

### 3. Technical Specifications

**Procurement Reference Number: CWA/C2017/124 – SUPPLY, INSTALLATION, & COMMISSIONING OF CONTAINERISED PRESSURE FILTRATION PLANTS**

#### 1. Scope of Supply

The Central Water Authority requires to purchase **ten (10) Nos. Containerised Pressure Filtration Plants** to treat raw water from reservoirs and rivers for domestic use and same shall be installed at the following sites and capacity:

Sr.No	Sites	Containerized Pressure Filtration Plant	
		No. of filtration plant with treatment Capacity of 2000 m3/day	No. of filtration plant with treatment Capacity of 2500 m3/day
1	Mont Loisir Rouillard	2	
2	Trianon	1	
4	Tyack		1
5	Pont Lardieu		1
6	Riviere Du Poste WTP		2
7	Mont Blanc		1
8	Belle Rose Clemencia		2
	<b>Total</b>	<b>3</b>	<b>7</b>

All the ten (10) containerised pressure filtration plants shall be installed and commissioned by the successful bidder/s.

#### 2. Regulations, Standards and Workmanship for Electrical Works

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All other standards used to ensure conformity of electrical equipment installation are :

- i. BS EN 60470 : 2001 – High-voltage alternating current contactors and contactor-based motor starters

- ii. BS EN 62271-106 : 2011 – High-voltage switchgear and controlgear. Alternating current contactors, contactor-based controllers and motor-starters.
- iii. BS 7889 : 1997 – Electric cables. Thermosetting insulated, unarmoured cables for voltages of 600/1000 V.
- iv. BS 5467 : 1997 +A3 : 2008 – Electric cables. Thermosetting insulated, armoured cables for voltages of 600/1000 V and 1900/3300 V.
- v. BS EN 12464-2 : 2007 – Lighting of work places – part 2 : Outdoor work places.
- vi. IEC 60309 : 2005 – Plugs, socket-outlets and couplers for industrial purposes.
- vii. IEC 60529 : 2004 - Degrees of Protection Provided by Enclosures (IP Code)
- viii. BS 5266 : 2011 - Emergency lighting Code of practice for the emergency escape lighting of premises

### **3. Regulations, Standards and Workmanship for Mechanical Works**

The performance of the equipment supplied under the Contract shall be guaranteed in accordance with BS EN ISO 9906:2012 – Rotodynamic Pumps:Hydraulic performance and acceptance tests, Grades 1, 2 & 3 or equivalent.

Mechanical installations shall be carried out to good standards of workmanship and all equipment, materials and fittings shall be new and according to specifications.

All other standards to be used for conformity of mechanical equipment installation are as follows:

- i). BS EN 60034-1:2010 – Rotating electrical machines. Rating and performance.
- ii). BS 5000-3:2006 – Rotating electrical machines of particular types or for particular applications. Generators to be driven by reciprocating internal combustion engines. Requirements for resistance to vibration.
- iii). IEC 60529:2004 - Degrees of Protection Provided by Enclosures (IP Code).
- iv). BS EN 60085:2008 - Electrical insulation. Thermal evaluation and designation.
- v). BS ISO 3046-4:2009 - Reciprocating internal combustion engines. Performance speed governing.
- vi). BS EN 12285-2:2005 - Workshop fabricated steel tanks horizontal cylindrical single skin and double skin tanks for the aboveground storage of flammable and non-flammable water polluting liquids.
- vii). BS EN 10255:2004 - Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions BS 7889:2012 – Electric cables. Thermosetting insulated, non-armoured cables for a voltage 600/1000 V.
- viii). BS EN 1092-1:2007 – Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Steel flanges.
- ix). BS EN 1092-2:1997 - Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Cast iron flanges.
- x). BS EN 14341:2006 - Industrial valves. Steel check valves.
- xi). BS EN 12334:2001 – Industrial valves. Cast iron check valves.

#### **4. Water Treatment**

- a) The Containerised Pressure Filtration Plant shall filter the raw river water to remove the total suspended solids and turbidity.
- b) The quality of the filtered water shall comply with the Drinking Water Standards of Mauritius as per the Environment Protection Act 1991 (G.N No. 55 of 1996)
- c) River Water Quality

- **To treat raw water with Turbidity up to 50 NTU at the following sites:**

- Mont Loisir Rouillard

- Trianon Borehole

- **To treat raw water with Turbidity up to 300 NTU at the following sites:**

- Tyack
- Riviere du Poste
- Pont Lardieu
- Mont Blanc
- Belle Rose Clemencia

- **Total Dissolved Solids – up to 1000 ppm**

- **pH – 6.5-9.0**

- d) Filtered Water Quality

The treated water quality shall be in compliance with the Mauritius Drinking Standards of EPA 1991 (G.N No. 55 of 1996): -

- **pH - 6.5 – 8.5**
- **TDS – up to 1000 ppm**
- **Colour - 20 Pt-Co**
- **Turbidity - 5 NTU**

#### **5. Electrical Power Supply**

The Containerised Pressure Filtration Plant shall be energised with a three-phase, four wire power supply – **400 V $\pm$  6 % and 50 Hz**. The successful Bidder shall provide an earthing system for each containerised pressure filtration plant. The earth resistance shall be less than 5 ohms. Power supply is available on sites .However, the bidder should specify the power required for the containerized filtration plant.

## 6. Container

The container shall be of a maximum length of **6 m (20 feet)** for treating raw water with **turbidity up to 50 NTU** and maximum length of **12m (40 feet)** for treating raw water with **turbidity up to 300 NTU** and of good quality to house the Pressure Filtration Plant and shall be equipped with an energy saving lighting fittings and installation. The container shall:

- i. be heat and corrosion resistant,
- ii. be equipped with an extractor fan controlled by a real time switch and
- iii. provide sufficient space/clearance (min 500 mm on each side) inside the container for maintenance and inspection of the filtration units and associated equipment.
- iv. The base of the filtration plants will be constructed as per the requirement of the Bidder.
- v. All the necessary equipment required for the treatment process should be housed in the container except the water tank for backwashing and mixing chemical tank if required

## 7. Working Principle of Filtration Plant

The Containerised Pressure Filtration Plant shall consist of the following mechanical and electrical equipment:-

- (a). A distribution board housing the Incoming Mains Circuit Breaker for supplying electrical power to a control panel for the electromechanical equipment and other electrical loads (internal and external lighting and socket) of the filtration unit only.
- (b). The containerised filtration plant shall also be equipped with an appropriate fiber glass or polyethylene tank for **automatic backwashing** of the filter/sand. The backwashing shall operate according to the following principles:
  - i. Differential pressure between the inlet and outlet of the filtration unit and
  - ii. Adjustable time based (Easily configured: 24 hour/7days programmable real time switch)

Both principles shall be selectable by the mean of a rotary switch or any equivalent user friendly method. In addition, manual backwashing shall also be available.

- (c). A **mechanical flow meter with electrical pulser** for measuring the volume of filtered water being injected into the reservoir. The flow meter shall be installed according to the manufacturer's recommendations - the meter shall be installed on a straight portion of the piping and clearance distance before and after the meter shall be respected.
- (d). The filtered water shall then be fed to:
- i) An appropriate size pure water tank (fiberglass/polyethylene) to cater for at least two backwashing per day and,
  - ii) CWA Reservoir.

The pressure head at the output of the filtration plant shall be sufficient to fill the pure water tank and CWA Reservoir simultaneously.

The containerized Pressure filtration plants with treatment capacity of 2000 m<sup>3</sup>/day and 2500 m<sup>3</sup>/day shall be equipped only with mixed media filter capable to treat raw water and the chemical used, if any in the treatment process should be mentioned.

Schematics of plant flow diagram and container layout shall be submitted together with the bid.

- The Intake pumps will be provided by the Authority.
  - During the backwashing process, the production of treated water shall be at least 50 % of the Maximum filtration capacity of the filtration plant.
- (d) Booster pumps shall be supplied for each of the containerized pressure filtration plant with the following characteristics:
- For treatment capacity of 2000m<sup>3</sup>/day; Flow = 80 m<sup>3</sup>/hr ; Head – 3bar
  - For treatment capacity of 2500m<sup>3</sup>/day: Flow =100m<sup>3</sup>/hr; Head -3 bar

## 8. Training

Training shall be provided to **ten (10)** CWA Technical personnel for inspection, operation and maintenance of the Filtration Plant for two (2) days. The training shall also include the troubleshooting and methods of PLC programming for the overall automated system. Two (2) Operation and Maintenance Manuals shall be supplied to the Client for each filtration plant.

### 9. Warranty Period

The Containerised Pressure Filtration Plants shall be guaranteed for a period of **twenty-four (24) months** from the date of commissioning of each plant.

The pumps and autotransformer panels shall be guaranteed for a period of **twenty four (24) months** from the date of commissioning same.

### 10. Inspection & Maintenance

The successful Bidder shall have a team of qualified technicians locally to carry out Inspection and Maintenance of each Containerised Pressure Filtration Plant on a fortnightly (15 days) basis for a total duration of **two (2) years in the presence of CWA Representatives**. The Inspection and Maintenance contract shall be renewed for another one year upon satisfactory performance of the contractor during the first year.

### 11. Spare Parts

The successful Bidder shall keep a minimum quantity of spare parts for **two (2) years** as per Manufacturer's recommendation for operation and maintenance of the Containerised Pressure Filtration Plant. A list of these required spare parts shall be indicated by each Bidder at stage of submission of their bid.

A copy of the software for programming the PLC and a copy of the program uploaded on the PLC for executing the complete filtration process shall be submitted to the Client at commissioning stage of the Filtration Plant. Any communication cables shall also be provided for each PLC for each filtration plant. Any necessary credentials and access authorisation to the PLC program shall be provided at commissioning stage.

### 12. Technical Documents

Bidders are requested to provide all the technical details/catalogues of the containerised Pressure Filtration Plant, electro-mechanical and electronic equipment at bidding stage. The proposed filtration process and layout of the plant shall also be submitted at bidding stage.

The mechanical and electrical equipment shall comply with the latest ISO standards and the same shall be indicated in the offer.

## **4. Inspections and Tests**

The following inspections and tests shall be performed:

1. Visual Inspection of quality of workmanship
2. Operation of all valves
3. Operation of protective devices
4. Water Quality test (turbidity, pH, TDS and colour)
5. Testing and operation of complete telemetry system
6. Testing and operation of air compressor and submission of test certificate by a machinery inspector (if applicable)