

**MECHANICAL SPECIFICATIONS FOR SUPPLY, INSTALLATION,
COMMISSIONING AND MAINTENANCE OF THE DOMESTIC BOOSTER
PUMPS FOR KUNENE VOCATIONAL TRAINING CENTRE AT KHORIXAS
– KUNENE REGION**

STANDARD SPECIFICATION: PUMPS INSTALLATIONS

PROJECT SPECIFICATION

A. GENERAL

This specification is for the supply, delivery, installation, testing, commissioning and maintenance of the pumps system with complete pipe work for the Construction of New Kunene Vocational Training Centre in Khorixas, Kunene Region.

The solar geyser Subcontractor, who within the scope of this document is referred to as the Subcontractor, will be a non-nominated Subcontractor to the Contractor and will be responsible for the complete solar geyser installation and the proper functioning thereof.

The specification and drawings form part of, and shall be read in conjunction with all contract documents and drawings, bills of quantities and the standard specifications dealt with in Part IV.

Tenderers shall study the building contract and make themselves fully aware of, and allow for all conditions and requirements, as the Client will not accept any responsibility for any disputes after submission of the quotation.

B. LOCATION OF THE SITE AND SITE CONDITIONS

The site is located in Khorixas in Kunene Region.

The average site altitude is 1027m above sea level. The average minimum and maximum temperatures are $\pm 8^{\circ}\text{C}$ and 34°C during the winter and summer months respectively.

No official site inspection will be conducted prior to tender closing date and tenderers must ensure that they familiarise themselves with local conditions.

C. CONTRACTOR'S RESPONSIBILITIES

The Mechanical Contractor shall be responsible for the supply, installation, testing, commissioning and free maintenance during the guarantee period of the installation detailed in this specification and on the accompanying drawings.

The Sub- Contractor shall provide all materials, equipment, labour and services necessary for the complete, safe and efficient operation of the electrical installation in accordance with the intention of this specification and drawings.

The work shall be carried out strictly in accordance with the following:

- The Machinery and Occupational Safety Act No. 6 of 1983 and the relevant regulations as amended.
- Manufacturers Installation manuals of the various equipment.
- SABS 400: National Building Regulations

Please note the following:

- As-built drawings to be submitted upon completion of the contract
- Comprehensive operating and maintenance manuals shall be submitted upon the completion of the contract.
- Conflicts between specification and drawing if any such conflict is discovered whereupon the Engineer shall be informed.

D. SUMMARY OF WORKS

The work, as detailed in the attached specifications and accompanying drawings, includes the, supplying / manufacturing, delivery, installation, testing, commissioning and free maintenance for 12 months during the guarantee period to provide the Employer with a fully functional and operable mechanical plant.

E. THE PROJECT COMPRISES OF THE FOLLOWING:

- Domestic water pumps & related equipment

COORDINATION SCHEDULE			
	Mech	Main	Elect.
General	Contr	Contr	Contr
The supply and erection of all scaffolding necessary for the mech. Installation.		√	
All rigging, hoisting and associated tools required for installation/ erection mech. Equipment.	√		
Removal from site of excess and waste material generated during the mech. Installation	√		
Co-ordinate space conditions, pipe & cable routes and terminations of the various services with all trades involved for proper installation of the work.	√	√	√
Building			
Chasing of pipes & conduit into brick walls.	√		
Cutting and core drilling required in structural members		√	
Openings & holes in roof structure		√	
Casting / building in of sleeves in concrete members and walls		√	
Sealing of all openings where ducting, piping or cabling goes through walls, slabs & shafts.	√		
The provision of flashing & waterproofing for duct/roof penetrations.		√	
Casting of all concrete bases and plinths for equipment as required.		√	
Marking/ Indication of plinths, holes & sleeves required	√		
Making good of building structure after installation (Painting & plastering)		√	
Painting& priming of material & equipment forming part of mech. Installation	√		
Provision of pipe supports, trucking, cable trays and vibration eliminators as required for mech. Inst.	√		
Supply & installation of ground and elevated tanks	√		
Building of pump house		√	

Electrical			
Electrical power supplies (Isolator) to mechanical equipment.			√
The provision of all necessary controls, instrumentation, and wiring from the control panels to the equipment as specified herein.	√		

1.1.1 INCLUDED

The work may consist but not necessary limited to the following:

- The entire installation must conform to the requirements of this specification and must be complete in every respect. All items required to make this a complete working installation, whether expressly mentioned or not, must be allowed for in the contract price.
- The supply, delivery, installation, testing, commissioning and maintenance of the various systems.
- The provision of all necessary controls, instrumentation, and wiring from the control panels to the equipment as specified herein. The electrical supplies will terminate at isolators next to the relevant equipment.
- Pipe sleeves for all holes in walls, floors, and ceilings as well as the chasing into brick walls.
- All rigging, hoisting, transportation, and associated work necessary for placement of all equipment in the final location shown.
- The necessary piping, conduits, cable trunking, cable ladders, cable trays, controls and wiring as indicated to ensure the system complies with and operates to specification.
- All equipment (pipe and duct) supports, vibration eliminators, brackets and accessories to complete this installation.
- Site establishment & storage of equipment
- Management of the works
- One year's default liability period on the complete installation
- One year's guarantee of air conditioning units commencing from the date when the equipment has been witnessed as completes and accepted by the client
- Attendance of all site meetings including first and final delivery inspections.
- One year's full comprehensive maintenance of the equipment, including consumables and spares.
- Submission of a programme, schedule of maintenance checks, log books and notification to the client's maintenance department when work is to be carried out for inspection purposes, after being witnessed as complete and accepted by the employer.
- Supply of Spares and tools where applicable, as provided with the equipment.

- Submission of detailed Operating and Maintenance Manuals. Format of manuals to be according to Burmeister & Partners standard specifications.
- Submission of workshop drawings of the complete installation for approval by the engineer prior to ordering or manufacturing (to include piping diagrams, workshop drawings etc.)
- Fees, permits, inspections, taxes, and approach from agencies that have the applicable jurisdiction.

1.1.2 EXCLUSIONS

The following work is excluded from this contract, and will be carried out by others:

- All builders' work including forming of holes in the structure, walls, roofs and floors and making good.
- The provision of flashing for duct/roof penetrations.
- Cutting and core drilling required in structural members, including locating of rebar or coordination of locating rebar.
- Casting of all concrete bases and plinths for equipment as required.
- Supply and fitting of timber frames where necessary.
- Electrical power supplies (Isolator) to mechanical equipment.

1.2 INTERPRETATION OF DOCUMENTS AND DRAWINGS

The tender document shall be read in conjunction with the relevant drawings and, in case of discrepancies, such discrepancies must be pointed out to the Engineer. Likewise, any obvious errors and/or omissions in the tender document or on drawings shall be pointed out to the Engineer and he shall rectify all such errors in writing.

For tender purposes, the following Mechanical Engineer's Drawings will be applicable, namely:

NTA KUNENE VTC - BP-01: PUMP CONNECTION LAYOUT

NTA KUNENE VTC - BP-01: BOOSTER PUMP DETAILS

The positions of equipment, service outlets, etc., as shown on the drawings are approximate, and in some cases diagrammatic. The successful Tenderer must verify the actual positions on site before construction and/or installation thereof can commence, as no extras will be allowed for any alterations to work proceeded with before proper verification.

Before fixing any equipment, the Pumps Contractor shall check with the Main Contractor and Electrical sub-contractor on his detail drawings for the exact positioning of ducts and/or equipment. Any discrepancies between the Main Contractor's detail drawings and the Mechanical Engineer's drawings must be pointed out to the Engineer.

The Pumps Contractor shall co-ordinate all work on site with the other Sub-contractors as well as with drawings for other services.

Tender drawings must be handed in with the completed tender document, as tenders without drawings will be regarded as incomplete. The Contractor shall sign these drawings and clearly mark all proposed alterations, deviations and errors with a red ink pen.

1.3 PROGRAMMING OF WORK

The preliminary programme for the execution of the works is as follows:

Hand-over of site to Main Contractor	T.B.C
Target completion date for Pumps	T.B.C
Hand-over of Completed Works to Employer	T.B.C
End of Defects liability period	T.B.C

Once appointed, the Sub-contractor will in conjunction with all the Main Contractors and Suppliers draw-up a detailed Gantt Chart.

The mechanical installation shall proceed concurrently with the building construction or in accordance with an approved programme in all respects.

It is essential that the Contractor programmes his construction and all other work in conjunction with the Main Contractor and the main contract programme in order to avoid possible delays or clashes of trades.

For direct contracts the Contractor shall submit a detailed programme in the form of a bar chart based on the contract period and the various activities and components of the installation. This programme shall be submitted to the Department within two weeks of site hand-over.

1.4 INTERFACES WITH OTHER CONTRACTORS

It is expected from the Contractor to cooperate with other trades in putting this installation in place on time. Schedule work and cooperate with the others to avoid delays, interferences, and unnecessary work, conforming to the construction schedule.

The Contractor shall co-ordinate his program with the Civil, Structural, Electrical and Building Contractor. His installation rates shall make provision for such "first fixing" of plant as may be

required, and for returning at a later stage to complete the installation when the other Contractor's has completed their operations, were necessary.

Delays due to lack of co-ordination between the Contractor's shall not form a basis for claims be the Contractor of this Contract.

Coordination may include but not limited to:

- Verify all dimensions by field measurements.
- Schedule all work in advance with the Main contractor
- Marking out openings, holes, positions of plinths
- Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
- Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
- Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the project. Give particular attention to large equipment requiring positioning prior to closing in the building.
- Coordinate installation and connection of mechanical systems to exterior underground and overhead utilities and services. Comply with requirements of governing regulations.

Coordinate the positions of electrical supply points and control interfaces with the electrical/electronic sub-contractors.

F. PROJECT TECHNICAL SPECIFICATIONS

1.5 GENERAL DESIGN CRITERIA

The drawings and specifications are considered a performance specification, i.e. prospective Contractors must size, select and price the plant and equipment to meet the duties intended herein. However, detail and specific requirements shall be met.

1.6 STANDARD SPECIFICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Specification	Description	Published By
SANS 1123	Standard for Pipe flanges	South African National Standards
SANS 719	Standard on Electric Welded low carbon steel pipes	South African National Standards

SANS 62	Standard on steel pipes of nominal size not exceeding 150 mm.	South African National Standards
SANS 10044	Welding Code	South African National Standards
SANS 10329	Standard on design and construction of sectional steel tanks for storage of liquids at or above ground level	South African National Standards

1.7 DOMESTIC PUMPS STATION

The two (2) booster pumps, one (1) duty, one (1) standby shall be installed in the pumps house. The pumps shall operate on an alternating basis. The pumps will supply potable water with a maximum soil content of less than 50 g/m³ to a 20m elevated water tank.

The booster pumps shall be of the centrifugal type multistage suitable for vertical installation. The booster pumps shall be compact units. The pumps shall be equal to the Grundfos/ Willo type multistage centrifugal inline pumps or similar and approved.

1.7.1 PUMPS

The pump shall be selected to operate at a speed not exceeding 2900 rpm. The duty point of each pump shall be **6.3 ℓ/s @ 20 mWh** with the maximum efficiency close to the duty flow.

The materials of construction shall be as follows:

Outer sleeve	:	Stainless Steel
Impeller	:	Stainless Steel
Shaft	:	Stainless Steel
Pump Head	:	Cast Iron
Stay Bolts	:	Stainless Steel
Bearing Bush	:	Lead Bronze / Rubber

The pump shall be supplied with a non-return valve and a flow-detecting switch as shown.

1.7.2 ELECTRIC MOTORS

The electric motor shall be a 4 pole totally enclosed, fan cooled motor suitable for 3 phase, 380 V, 50 Hz supply. The motor shall be of the lubricated squirrel type. The Electric motors shall be

designed, rated and manufactured in accordance with the relevant SABS / IEC / DIN codes for motors. Single-phase induction motors shall comply with SABS 1189 and three phase induction motors with SABS 948. They shall be suitable for operation at the rated voltage on a 50 Hz supply.

The motor shall be direct on-line starting. In addition the motor shall meet the following:

- Winding indication class : H
- Enclosure : IP55

The motor rating shall be at least 15% in excess of the maximum power absorbed by the pump at any point of the characteristic curve. The contractor shall submit full details of the motor with the tender to allow electrical protection equipment (by other) to be size accordingly.

1.7.3 GENERAL

Pumps shall be supplied as complete sets by their suppliers, incorporating actual pumps, motors, drives, bed plates, etc., factory assembled and dispatched to the project complete in all respects.

1.7.4 MOTOR CONTROL CENTRE (MCC)

Schematic layouts as well as Line diagrams of the MCC shall be submitted to the engineer for approval prior to manufacturing.

A control board shall be supplied next to the boreholes for the control thereof. The control board shall include the following functions:

- Automatic Pump activation by flow sensing for flow rates in excess of 0.3 l/s
- Motor protection unit
- Applicable size contactors
- Control relays
- Ammeter
- Running Hour meter
- Start/Stop pushbuttons
- Auto/off/manual selector switch
- Run/Stop/Trip/Winding Over temperature/ indicating lamps will be provided
- Voltmeter and voltmeter selector switch
- Suitably sized 5 kA circuit breaker, complete with shunt trip and 250 mA earth leakage unit.
- LIGHTNING AND SURGE PROTECTION (40 kA rated surge arrestor)
- PANEL PLUG WITH EARTH LEAKAGE (weather proof)

Motor protection unit shall provide the following:

- Over voltage protection
- Under voltage protection
- Phase loss protection
- Phase imbalance protection
- Phase rotation protection
- Overload
- Under load
- Dry running Protection

The board shall furthermore comply with the following:

Enclosure material	:	Epoxy coated sheet metal c/w padlockable hinged door
IP Rating	:	IP 55 to IEC 529
Cable entry / exit	:	Bottom
Switch gear	:	DIN rail mounted of same manufacturer.
Contactor utilisation	:	AC-3
Control circuit voltage	:	220 V _{AC} or 110 V _{AC} or 24 V _{DC}
Power circuit voltage	:	380/220V _{AC}
System isolation volt level	:	1000 V _{AC}
Switch gear short circuit rating	:	5 kA
Colour	:	Electric Orange
Ventilation	:	Internally self ventilated
Spare capacity	:	20% prefitted with DIN rail
Wiring	:	in PVC channels

All electrical work shall be carried out by a capable electrician and in accordance with the requirements of Part IV.

A 380 V, 50 Hz 3 phase electrical point will be supplied by others and shall terminate outside the MCC. The pump sub-contractor will be responsible to terminate this point to the MCC by means of a three phase isolator.

1.7.5 CONTROL CIRCUIT

The automatic stopping/starting of the domestic pump set shall be activated by a conductive probe system with the necessary control relays & accessories. The standby pump shall be activated on low level. The circuit shall include cyclic changeover for duty pump rotation.

The fire pump shall be activated by means of a manual push button.

Both pumps shall be protected on no flow condition by an electronic flow sensor.

1.7.6 ALARMS

The system will provide the following on-panel alarm indications:

- Trip condition
- Winding Temperature Trip
- No Flow
-

1.8 INSTRUMENTATION

1.8.1 No Flow Detecting Switch

The flow detecting shall be of the thermal / electronic type. The flow switch will be screwed in to a adaptable socket welded on top of the inlet pipe to the booster pumps as shown. The switches shall stop both pump sets on no flow condition. The switch shall be similar to EGE.

Mechanical switches will not be accepted.

1.8.2 Level Control

Level control should be carried out by a conductive 3 probe system.

The probes shall be stainless steel.

The probes shall be supplied complete with a probe level control module.

The control module should be installed inside the MCC and wired to the probes, all by the pump contractor.

1.8.3 Pressure Gauges

Pressure gauges shall be glycerine filled, waterproof, of Bourbon tube design and damping movement with a BSPT bottom connection. Dial faces shall be 100mm and be white with black lettering and pointer. The gauge body, tube and working parts, including screws, etc shall be manufactured from brass or stainless steel. Gauges shall be manufactured and tested in accordance with BS 1780. The gauge shall be marked in calibrated steps from 0 to 20 bars and be accurate to within 3%. All gauges will be installed on a flanged stub or socket welded (before galvanising) onto the pipe and must be provided with a brass T-port gauge cock.

Gauges shall be installed in the positions as shown on the relevant drawings or as ordered by the Engineer. Gauge ranges shall be as indicated on the drawings.

1.9 PIPE WORK AND RELEVANT FITTINGS

1.10 GENERAL

The specification for pipe work and installation described hereunder shall hold for all installations that form part of this contract. All dimensions, levels and sizes given on drawings, shall be verified before ordering of materials commence. The contractor shall co-ordinate with the main contractor to ensure that the different components can be linked as indicated on the drawings. No additional claim for either time or payment for incorrect fittings and specials delivered to site will be considered in the course of the contract period.

The successful tenderer must therefore ascertain himself of the all details and must immediately inform the Engineer in the event of a discrepancy with levels and dimensions on the drawing.

Tenderers must note that the final lengths of the pipe work may change with ± 100 mm, but no adjustment to the tendered price will be made.

All pipe work shall be SANS 62, medium grade or to Schedule 40.

All pipe work relevant to the tender installation shall be stainless steel 304. The successful sub-contractor shall measure all existing connection flanges to ensure correct mating.

All puddle flanges and anchor flanges shall comply with SABS 1123, table 600/3 and shall be undrilled.

In general, pipe protection shall comply with the lining specification as per Standard Technical Specifications of this document. Any alternative to the above shall first be submitted to the Engineer for approval before manufacturing may commence.

Adequate and robust pipe supports shall be provided and installed as required.

1.10.1 Sockets

All small diameter sockets shall be welded onto the pipe around the full circumference of the socket over a hole in the pipe of a diameter equal to the nominal size of the socket. All sockets shall comply with BS 1740 supplied with a Galvanised Mild Steel plug.

1.10.2 Flanges

All flanges shall comply with SABS 1123 with pressure ratings as specified on drawings.

1.10.3 Restraining Flanges

Unless clearly otherwise specified, retaining flanges can be standard flanges to the same specification as the connection flanges or they may be of thinner material with supporting webs (tensile). The number of holes and PCD shall be that of the appropriate connecting flange on the

item to which the retaining flange is fixed. Fixing shall be by means of fillet welds around the full circumference of the pipe and on both sides of the retaining flange.

1.10.4 Flexible Couplings

Couplings shall be of the sleeve type slip-on couplings (e.g. Viking Johnson or similar), conforming to the requirements of BS 534. Slip-on type flanged adaptors shall conform to the same requirements as for the couplings. All flanges shall comply with SABS 1123. Couplings and adaptors shall be complete and ready for installation with the necessary sleeves, rubber wedge rings, bolts and nuts. Bolts shall be galvanised. Bolts & Nuts All bolts and nuts shall be Strength Grade 4.8 to SABS 135 and shall be Stainless Steel.

1.10.5 Pipes buried in soil

All pipes and couplings buried in soil shall be corrosion protected by means of petrolatum impregnated tape, Denso or similar approved to the manufacturers specifications.

1.11 VALVES

This specification covers the supply, delivery and installation of butterfly, non-return and air valves for the use in pressure pipes.

1.11.1 GENERAL

The minimum pressure rating of the valves shall be equal or higher than that of the mating flanges. Valve bodies shall be wire brushed to standard St 3 of SIS 05 5900 or equivalent and painted one coat of Coupon EP 2300 or similar approved.

1.11.2 RESILIENT SEAL (RSV) GATE VALVES

1.11.2.1 GENERAL

Gate valves shall be double flanged, according to SAN 1123 Table 10 (1001/3), and be resilient seated and the valves shall be of the non-rising spindle type. The valves shall be capable of withstanding the nominal pressure and specified test pressure and shall have the capability to seal drip tight bi-directionally.

The valves shall generally be manufactured in accordance to SANS 664.

1.11.2.2 GATE DESIGN

The gate shall be fully rubber encapsulated inside and outside to ensure drip tight sealing and avoid corrosion. The gate shall further have a drain hole, preventing stagnant water or impurities from collecting.

Rubber utilized in the coating of the wedge shall be inert and shall not impart odour, taste and colour.

The gate nut shall not be fixed to the wedge, thereby reducing opening torques.

1.11.2.3 GATE AND BODY DESIGN

The gate shall have optimally placed guides of wear resistant plastic so as to reduce the torques as well as to reduce wear between the rubber and the coating on the body.

The bore of the body shall be straight through design in order to allow cleaning with a badger.

1.11.2.4 VALVE BONNET

The valve shall utilize 3 independent bonnet seals which shall include a set of stem seals embedded in non-corrosive material, a back seal to prevent leakage when changing seals, and a wiper ring to protect against debris entering the valve.

Two friction washers (sizes 50mm – 200mm) and thrust ball bearings (250 mm – 600mm) shall be incorporated to ensure smooth spindle operation as well as to reduce opening and closing torques.

A full circle thrust collar shall be utilized to ensure low torque operation. O-ring stem seals shall be replaceable under pressure for sizes 50 mm – 200 mm.

1.11.2.5 SPINDLE

Spindles shall be made of stainless steel. The stem threads shall be rolled to maintain steel structure and increase strength and, to ensure smooth thread edges and consequently a low operating torque.

1.11.2.6 BODY AND BONNET ASSEMBLY

The rubber bonnet gasket shall fit in a recess in the valve bonnet preventing blow out of the seal under surge conditions. The bonnet bolts shall pass through the gasket and sunk into the bonnet and sealed for corrosion protection.

1.11.2.7 CORROSION PROTECTION

Every valve shall be internally and externally fusion bonded epoxy powder coated as standard.

An edge protecting ring shall permanently be fitted around the body and bonnet joint in order to protect the coating during transportation and installation.

1.11.2.8 Type

Gate valves shall comply with BS 3952. They shall be of the knife type manually operated. The gate shall seal either on a replaceable nitrile O-ring or a PTFE seal secured in the body. These type of valve shall be used for the sewer pump station.

1.11.2.9 CONSTRUCTION

Valves shall be fitted with a hand wheel and be geared such that they may be opened or closed against the design pressure as a differential pressure across the valve with an effort not exceeding 400 N on the hand wheel.

- Valves must be right-hand closing.

- Valves shall be fitted with adequate torque limiting devices and positions stops such that the disk will remain in any fixed position for an extended period of time. The shut-off pressure rating of the disk, in both directions, shall at least be equal to the working pressure of the pipe work system in which the valve will be installed.
- Rubber wedge rings shall conform to the requirements of BS 2494.

Material specifications

Size	:	As specified in the Schedule of Technical Information
Pressure rating	:	10 bar
Body Material	:	Cast Iron
Shaft Material	:	Stainless Steel
Disc Material	:	Spheroidal graphite iron with nylon coating
Gate seal	:	Nitrile rubber O-ring / PTFE seal
Shaft seals	:	Primary and secondary – integral with body liner Tertiary O-rings – shaft mounted and replaceable

1.11.3 BALL TYPE NON-RETURN VALVES

Non-return valve, pressure rating suitable for conditions pertaining to this contract, shall be provided on the delivery line of each pump, as indicated on drawings, to protect the pumps. It shall be of a ball type to reduce water hammer effects to a minimum. Full details of the offered non-return valves shall be supplied by the Firm.

Ball check valve shall be similar or equal to Vosa ball check valve and shall be manufactured from the following materials:

Body and Bonnet	:	Nodular cast iron – epoxy powder coated
Ball	:	Aluminium coated with nitrile rubber
Bonnet Seal	:	Nitrile rubber
Bolts and Nuts	:	Cadum plated steel

1.11.3.1 TYPE

Non return valves used for the sewer pump stations shall be of the ball type.

The valves shall have minimum hydraulic resistance at the required flow rate, shall not be subjected to disc flutter and shall give rapid non-slam closure upon reversal of flow.

Installation positions and details are shown on the relevant mechanical drawings. Please note that these type of valves shall be used for the sewer pump station.

1.11.3.2 MATERIAL SPECIFICATIONS

Size	:	As specified in the Schedule of Technical Information
Pressure rating	:	10 bar
Body Material	:	Cast Iron
Shaft Material	:	Stainless Steel or Brass

1.12 TESTING AND COMMISSIONING

Applicable to this Contract – refer to Mechanical Standard Specifications.

1.12.1.1 12-MONTH FREE MAINTENANCE GUARANTEE

Applicable to this Contract – refer to Standard Specifications

The maintenance and guarantee period shall be twelve (12) months from the date of successful first delivery acceptance and shall comply with the relevant clauses of the Standard Specification.

It is required that tenderers allow for 12 months maintenance services of the installation, four visits, one every 3 months after successful practical conception.

1.13 STAFF TRAINING PERIOD

Applicable to this Contract – refer to Mechanical Standard Specifications.

1.13.1.1 OPERATING AND MAINTENANCE MANUALS

Applicable to this contract – refer to Mechanical standard specifications.

1.13.1.2 WORK EXCLUDED FROM THIS SECTION

All work specified and implied in this document forms part of the deliverables of this contract.

1.13.1.3 INTERFACES WITH OTHER CONTRACTORS

It is expected of the Sub-Contractor to co-ordinate on-site with the Contractor, other Sub-Contractor and Suppliers the exact details of interfaces required. These include marking out openings, holes, positions of plinths, positions of electrical connections etc.