

REPORT	
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Author:	Moeketsi Mahlatsi
Owner:	Transnet
Client:	Transnet National Port Authority
Project Sponsor:	Transnet National Port Authority
Project Manager:	Johan Du Plessis
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Distribution	
Name:	Title:
Thokozani Mhlongo	Engineering Manager

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 Moeketsi Mahlatsi (Technologist) Date

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 Aslam Haffejee (senior Engineer) Date

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**ADDITIONAL SIGNATORIES:**

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 (Eng. Manager) Date

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## 1 INTRODUCTION

This technical specification is for the supply, delivery and installation of Hot and cold-water reticulation at the Upgrade of Tuzi Gazi Waterfront Old Cricket Building Richards Bay TNPA Offices. The clauses referred to herein are clauses of standard specification. Relevant clauses not specifically mentioned shall also apply. All equipment and installations shall comply in all respects with the requirements of the Occupations Health and safety Act No. 85 of 1993.

## 2 STANDARDS

SANS 460 – Copper tubes for domestic plumbing services.

SANS 10400- National Building Regulations

SANS 10400- XA – The application of the National Building Regulations

Part X: Environmental sustainability Part XA: Energy usage in buildings

SANS 10252-1– Water supply and drainage for buildings Part 1: Water supply installations for buildings.

SANS 966 – HDPE tubes for domestic plumbing services.

The contractor shall provide all protective devices, etc. and arrange for all inspections, tests, certificates, etc. necessary to comply with the said Acts, Regulations and By – Laws, whether specified herein or not.

## 3 WATER SUPPLY SYSTEM DESCRIPTIONS

### 3.1 Domestic Cold-Water Supply (Main Building)

The water is to be supplied to the showers, all wash hand basins, toilets, hydro boiler, water dispenser and kitchens sink. This water will be supplied from the municipal line directly into the main header supply for the building. The position, excavation and backfill must be coordinated with the Contractor, via the civil engineering layouts for connection to the internal supply line. Isolation valves, pressure gauges to be installed for the maintenance or troubleshooting.

All domestic water pipes underground pipework shall be HDPE CLASS 12 unless otherwise indicated. All pipework above ground shall be Class1 copper.

### 3.2 Domestic Cold-Water Supply (Guard House Building)

The water is to be supplied to the wash hand basins and the toilets. This water will be supplied from the municipal line directly into the main header supply for the building. The position, excavation and backfill must be coordinated with the Contractor, via the civil engineering layouts for connection to the internal supply line. Isolation valves, pressure gauges to be installed for the maintenance or troubleshooting.

All domestic water pipes underground pipework shall be HDPE CLASS 12 unless otherwise indicated. All pipework above ground shall be Class1 copper.

### 3.3 Shower Hot Water Solution

Hot water is to be supplied to the showers only. This hot water system is fed from hot water tank with a capacity of 200 litres positioned and mounted horizontally on the galvanized steel cantilever, of appropriate strength to support the weight of the unit at 600 mm Above Finished Floor Level (AFFL) on the outside wall of the toilet see water reticulation layout drawing (Drawing number: 4087497-6-000-M-LA-0011-01). Access to this tank is to be easily accessible for maintenance and troubleshooting due height and position. The system shall include a heat pump to provide the hot water to the tank. The tank will consist of back up electric heating element in the event that the heat pump is being serviced or undergoing repairs.

## 4 EQUIPMENT

### Water Heating

The contractor shall supply and install 1x steel 200 litres hot water tank mounted and supported by outside wall on the galvanized steel with appropriate strength to support the tank at 600 mm above the floor level. The hot water tank shall be manufactured from 1.6mm steel plate and thermofused porcelain enameled for cylinder longevity and hygiene. The hot water tank to be pressure tested to 600 kPa.

Tank shall be insulated with 100mm Mineral wool insulation minimum R Value of 2.2 m<sup>2</sup>k/W. Insulation shall be clad with 1mm galvanized steel cladding.

The hot water tank shall consist of back up electric heating element which will operate only in the event the heat pump is being serviced or undergoing repairs.

The main source of the heat generation will be via a 3.5 kW heat pump for the 200 liters tank. The heat pump shall have a built-in circulating pump. The size of the heat pump shall be of length 750mm, height 493mm and 264mm wide and yield 75l/h at 55 degrees Celsius. The outdoor exposed piping must include all insulation, fixings, and stainless-steel cladding.

The heat pump shall include the timer feature and operate only during the working hours.

For the efficient water operation and ease of maintenance, the installation must comprise of ball valves expansion relief valves, in-line strainers, non-return valves, coupling, fittings etc. Included in the system for water flow and pressure being maintained, bleeding valves, temperature and gauges and non-return valves.

The overflow piping must be routed to the closest drain point and where it is in an obstruction to people traffic, must have a safety step for protection.

## 5 INSULATION

Contractor shall insulate all hot water piping and equipment with preformed fibreglass sections or mineral wool insulation. The contractor shall provide suitable sleeves where pipework penetrates through any openings.

The sleeves shall be of the appropriate size to prevent the insulation being compressed. Where pipework runs over or around any edges or materials that may damage the insulation, the pipes shall be clad in galvanized steel over that section of the insulated pipe

All hot water pipework chased in wall shall be wrapped in kraft paper prior to plastering. Pipework shall be insulated with Fibreglass insulation with a minimum R Value of 2.2 m<sup>2</sup>k/W.

## 6 PIPING, VALVES AND SYSTEM FITTINGS

### 6.1 Piping material

All domestic water pipes underground pipework shall be HDPE CLASS 12 unless otherwise indicated. All pipework above ground shall be Class 1 copper.

### 6.2 Painting

All exposed piping and brackets to be degreased and painted over its entire length in accordance with the SANS standards.

### 6.3 Pipe Hangers and Brackets

Pipe hangers and supports shall be installed at the following maximum centres: -

<b>Pipe Bore:</b> (Millimeters)	<b>Distance Between Supports:</b> (Meters)
Up to 10	1,0
12 to 15	1,25

22	1,8
28 up to 50	2.5
65 to 100	3.0

Additional supports shall be installed where dictated by structural details:

#### 6.4 Valves

All valves to be ball valves with stainless steel bodies and balls and PTFE or Teflon seals. They shall be suitable for a working pressure of 1000 kPa gauge or 1.5 times the maximum working pressure, whichever is the larger. Valves shall be fitted into the pipeline by means of capillary hard soldered joints containing silver.

## 7 TESTING & COMMISSIONING OPERATING

Before the combined water reticulation system installation is disinfected or pressure tested for acceptance, the system shall be properly cleared of all the foreign matter. The contractor shall follow effective method of in according to SANS 10252-1.

The inspection shall be conducted visually to detect faults in construction of materials and for compliance with drawings, specifications, and requirements prior to testing of the system.

The contractor shall ensure there are no leakages in the system during testing and commissioning of the system. The system shall be subjected test pressure of 1500kpa, but not less than 1.5 times the maximum working pressure of the installation and maintain such test pressure for at least 1 hour.

The Testing, commissioning shall be carried out by an competent technicians . Such a Contractor shall forward all test results to the Employer's Engineer and Selected Subcontractor, for approval. The contractor shall issue a relevant certificate of compliance (COC).

Upon the 'Practical Completion of the Contract Works', the contractor shall efficiently test and commission all relevant items of equipment before setting such equipment into regular operation. All water systems shall be flushed, and pressure tested before connection of the fixtures.

Each item of equipment shall be set to produce the required designed capacity when operating against the calculated duty of the relevant system, i.e.: Specified pressures and temperatures.

## 8 OPERATING & MAINTENANCE MANUALS

8.1 Four Sets of Operating and Maintenance Manuals shall be prepared in the form as suggested in and As-built drawings shall be supplied on USB in both PDF and native format with four sets of hard copies.

8.2 Plant schematics and wiring diagrams shall be the latest revision and shall be framed behind glass and displayed adjacent to switchboards.

8.3 The operating and maintenance manuals shall include but not be limited:

- Descriptive Information

This section shall consist of but not be limited to:

- General description,
- Design parameters,
- Building load,
- Installed capacities,
- Principal components,
- Refrigeration piping distribution schematics
- Air distribution schematics
- Control schematics
- Electrical board schematics

- Equipment data

This section shall consist of but not be limited to:

- Equipment designation
- Manufacturer and model
- Manufacture local representative
- Size and rating
- Speed, pressure, and temperature limitations

- Operating instructions

This section shall consist of but not be limited to:

- Starting and stopping procedures
- Time switch functions

- Seasonal adjustments
- Sequence under loading and unloading
- Normal operation and tripped conditions
- Logs and records to be kept
- Inspection and maintenance

This section shall consist of but not be limited to;

- Inspection Schedules and Checklist.
- Lubrication Schedules.
- Air Filter Maintenance Schedules.
- Routine Replacements, Adjustments and Calibrating.
- Routine Cleaning, Painting and Protection.
- Inspection and Maintenance Logs and Records to be kept.
- Reference documents

This section shall consist of but not be limited to;

- Tender Specification & Drawing List
- As built Record Drawings
- Test Reports
- Commissioning Reports
- Equipment manufacturer data

This section shall consist of but not be limited to;

- Descriptive literature
  - Catalogue Cuts, Brochures or Shop Drawings
  - Dimensioned Drawings
  - Materials of Construction
  - Parts Designations
- Operating characteristics
  - Performance Tables and Charts
  - Performance Curves
  - Pressure, Temperature, and Speed Limitations
  - Safety Devices
- Operating Instructions
  - Pre-start Checklist

- Start-up Procedures
- Inspection during Operation
- Adjustment and Regulation
- Testing
- Detection of Malfunction
- Precautions
- Inspection instructions procedures
  - Normal and Abnormal Operating Temperature, Pressure and Speed Limits.
  - Schedule and Manner of Operation
  - Detection Signals
- Maintenance instructions procedures
  - Schedule of Routine Maintenance.
  - Procedures.
  - Troubleshooting Chart
- Parts list
- Service contracts

## 9 MAINTENANCE

9.1 Allow for the maintenance of the complete installation for a period of TWELVE (12) MONTHS after 'practical' completion certificate has been issued by the Engineer. Visit the installation once a month on the basis of a proper preventive programme approved by the Engineer.

9.2 Report to an official nominated by the Client on arrival and again on leaving their premises on each visit. Such person, who has been nominated by the Client, shall sign a Service Report giving details of corrected temperature and humidity readings taken, etc.

9.3 At each service visit, maintenance personnel shall, inter alia, perform the following duties in addition to any other which may be necessary.

9.3.1 Check all control systems and safety devices, air flow switches, manometers, etc. for correct functioning and replace defective items or any other items as necessary.

9.3.2 Make good any defects as required in items of the guarantee given for the plant in terms of the specification.

9.3.3 Attend to any complaints made with respect to the installed plant by the authorized person mentioned in the foregoing. No other person

shall have any right to instruct the Selected Subcontractor or make any complaint.

9.3.4 Instruct the Client's maintenance personnel on the attention required to any item requiring more frequent attention during the service visits.

9.3.5 A major service shall be executed in the sixth and twelfth month of the maintenance period shall be to the satisfaction of the Employer's Engineer. This major service shall include all annual servicing functions as recommended by the manufacturers of material and equipment supplied and/or installed under this contract.

## **10 GUARANTEE**

10.1 The contractor shall guarantee the materials, apparatus and workmanship delivered and installed by him. The guarantee shall be valid for a period of twelve months starting on the date when the practical completion certificate is issued. The complete installation shall be guaranteed against defects as a result of patent and latent defects of the apparatus, as well as against faulty materials and workmanship. Fair wear and tear is excluded from the guarantee.

10.2 The guarantee shall provide for all parts, spares and appurtenances which become defective during the guarantee period, to be replaced free of charge to the Client. All costs of labour, out-of-town allowances, materials and transportation required to replace such part of a defective installation shall be borne by the Selected Subcontractor and shall be included in his guarantee. The Selected Subcontractor shall cede to the Client the remainder of any equipment guarantee which he has received from his suppliers, and which may extend beyond the period of twelve months mentioned herein.

## **11 EXTENDED GUARANTEE**

11.1 Where certain equipment have supplier's standard guarantee clauses of which do not correspond with the guarantee Clause 9.1, the Contractor shall allow in the tender price for the extension of guarantees and additional charges thereof, in order to comply with guarantee clause.

## **12 EQUIPMENT IDENTIFICATION AND SIGNAGE**

The Contractor shall supply and install Identification Labels to all equipment hot water storage, controls, and gauges. The labels shall be fabricated in black plastic sheet and shall be engraved clearly in white, to indicate the equipment controlled.

All items of plant and exposed pipes shall be provided with neat signs or signboards describing or naming the function or duty in each instance, together with arrows indicating the direction of the water flow in pipes, e.g., Hot water storage tank, Heat pump

The contractor shall detail all such signage, wording and terminology and submit the same to the Engineer for approval prior to installation.

## **13 SYSTEM SUBMITTALS**

The installing contractor shall submit the following design information and drawings for approval prior to starting work on this project:

- Field installation layout drawings having a scale of not less than 1:100, detailing the water reticulation system including pressure valves, pipework, heat pump, control panel, fittings etc.
- Separate layouts, or shop drawings, shall be provided, (i.e., water reticulation floor plan) and for mechanical and electrical work.
- Electrical shop drawings shall show the location of all devices and include point-to-point conduit runs and a description of the method(s) used for detector mounting.
- Separate drawing providing symbol legend to identify all symbols used.
- Hot water generating system Certificate of Compliance (COC).

## 14 MECHANICAL DRAWINGS

This is a list of mechanical drawings, which shall be read in conjunction with this specification

Description		
Drawing No.	Rev.	Description
4087497-6-000-M-LA-0011-01		Water Reticulation Layout Main Building
4087497-6-000-M-LA-0015-01		Water Reticulation Layout Guard House