

Technical Requirements**For the Installation of the Second-Class Water System at St. Joseph Junior School, Sliema, Malta**

**In the framework of
the "ALTER AQUA – Phase IV" project**

**Funded by
The Coca-Cola Foundation
and the Energy and Water Agency of Malta**

1. General Terms

- a) The contractor shall execute work in a diligent and competent manner.
- b) The contractor shall complete the work in its entirety, to the Supervising Authority's satisfaction and in accordance with the design and instruction of the Supervising Authority.
- c) Special attention has been given such that as far as possible, the drawings, specification and schedule of items, detail the whole of the requirements for this work. The tenderer shall however satisfy himself that these documents cover the complete systems, as regards materials, equipment and accessories, for the correct and proper operation of the installation as a whole.
- d) All major pipelines and service type shall be identified according to BS 1710: 2014 or equivalent.
- e) The successful tenderer will be expected to complete all works to a high standard of finish and to collaborate with other contractors / sub-contractors so that the project is completed to the desired levels of quality and in the predetermined time schedule.
- f) The successful Tenderer shall guarantee that all spare parts for all material and accessories offered shall be made readily available in Malta for a period of 10 years after the installation is commissioned.
- g) The Supervising Authority may supply any additional drawings or directions as may be necessary for the proper execution of the work. If the work shown on any such drawings or directions is, in the opinion of the contractor, extra to that comprised in the specifications and Bills of Quantities, he shall give notice in writing to this effect before proceeding with such work; if this condition is not adhered to, the Contractor shall have no right for any additional claim at a later stage.
- h) The Contractor shall be responsible for the preparation of all-working drawings, diagrams, schedules of materials, etc., necessary, to be submitted to the Supervising Authority for approval before proceeding with the works. The contractor shall keep such records as

necessary, in order to be able to complete the as-fitted drawings upon completion of the works.

- i) The whole works shall be scheduled by the main contractor on site by consulting the Supervising Authority. The contractor is responsible for preparing an overall works programme which shall require the approval of the Supervising Authority. The contractor shall bind himself to co-ordinate the programme of works with the works of other contractors.

2. Complete System:

The system shall be complete and working in all respects, and shall include all necessary accessories, fittings, ancillary equipment, pipes, vents, strainers, spigots, dampers, valves, controlling equipment, insulation, drains etc., and all items not specifically mentioned according to the scope and spirit of this description.

3. Protection of Works:

The Contractor shall protect all equipment, material and works until taken over by the client and shall remain his sole responsibility until official handing over.

4. Workmanship:

All work shall be carried out in accordance with the relevant safety regulations, normal trade practice and to the entire satisfaction of the Supervising Authority.

5. Piping Installation

- a) Pipes types for the various installations shall be as follows:

Fresh Water Distribution	High Density PPR PN6 tested to BS 6920 or equivalent of the multilayer pipe mains.
Second Class Water Distribution	High Density PPR PN6 tested to BS 6920 or equivalent of the multilayer pipe mains.

All external runs must be shielded from exposure to UV lights using UV resistant tape (UV cover to be included in pipe rates) or specialised external type pipe used.

- b. All pipe/duct sizes shown shall be internal diameters.
- c. Any pipes, brackets, hangers, steelwork and the like, shall be protected by galvanizing (pre-galvanised type). Flow direction shall be stencilled clearly on the pipe itself.
- d. Expansion bellows/joints shall be used where long runs of pipework are required or where there are any expansion joints for the building. This shall depend on the expansion coefficient of the pipework material and shall be used as frequently as required and to manufacturer's recommendations.
- e. Pipe supports, bracketing and anchoring shall be according to manufacturer's recommendations as shall be found in the manufacturer's installation manual of the material.
- f. Hangers and supports shall be secured with neat purposely made wrap around bolted brackets.
- g. Where threading is used, this shall be carried out for the total length of the joint or accessory with a good threading machine. Any threads exposed after jointing shall be painted with a suitable rust preventor. PTFE tape or flax fibres (for sealing metal threaded connections) with a good threading compound shall be used throughout on all threaded joints.
- h. All distribution pipe work shall be thoroughly cleaned before any tests are carried out. Pressure test shall be applied to the piping only excluding any parts of the equipment. The test pressure shall be one and a half times the operating pressure and shall be applied for a duration of at least 24 hours. The tests shall be applied before any insulation is installed or pipes concealed.
- i. Installation of pipework in toilets shall be carried out using PPR.
- j. No pipe work is to pass from underneath floor tiles except where specifically approved.
- k. Sizing of pipes shall be as indicated on drawings.
- l. Pipes and fittings shall comply with the requirements of the fire classification B2 (normal inflammable).

- m. All pipe ends shall be blanked off during the works to prevent the ingress of dirt and other obstructions, which may cause blockages etc. The contractor shall take all precautions to comply with this measure.
- n. Pipe joints shall under no circumstances be allowed in the thickness of walls, floors, etc. Pipework shall be placed in chase within walls, only where specifically instructed by the Supervising Authority.
- o. Sleeves shall be provided wherever pipes cross-floors or walls in the structure. When these are required to cross Reinforced Concrete members, instructions are to be sought from the Architect as to the correct placement, and size of the holes, as also to the method of procedure in drilling. PVC sleeves shall be cemented into the wall thickness and the space between the pipe and the sleeve shall be caulked with approved flexible mastic etc.
- p. All pipes and fittings shall be procured from the same manufacturer and be of the same specifications as recommended by the manufacturer.
- q. Pipework shall be fixed at approved levels after co-ordination with the Supervising Authority as to False Ceiling heights etc. They shall be properly hung using adequate brackets, hangers, support frames etc. Provision of loops, expansion bellows, or the use of changes in direction, shall be necessary to allow for pipe movement and expansion.
- r. Quantities of pipework and valves are as accurate as possible, but the contractor is enjoined to check the runs for himself and satisfy himself as to their correctness.
- s. When routing services, it is imperative that fire rating of walls is retained as originally intended. Any queries with this regard are to be clarified through the Supervising Authority.
- t. Pipework shall not be routed through electrical rooms. Refer to attached plan for location of electrical room.
- u. Sufficient restraint shall be provided at all pipe penetrations to ensure forces are sufficiently restrained within the pipeline.
- v. All pipe penetrations through the reservoir construction are to be constructed with an acceptable water sealing arrangement to maintain the watertightness of the compartment.

6. Testing and Commissioning

- a. All testing and commissioning shall be in accordance BS guides for test procedures, and to the satisfaction of the Supervising Authority.
- b. Although testing of individual sections is allowed, in the interest of speed, the testing shall be considered carried out only when the COMPLETE installation is tested and commissioned. The contractor shall remain responsible for individually tested sections and will cover them at his own risk.
- c. The contractor shall provide all test points, equipment and facilities to carry out the tests, both on site and at remote locations. All manufacturers' items performance data and characteristics shall be collated together with test results, for future reference and maintenance.
- d. All equipment shall be adequately labelled and marked. Schematic pathway and riser "as built" Drawings etc., shall be prepared by the contractor and presented to the Engineer on completion.
- e. The following tests are to be carried out during or before commissioning:
 - i. Pipework testing - All pipework runs shall be tested, including bellows, joints, flexibles etc., and a test schedule shall be prepared by the contractor, for approval and used to clarify the tests carried out. This schedule shall be approved by the Supervising Authority before adoption for use.
 - ii. Hydraulic testing of pipe runs - This shall be to 1.5 times working pressure for 24 hours duration, and shall exhibit no loss of pressure, and no visible leakages on inspection. Any parts or instrumentation not designed for such pressure shall be temporarily excluded from the test.Notice of tests shall be given to the Supervising Authority who shall be the only one to certify test approval.
- f. Calibration certificates of instruments used for testing to be presented to the Supervising Authority.

7. Method statement

The contractor shall furnish the Supervising Authority with a detailed description of the method statement to be employed in the installation of the various services. This method statement is to be approved by the Supervising Authority prior to the works being taken in hand.

8. Second Class Water Pump

This shall be compact close-coupled submersible pump. They shall have the shaft, base and strainer in stainless steel (316L). The pump shall also be equipped with a non-return valve. The pump motor shall be suitable for three-phase 50Hz operation and shall have a class F Insulation. The motor shall also have an IP 68 protection rating for continuous immersion.

The pump shall be supplied with a control panel. The panel shall be supplied c/w thermal overload protection for the pumps with reset button, run timer to control the number of starts, protection fuses, auxiliary low voltage contacts with fuses to connect float switches to inhibit the function of the pump if the reservoir runs dry, a switch to select 'manual', 'auto', 'off' for each pump, and pressure switches / transducers.

The pump shall have the following minimum characteristics:

Flow rate	: As indicated in the drawings.
Head	: As indicated in the drawings
Power Supply	: 400V, 3-Phase, 50 Hz
Starting	: Variable speed drive
Control	: Constant pressure

All Stainless-steel Components shall be in 316L. The submersible pump is intended for installation in the Second-Class Water reservoir at car park level as indicated in the drawings, and hence, it shall also be suitable to second class water with any suspended solids and fine particles without interruption.

Installation is to be complete, inclusive of routing of submersible pump power supply cable to electrical isolator at garage level.

Any alternative arrangements to the above to be submitted and approved by the Supervising Authority.

The pump is to be installed in a location to allow ease of access for maintenance.

9. Material Specification

a. General Requirements

All materials and equipment shall be:

- Of a duty rating appropriate to the application.
- Suitable for the purpose.
- Proven in service.

- Suitable for installation in the spaces allocated with suitable access and clearances for normal and long-term maintenance requirements.
- Compatible with other materials and equipment to be used in the works.
- Supported by appropriate servicing facilities and locally available spare parts.
- Corrosion resistant.
- Wear resistant.

Where dissimilar metals come into contact, the surfaces shall be kept from direct metal to metal contact by use of PTFE gaskets, high strength phenol washers or other accepted methods.

The following materials are prohibited and shall not be included in any components of the equipment supplied:

- Asbestos and materials containing asbestos.
- Polychlorinated biphenyls (PCBs) and material containing PCBs.
- Ceramic fibres.
- Formaldehyde insulation.
- Halon.
- Lead based paints.
- Chlorofluorohydrocarbons (CFCs)
- Radioactive materials.

b. Uniformity

All materials used under this contract shall be of uniform design throughout, similar parts being interchangeable.

10. Electrical Equipment

All electrical equipment forming part of the mechanical services shall be suitable for 230V/400V 50Hz electrical supply. All motors above 750W shall meet the IE3 standard (circuit breakers must cater for high in-rush currents in this case) or shall meet the IE2 standard and be equipped with a variable speed controller.

11. Piping

All piping shall be as specified above and of the sizes indicated in the bills of quantities and on drawings.

12. Flexible pipe connectors

Flexible pipe connectors shall be installed in order to minimise noise and transmission of vibrations from the equipment to the pipework.

Flexible pipe connectors shall be included and installed on the inlet and outlet sides of pumps. They shall be sized equal to the adjacent pipework to which they are connected and shall be deemed to be included in the cost of the pumps.

They shall be manufactured from approved materials, having flanged or screwed ends, and shall be designed to withstand the test pressures and system working temperatures without deterioration.

13. Valves

Valves shall be made of the same material as the pipework being used and shall be of the same brand and from the same manufacturer as the pipe on which it is installed.

Valves, etc., shall be installed wherever in the system they are necessary so that this can be closed off without affecting the remaining sections. Some of the important nodes and positions are indicated in the drawings, but these are not exhaustive.

14. Pressure boosting pump set

This specification applies for the second-class water pressure boosting pump. The Pressure boosting pump shall be of the multi-stage type. The pump shall have a suction and delivery header in stainless steel (316L), isolation gate valves in suction and delivery of the pump with a non-return valve in the suction side, anti-vibration rubber feet, bypass circuit between suction and delivery manifold with an on/off valve and an automatic valve for pressure relief. The pump body shall be in a non-corrosive metal with bronze impellers and stainless-steel mechanical seals.

The pump shall be supplied with an integral control panel. The panel shall be supplied c/w thermal overload protection for the pumps with reset button, run timer to control the number of starts, protection fuses, auxiliary low voltage contacts with fuses to connect float switches to inhibit the function of the pump if the tank runs dry, a switch to select 'manual', 'auto', 'off' for each pump, and flow switches / transducers. The pump shall be supplied complete with

flow switches. The pump shall be variable speed controlled in order to maintain a constant pressure throughout the range of operation.

The pump shall have the following minimum characteristics:

Flow rate	: As indicated in the Schematic Drawings.
Head	: As indicated in the Schematic Drawings.
Power Supply	: 230V, 1-Phase, 50 Hz
Starting	: Variable speed drive
Control	: Constant pressure

Installation is to be complete, inclusive of routing of pump power supply cable to electrical isolator at roof level.

15. Water Storage Tank

The water storage tank shall comply with the local health and safety regulations and the COSHH standards. These shall be manufactured of HDPE thermoplastic, UV stabilised, zero light transmittance in direct sunlight and be guaranteed to be totally resistant to the formation of algae. The tank shall have an air tight manhole to facilitate periodic cleaning and disinfection. Compliance to BS EN 12573 or equivalent is essential.

The capacity of the stowage tank shall be as indicated in the schematic diagram. Furthermore, the tank shall be designed to accommodate the installation of multiple water inlets as indicated in the schematic diagram.

16. Reservoir Level Gauge

A sensor-based level reading system shall be installed complete with level display unit, determining the quantity remaining inside the second-class water reservoir. The system is to allow for at least four (4) level readings, the lowest one of which is to alarm LOW LEVEL and the highest one of which is to alarm OVERFLOW. Intermediate level readings are to be installed at standard interval heights.

The installation of this system shall be complete and include all the necessary documentation, fittings, antenna, housing, cables and electrical connections required to complete the installation.

The display to determine the level remaining in the reservoir is to be installed at garage level. The exact location is to be determined on-site in agreement with the Supervising Authority.

The system and its individual components are to comply with the relative ISO standards or equivalent. Installation shall be strictly in accordance with the manufacturer's specifications.

Commissioning of the measuring device shall be undertaken by the Contractor in line with manufacturers requirements.

All level sensors are to be installed in a location to allow ease of access for maintenance.

17. Bib-tap

The body of the angled pattern ball bib-tap shall be chrome plated brass. The quarter turn handle is in place of the normal tee handle making it easier to operate. The spout includes a hose fitting for a standard garden hose.

The bib taps provided for the second-class water system shall be of lockable type, sample of which is shown below.



Figure 1: Lockable Type Bib-Tap