30 years and resistance to hot water.

The properties of PPR pipes should be as follows:
• Density of PPR material 0.9 g / cm3
• Adhesion point 146 degrees celsius
• Thermal conductivity at 20 degrees 0.23 W / m.K
• Linear thermal expansion coefficient 1.5 x 0.0001 K
• Modulus of elasticity at 20 degrees 670 N / mm2
• Strength during flow at 20 degrees 22 N / mm2
• Fracture strain at 20 degrees 35 N / mm2

The diameters of the pipes will be a function of the calculated amount of drinking water and the speed of movement. During the calculations, the movement speed should be taken in the intervals 0.8-1.4 m / sec.

The length of the pipes is 6-12 m, while the diameter and thickness should be according to the data in the technical drawings. Data on the outside diameter of the pipe, the pressure, the name of the manufacturer, the standard they refer to, the year of manufacture, etc., must be stamped on each pipe.

Water supply pipes should be placed at the entire height of the building, in the form of columns, in those sanitary joints where the appliances are more grouped and preferably as close as possible to those joints that require drinking water. They are installed inside the wall. In case the length of their extension is large, compensators of simple elbow type or omega type should be installed.

The water supply pipes are connected to the sanitary fittings or group of fittings on each floor by means of delivery pipes. The connection of the delivery pipes to the discharge columns must be done with three-way or elbows. To reduce the number of columns, sanitary equipment should be grouped and placed on top of each other from floor to floor of the building. The diameter of the vertical water supply columns is taken to be the same for the entire height of the building, with a diameter smaller than the main supply pipe and in no way smaller than the largest drinking water delivery pipe supplied by the equipment.

The main horizontal water supply lines are placed on an ascending slope in the direction of water movement of not less than 2%. The distance between the sewer pipes coming out transversely from the building and the water supply connections, should be not less than 1 m in the horizontal plane and always at a higher quota than the sewage systems.

PPR pipes are welded by electrofusion method using appropriate electrofusion welding equipment. This type of gluing guarantees a secure, homogeneous and long-lasting bond. The electrofusion bonding process takes very few minutes. During this process, the pipes are cut, heated and the corresponding PPR fittings are made with special welding equipment. The electrofusion bonding process is done as follows:

• The electro-fusion welding equipment and the appropriate tools for the specified pipe diameters are ready
• The welding equipment is plugged in and the ignition lamp and the work lamp are checked.
• Wait until the welding temperature of 260 degrees Celsius is reached
• The welding depth is marked with a conductive pencil.
• If pipes, fittings or equipment are dirty, clean them.
• The process of heating and welding the pipes begins. The heating, welding process and cooling times are given in the following tables of the welding apparatus.

Outer Diameter	Heating Time	Pressure time	Cooling time
16 mm (1/2")	5	4	2
20 mm (3/4")	5	4	2
25 mm (1")	7	4	2
32 mm(1.1/4")	8	6	4
40 mm(1.1/2")	12	6	4
50 mm(1.3/4")	18	6	4
63 mm (2")	24	8	6

• Place the end of the tube on the hot hole and the corresponding fitting on the other side of the appliance. The respective ends of the pipe and the corresponding fitting, after being allowed to warm up, as shown in the table, are joined to the heated state they are in and left to cool for a few minutes (see table). It should be borne in mind that for different diameters there are different times for heating, welding and cooling.
• The tube is ready to use

In case xingatos pipes are used, their connection is done by threading. During joining, the threaded part should be wrapped with linen thread and anti-rust paint or paste to prevent leakage (crying).

All work related to their installation and placement in the facility should be done according to the technical requirements of the supervisor and the project.

A model of the water supply pipe to be used together with the quality certificate, certificate of origin, testing certificate and pipe warranty will be given to the Supervisor for consideration for approval before being placed on the facility. The supervisor can perform additional tests for the physical-mechanical-thermal data of the pipes, possible leaks, as well as the pressure that the pipes withstand (The pressure test is done with 1.5 times the working pressure).
1.2.2 Fittings for drinking water pipes

For the water supply system of buildings, in cases when PPR (Polypropylene Random) plastic pipes will be used, the respective fittings must be PPR which meet the quality requirements according to the ISO 9001 and DIN 8078 standard (quality and testing requirements) while in xingato pipes the fittings are xingato.

The fittings used in these lines are:

• Simple elbows with 45 degrees and 90 degrees
• Elbows with metal fillets of female and male type;
• Simple and filleted triangles;
• Four (Crosses)
• Simple connectors
• Couplings with metal fillets female type and male type;
• Various reductions;
• Dutch type fittings;
• Support;
• passing;
• Omega type compensator;
• Caps.

The types of fittings to be used for each occasion should be provided by the designer at Technical drawings.

Fittings to be used for water supply must provide perfect corrosion resistance, high resistance to chemical agents, light weight, easy repair and transportation options, easy and fast mounting, lifespan over 30 years and water resistance warm.

The properties of PPR fittings should be as follows:

• Density of PPR material 0.9 g / cm3
• Adhesion point 146 degrees celsius
• Thermal conductivity at 20 degrees 0.23 W / m.K
• Linear thermal expansion coefficient 1.5 x 0.0001 K
• Modulus of elasticity at 20 degrees 670 N / mm2
• Strength during flow at 20 degrees 22 N / mm2
• Fracture strain at 20 degrees 35 N / mm2

The diameter and spacer should fit the respective pipes and be according to the data in the technical drawings and technical conditions (the fitting of the fittings should be such as to withstand 1.5 times the working pressure of the pipes). Data on the outer diameter of the fittings (elbows, trusses, couplings, reductions, etc.), pressure, manufacturer name, standard they refer to, year of manufacture, etc. must be stamped on each piece.

PPR fittings are welded by the electrofusion method using the appropriate electrofusion welding equipment. This type of gluing guarantees a secure, homogeneous and long-lasting bond. The electrofusion bonding process takes very few minutes. During this process, the pipes are cut, heated and the corresponding PPR fittings are made with special welding equipment.

The electrofusion bonding process is done as follows:

• The electrofusion welding equipment and the appropriate tools for the specified pipe diameters are ready;

• Connect the welding equipment to the power outlet and check the ignition lamp as well as the work lamp

• Wait until the welding temperature of 260 degrees Celsius is reached

• The welding depth is marked with a conductive pencil.

• If pipes, fittings or equipment are dirty, clean them.

• The process of heating and welding the pipes and proper fitting begins. The heating, welding process and cooling times are given in the following tables of the welding apparatus.

Outer Diameter	Heating Time	Pressure time	Cooling time
16 mm (1/2")	5	4	2
20 mm (3/4")	5	4	2
25 mm (1")	7	4	2
32 mm(1.1/4")	8	6	4
40 mm(1.1/2")	12	6	4
50 mm(1.3/4")	18	6	4
63 mm (2")	24	8	6

Place the end of the tube on the heated hole and the corresponding fitting on the other side of the device. The respective ends of the pipe and the corresponding fitting, after being allowed to warm up, as shown in the table, are joined to the heated state they are in and left to cool for a few minutes (see table). It should be borne in mind that for different diameters there are different times for heating, welding and cooling.

When xingato pipes are used, their connection to the respective fittings is done by threading. The fittings in this case are all threaded metal. During joining, the threaded part should be wrapped with linen thread and anti-rust paint or paste to prevent leakage.

All work related to their installation and placement in the facility should be done according to the technical requirements of the supervisor and the project.

A model of proper fitting to be used with the water supply pipes, together with the quality certificate, certificate of origin, testing certificate and pipe warranty will be given to the Supervisor for consideration before approval. placed in the object. The supervisor can perform additional tests for their physical - mechanical - thermal data, possible leaks, as well as the pressure they endure after installation (Pressure test is done with 1.5 times the working pressure).

Collectors with bronze fittings have been used in the sanitary nodes of the building as a material to be used referring to cost-efficiency standards. From the main lines of PPR are supplied the collectors of sanitary joints with diameter 1 ", 1x1 / 4" or 1x1 / 2 "according to the dimension of the collectors that are advised not to be bigger than 10x10. The collector gives you the opportunity during operation and maintenance to interrupt the supply for each device separately. Cold and hot water are distributed in the collector according to the requirements and needs.

Fittings in the collectors of sanitary joints are made of bronze material with asbestos gaskets. Bronze material is a material that does not contaminate the water that passes in the fitting and has no corrosion.

From the collector come the PE-Xa lines (Multistrat) which are connected to the respective bouquets according to the dimension and the collector uncle.

Use of multilayer lines with polyethylene coating and aluminum or copper coating which are not in contact with water but an intermediate layer to give the possibility of bending the pipe or even bending as needed and terrain.

The use of multistrat lines for distribution of cold or hot water is efficient as no fittings are used along the line, avoiding blockages, reducing longitudinal losses and speed in installation. Multistrate lines have blue or red thermal insulation making it easier to distinguish their laying.

The multistrat pipe is also used for laying lines for the heating system as it works very well up to temp +95 degrees.

1.2.3 Valves

Saracens are special devices that will be used to control the flow in water pipes. The size of the flow given to the rest of the pipe or the complete cessation of flow can be changed by means of sockets. Saracens can be made of bronze, cast iron or PPR. They are of the spherical or port type, coupling, threading or flange type.

Saracens are divided into types according to the way of joining the pipes: with flange and with fillets.

The valves consist of the following parts:

• Cylindrical body made of cast iron or bronze. Relevant flanges must be fixed to this body, which serve to connect the valves to the mains pipeline.
• The disc or sphere which should secure the closing and opening of the valves. They are made of steel or bronze and must be resistant to corrosion, mechanical shocks, etc.
• The flywheel or lever, which connects to the axis of rotation and opens or closes the disc by means of a vertical rotational motion.
• valves cap, which is connected by bolts and nuts to the cylindrical body of the valves or by threading.

Rubber guaino in flanged or flax thread type and anti-rust or paste paint, for those with fillets, should be placed at the junction of the pipes with the pipes, so that there is no water leakage.

Saracens used in a water supply line must withstand a pressure 1.5 times higher than the working pressure. They must withstand a minimum pressure of 10 atm.

Saracens should provide perfect resistance to corrosion, resistance to chemical agents, light weight, easy repair and transportation, lifespan over 25 years and resistance to mechanical shocks.

In special cases, at the request of the project or the supervisor, solenoid valves are used, which allow water to move in one direction only. These should be placed in the suction pipe of the pumps or in their delivery pipe. They can also be placed at the entrance of any building to block water from entering.

They are of the gate type, which by means of a hinge opens only in one direction. If the water flows in the opposite direction to what is required, it is closed by a hose.

For the water supply system of buildings, in cases where PPR (Polypropylene Random) plastic pipes will be used, the respective slides can be PPR, which meet the quality requirements according to the ISO 9001 and DIN 8078 standard (quality and testing requirements) .

All work related to their installation and placement in the facility should be done according to the technical requirements of the supervisor and the project.

A valve model to be used in conjunction with the quality certificate, certificate of origin, test certificate and warranty will be given to the Supervisor for consideration for approval before being placed on the facility. The supervisor can perform additional tests for their physical-mechanical-thermal data, possible leaks and the pressure they endure after installation (Pressure test is done with 1.5 times the working pressure).

1.2.4 Water deposits

Water depot considering the calculations on the number of students referring to the requirements for sanitary water as well as the calculated amount for Fire Protection the amount of required deposits would be large and their installation would be problematic during the period of operation and maintenance.

To reduce occupied surfaces and increase performance a joint reinforced concrete depot should be constructed below the ground surface with water proof concrete to avoid internal or external filtration. Since the MNZ and Drinking Water pumps will be mounted on the -1 floor such a depot would provide self-flow supply. Calculated quantity 35 liters per student (35 liters x 840 students = 29,400 liters), Needs for cleaning and maintenance 5000 liters of water and the need for MNZ (1 hour 3600 sec x 5 liters / sec = 18,000 liters) Seeing the possibility without added to the surface the reserve of MNZ is kept larger to be used by the means of PMNZSH without the need to move the means from the object in case of fire. A warehouse with internal dimensions of 7x6 m and h 2.75 m from the ground surface or h 1.5 of water has been selected so as not to dig below the quota of the school foundations and to provide water with its own flow to the service pumps.

Between the base of the depot and the walls will be used metal water stop to avoid filtration between the concrete carried out at different times.

The warehouse will have a checkpoint and non-contaminating stairs with clothing to avoid corrosion to enable galaxy control or even cleaning when the school is not in use.

Since the depot is used for both drinking water and MNZ systems, the continuous circulation of water is ensured and at the level of 0.7 m from the bottom of the reservoir an electric galley will be installed which will cut off the energy of the pump for water supply by providing the amount of MNZ intact.

1.2.5 Water pumps

Centrifugal type water pumps can be installed at the request of the project to ensure proper pressure and flow throughout the day in a building. Pumps must be equipped with water meter, pressure gauge, relevant pipes connecting the pump to the water supply system, their respective electrical panel, relay protection system, thermal protection, as well as the automatic control system of work.

The required pressure, flow, their power and other technical specifications, should be given in the technical drawings by the designer in view of the daily requirements for water consumption.

When there are only pumps in the internal water supply network, the pump flow should be equal to the maximum daily water flow per second.

When there is a water tank and pump in the internal water supply network, the pump flow must correspond to the daily schedule of water use and delivery through the building.

In determining the height of the pump rise (required pressure) should be taken into account the height of the building, water pressure in the external water supply network as well as local losses through turns, exits, in each part of the building.

The power of the water pump is determined by the relevant formula as follows:
N = Q x H / 102 x n
Where: Q = water flow to be pumped in l / sec
H = Height of water delivery
n = pump efficiency which must be more than 65% and given by the pump manufacturer.

INVERTER sanitary water pumping group

These pumps are anticipated pumps with vital stainless-steel parts and have the following characteristics:
A pump connected to the sending and suction collector centrifugal type, horizontal, connection with flanges and anti-vibration jute.

The pump body and motor are coated with ipoxide resin.
Body: Iron
Rotor: Plastic
Communication parts: Cast iron
Shaft: X 20 Cr 13 (1.4021)
Shaft cover: 316 stainless steel
Mechanical sealant: AQ1EGG (Standard)

Fluid: Pure water
Flow: 3.0 m³ / h
Pressure: 25-45 mkH2O or 350 kPa
Working temperature: (-10 to + 120 ° C)

Working pressure: (max. 10 bar)

engine
Winding: 3 ~ 400V / 50Hz
Motor power: 1 x 2.5 kW
Speed: 3770 1 / min
Current: 2 x 10.0 A
Protection: IP 55
Flange connections: DN 50 / PN16

The group consists of an electrical panel and is equipped with zingato suction and discharge pipe, low- and high-pressure resistors, electric caliper, electric frame for release and protection. It consists of an electronic regulator for the gradual operation of pumps (temporizer), as well as for the protection and signaling of over / under voltages, as well as in cases of phase change / absence in the electrical circuit.

The group is equipped with a 10-bar safety valve. It should be placed in such a way as to provide front and side space needed for test operations and maintenance.
To avoid resonances or mechanical stresses for eccentricity, support supports must be installed. It is recommended to place supporting supports on the sending and return collector pipes.
The base should be made of concrete and the gluing should be done with shock absorbers
Each pump is controlled by an independent electrical frame, with easy reading of measuring and signaling instruments.

1.2.6 Hot water system

The hot water system consists of the thermal energy producer, distribution pipes and relevant thermal power supply equipment.

The producer of thermal energy depending on the source of this energy can be the boiler, solar panel or boiler. In the case of the school, the sanitary hot water is produced solar panel
For hot water supply will be used PPR pipes as well as multistrat pipes with thermal insulation which are suitable for high temperatures.
The diameters of the pipes will be a function of the calculated amount of drinking water and the speed of movement. During the calculations, the movement speed should be taken 0.8-1.2 m / sec.

All work related to the installation and placement of the hot water system in the facility must be done perfectly and according to the technical requirements of the supervisor and the project. Hydraulic and thermal tests must be performed before the pipes are put into use. Thermal tests are performed at maximum temperatures to determine heat losses as well as other technical indicators specified in the design.

Hydraulic tests are performed for test pressure 25% higher than working pressure. They are made to see the stability of the network as well as possible leaks that may occur in the pipelines.

A model of hot water supply pipes, fittings, thermal insulation material together with quality certificate, certificate of origin, test certificate and warranty will be given to the Supervisor for consideration for approval before being placed on the facility. The supervisor can perform additional tests for the physical - mechanical - thermal data of possible leakage as well as the pressure and temperature that the pipes endure.

1.3 Wastewater Discharges

Dimensioning and design of all components and accessories of the sewage and rainwater discharge system will be performed taking into account all the defining elements as follows:

• Distribution scheme (internal discharges of H / S equipment, columns, collectors, wells);
• Determining the nominal discharge flow for each H / S device;
• Determining the projected flow of discharges;

• Drawings and dimensions of internal wastewater discharges;
• Drawings and dimensions of sewage column discharges;
• Drawings and dimensions of wastewater pressure balancing columns;
• Drawings and dimensions of internal discharge collectors;
• Drawings and dimensions of rainwater discharge pipes;
• Drawings and dimensions of external collectors;
• Drawings and dimensions of sewage and rainwater wells.

The dimensioning of the pipes will depend on the calculated flow of sewage or rain, the speed of circulation and their slope, etc. The speed should be 1.0-1.2 m / sec and the slope of the pipes in the range (0.5 - 0.8)%.
The length of the pipes will be 6-10 m. The diameters and thicknesses will be in accordance with the project data. The outer diameters of each pipe must be stamped with characteristics such as pressure, manufacturing plant, year of manufacture, etc.

1.3.1 Exhaust pipes

For water discharges inside the premises will be used plastic pipes RAU - PP (thermopostable polypropylene at high temperatures) that meet all quality requirements according to standard EN 1451 (Requirement for testing and quality of pipes). They are designed in accordance with standard EN 12056.
These pipes must provide perfect resistance to corrosion, high resistance to chemical agents, light weight, easy repairs, transportation, easy and fast installation and lifespan over 30 years.

Exhaust pipes should be placed at the entire height of the building, in the form of columns, in those sanitary joints where the appliances are more grouped and preferably as close as possible to those joints that collect more polluted water and greater pollution.
Exhaust pipes are connected to the sanitary equipment or group of equipment on each floor by means of delivery pipes. The connection of the delivery pipes to the discharge columns should be made with sloping triangles at an angle of 45 or 60 degrees. The delivery pipes can be laid along the walls, above or under the soles, taking into account the certain conditions for the installation of the internal sewerage network. The length of these pipes should not be more than 10 m. Their diameter will be in function of the outlets of the sanitary equipment that have been placed.

Each vertical discharge column is equipped with control points which must be placed on every two floors starting from the bottom of the column.

Exhaust pipes to be used outdoors, are stunned PP pipes, with technical specifications as follows:

Technical specifications:

Material: PP (Polypropylene) in black and yellow
dimensions:
- Marry with [mm]: 150-600 - L [m]: 3, 6
Maximum operating temperature [° C]: 95
Pipe stiffness class [kN / m2]: SN 4, SN 8

9.3.2 Fittings for sewage pipelines

For the connection of the discharge pipes with each other as well as with the sanitary equipment or their groups will be used the respective fittings with ad hi material RAU - PP, that meet all the quality requirements according to the standard EN 1451 (Requirement for testing and quality of pipes) .

These fittings (coupling parts) should provide corrosion resistance, high resistance to chemical agents, light weight, easy repair, transport and installation, simple and fast.

Their dimensions (ad hi ic) will be a function of the calculated amount of polluted water, the type of sanitary equipment, the speed of water movement and the diameters of the respective pipes. During the calculations, the speed of water movement should be taken 1-2 m / sec and the filling rate will be 0.5-0.8 of the pipe section.

Their diameter and thickness should be according to the data in the technical drawings. Data on outer diameter, lengths, pressure, manufacturer name, standard they refer to, year of production, etc. must be stamped on each fitting.

The diameter of the fittings must be the same as the diameter of the discharge pipe to which it will be connected and in no way smaller than the most suitable sewer pipe connected to it. In the event of a change in the diameter of the discharge and delivery pipes, the fittings must be fitted to each of them.

1.3.3 Ventilation pipes

Ventilation pipes are an extension to the upper part of the exhaust columns and should be drawn 70 - 100 cm higher than the upper part of the roof or terrace of the building.

They should serve for the ventilation of the internal and external sewerage network. This ventilation is necessary because it makes it possible to remove the gases created in the exhaust columns and various vapors that are harmful to the lives of residents.
Also, the ventilation pipes will serve to connect the sewer columns with the atmosphere to avoid interruption of the work of the siphons in the sanitary equipment.

Ventilation pipes should have an internal diameter of DN 75 and on top of the ventilation pipes should be placed a hood which prevents the entry of rainwater and snow into the pipe and improves the ventilation of the discharge column.

To improve and speed up the ventilation of the exhaust columns (depending on the importance of the facility and the requirements of the project, in the ventilation tubes, helical devices can be mounted which make the rapid removal of gases and vapors coming from the exhaust columns.

1.3.4 Piles

RAU - PP piles will be used for floor water discharges, which meet all quality requirements according to standard EN 1451 (Requirements for testing and quality of pipes.

Chickens can be made of plastic, stainless steel and bronze.
Piles must provide high water permeability, resistance to corrosion and chemical agents, easy repair, transport and assembly.

Discharge piles should be placed on the lower part of the surface where the water will collect. Usually they are not placed close to the junction of the floor with the walls, but as close as possible to the middle of the floor.

The discharge chambers are connected to the discharge columns by means of a PP pipe. The connection of the piles to the discharge columns can be made with inclined triangles at an angle of 45 or 60 °. The connection pipe must be PVC with the same technical characteristics of the water discharge pipes. The length of these pipes is 20 - 30 cm. Their diameter will be in function of the outlets of the plate where they are placed. In case of change of the pilot dimmer with that of the delivery tube, the corresponding reductions will be used.

1.3.5 Pusetat

All types of wells mentioned above can be with such walls with prefabricated concrete elements, or with concrete poured in place.

The material from which both the frame and the lid are made must be made of cast iron.
Wells must meet the following technical requirements:

• External bearing load;
• Soil pressure;
• Water pressure.

The dimensions of the wells are calculated as a function of the feeds are determined by the designer in the respective drawings.

Also, the dimensions of the collectors that discharge sewage and rainwater are calculated and dimensioned in function of the inflows and their material is selected PE wrinkled on the outer surface and polished on the inner one with dimensions ranging from 200 - 250 mm.

1.4 Drainage of rainwater

An important point when designing a building is the drainage of rainwater, which collects from the roofs or terraces.
Rainwater will have a new sewer around the building and then must drain into the general school sewer and further into the existing one in the area.
Roofs, balconies, terraces and other building elements, water must be removed with a system consisting of slopes towards the wells and further collected through pipes inside the building.

1.4.1 Rainwater wells

For the collection of rainwater will be used collection type wells with prefabricated construction waterproof polyethylene and cast iron lid. They can be square, rectangular or circular in shape, while in the way they are organized, they can be one-room with two or more rooms.

Rainwater wells should be circular in shape with a depth of not less than 60 cm. Dimensions are 40 x 40, covered with iron or cast iron grill lid. The cracks with the grill lid are from 25 to 35 mm to stop the garbage and to enable the drainage of water.

Material inlet wells PE - polyethylene, method of production by the rotary casting method. Inspection of PE wells marketed by ITC, must be manufactured in accordance with European standards Pren 13.598 which includes plastic piping systems for drainage and sewerage. The good foundation is built in accordance with DIN V 4.034-1.

The positive characteristics of PE wells are as follows:
• Objects produced without the use of pressure are always perfect;
• No welds;
• It is also possible to produce large objects;
• Ability to produce objects of any shape.

1.4.2 Drainage wells

The rainwater drainage system around the sports fields will be made with prefabricated polymer concrete concrete pins referring to the UNI EN 1433 norm with anti-noise, integrated 8 mm chassis.

1.4.2 Drainage wells

Grill lid, Gize en material - GJS-500-7 (GGG).

Use for drainage of sports fields, width 13.5 cm, height 15.5 cm, load class from class A15 to F900 according to UNI EN 1433.

1.5 Hydro-sanitary equipment

1.5.1 Toilet and exhaust cassette

Toilets are also provided in the washing facilities or toilet rooms. They are made of porcelain material with the data of international technical standards and must be defined in the project by the designer. They can be of the oriental type or alla frenga. In schools, oriental type toilets are

recommended, where it is placed directly on the floor and cement mortar is installed according to the instructions given by the supervisor.

Toilet type alla frenga are used in kindergartens and for pedagogical staff and anti-caps, fixed to the floor or wall with brass bandages, screws and fillet caps without interrupting the tiling of the wall. Before fixing them, the connection with the water discharge pipes must be made. The toilet can be with the exit from the bottom of its body or with the side exit at the back of the toilet. In the toilet with side outlet, the outlet pipe should be 19 cm high from the floor.

In the lower part of the surface of the collecting pit is a hole with a minimum diameter of 90 mm. The upper part of the toilet is oval or circular in shape depending on the demand of the project, their type and model. Toilets alla frenga are 38-40 cm high and are placed according to the request of the project and the Supervisor. The horizontal distance of their placement from other sanitary equipment (Sink, bidet, etc.) should be at least 30 cm.

The toilet must provide high water permeability, resistance to mechanical shocks, insulating protection against water, resistance to corrosion and chemical agents, ease of operation and easy repair.

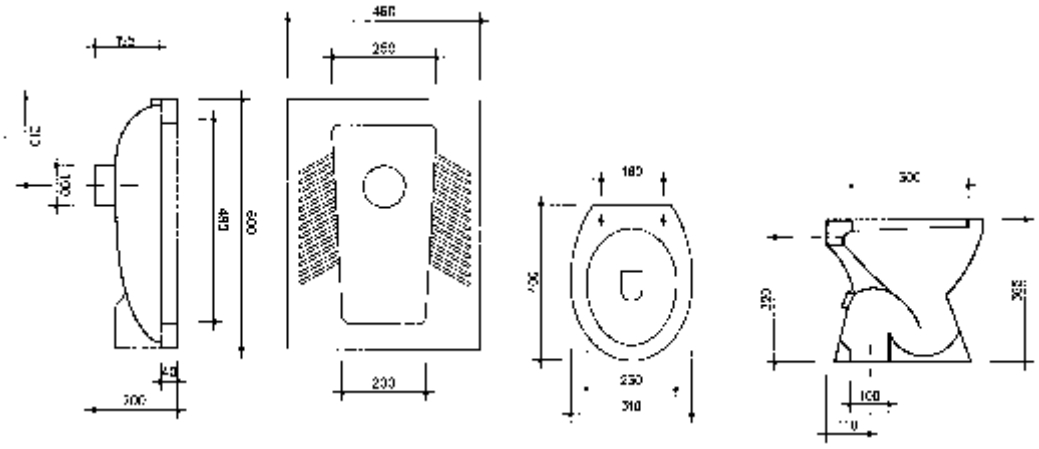
The toilet is connected to the water discharge pipes through a siphon-shaped pipe. The connection pipe of the toilet with the exhaust pipes must be PVC with the same technical characteristics of the water discharge pipes. Their diameter will be a function of the toilet outlets (usually they are 100-110 mm).

The toilet is connected to the water supply system via a discharge cassette which can be installed directly above the toilet or in a wall separated from the toilet. It depends on the type of equipment. The discharge tape is placed at a height of about 1.5 m above the floor (if it is separated). It can be porcelain, metal or plastic. The type of its material should be defined in the project. The exhaust pipe is fixed to the wall with strong xingato bandages, with screws and fillet caps every 50 cm.

All work related to the installation and placement of the toilet must be done according to the technical requirements of the supervisor and the project. The connection of toilets to the exhaust pipes must be done with mastic suitable for PVC pipes, recommended by the manufacturer of the pipes.

A toilet model to be used in conjunction with the quality certificate, certificate of origin, test certificate and warranty will be given to the Supervisor for consideration for approval before being placed on the premises. The technical data of the toilet, including its model, the name of the manufacturer, the standard they refer to, the year of production, etc. must be given in the relevant catalog that accompanies the goods. The supervisor can perform additional tests for their physical-mechanical data.

The following figures show two types of toilets, the Turkish type and the French type.



1.5.2 sinks

In the washing facilities or toilet rooms, the appropriate hydrosanitary equipment (sinks) should always be provided, which serve as places for washing the hands and face of children. Sinks can be metal, porcelain, plastered brick wall lined with tiles or mounted on the work. The type of their constituent material must be determined in the project by the designer.

Sinks should provide high water conductivity, resistance to mechanical shocks, waterproof insulation, elimination of noise during operation, resistance to corrosion and chemical agents, ease of operation and easy repair.

Porcelain sinks and their supports are fixed to the wall with brass bandages, screws and fillet caps without interrupting the wall tile coating. After fixing it to the wall, chrome brass faucets should be placed on the sink and the sink should be connected to the siphon drainage pipes and water discharge pipes. At the same time, the sink must be equipped with its metal plate. The pile should be placed on the lower part of the surface of the collecting pit where a hole the size of the pile has been drilled. The sink has a collecting hole with dimensions 40/60 x 36-45 cm depending on the type and model chosen. The dimensions of the sink are depending on their type and model. The sinks are placed at a height of 75-85 cm according to the request of the project and the Supervisor. The horizontal distance of their placement from other sanitary equipment (bidet, toilet, etc.) must be at least 30 cm

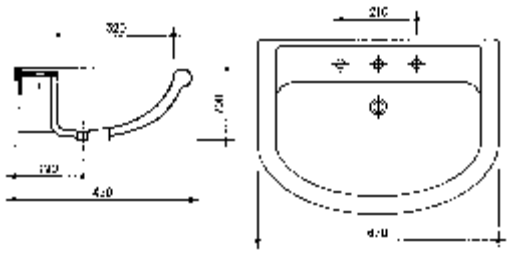
The sinks are connected to the water discharge pipes by means of a pipe, a siphon-shaped pipe made of PVC material. The above connection can be made with sloping triangles at an angle of 45 or 60 degrees. The connection pipe must be PVC with the same technical characteristics of the water discharge pipes. The length of these pipes is 20 - 40 cm. Their diameter will be in function of the outlets of the plate where they are placed.

The sinks are connected to the water supply system by means of two flexible pipes with a length of 30 - 50 cm and a diameter of 1/2 ", which connect the faucet to the hot water supply pipes and ordinary water. At the connection point that the faucet with the sink should be fitted with suitable tires, to prevent the flow of water.

All works related to their installation and placement in the facility are done according to the technical requirements of the supervisor and the project. Sink connections to discharge pipes must be made with the appropriate pipes and with suitable mastic for PVC pipes recommended by the pipe manufacturer.

A sink model to be used in conjunction with the quality certificate, certificate of origin, test certificate and warranty will be given to the Supervisor for consideration for approval before being placed on the facility. The supervisor can perform additional tests for their physical-mechanical data.

The figure below shows a porcelain sink, which is embedded in the wall.



1.5.3 taps

Taps are special devices used to control the flow in water pipes. They are placed in the appropriate sanitary equipment (sinks, sinks or bidets) and can be simple (used only for drinking water) or composite (used for cold and hot water systems). For simple faucets you can refer to item 95 (Valves). With the help of faucets, the size of the flow that comes out in the sanitary equipment can be changed and the temperature of the water used can be adjusted. Faucets can be made of bronze, cast iron or nickel-plated material. They are of the sphere or gate type. The faucet group is a type with pipe connection, or two circular connections, which consists of the following parts:

- Cast iron or bronze body. The shape and type of faucet body are different. The color, shape and type are defined in the project or must be determined by the Investor.
- Disc or sphere, which should ensure the closing and opening of the faucet for cold or hot water, making the adjustment of the amount coming out of the faucet. They are made of steel or bronze and must be resistant to corrosion, mechanical shocks, etc.
- The lever which is connected to the axis of rotation and realizes the opening or closing of the disc.
- Water filter which is placed by threading at the outlet of the faucet and ensures the purification of water from various minerals or salts that accompany drinking water
- Flexible pipes with a length of 30-50 cm which make the connection of the faucet to the water supply pipes. Flexible pipes have a diameter of 1/2 "or 3/8" depending on the type of faucet and pipes

At the place of connection of the taps with the sanitary device and with the connecting pipes, the respective tires must be placed which do not allow the water to flow.

Taps must provide perfect resistance to corrosion, resistance to chemical agents, the best possible appearance, easy repair possibilities, longevity and resistance to mechanical shocks. The faucets must withstand a pressure 1.5 times higher than the line pipes themselves. They must withstand a minimum pressure of 10 atm.
All work related to the installation and placement of faucets in the sanitary equipment to be done according to the technical requirements of the supervisor and the project.

A proper faucet model to be used in conjunction with the quality certificate, certificate of origin, test certificate and warranty will be given to the Supervisor for consideration for approval before being placed on the facility. Data on the outside diameter of the faucet, its model, pressure, manufacturer name, standard they refer to, year of production, etc. must be given in the relevant catalog that accompanies the goods. The supervisor can do additional tests for their quality as well as the pressure they endure after installation (Pressure test is done with 1.5 times the working pressure).

Important note: All the material components and equipment of hydraulic system such as hydro sanitary equipment, nozzles, WC, washbasins, discharge pipes, solar panels etc, must be delivered on the construction site only after the example and technical specifications and brochures has been approved by writing from the supervisor and UNDP Engineer.

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Nr. Lic. K.0130/3