

SCOPE OF WORK

MAINTENANCE, REPAIRS AND REPLACEMENT OF HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEM AND CHILLERS AT TRANSNET PIPELINES PUMP STATIONS AND TERMINALS

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SUMMARY VERSION CONTROL

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00	New Procedure		
01	Updated procedure		04/08/2016
02	Updated in New format. Added NMPP Terminals. Added SARACCA and SAQCC Gas requirements. Added COC requirement		06/01/2020
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Note: Only latest amendments and/or additions are reflected in italics in the body of the document.

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SECTION 1

1 ABBREVIATIONS & DEFINITIONS

- 1.1 Definition, Interpretation and General Provisions as stipulated within the NEC-3 Engineering and Construction Contract set of documents shall apply to this specification in its entirety.
- 1.2 For the purpose of understanding these Standards, the following abbreviations apply:

Abbreviation	Expansion
RH	Relative Humidity
SANS	South African National Standard
BS	British Standards
IEC	International Electrotechnical Commission
BS	British Standards
SARACCA	South African Refrigeration and Air Conditioning <i>CONTRACTORS</i> Association
SAQCC	South African Qualification and Certification Committee
HVAC	Heating Ventilation and Airconditioning
TPL	Transnet Pipelines
CFCs	Chloroflourocarbons
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
COC	Certificate of Conformance
TN1	Twini Pump Station
HTP	Hilltop Pump Station
MBT	Mnambithi Pump Station
WDN	Warden Metering Station
VLR	Villiers Metering Station
MNG	Mngeni Booster station
DUZ	Duzi Booster station
MRR	Mooi River Booster station
FTM	Fort Mistake Booster station
WIL	Wilge Booster Station
IVW	Island view Terminal
JMP	Jameson Park Terminal
DNR	Durban Pump station
WAO	Waltloo Delivery station
ALR	Alrode Pump station

1.3 BACKGROUND

Transnet Pipelines has a Heating, Ventilation and Air conditioning (HVAC) System and Chillers installed in various sites situated in KwaZulu natal and Gauteng. The purpose of the HVAC system and chillers is cooling of various equipment or assets required for the operation of the pipeline network i.e. Variable speed drives (VSD's), Information Technology (IT), Instrumentation systems (MC&I) and general offices. It is critical to ensure that the HVAC System is well maintained, repaired and replaced when there are failures to minimize downtime and ensure smooth operation of the equipment mentioned above to deliver planned volumes on time to TPL clients.

SECTION 2

2 SCOPE OF WORK

2.1 MONTREAL PROTOCOL

Tenders for equipment utilising chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) or hydrofluorocarbons (HFCs), to be supplied and installed shall be within the constraints and schedules of the Montreal Protocol and the Copenhagen Agreement and such amendments there to as may be made by the international community.

Note: The respective works specified in clause 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.3.5, 2.3.6, 2.3.7, 2.3.8 and its respective sub-clauses shall be conducted on all the applicable equipment as reflected in **Annexure "A"** – HVAC Master Data.

2.2 SITES TO BE MAINTAINED

This scope of work is for the maintenance, repairs and replacement of HVAC system and Chillers that are installed at the following TPL pump stations and terminals:

- | | |
|--------------------------------|---|
| • Twini Pump Station | : Old Main Road, Amanzimtoti |
| • Mngeni Booster station | : Stockville Rd, Mahogany Ridge, Westmead, Pinetown |
| • Hilltop Pump Station | : Chief Mhlabunzima Rd, Copesville, Pietermaritzburg |
| • Duzi Booster station | : Ottos Bluff Rd, Dunimarle, Pietermaritzburg |
| • Mooi River Booster station | : District Rd (D54), Mooi River |
| • Mnambithi Pump Station | : un-named road off R600, on farm Kranskloof 13091, Ladysmith |
| • Fort Mistake Booster station | : off N11, Newcastle |
| • Warden Metering Station | : Rondavel 1674, Farm Road, Harrismith |
| • Villiers Metering Station | : Niemandskraal, Farm Road, Cornelia |
| • Wilge Booster station | : S159, Frankfort, Wilge River |
| • Island View Terminal | : Cnr Taiwan & Trinidad Rd, Island View, Durban |
| • Jameson Park Terminal | : Cnr R42 Poortjie Road, Nigel, Heidelberg |

- Alrode Pump Station : 35 Garfield Street, Alberton
- Waltloo Delivery Station : 274 Alwyn Street, Waltloo, Pretoria
- Durban Pump Station : Cnr Abadan & Sumatra Rd, Islandview, Durban

2.3 THE HVAC SYSTEM AND CHILLERS - OPERATING PHILOSOPHY

A detailed list of installed equipment shall be found in **Annexure A – HVAC Master Data**. The following is a brief description of the equipment that is installed at each site and its operation.

2.3.1 TWINI, HILLTOP & MNAMBITHI

These sites consist of three buildings and two MV generator rooms that are air conditioned.

- a) The control building includes: the IT room; EPN room; Control room; PCN room; PLC room; VSD room and LV switchgear room.
- b) The MV substation.
- c) The Guard house.
- d) MV generator control rooms

There are redundant (2) central HVAC units with roof top condensers on the Control Building and on the MV Substation building. There two additional midwall split units in the IT room and one midwall split unit in the EPN room. The guard house has a midwall split unit and the two MV generators have one window/wall unit each.

Each site also has three Kelvin chiller units which are connected via raw water piping to an ABB ACS1000 Medium Voltage Variable Speed drive (VSD). The chiller extracts heat from the VSD's by means of a glycol mixed external raw water system.

2.3.1.1 Control Building

There are two air-handling units located in the ground floor HVAC plant room which supply conditioned air to the various rooms. These units are sized for 100% redundancy, and only one runs at any time, the other being standby. Each unit is fitted with an electrically operated shut-off damper in the supply duct to isolate it when it is in standby mode to prevent re-circulation of air. The speed of supply fan in each unit is controlled by a variable frequency drive to maintain a constant supply air pressure. Each of these units has a DX cooling coil which is connected via refrigeration pipework to an air-cooled condensing unit on the roof above. The return air is brought back via two return air axial fans, also sized for 100% redundancy, and only one runs at any time, the other being standby. Each fan is fitted with a mechanically operated nonreturn damper to prevent air recirculation when it is not running. The speed of each return air fan is controlled by a variable frequency drive to maintain a constant return air pressure. Supply and return air is distributed through the building through externally insulated

galvanized steel ducting at high level, with double deflection supply grilles. The supply grilles are fitted with heaters to prevent over-cooling in the rooms. The control system will measure the temperature in each room and control the units and their individual re-heaters. Air quantities have been selected to maintain a positive pressure of 100Pa where required.

Electrically operated fire dampers are installed in the ductwork wherever it passes through a fire wall. In addition, electrically operated shut-off dampers are installed in the ductwork to each room which close in the event of fire in order to contain the fire suppression gas.

There are two switchboards in the HVAC plant room controlling the air conditioning. These switchboards contain the switchgear for each unit, the variable frequency drives for the supply and return air fans, the power supply for each condensing unit, the temperature controls for each unit and the switchgear for the cable basement ventilation fan. These two switchboards are completely independent of each other and are fed from separate power supplies in order to maintain 100% redundancy.

Attached to the switchboard is a control panel which contains the automatic changeover system, the power supplies to the terminal re-heaters and the power supply for the electrically operated fire dampers and shut-off dampers. This control panel takes power from either of the two units, whichever is the duty unit. In the event of a power failure to the duty unit, the control panel automatically takes power from the standby unit. In addition, if there is a fault with the duty unit, the control panel will automatically start the standby unit.

With this arrangement it is possible to maintain the desired positive pressures in the various rooms.

Two supplementary mid-wall split units are installed in the IT room and one midwall split unit is installed in the EPN room. These stand-alone units are meant to ensure that these rooms with their critical equipment are always kept within design temperatures, including those times when a fire signal will shut down the main building HVAC unit. They are also supplied from the standby generator to ensure there is sufficient cooling for the equipment situated in these rooms during a power failure.

2.3.1.2 MV Station

The MV Substation and HV Protection Room are airconditioned by a single air conditioning unit located in the HVAC Room. There is also a redundant standby unit.

This is a dual circuit heat pump split type unit, and the air-cooled condenser is mounted on the roof of the HVAC room.

Air is distributed through externally insulated galvanized steel ducting at high level in the center of each room, with double deflection supply air grilles. Return air is ducted back to the HVAC Room. Fresh air is supplied at the rate of 10% of supply air.

2.3.1.3 Guard House

The Guard Room is airconditioned by a mid-wall split unit with the condensing unit mounted on the wall outside.

2.3.1.4 MV Generator Control room

There is one Self-contained wall unit in each of the two MV Generator Control Rooms.

2.3.1.5 Kelvin Chillers

Each site has 3 Kelvin chiller units, which extracts the heat from the 3.3kV ABB ACS 1000 variable speed drives. The heat from the pure water circulating in the VSD is transferred to the raw water/glycol mixture via a plate heat exchanger, which is in turn cooled by the external Kelvin chiller units. The Kelvin chiller unit consists of two cooling circuits, one condensing coil and a raw water/glycol circulating system. Each cooling circuit has 3 vent fans and 1 compressor. The raw water/glycol system consists of 2 pumps, a Y-strainer and a raw water/glycol tank. The raw water is cooled by both refrigerant systems at a single condenser.

2.3.2 **WARDEN AND VILLIERS**

2.3.2.1 There are two Daikin air-cooled packaged air conditioning units located outside the Control Building which supply conditioned air to the various rooms. These units are sized for 100% redundancy, and only one runs at any time, the other being standby. Each unit is fitted with electrically operated shut-off dampers in the supply air and return air ducts to isolate it when it is in standby mode to prevent re-circulation of air. These are heat pump units which heat or cool the air as necessary. Electrically operated fire dampers are installed in the ductwork wherever it passes through a fire wall. In addition, electrically operated shut-off dampers are installed in the ductwork to each room which close in the event of fire in order to contain the fire suppression gas.

2.3.2.2 Two supplementary mid-wall split units are installed in the PLC room and two are installed in the EPN room. These stand-alone units are meant to ensure that these rooms with their critical equipment are kept within design temperatures at all times, including those times when a fire signal will shut down the main building HVAC unit.

2.3.2.3 The guard room has a small mid wall split unit, with the condensing unit mounted on the outside wall. This is a heat pump unit and will cool or heat as necessary.

2.3.3 ISLAND VIEW TERMINAL

This site consists of three buildings and two MV generator control rooms that are air conditioned.

- a) The control building includes: the IT room; EPN room; Control room; PCN room; PLC room; Cathodic Protection room, VSD room, LV switchgear room, MV Substation.
- b) The Guard house
- c) Testing Facility
- d) MV generator control rooms

2.3.3.1 CONTROL BUILDING and CABLE BASEMENT

The IT Room and the EPN Room are airconditioned by two ducted direct expansion air-handling units, 50AHU01 and 50AHU02, located in the HVAC plantroom.

Only one of these units runs, the other is standby and change-over is automatic in the event of a fault in the duty unit. The Control Room has one cassette unit, 50CON14.

The condensing units for these air-handling units, 50CON01 and 50CON02, are located on the roof above the plantroom.

Fresh air is supplied to these rooms by a dry chemical scrubber unit, 50SCR01. This fresh air is filtered by this unit and ducted into the common return air duct of the air-handling units. This system also serves to maintain the rooms under positive pressure.

A motorised fire damper, 50DFD05, is installed in the fresh air supply duct to isolate the unit in the event of fire.

A blast damper, 50BLD04, is installed in the fresh air supply duct to protect against external explosions.

The toilets are ventilated by an extract fan 50FAN04, with extraction via galvanized steel ductwork and disc valves. A motorised fire damper, 50DFD01, and a blast damper, 50BLD01, are installed in the ductwork.

The kitchen is ventilated by an extract fan 50FAN03, with extraction via galvanized steel ductwork and disc valves. A motorised fire damper, 50DFD02, and a blast damper, 50BLD02, are installed in the ductwork.

The LV Generator room is ventilated by an extract fan 50FAN02, with extraction via galvanized steel ductwork and grilles. A motorised fire damper, 50DFD03, and a blast damper, 50BLD03, are installed in the ductwork.

The Cable Room is ventilated by an extract fan 50FAN01, with extraction via galvanized steel ductwork and grilles. A motorised fire damper, 50DFD04, and a blast damper, 50BLD05, are installed in the extract ductwork.

Make-up air into the Cable Room is via nine sets of motorised fire dampers and blast dampers located in the external walls.

The air-handling units, the condensing units, the dry scrubber, the Cable Room extract fan and all fire dampers are supplied with power and controlled by control panels 50HVAC01, 50HVAC01A and 50HVAC02 located in the HVAC plantroom. The kitchen fan, the toilet fan and the LV generator room fan are supplied with local power and run permanently.

The control building has a cassette unit that is separated from control room HVAC system. This is a heat pump unit and will cool or heat as necessary.

2.3.3.2 CONTROL BUILDING - FIRST FLOOR

The first floor consists of the PCN Room, the PLC Equipment Room, the LV Switchgear Room, the MV Switchgear Room, the HV Protection Room and the CP Rectifier Room, which are airconditioned by two ducted rooftop packaged units, 50RTU01 and 50RTU02 which are located on the first floor slab outside. Only one of these units runs, the other is standby and change-over is automatic in the event of a fault in the duty unit.

Fresh air is supplied to these rooms by a dry chemical scrubber unit, 50SCR03. This fresh air is filtered by this unit and ducted into the common return air duct of the rooftop units.

This system also serves to maintain the rooms under positive pressure. The rooftop units and all fire dampers are supplied with power and controlled by control panels 50HVAC03, 50HVAC03A and 50HVAC04 located in the LV Switchgear Room.

2.3.3.3 CONTROL BUILDING FIRST FLOOR - VSD ROOM

The VSD Room is airconditioned by four ducted rooftop packaged units, 50RTU03, 50RTU04, 50RTU05 and 50RTU06, located on the roof above.

Only two of these units runs, the other two are standby.

The units run in pairs, 50RTU04 and 50RTU05, 50RTU03 and 50RTU06.

Change-over is automatic in the event of a fault in either of the duty units.

Fresh air is supplied to these units by a dry chemical scrubber unit, 50SCR02. This fresh air is filtered by this unit and ducted into the common return air duct of the rooftop units.

This system also serves to maintain the rooms under positive pressure.

The rooftop units and all fire dampers are supplied with power and controlled by control panels 50HVAC05, 50HVAC05A and 50HVAC06 located in the MV/VSD Room.

2.3.3.4 TESTING FACILITY

The offices, product sample room and test room have split units as follows:

Test room, two midwall units, 50SIU08/50CON10 and 50SIU09/50CON11

Product sample room, one cassette unit, 50SIU11/50CON13

Office, one midwall unit, 50SIU10/50CON12

There is a ducted extract system serving the product sample store, the test room, the product sample room and the bottle wash and dry room.

Air is extracted by two extract fans 50FAN07 and 50FAN08.

These fans are run and standby and only one runs at any time. Change-over is automatic if the duty fan fails.

They are rated flameproof to Class 1 Division 1

There are two extract fans, 50FAN11 and 50FAN12, serving the fume cupboard in the product sample room.

These fans are run and standby and only one runs at any time.

Change-over is automatic if the duty fan fails.

The fans and dampers are supplied with power and controlled by control panel 50HVAC11 located in the passage.

The toilet is ventilated by a tube fan, 50FAN09, ducted to a disc valve. The kitchen is ventilated by a tube fan, 50FAN10, ducted to a disc valve. The kitchen fan and the toilet fan are supplied with local power and run permanently.

Blast louvres have been fitted by others in all external wall openings.

2.3.3.5 GUARD HOUSE

The guard room has a mid-wall split unit 50SIU01, with the condensing unit 50CON03 mounted on the outside wall.

This is a heat pump unit and will cool or heat as necessary. The kitchen has a wall mounted extract fan 50FAN05 The toilet has a wall mounted extract fan 50FAN06.

2.3.4 JAMESON PARK TERMINAL

This site consists of eleven buildings and two MV generator control rooms that are air conditioned. There are also six Kelvin Chiller units.

2.3.4.1 CONTROL BUILDING

This building is airconditioned by individual Daikin split units as follows:

Control Room: 2 off ceiling cassette units 59SIU22/59CON22, 59SIU23/59CON23

Server Room: 2 off ceiling cassette units 59SIU19/59CON19, 59SIU20, 59CON20

IT room: 2 off mid-wall units 59SIU68/59CON68, 59SIU69/59CON69

Shift supervisor: 1 off mid-wall unit 59SIU24/59CON24

Meeting room: 1 off mid-wall unit 59SIU21/59CO21

The toilets are ventilated by an extract fan 59FAN05 and ducted system, with extraction via galvanized steel ductwork and disc valves.

The kitchen is ventilated by a wall mounted extract fan 59FAN19.

The IT room and the Server room are maintained under positive pressure by means of a supply fan 59FAN04 and air filter 59FIL05 which discharges outside air directly into the rooms. This fan also supplies fresh air into the Control room.

Fire dampers are installed in the supply ducts to isolate the rooms in the event of fire. 59DFD24 isolates the IT room, 59DFD25 and 59DFD26 isolate the Server room. This fan and the associated fire dampers are controlled by control panel 59HVAC06 located in the Server room.

2.3.4.2 VSD BUILDING

There are four Daikin rooftop packaged units 59RTU01, 59RTU02, 59RTU03 & 59RTU04 installed on the roof of the VSD building serving most of the first floor. Exceptions are listed below.

Two of these run and two are standby.

Change-over is automatic in the event of a fault in one of the duty units.

The return air is brought back via two return air axial fans 59FAN13 & 59FAN14, also sized for 100% redundancy, and only one runs at any time, the other being standby.

These return air fans have their speed controlled manually by variable frequency drives to allow the room pressure to be set.

The following rooms have electric heater banks in the supply ducts to prevent overcooling:

PLC room, 59EHB01

LV switch room, 59EHB02 & 59EHB03

MV/VSD room, 59EHB04

The above items are all supplied with power and controlled by control panel 59HVAC03, 59HVAC03A and 59HVAC04 located in the LV switchgear room on the first floor.

The following areas are not fed from the main ducted system but have individual independent split units installed.

The condensing units for these areas are located on the roof.

PCN room: 59SIU56/59CON56 and 59SIU57/59CON57

EPN room: 59SIU60/59CON60 and 59SIU61/59CON61

IT room: 59SIU64/59CON64 and 59SIU65/59CON65

The first-floor toilets are ventilated by fan 59FAN18 via ductwork and extract disc valves.

The first-floor kitchen is ventilated by a wall mounted extract fan 59FAN16.

The cable basement is ventilated by a single extract fan 59FAN15 which extracts air from the basement through ductwork and grilles and discharges it to outside. Intake air is through nine weather louvres installed in the wall of the basement.

This fan also extracts air from the storerooms on the first floor.

Motorised isolation damper 59DMT31 is installed in the cable basement ductwork to isolate the area in the event of the release of fire suppression gas.

2.3.4.3 MV SUBSTATION

There are two air handling units 59AHU01 and 59AHU02 located in the ground floor HVAC plantroom which supply conditioned air via ductwork and grilles to the MV switchgear room and the HV protection room on the first floor.

Return air is ducted back to the plantroom.

Fresh air enters the plantroom via weather louvre 59GWL24 and air filter 59FIL06.

These units are sized for 100% redundancy, and only one runs at any time, the other being standby.

Each unit is fitted with an electrically operated shut-off damper in the supply duct to isolate it when it is in standby mode to prevent re-circulation of air.

59 DMT09 is fitted to 59AHU01 and 59DMT10 is fitted to 59AHU02.

Each of these units has a DX coil which is connected via refrigeration pipework to air cooled condensing units 59CON28 and 59CON29 on the roof above. These are heat pump units and will cool or heat the supply air as necessary.

Electrically operated fire dampers 59DFD15 and 59DFD16 are installed in the supply and return air ductwork where it enters the first floor.

In addition, electrically operated shut-off dampers 59DMT26 and 59DMT27 are installed in the ductwork to HV protection room. These close in the event of fire in order to contain the fire suppression gas.

The cable basement is ventilated by an extract axial fan 59FAN09 located in the HVAC plantroom. Air is extracted from the cable basement through uninsulated galvanized steel ductwork and extract grilles.

An electrically operated fire damper 59DFD14 is installed in the duct where it passes through the plantroom wall.

Make-up air into the cable basement is through three weather louvers in the outside wall. Each of these louvers is filled with an electrically operated fire damper.

The plant is supplied with power and controlled by control panel 59HVAC01, 59HVAC01A and 59HVAC02 located in the ground floor HVAC plantroom.

2.3.4.4 GUARD HOUSE

The guard room has a midwall split unit 59SIU27, with the condensing unit 59CON27 mounted on the outside wall.

The security control room has two midwall split units 59SIU25 and 59SIU26, with the condensing units 59CON25 and 59CON26 mounted on the outside wall.

These are heat pump units and will cool or heat as necessary.

The kitchen has a wall mounted extract fan 59FAN06.

The toilets each have a wall mounted extract fan, 59FAN07 and 59FAN08.

2.3.4.5 WORKSHOP AND STORES

The offices each have a midwall split unit as follows:

Electrical office, 59SIU37/59CON37.

M&I office, 59SIU38/59CON38.

Mechanical office, 59SIU39/59CON39I.

These are heat pump units and will cool or heat as necessary.

The toilets and change rooms are ventilated by fan 59FAN17 via ductwork and extract disc valves.

2.3.4.6 TESTING FACILITY

The offices and Test room have a midwall split units as follows:

Test room, 59SIU70/59CON70 and 59SIU71/59CON71

Office 1, 59SIU72/59CON72

Office 2, 59SIU73/59CON73

These are heat pump units and will cool or heat as necessary.

There is a ducted extract system serving the Product Sample Store, the Test Room, the kitchen and the Fire Suppression Room.

Air is extracted by two extract fans 59FAN20 and 59FAN21. These fans are run and standby and only one runs at any time. They are rated flameproof to Class 1 Division 1.

The fans and dampers are supplied with power and controlled by control panel 59HVAC05 located in the Fire Suppression room.

The toilet is ventilated by a wall mounted fan 59FAN22 which extracts via ductwork and a disc valve.

2.3.4.7 ADMINISTRATION BUILDING

The administration areas are airconditioned by a Daikin VRV system comprising three condensing units, 59CON01, 59CON02 and 59CON03 connected to the indoor units as follows:

Board room: cassette units 59SIU01 & 59SIU02

Open plan office: cassette units 59SIU04, 59SIU05, 59SIU06, 59SIU07 and 59SIU08

Reception: cassette units 59SIU12 and 59SIU13

Superintendent: midwall unit 59SIU14

Terminal manager: midwall unit 59SIU15

Workstations: cassette units 59SIU16 and 59SIU17

Fresh air is ducted into these units by fan 59FAN02 located in the roof void.

The computer room is airconditioned by two under-ceiling split units.
59SIU66/59CON66 and 59SIU67/59CON67

The toilets and kitchen are ventilated by extract fan 59FAN03 located in the ceiling void.

This fan extracts from the various areas through ductwork and disc valves.

2.3.4.8 REMOTE ROOMS (1; 2; 3; 4; 6)

The Instrumentation room is airconditioned by two midwall split units, The Electrical room is airconditioned by two midwall split units.

There is a pressurisation system which maintains a constant positive pressure of at least 30Pa in the Electrical room.

This comprises a variable speed fresh air fan-filter unit which supplies air into the room and an exhaust damper and louvre in the opposite wall.

The speed of the fan is controlled by a pressure transmitter and controller to maintain the correct pressure.

A fire damper is installed in the supply duct, and one is fitted behind the exhaust louvre.

The fan and dampers are supplied with power and controlled by control panel, located in the Electrical room.

2.3.4.9 KELVIN CHILLERS

There are 6 Kelvin chiller units, which extract the heat from each of the six, 3.3kV ABB ACS 1000 variable speed drives. The heat from the pure water circulating in the VSD is transferred to the raw water/glycol mixture via a plate heat exchanger, which is in-turn cooled by the external Kelvin chiller unit. The Kelvin chiller unit consists of two cooling circuits, one condensing coil and a raw water/glycol circulating system. Each cooling circuit has 3 vent fans (6 per chiller) and 1 compressor. The raw water/glycol system consists of 2 pumps, a Y-strainer

and a raw water/glycol tank. The raw water is cooled by both refrigerant systems at a single condenser.

2.3.5 **MNGENI, DUZI, MOOI RIVER; FORT MISTAKE; WILGE**

2.3.5.1 VSD ROOM

The purpose of the HVAC in the VSD room is to remove the warm air exhausted from the 3.3KV ABB variable speed drives.

The HVAC system consists of two identical air-cooled systems connected to a common supply air duct. Only one unit runs at a time, the other unit is a backup unit. The supply air ducting of each unit is equipped with isolation dampers that are open for the operational unit and closed for the back-up unit. The backup unit cannot be run at the same time as the operational unit.

The units are designated as "Unit A" and "Unit B". Each unit has a single refrigerant system.

Each system consists of one HCM GAH2000 indoor unit and one HCM GVH31S-1C air cooled condensing unit. The indoor unit contains one evaporator, with the air flow coming from a single shaft belt driven, double fan. The supply air fan is driven by a single motor. Each refrigeration system has its own condenser that uses two axial fans; with both fans being speed controlled for high side pressure control. The system is capacity controlled using hot gas bypass and is cycled by room temperature using a single stage thermostat configuration via the Carel pCO3. The hot-gas bypass capacity control system automatically modulates to reduce/increase the system cooling to meet the current heat load condition. The compressor will carry on running until the room air temperature set-point is reached, then the refrigeration system will pump down and cycle off, while the supply air fan continues to run.

The compressor will come back on once the room temperature cut-in setting is reached.

The system is 100% redundant. If there is a fault on the "primary" operational unit, the back-up "secondary" unit will automatically take over. This is achieved by a Moller Easy programmable relay located in the PLC Control electrical box. It will also swap the two units every 8 days to assure equal running times. It also logs the units' running hours and starts, the compressors' running hours and starts. It visually and audibly signals a unit fault and indicates on the display which unit has the fault.

2.3.5.2 THE CONTROL ROOM

Two mid-wall split unit with the condensing unit mounted on the outside wall. This is a heat pump unit and will cool or heat as necessary.

2.3.5.3 THE GUARD HOUSE

A small mid wall split unit, with the condensing unit mounted on the outside wall. This is a heat pump unit and will cool or heat as necessary.

2.3.6 **ALRODE PUMPSTATION**

2.3.6.1 THE ADMIN BUILDING

There are twenty split units with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.6.2 THE GUARD HOUSE

A small mid wall split unit, with the condensing unit mounted on the outside wall. This is a heat pump unit and will cool or heat as necessary.

2.3.6.3 THE CONTROL ROOM BUILDING

There are five mid-wall split units and three cassette units with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.7 **WALTLOO DELIVERY DEPOT**

2.3.7.1 THE MANAGER'S BUILDING

There are three split units with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.7.2 THE CONTROL ROOM BUILDING

The control building is airconditioned by centralised Dunham Bush package units. Three units, HP18MLNI are located in the LV Switchgear and HP24MLNI units are located at the MC & I equipment room.

2.3.7.3 THE WORKSHOP BUILDING

There is one mid-wall split unit with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.7.4 THE GUARD HOUSE

There are two mid-wall split unit with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.8 **DURBAN PUMP STATION**

2.3.8.1 THE ADMIN BUILDING

There three mid-wall split units and one under ceiling split unit with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.8.2 THE MANAGER'S BUILDING

There one mid-wall split unit with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.8.3 THE ARTISAN'S OFFICE

There one mid-wall split unit with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.8.4 THE CANTEEN BUILDING

There is one mid-wall split unit with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.8.5 THE TESTING FACILITY

There are three split units with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.8.6 THE GUARD HOUSE

There is one mid-wall split unit with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.8.7 THE CONTROL ROOM BUILDING

There are five mid-wall split units with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.3.8.8 THE MAIN SUBSTATION

There is one Under ceiling split unit with the condensing unit mounted on the outside wall in this building. These are heat pump unit and will cool or heat as necessary.

2.4 MAINTENANCE AND SERVICING

2.4.1 The *Contractor* shall be a member of SARACCA and shall be registered with SAQCC Gas.

2.4.2 The *Contractor* shall provide all labor, supervision, materials, equipment, tools, transportation and be responsible for the maintenance, repairs, and replacement of the specified HVAC equipment, as listed in the attached Annexures, for a period of 36 months. During this period, the *Contractor* shall maintain all HVAC plant and equipment in optimal operating condition.

2.4.3 The *Contractor* shall be entirely responsible for carrying out regular inspections at intervals not greater than 6 months (2 per year), unless otherwise specified, and for full servicing of all components of the installation in accordance with the manufacturer's instructions. For this purpose, the *Contractor* shall prepare a detailed inspection and service report as detailed in clause 2.9 "Record Keeping", of this specification and as listed in **Annexure 'B'** – Maintenance Checklists

- 2.4.4 All parts installed and/or materials used are to be the exact duplicate, or an approved substitute of the original used and/or specified by the manufacturer of the equipment, and in every case, guaranteed as per manufacturer's specification(s). Any deviation must be approved, in writing, by the TPL *Project Manager*.
- 2.4.5 The *Contractor* shall allow for all expendable materials necessary for servicing such as lubricating oils, grease, refrigerant, cleaning materials, V-Belts and replacement filters, when required.
- 2.4.6 The *Contractor* must complete cooling related items in the months of August and September and heating related items in the months of March and April.
- 2.4.7 Preventive Maintenance shall be performed as detailed in **Annexure "B"** – Maintenance Checklist and shall include the following:
- 2.4.7.1 **Bi-annually**
- 2.4.7.1.1 Check all HVAC units and associated components.
- 2.4.7.1.2 Check for proper voltage, amperage, contactor relays and tighten loose connections as needed.
- 2.4.7.1.3 Check fans, fan belts for wear and tightness, adjust or replace as needed.
- 2.4.7.1.4 Check pulleys for dirt build up, cracked collars clean or replace as needed.
- 2.4.7.1.5 Check unsealed motors for lubrication, lubricate as needed.
- 2.4.7.1.6 Check motors, pumps and compressor operations.
- 2.4.7.1.7 Check VAV drains, drain lines, traps and drain pans; check for static pressure, mould and algae build-up, correct as needed.
- 2.4.7.1.8 Check coils and intake hoods for corrosion.
- 2.4.7.1.9 Inspect casings.
- 2.4.7.1.10 Clean fan wheels and shafts
- 2.4.7.1.11 Check damper linkage and set screws.
- 2.4.7.1.12 Clean damper operators
- 2.4.7.1.13 Check power boxes and line voltage to insure secure wiring.
- 2.4.7.1.14 Check gaskets and flex connections.
- 2.4.7.1.15 Clean condenser coils.
- 2.4.7.1.16 Check refrigerant levels and change as needed.
- 2.4.7.1.17 Chillers – Should be maintained according to the manufacturer's recommended published schedule.
- 2.4.7.1.18 Check pH and general fluid quality of all heating and cooling fluids, flush and replace as needed.
- 2.4.7.1.19 Test the Chiller Glycol mixture with the reflectometer to ensure the recommended fluid concentration is within the acceptable percentage 30% / 70% glycol / Demin Water. The glycol must be compatible with fluorocarbon elastomers (FPM) like Viton and coating of Silicon Carbide (SiC),

2.4.7.2 **Annually (This maintenance to include all bi-annual items as listed in 2.4.7.1)**

- 2.4.7.2.1 Supply and replace air filters to ensure proper air flow, to prevent coil freeze up.
- 2.4.7.2.2 Supply and replace v-belts.
- 2.4.7.2.3 Check safeties and sensor calibration.
- 2.4.7.2.4 Supply and replace evaporator filters.

2.4.7.3 **Chemical Scrubber – Islandview Depot**

- 2.4.7.3.1 Supply and replace the dry Chemical filters of all scrubber units located at Island View Terminal one, once in the first service of the contract and once in the last service.

2.5 REPAIRS

- 2.5.1 If requested by the *Project Manager* or any other authorised representative, the *Contractor* shall provide a written estimate for any repair work.
- 2.5.2 There shall be no fee charged for any such estimate and the estimate shall include all travelling, accommodation, labour and component costs.
- 2.5.3 The *Contractor* shall ensure that the estimate is cost effective by scheduling the repair to coincide with other planned work at a specific site, where possible.
- 2.5.4 If the *Contractor* finds upon examination of the assigned job that the work will be more extensive than originally planned, he should contact the *Project Manager* or his/her designee within 24 hours for authorization to proceed with the additional work.
- 2.5.5 **Provision for Future HVAC system equipment repairs for 3 year contract period**

NOTE: The employer reserves the right to execute activity in part or as a whole or omit the entire activity upon instruction by the employer and be implemented by a defined costs compensation event for the possible major and minor defects listed below, Refer to the shorter schedule of cost components.

2.5.5.1 **Condenser Units**

- 2.5.5.1.1 Make: Cubi cool, Model: CC25532MTZ100, Refrigerant: R407C
 - a) Replace compressor and re-gas the system.
 - b) Replace the crank case heater.
 - c) Replace fan motor.
 - d) Replace HP/LP switch.
 - e) Replace suction line filter drier.
 - f) Replace liquid line filter drier.
 - g) Replace Schroeder valve.
- 2.5.5.1.2 Make: Huski, Model: BWP 180 - HTB2, Refrigerant: R407C
 - a) Replace compressor and re-gas the system.
 - b) Replace the crank case heater.

- c) Replace fan motor.
- d) Replace HP/LP switch.
- e) Replace suction line filter drier.
- f) Replace liquid line filter drier.
- g) Replace Schroeder valve.
- 2.5.5.1.3 Make: Huski, Model: BWC 26 - HTB2, Refrigerant: R407C
 - a) Replace compressor and re-gas the system.
 - b) Replace the crank case heater.
 - c) Replace fan motor.
 - d) Replace HP/LP switch.
 - e) Replace suction line filter drier.
 - f) Replace liquid line filter drier.
 - g) Replace Schroeder valve.
- 2.5.5.1.4 Make: Huski, Model: BWP 190 HTB2, Refrigerant: R407C
 - a) Replace compressor and re-gas the system.
 - b) Replace the crank case heater.
 - c) Replace fan motor.
 - d) Replace HP/LP switch.
 - e) Replace suction line filter drier.
 - f) Replace liquid line filter drier.
 - g) Replace Schroeder valve.
- 2.5.5.1.5 Make: Huski, Model: BWC 20 - HTB2, Refrigerant: R407C
 - a) Replace compressor and re-gas the system.
 - b) Replace the crank case heater.
 - c) Replace fan motor.
 - d) Replace HP/LP switch.
 - e) Replace suction line filter drier.
 - f) Replace liquid line filter drier.
 - g) Replace Schroeder valve.
- 2.5.5.1.6 Make: Huski, Model: BWP 160 - HTB2, Refrigerant: R407C
 - a) Replace compressor and re-gas the system.
 - b) Replace the crank case heater.
 - c) Price to replace fan motor.
 - d) Replace HP/LP switch.
 - e) Replace suction line filter drier.
 - f) Replace liquid line filter drier.
 - g) Replace Schroeder valve.
- 2.5.5.1.7 Make: HCM - Heat pump International, Model: GVH31-1C, Refrigerant: R407C
 - a) Replace compressor and re-gas the system.
 - b) Replace the crank case heater.
 - c) Replace fan motor.
 - d) Replace HP/LP switch.
 - e) Replace suction line filter drier.
 - f) Replace liquid line filter drier.
 - g) Replace Schroeder valve.
- 2.5.5.1.8 Make: Dakin, Model: UATYP450AMY1, Refrigerant: R407C
 - a) Replace compressor and re-gas the system.
 - b) Replace the crank case heater.

- c) Replace fan motor.
- d) Replace HP/LP switch.
- e) Replace suction line filter drier.
- f) Replace liquid line filter drier.
- g) Replace Schroeder valve.

2.5.5.1.9 Make: Daikin, Model: RXYQ18P9W1B

- a) Replace compressor and re-gas the system.
- b) Replace the crank case heater.
- c) Replace fan motor.
- d) Replace HP/LP switch.
- e) Replace suction line filter drier.
- f) Replace liquid line filter drier.
- g) Replace Schroeder valve.

2.5.5.1.10 Make: DUNHAM BUSH, Model: HP18MLNI, R410A

- a) Replace compressor and re-gas the system.
- b) Replace the crank case heater.
- c) Replace fan motor.
- d) Replace HP/LP switch.
- e) Replace suction line filter drier.
- f) Replace liquid line filter drier.
- g) Replace Schroeder valve.

2.5.5.1.11 Make: McQuay, Model: M4MC125, Refrigerant: R407C

- a) Replace compressor and re-gas the system.
- b) Replace the crank case heater.
- c) Replace fan motor.
- d) Replace HP/LP switch.
- e) Replace suction line filter drier.
- f) Replace liquid line filter drier.
- g) Replace Schroeder valve.

2.5.5.2 Air Handling Units

2.5.5.2.1 Make: Huski , Model: ZKL 06-4

- a) Replace motor bearings.
- b) Replace deck fan.
- c) Replace motor.
- d) Replace ABB 550 VSD.

2.5.5.2.2 Make: Huski , Model: ZKL 35-6

- a) Replace motor bearings.
- b) Replace deck fan.
- c) Replace motor.
- d) Replace ABB 550 VSD.

2.5.5.2.3 Make: Huski , Model: ZKL 07-4

- a) Replace motor bearings.
- b) Replace deck fan.
- c) Replace motor.
- d) Replace ABB 550 VSD.

2.5.5.2.4 Make: Huski , Model: ZKL 35-4

- a) Replace motor bearings.
- b) Replace deck fan.
- c) Replace motor.
- d) Replace ABB 550 VSD.

2.5.5.2.5 Make: Petra , Model: CM75 X8

- a) Replace motor bearings.
- b) Replace deck fan.
- c) Replace motor.
- d) Replace ABB 550 VSD.

2.5.5.2.6 Make: Petra , Model: CM75 X8

- a) Replace motor bearings.
- b) Replace deck fan.
- c) Replace motor.
- d) Replace ABB 550 VSD.

2.5.5.2.7 Make: Petra, Model: DSPc195

- a) Replace motor bearings.
- b) Replace deck fan.
- c) Replace motor.
- d) Replace ABB 550 VSD.

2.5.5.2.8 Make: McQuay, Model: MDB125

- a) Replace motor bearings.
- b) Replace deck fan.
- c) Replace motor.
- d) Replace ABB 550 VSD.

2.5.5.3 Chemical Scrubber - Islandview Depot

2.5.5.3.1 Make: Alphasorb, Model: INL404

- a) Replace motor bearings.
- b) Replace motor.
- c) Replace fan
- d) Replace VSD

2.5.5.3.2 Make: Alphasorb, Model: INL606

- a) Replace motor bearings.
- b) Replace motor.
- c) Replace fan
- d) Replace VSD

2.5.5.4 Chiller Units

2.5.5.4.1 Make: Kelvin, Model: KRNA600A93540, Refrigerant: R410A

- a) Replace fan speed controller
- b) Replace compressor and re-gas the system.
- c) Repair leaks and refill raw water glycol
- d) Replace and programme PC05+ Large controller.
- e) Replace water pump.
- f) Replace fan motor.

2.5.5.4.2 Make: Kelvin, Model: KRNA600A93540, Refrigerant: R410A

- a) Supply and replace 2x Chiller condenser coils for 1 chiller unit.

2.5.5.5 **Supply and Programme PLC Controllers**

- 2.5.5.5.1 Make: Carel, Size Small, Model: PC05+
- 2.5.5.5.2 Make: Carel, Size Medium, Model: PC05+
- 2.5.5.5.3 Make: Carel, Size Large, Model: PC05+
- 2.5.5.5.4 Make: Array
- 2.5.5.5.5 Make: Carel, Model: IR33 W7L R20

2.5.5.6 **Provision for ad-hoc gas leak detection, repair and re-gas leaks on an as and when basis :**

Note: The employer reserves the right to execute activity in part or in whole or omit the entire activity upon instruction by the employer and be implemented by a defined costs compensation event.

2.5.5.7 **Provision for general HVAC System minor ad-hoc repairs on an as and when basis:**

Note: The employer reserves the right to execute activity in part or in whole or omit the entire activity upon instruction by the employer and be implemented by a defined costs compensation event.

2.5.6 **Provision for ONCE-OFF HVAC System equipment replacement**

2.5.6.1 **Twini Depot**

- 2.5.6.1.1 Supply and replace 1x Huski BWP 180-HTB2 condenser unit in the Control Building, 51CON04. Also supply, programme Array controller and commission the condenser unit.

NOTE: Please take note of the additional activities or task that might be required but not limited to for Activity number 2.5.6.1.1 above when replacing condenser units for HVAC system at TPL Stations:

- Strip, decommission, rigg and remove the existing condensing unit from site.
- Supply, rigg, install to position new condensing unit, reconnect piping to existing evaporator and controls.
- Supply Blue chem corrosion treatment and apply to the condenser and evaporator coils, as well as associated panel.
- Supply and programme the Array controller.
- Pressure test the unit, commission and monitor efficient operation including SAT (Site Acceptance Testing) by the customer.
- Issue certificate of conformance (COC) as per Pressure Equipment Regulations 17(3) from OHS Act 85 of 1993, for any modifications to the HVAC equipment installed.

2.5.6.2 **Hilltop Depot**

- 2.5.6.2.1 Supply and replace 2x Huski BWC 26-HTB2 condenser units in the MV Substation Building, 53CONC01 and 53HCON02. Also supply, programme Array controller and commission the condenser units.

NOTE: Please take note of the additional activities or task that might be required but not limited to for Activity number 2.5.6.2.1 above when replacing condenser units for HVAC system at TPL Stations:

- Strip, decommission, rigg and remove the existing condensing unit from site.
- Supply, rigg, install to position new condensing unit, reconnect piping to existing evaporator and controls.
- Supply Blue chem corrosion treatment and apply to the condenser and evaporator coils, as well as associated panel.
- Supply and programme the Array controller.
- Pressure test the unit, commission and monitor efficient operation including SAT (Site Acceptance Testing) by the customer.
- Issue certificate of conformance (COC) as per Pressure Equipment Regulations 17(3) from OHS Act 85 of 1993, for any modifications to the HVAC equipment installed.

2.5.7 Provision for future HVAC system equipment replacement for 3-year contract period

NOTE: The employer reserves the right to execute activity in part or in whole or omit the entire activity upon instruction by the employer and be implemented by a defined costs compensation event for the possible major and minor defects listed below, Refer to the shorter schedule of cost components.

2.5.7.1 Condenser Units

- 2.5.7.1.1 Make: Cubi cool, Model: CC25532MTZ100, Refrigerant: R407C
- 2.5.7.1.2 Make: Huski, Model: BWP 180 - HTB2, Refrigerant: R407C
- 2.5.7.1.3 Make: Huski, Model: BWC 26 - HTB2, Refrigerant: R407C
- 2.5.7.1.4 Make: Huski, Model: BWP 190 HTB2, Refrigerant: R407C
- 2.5.7.1.5 Make: Huski, Model: BWC 20 - HTB2, Refrigerant: R407C
- 2.5.7.1.6 Make: Huski, Model: BWP 160 - HTB2, Refrigerant: R407C
- 2.5.7.1.7 Make: HCM - Heat pump International, Model: GVH31-1C, Refrigerant: R407C
- 2.5.7.1.8 Make: Dakin, Model: UATYP450AMY1, Refrigerant: R407C
- 2.5.7.1.9 Make: Daikin, Model: RXYQ18P9W1B
- 2.5.7.1.10 Make: DUNHAM BUSH, Model: HP18MLNI, R410A

2.6 EMERGENCY BREAKDOWN WORK

- 2.6.1 The *Contractor* shall provide an emergency breakdown call out service on request from the Client.
- 2.6.2 The *Contractor* shall report to site within Eight (8) hours of receiving an emergency breakdown call out.
- 2.6.3 The *Contractor* shall use his best endeavors, to rectify a breakdown or malfunction of the equipment and restore it to good working order in the shortest possible time.

- 2.6.4 In the event that both units (main unit and backup unit) have failed, the *Contractor* shall have at least one unit repaired and functional within 24 hours of visiting site.
- 2.6.5 The *Contractor* shall provide a written quotation, which must first be approved by the TPL *Project Manager*, before any repair work may proceed. This written quotation shall comply with the pricing as specified in "C2.2" - Activity Schedule (see clause 3.6.12 & 3.6.14)

2.7 CERTIFICATE OF CONFORMANCE

- 2.7.1 A SAQCC GAS registered Refrigeration Gas Practitioner to issue a Certificate of Conformance (COC) as per Pressure Equipment Regulations Regulation 17(3) from OHS Act 85 of 1993, for any alterations or modifications to the HVAC equipment installed at listed TPL Pump stations and Terminals, as stipulated herein.
- 2.7.2 Inform the *Project Manager* in writing of non-conformance and advise on appropriate mitigation post assessment.

2.8 GUARANTEE & LIABILITY

- 2.8.1 All workmanship, equipment and components supplied, shall be warranted for a period 52 weeks from date of installation. Upon receiving a warranty claim from Transnet Pipelines, the *Contractor* shall at its own cost and expense and without reimbursement by Transnet Pipelines promptly correct, repair or replace the faulty components or equipment. The *Contractor's* warranty shall cover all costs (Including, without limitation, those costs associated with parts, labour, technical support, travel, transportation, shipping and handling).

2.9 RECORD KEEPING

- 2.9.1 A report of the Preventive Maintenance Inspection shall be submitted with the invoice. The report will include the unit location, equipment tag, type, inspection type, i.e., semi-annual, annual, the findings and action taken on each unit.
- 2.9.2 A report and quotation for repairs, where necessary, shall be submitted to the TPL *Project Manager*, immediately after such a defect has been identified.
- 2.9.3 The *Contractor* shall maintain a detailed plant logbook on site for each HVAC Unit, in which he shall record, sign and date all work carried out at each inspection. This logbook shall remain in the control panel of each HVAC / Chiller unit.
- 2.9.4 These logbooks and checklists should include: the date; inspector's name; record of operating conditions; record of all required measurements; record of any work undertaken, and parts replaced; record of any items requiring further attention; record of all set-points and adjustments.
- 2.9.5 The *Contractor* and a representative of TPL shall sign off all logbooks and checklists.

2.9.6 Copies of these logbooks and checklists shall be regularly submitted to the *Project*

2.9.7 The *Contractor* shall provide a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance.

2.10 SITE CLEARING

2.10.1 The *Contractor* shall remove all debris, packing material, old parts and old refrigerant from the applicable pump station, generated as a result of the maintenance or repair work.

2.10.2 The *Contractor* shall keep the work sites clean and tidy at all times.

2.10.3 The *Contractor* shall take clause 5 (Environmental Management Requirements) into account in terms of disposal.

SECTION 3 – GENERAL

3 HEALTH AND SAFETY MANAGEMENT

3.1 HEALTH AND SAFETY STANDARD

The *Contractor* shall comply with the requirements of the Transnet *Contractor* Management Procedure TRN-IMS-GRP-PROC-014 **Annexure "C"** and OHS Act 85 of 1993 and its applicable regulations and any laws applicable in the terms of Health and Safety.

3.2 **CONTRACTOR'S GENERAL REQUIREMENTS FOR HEALTH AND SAFETY**

The *Contractor* is solely responsible for carrying out the work under the Contract having the highest regard for the health and safety of its employees, Transnet's employees and persons at or in the vicinity of the Site, the Works, temporary work, materials, the property of third parties and any purpose relating to the carrying out its obligations under this contract. The *Contractor* must make sure they have SHE personnel who is knowledgeable about SHE concepts who will be available as and when the need arises.

3.3 **CONTRACTOR'S HEALTH AND SAFETY FILE (MINIMUM REQUIREMENT)**

The *Contractor* is required to submit a compliance Health and Safety file for review and approval to the SHEQ Department, see **Annexure "D"** *Contractor* compliance file assessment checklist. Site access will only be recommended once the aforementioned approval has been provided. The SHE file must include but not limited to the following documents:

3.3.1 A valid Letter of Good Standing with the Workman's compensation.

3.3.2 And proof of relevant insurances to carry out work.

3.3.3 *Contractor* Health & Safety Plan correlating with Transnet *Contractor* Management Procedure (TRN-IMS-GRP-PROC-014) submitted and approved.

- 3.3.4 Copies of TPL & *Contractor*'s health, Safety & Environmental Policies
- 3.3.5 Mandatory agreement as per section 37.2 of the OSHACT. Act 85 of 1993 and CR 5.1(K)
- 3.3.6 Legal Appointments of Employees
- 3.3.7 Risk Assessments, Method statements and Safe Working Procedures
- 3.3.8 Employee Induction packs shall include the following documents:
 - a) Employee scope of work.
 - b) Proof of site-specific induction (*Contractor*).
 - c) ID copies and police clearance (NKP requirement)
 - d) Legal Letter of Appointment.
 - e) Abbreviated CV for the management and Legal appointees.
 - f) Proof of competence.
 - g) Valid entry medical certificate of fitness done by an Occupational Health Practitioner.
- 3.3.9 Project Specific Risk Assessment indicating the full scope of work and risk profile.
- 3.3.10 Copy of equipment registers to be used with copy of each item's inspection checklist.
- 3.3.11 Copy of nominated responsible person to conduct monthly inspections and proof of their competency.
- 3.3.12 Organogram of reporting structure: This document must provide all persons appointed in terms of OHS Act & Regulations (85 of 1993) including contact details. (Rev number, date, approval) All other statutory registers as required by the OHS Act No. 85 of 1993.
- 3.3.13 Copy of equipment registers to be used with copy of each item's inspection checklist.
- 3.3.14 Copy of nominated responsible person to conduct monthly inspections and proof of their competency. All other statutory registers as required by the OHS Act No. 85 of 1993.
- 3.3.15 The *Contractor* will be issued with a starter kit at the kick-off Meeting, the starter kit will contain all the health and safety templates and procedures to be used throughout the contract.
- 3.3.16 The *Contractor* shall ensure that no person or employees are allowed to enter TPL facilities on their behalf, unless that employee or person has undergone SHE induction pertaining to the hazards prevalent to the site at the time of entry.
- 3.3.17 All safety documents shall comply with the Project Document Control Procedure.
- 3.3.18 The *Contractor* shall furnish the client with the Exit Medicals at the end of the contract.
- 3.3.19 The *Contractor* shall also ensure that the correct PPE is worn at all times.
 - **NOTE** to *Contractors*: *Contractor* to ensure that their Health & Safety Management plan as well as their Baseline Risk Assessment includes the management of communicable diseases.

3.4 ACCESS CONTROL TO SITE

3.4.1 Security Screening

3.4.1.1 The *Contractor* will be expected to go through security screening prior to be given access to Transnet premises.

3.4.1.2 The following documents are needed from the company: -

- a) Company registration number.
- b) CIPC registration.
- c) Company TAX clearance TCS Pin.
- d) Certified Copies of ID of directors.
- e) Fingerprints of directors (Use SAP 91) to be found at local SAPS. Original fingerprints must be submitted.
- f) Certified Copies of ID of employees who will be working on site.
- g) Fingerprint of employees who will be working on site (Use SAP 91) to be found at local SAPS. Original fingerprints must be submitted.

Note: Please take note that SSA takes 3- 4 weeks for screening to take place once all required documentation has been submitted.

3.5 ENVIRONMENTAL MANAGEMENT REQUIREMENTS

All work is to be conducted in accordance with the principles of the National Environmental Management Act, 1998 (Act No. 107 of 1998) but not limited to other applicable regulations as well as acceptable environmental good practices. The following Project Environmental Specifications (PES) included in the Annexures of works information provide the minimum acceptable standards that shall be adhered to for this contract:

- 3.5.1 Transnet Integrated Management System (TIMS) Policy Commitment Statement.
- 3.5.2 Project Environmental Authorisation (Reference Number 12/12/20/735).
- 3.5.3 The *Contractor* must submit Environmental Management Plan to Transnet Pipelines Environmental Department for approval.
- 3.5.4 The *Contractor* shall perform all activities within the site and working areas having due regard to the environment and to environmental management practices as more particularly described within the aforesaid Project Environmental Specifications.
- 3.5.5 The EMP is project specific and addresses the projects potential environmental impacts and their mitigation measures.
- 3.5.6 The *Contractor* must sign the declaration of understanding as a commitment to abide with Transnet Pipelines.
- 3.5.7 Environmental Governance Framework and Project Environmental Specification.
- 3.5.8 The *Contractor* to implement sound waste management practices as defined in the Environmental Management specification. The scope of work includes disposal of waste generated as a result of the project in a permitted landfill site and submission of proof of disposal to Transnet Pipelines.
- 3.5.9 The above requirements shall be applicable to the main *Contractor*, its *Contractor's*, and the *Contractor* must comply with all the requirements of the PES as mentioned in Clause 3.5 above.

3.5.10 All personnel will be required to attend the environmental induction prior to commencement with their activities.

3.6 CONTRACTORS OBLIGATIONS

3.6.1 All work as described in this specification represents works on existing facilities that will be in operation during the course of the contract and that all necessary precautions are taken to ensure that normal pipeline operation is not disrupted in any way. The *Contractor* is thus required to note that access to the sites will be limited and dependent on operational constraints. The *Contractor* will therefore be required to co-operate responsibly with operational staff, and to schedule their work program so as to achieve the completion of the project on scheduled time.

3.6.2 The *Contractor* to note that work shutdown periods shall be scheduled according to Transnet Pipelines Operational constraints and may fall over weekends/public holidays. Transnet Pipelines will not be held responsible, in terms of cost, for any site delay that may arise from petroleum line operations enforced by Transnet Pipelines.

3.6.3 The *Contractor* shall supply adequate and competent labour, supervision, tools, equipment, services, testing devices for each and every item necessary to complete the work. Transnet Pipelines reserves the right to terminate the contract at any point if it is found that the *Contractor's* performance, supervision, tools, equipment, services, testing devices and material do not comply with specified requirements. The *Contractor* will only be allowed to claim for work completed to the specified acceptable standard.

3.6.4 The *Contractor* to note that the responsibility for the maintenance of all Equipment, Hardware and Software as included in the contract offer shall remain with the *Contractor*. In this regard, the *Contractor* is required to satisfy himself that all elements for the maintenance of the Equipment offered are capable of complying with PL657 Specification as included in the tender documents. Failure to meet specification shall render the successful *Contractor* liable to rectify the problem at no cost to Transnet Pipelines.

3.6.5 The *Contractor* shall only utilize testing devices and measuring equipment that are certified and carries a valid calibration certificate as issued by an approved calibration authority. Documentation reflecting the type, name and calibration certificate of the test equipment that will be utilized to complete the work, shall be submitted as part of the tender bid.

3.6.6 The *Contractor* shall adhere to the Transnet Pipelines/Transnet Freight Rail High Voltage Electrical Safety Instructions, which are applicable to all Transnet Pipelines substations and will be working under the supervision of TPL Electrician for the duration of this project.

- 3.6.7 The *Contractor* shall submit the required Safety File for approval by Transnet Pipelines, before any works can commence. The content of the Safety File is dictated by the work undertaken but shall ensure full compliance to the relevant regulations, refer to section 3.1 to 3.3 from the scope of work.
- 3.6.8 The *Contractor* and his personnel / sub-*Contractors* shall ensure that no person or employees are allowed to enter the affected TPL sites on their behalf, unless that employee or person has undergone, SHE induction pertaining to the hazards prevalent to the site at the time of entry conduct the compulsory Transnet Pipelines induction training, before commencement of the work.
- 3.6.9 The *Contractor* shall only be allowed to submit claims on completion of all the specified works per pump station as agreed with the TPL *Project Manager*.
- 3.6.10 The *Contractor* shall submit a FIXED PRICE for completion of all elements of the works. With ref. to clause 3.6.11 – The successful *Contractor* shall only be allowed to claim for actual works completed. In the case where a price was submitted for a particular item e.g. replacement of a component, but onsite investigation proved no replacement is required, the *Contractor* shall not be allowed to claim for that particular item. It might therefore be possible to end with a lower Total contract value than the original tender price.
- 3.6.11 The *Contractor* shall supply a detailed breakdown of all costs to complete all the WORK as specified in this document. With reference to the attached C2.2 - Activity schedule, the *Contractor* shall submit a price per pump station, per activity to complete the work, which shall include all travel, accommodation, labor, supervision, tools, equipment, services, testing devices and specified equipment. *Contractor* to note with reference to clause 3.6.2 and above mentioned labour cost, Transnet Pipelines will not entertain any additional claims for labour cost over weekends, public holidays or after hours labour. Any work not complying with specifications as contained herein and elsewhere in the contract document shall be redone at the *Contractor* own expense.
- 3.6.12 *Contractors* are required to complete the attached C2.2 - Activity schedule. The tender document will be deemed incomplete if the attached C2.2 is not 100% complete.
- 3.6.13 The *Contractor* to note that for materials and parts not included in this document the *Contractor* shall provide an installed price for these parts at cost plus a predetermined mark-up. This predetermined mark-up is to be supplied by the *Contractor* with a supplier's invoice before payment will be approved. If the *Contractor* is an agent of a particular range of products their price lists are to be included in the tender documentation. The *Contractor* must note this is an installed price and must include travelling, accommodation, site installation, labour, materials, and all equipment involved. Please note no further claims of any nature will be allowed and cost prices of items will be verified with suppliers before payment is approved.

- 3.6.14 The *Contractor* shall supply day work rates for the various grade of staff required. These day work rates will only be applicable where the Engineer gives written instruction for additional works and these or similar works have not been included in the tender document hereto and no material + predetermined mark-up is applicable as no material/parts are involved.
- 3.6.15 The *Contractor* shall furnish proof of actual experience in the class of work for which they have tendered and must submit with the tender on the relevant form attached to the tender documents, a statement of works recently carried out. The list shall include the value of previous contracts, completion dates, contact names and telephone numbers.
- 3.6.16 The *Contractor* to note that incomplete tender documents will not be considered.

3.7 PROJECT TIME SCHEDULE FOR MAINTENENCE

3.7.1 PROGRAM TO BE FURNISHED WITH TENDER

The *Contractor* must provide a program which provides the detail that would indicate the order and timing of activities to carry out the works in terms of the Employer's requirements and within the stipulated timeframes. The *Contractor* must provide the proposed program complying with, but not limited to, the minimum format requirements (MS Projects and Primavera preferably), as follows:

- 3.7.1.1 A level 3 detailed schedule aligned to the works information.
- 3.7.1.2 Project Timeline: The *Contractor* to demonstrate capability to meet the required time frame for maintenance aligning with the Scope of Works.
- 3.7.1.3 Key Milestones: The *Contractor* to clearly indicate the key milestones for all activities e.g., Kick off, safety file approval, Project start date, Site Access date, Completion date, employer documents review & approval date.
- 3.7.1.4 Columns Required: The columns that should reflect per activity the date requirements include the Start date, Finish date, Duration, Float, Predecessors, Successors and Calendar.
- 3.7.1.5 Critical Path: Clearly show the sequencing of all deliverables/activities. All activities should be linked with no open-end activities, critical path method to be used, and critical path clearly visible.
- 3.7.1.6 Project Activities: The *Contractor* to list all activities relating to maintenance services as per the Scope of Work. *Contractor* to note that the schedule will be affected by long lead items for major repairs (unforeseen work). If the schedule is delayed by the *Contractor*, the *Contractor* will adjust at no additional cost.

3.7.2 PROGRAM TO BE FURNISHED AFTER CONTRACT AWARD

- 3.7.2.1 The order in which the Works are to be carried out shall be as directed by the *Project Manager* within fourteen (14) days after the acceptance of this tender. The *Contractor* shall submit to the *Project Manager* for his approval a detailed program conforming to the *Project Manager's* requirements as specified above. The *Contractor* shall submit to the *Project Manager* three copies of such program.
- 3.7.2.2 This program, when agreed by the *Contractor* and the *Project Manager* shall be signed by both parties and will be binding on the *Contractor*. Amendment to the program can only be effected by agreement in writing between the *Contractor* and the *Project Manager*.
- 3.7.2.3 The program shall be used to monitor progress. The program shall remain in force but the resources to achieve the program shall be updated at each progress meeting and the *Contractor* shall report progress to date and what steps shall be taken to ensure adherence to program.
- 3.7.2.4 Should the successful *Contractor* at any time during the contract fall behind the approved program then the *Project Manager* may require the successful *Contractor* to adjust his manner of working and/or employ additional staff at NO additional cost to Transnet Pipelines in order that the approved program can be achieved.

3.8 REFERENCE DOCUMENTATION

- 3.8.1 The requirements of the materials, repairs, maintenance, replacement, examination, inspection and testing of equipment and facilities on site shall be in accordance with the relevant sections of the below mentioned codes.
- 3.8.2 Where Government, Local authorities and other statutory body's regulations, laws and requirements are more stringent than those specified hereunder, the aforementioned regulations, laws and requirements shall take precedence.
- 3.8.3 Where no specific rules, regulations, codes or requirements are contained in this specification nor covered by the below mentioned codes, the *Contractor* shall, in consultation with Transnet Pipelines, adhere to internationally accepted engineering practices or original manufacturers specification.
- 3.8.4 The latest revision of the following standards where applicable shall be read in conjunction with this document and need to be noted by *Contractor* in order to signify familiarity and compliance with its requirements.

GENERAL:

TITLE	SANS	IEC	OTHER
Code of Practice for the Installation, Testing and Balancing of Air Conditioning Ductwork.	SANS 10173-2003		
Room air conditioners and heat pumps	SANS 1125-2004		

Refrigerating systems including plants associated with air conditioning systems.	SANS 10147-2009		
Fire dampers.	SANS 193-2013		
The wiring of premises Part 1: Low-voltage installations	SANS 10142-1		
Air-conditioning ductwork.	SANS 1238 - 2005		
Filters for air-conditioning and general ventilation	SANS 1424 - 2008		
Household and similar electrical appliances - Safety Part 2-104: Particular requirements for appliances to recover and/or recycle refrigerant from air conditioning and refrigeration equipment	SANS 60335-2-104 2003	IEC 60335-2-104	
Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling Part 1: Terms and definitions	SANS 54511-1 2010		
Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling Part 2: Test conditions	SANS 54511-2 2010		
Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling Part 3: Test methods	SANS 54511-3 2010		
Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling Part 4: Requirements	SANS 54511-4 2010		
Household and similar electrical appliances - Safety Part 2-40: Particular requirements for electrical heat pumps, air- conditioners and dehumidifiers	SANS 60335-2-40 2006	IEC 60335-2-40	
Part II-1965 The Petroleum Industry Part II: Electrical Code	SANS 10089		
The installation and Maintenance of Electrical Equipment used in explosive atmospheres.	SANS 10086		
Categorization and conformity assessment criteria for all pressure equipment	SANS 347:2019		
Standard voltages, currents and insulation levels for electricity supply	SANS 1019		
Categorization and conformity assessment criteria for all pressure equipment, SANS 347 & 10147.	SANS 347 & SANS 10147		

3.9 SPECIFICATIONS

3.9.1 The *Contractor* shall familiarize themselves with the specifications for the execution of any major repairs for compliance purposes. TPL specifications will only be supplied to the recommended *Contractor*.

- PL727 Specification for Cable, Racking, Trenching & Earthing Reticulation
- PL711 Specification for Equipment Cabinets to house Electronic Equipment
- PL631 Specification for Low Voltage Distribution Boards and Switchgear
- PL101 Plant & equipment Tag numbering Standards
- PL102 Equipment, Instrument & Electrical Symbolology Standard
- PL103 General Drawing Standards

3.9.2 The following standards also have reference:

- Safety regulations for *Contractors* - refer to clause 3.1-3.3 (Health & Safety Management)
- Technical Instructions - work permit procedures

3.10 ANNEXURES

- Annexure A: HVAC Master Data per Station
- Annexure B: Maintenance Checklist
- Annexure C: TRN-IMS-PROC-014
- Annexure D: *Contractor* compliance file assessment checklist

4 GENERAL OPERATING CONDITIONS

4.1 CLIMATIC CONDITIONS

- 4.1.1 Unless otherwise specified, all control equipment, peripherals and auxiliary equipment shall be capable of operating in an uncontrolled environment, and at ambient temperatures, which vary between -5 degrees Celsius and 50 degrees Celsius.
- 4.1.2 *Contractor*'s must state the heat, power and environment requirements for all equipment offered in the tender.
- 4.1.3 *Contractor*'s must note that certain equipment will be installed in an open environment, exposed to the elements. It will be the responsibility of the successful *Contractor* to ensure that the installed equipment is able to withstand any hostile environment.
- 4.1.4 The equipment must operate satisfactorily between sea level and 1800 meters above sea level.
- 4.1.5 The equipment must be capable of operating in a relative humidity range from 5% RH to 95% RH.

- 4.1.6 Severe lightning occurs in certain areas in which the equipment will operate.
- 4.1.7 Suitable protection is to be provided for all incoming power supply lines as well as sensitive control equipment in order to prevent damage due to lightning and power surges. *Contractor's* are requested to include full particulars of lightning and surge protection to be provided, in the tender.
- 4.1.8 Transnet Pipelines will not regard damage to equipment resulting from a lightning strike or a power surge as unavoidable except where such a strike is a "direct strike".
- 4.1.9 *Contractor's* must note that equipment and cabling mounted in the manifold area may be exposed to periodic testing of chemical fire extinguisher sprays.
- 4.1.10 There is a presence of electrical and RF noise circuits. Systems are to be designed so as to prevent interference from this noise.

4.2 SITE CONDITIONS

- 4.2.1 SITE SAFETY to be strictly administered at all times.
- 4.2.2 **Site Facilities**
 - 4.2.2.1 The *Contractor* shall maintain this site in a neat and tidy condition to the satisfaction of the Project Manager.
 - 4.2.2.2 The employer facilities are secure; however, the *Contractor* is responsible for the safe keeping of their property.

4.2.3 Electricity

The electrical power supplied on site, for construction purposes, is as follows: - 400 Volt A.C. / 20 Amp (three phase) and 230v 15 Amp.

There will be no charge for the use of this power supply, provided the usage is deemed reasonable by the *Project Manager*.

Transnet Pipelines will not be responsible for any claims whatsoever brought about by any disruption or fluctuations in the supply of any such electric power supplied to the *Contractor*. During a power failure or substation isolation periods the *Contractor* will supply his own power by means of a portable generator.

4.3 INSPECTION RIGHTS

Transnet Limited reserves the right to inspect, examine and test any machinery, equipment, materials or methods, employed in expediting the works. Transnet shall utilise their own personnel or employ a 3rd party to carry out the said inspections, examinations or tests. The *Project Manager* or his deputy must have access to the manufacturer's works at all times for the purpose of inspecting the work during manufacture.

4.4 HOURS OF WORK

Normal working hours are as follows: -

Monday to Friday: 08:00 to 16:00



These hours may however be extended, as required, by prior agreement with Transnet Pipelines.

4.5 SITE MEETINGS

The *Contractor* shall attend site meetings when convened by the Project Manager. Such meetings will be for the purpose of discussing progress, delays, materials, conditions and specifications, as well as the co-ordination of site activities. The meetings will be chaired by the *Project Manager*, or his Deputy and the proceedings shall be minuted and circulated by the *Project Manager*.

4.6 DOCUMENTATION SIGN-OFF SHEET

I, the undersigned hereby approve this specification.

ROLE	CAPACITY/ FUNCTION	SIGNATURE	DATE
Project Manager:	Engineering Technician: Molly Nxoko		18-11-2024
Accepts document for adequacy and practicability. Comments:			
Process Owner:	Principal Engineer: Shanil Rugbeer		18/11/2024
Approves document for use. Comments:			