PORT SHEPSTONE HOSPITAL
NEW PSYCHIATRIC WARD

MEDICAL GAS AND VACUUM INSTALLATION

(WIMS 044044)

PARTICULAR TECHNICAL SPECIFICATIONS

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public works
Department:
Public Works
PROVINCE OF KWAZULU-NATAL

AUGUST 2024

PART ONE : PARTICULAR TECHNICAL SPECIFICATION

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PORT SHEPSTONE HOSPITAL – NEW PSYCHIATRIC WARDS

MEDICAL GAS AND VACUUM INSTALLATION

PARTICULAR TECHNICAL SPECIFICATION

1.1.0 **General**

1.1.1 Standard Technical Specification

The standard specification document attached herewith as appendix MG/A, shall form part of this document and shall be read in conjunction with the rest of this document.

The standard specification document is available as a soft copy upon email request from the tenderer.

1.1.2 Tender Drawings

The following drawings form part of this specification and must be read in conjunction with it:

M652/MG/01 (REV 0) – Medical Gas layout – Basement Plan
M652/MG/02 (REV 0) – Medical Gas layout – Ground Plan
M652/MG/03 (REV 0) – Medical Gas layout – First Floor

1.3.3 Works Programme

Type of contract : as per contract data in main contract document.
Contract period : as per contract data in main contract document.

Unless otherwise stated, in the tender documentation, the successful Tenderer, shall within 14 days of appointment, provide the Engineer with a comprehensive programme of works to tie in with that of the main contract programme. The programme must be comprehensive and indicate lead times for equipment, production of shop drawings, first and second fix items, and commissioning. At least one month must be allocated for commissioning of the systems prior requesting the Engineer to inspect the works for practical handover.

1.1.4 Maintenance and Guarantee

All plant and equipment supplied under this contract shall be guaranteed for a period of twelve (12) calendar months from the date of practical or first handover of the installation, whichever occurs first.

1.1.5 Shop Drawings

The successful Tenderer will be required to issue for the Engineer's acceptance three copies of all shop drawings, including alarm and control board circuit diagram within three weeks of the tender being awarded or as and when requested by the Engineer.

These drawings shall be adjusted and re-submitted should they be red-lined by the Engineer.

The acceptance of shop drawings by the Engineer shall in no way relieve the Contractor of his/her responsibilities, such as accurate dimensioning of builder's works, providing correct size and strength of supporting structures, location of plants,

fittings and access panels for adequate access for servicing and maintenance, and adherence to all applicable regulations, generally accepted good practice, and the technical specification and drawings.

The Contractor must draw to the Engineer's attention, in good time, if any part of the design he believes to be not correct.

Drawings shall be produced using a reputable drawing package, and compatible with AutoCad.

1.1.6 Tender Price Details

The tenderer shall be required to complete the tender price schedule at the time of tender. Failure to do so may result in the tenderer being disqualified. Alteration to the bill of quantities, in anyway whatsoever, shall render the tender invalid.

1.1.7 Make and Model of Equipment offered

Where alternate make of equipment to that indicated in this specification is offered, then this shall be equal, and subject to acceptance by the Engineer, prior to submission of the tenders. Acceptance of the alternative shall not relieve the tenderer from his/her obligation to ensure compliance with the specification, compatibility with other components forming part of the system, and that the equipment will fit in the space available without compromising functionality and access. The Engineer reserves the right to reject the alternate, for any reason whatsoever, and call for the make and model specified to be provided at no additional cost.

1.1.8 Price Variance/Price adjustment

Refer to contract data in the main contract document.

1.1.9 Progress Payments

The Contractor shall submit his/her claim timeously to allow for the Engineer/Quantity Surveyor at least 7 working days to process and submit his payment certificate to the Professional Quantity Surveyor.

1.1.10 Ordering of Materials and Equipment

Within 3 working days of acceptance of the successful Tenderer, the Contractor shall submit, for the Engineer's approval, a list of make and model numbers of all equipment and materials to be utilised in this contract. An acceptance by the Engineer shall not absolve the Contractor from complying with the specification unless the Contractor has specifically applied for deviation from the specification for the item in question.

The equipment and materials referred to above shall include but not be limited to;

- Alarm panels,
- Switchboards,
- Vacuum pumps,
- Vacuum plant reservoir,
- Pressure regulators, etc.,
- And any other equipment the Engineer may request, during the contract.

The Contractor shall be responsible to ensure that the contract programme is adhered to and that no delays are caused by late deliveries of equipment and materials.

Other activities which must precede placing of orders must be taken into account when the Contractor schedules his activities.

1.1.11 As-Built Drawings

The Contractor shall provide a complete set of as-built drawings and one electronic copy on a flash drive in AutoCad Format, with each operating and maintenance manual and

The provision of complete set of approved as-built drawings shall be a prerequisite to first delivery.

A full set of As-built drawings shall be framed and mounted on the plantroom wall.

1.1.12 Maintenance and Operating Manuals and Maintenance Plan

Four (4) copies of maintenance and operating manuals, each with CD with a scanned PDF copy of the entire manual is required for this installation. The manuals must include the following items;

(a) List of contents.
(b) Client's, Consultant's and Sub Contractor's details including name, contact person telephone and fax numbers, etc.
(c) Full description of installation and operating features.
(d) Detail description of automatic control system, accompanied by control schematics and controller logic setup information.
(e) Step-by-step instructions for starting/stopping each item of equipment.
(f) List of all equipment with reference numbers, model numbers, Serial Numbers, and suppliers names and contact details.
(g) Names and addresses of firms from whom spare parts can be obtained if different from the above.
(h) Spare parts lists.
(i) Commissioning data (water flow quantities, temperatures, thermostat, pressurestat and timer settings, motor voltages, amperages, meg-ohm readings, trend logging, etc.,
(j) Manufacturers data, brochures, etc.
(k) Full maintenance and servicing schedules (as recommended by equipment suppliers and including schedules attached to this document)
(l) Full set of as-built installation drawings. wiring diagrams, piping schematics, etc.,
(m) A softcopy in PDF format of entire document and drawings shall be provided on a flash drive in included in each hardcopy of the manuals.

Each manual must be bound in a hardcovered ring file or similar, with the project title and type of installation printed permanently on the face and spine of the manual.

A draft copy of the manual must be submitted to the engineer during commissioning stage for his approval and shall include all items stated above except for the commissioning data.

Once commissioning has been completed a draft copy of the commissioning data must be submitted to the engineer for his approval. The accepted commissioning data must then be bound with the rest of the manual for final submission.

The Engineer reserves the right, at any time, to request a resubmission of draft copies by the Contractor for the Engineers approval.

The provision of complete and approved set of Operating and Maintenance Manuals shall be a prerequisite to first delivery or beneficial handover.

1.1.13 Power and Water Supply for site Works

Power and Water supply to site works shall be as per the main contract. The main contractor will charge for provision of these services. Power requirements for welding and cutting purposes shall be allowed for under this subcontract.

1.1.14 Contracts Management

1.1.14.1 Upon appointment, the Contractor shall allocate to this project, a suitably qualified Contracts Engineer and a site foreman, each with at least 7 years medical gas experience of similar scope and extent of the works and a relevant SAQCC certification. This person shall at all times be in full control of, and be able to report expediently to the Engineer and the Main Contractor on all aspects of the the Contract. The site foreman will be required to be full time on site, and as and when the Engineer and/or the main Contractor deems it necessary.

1.1.14.2 Should the Engineer indicate that the Contractor has not satisfactorily complied with the above and has failed to remedy the situation within 14 days of written instruction to do so, the contract may be cancelled or payments withheld.

1,2.0 **Site Description, Scope of Contract, etc**

1.2.1 Site Description

1.2.1.1 The site is located in the Port Shepstone hospital at 7 Bazley Street, Port Shepstone, Hibiscus Coast, 4240**.**

1.2.2 Site Conditions

Site conditions are as follows:

(a) Altitude: Sea level
(b) Electrical Supply 400 Volts (+/-10%), 3 phase, 50 Hz, 4 wire
(c) Design summer outdoor air condition: 35.0ºC db/80%RH

Fault levels for Switchboards:

(a) Switchboards – 5kA

All equipment selected must be capable to operate safely at a voltage supply of 220V or 400V with +/-10% fluctuation.

1.2.3 **Abnormal and/or unusual conditions**

The tenderer shall make note of the following conditions, and shall make adequate allowance in his/her rates for such conditions;

i) The project is on a live hospital site, and due care must be taken at all times to ensure that no unplanned disruptions of services are experienced.

ii) Ensure that construction activities does not pose a safety hazard to the hospital staff and patrons utilizing the hospital.

1.2.4 **Scope of Contract**

1.2.4.1 This section of the contract incorporates the supply, installation, testing and 12 months guarantee and maintenance of a oxygen and vacuum installation for the new Psychiatric Ward block.

1.2.4.2 The Medical gas and Vacuum installations comprises in general of the following;

a) Relocating of the existing oxygen cylinder banks serving Special Clinic Ward Block and reconnecting,
b) Relocating of the bulk oxygen tank to a new permanent location and reconnecting to Hospital mains,
c) New bottled oxygen bank and reticulation to outlets in new Psychiatric Ward,
d) New vacuum plant and reticulation to outlets in new Psychiatric Ward,
e) Commissioning of all installations,
f) Production of operating and maintenance manuals, and shop and as-built drawings ,
g) 12-month guarantee and maintenance of all equipment installed under this contract

1.2.5 Electrical and Builder's Works

1.2.5.1 Power supply to control panels, and alarm panels shall be supplied by the contractors Electrician. Final cabling and termination shall form part of this contract.

1.2.5.2 Unless otherwise specifically indicated, builder's works shall be by the main contractor. It will be the responsibility of the contractor, to timeously provide the necessary information to the Main Contractor, including marking up on site, builder's works drawings, verification on site that builder's works has been correctly provided, and provide assistance to the main contractor in ensuring that the builder's works is timeously done. Where openings are required in slabs, this must be verified on site, prior to the concrete been poured.

1.2.6 Site Inspection

1.2.6.1 The contractor shall be required to inspect the site prior to providing a quotation to suit.

1.3.0. **VACUUM INSTALLATION**

1.3.1. General

A new vacuum plant shall be supplied and installed in the plantroom within the new Psychiatric Ward and piped to six of outlets points within the building.

The system shall incorporate 2-off vacuum pump sets with reservoir, control panel and vacuum bottles, regulators, filters, etc.,

All piping shall be of medical grade copper in accordance with SABS 460/85 as amended.

All piping shall be painted to colour code given elsewhere (including those in roof or ceiling void).

Piping in shall be supported on cable trays using PVC saddles and hung using galvanised trapeze type hangers.

The time between shutting down of the existing plant and changing over to the new plant shall be kept to a maximum of 1 hour and only to one occasion. This process shall be carefully coordinated with the hospital, to suit the hospital. Where temporary connections are necessary to facilitate the process, this shall be allowed for.

1.3.2 Vacuum Pump Sets

Two vacuum pumps shall be provided, mounted on a common horizontal 750 Litre steel receiver tank. The pumps shall be of the dry rotary vane type.

The capacity of each pump shall be as follows:

Capacity (free air):	a minimum of 3600L/min at 250mmHg below atmosphere
Speed of pump:	1440 RPM
Type of drive:	direct drive
Motor kW:	2.2 kW (minimum)
Type of Motor:	Squirrel cage
No. of Phases:	3
Motor rating:	BSS 2613 (1970)

1.3.3 The receiver shall be test certificated in accordance with OHS ACT, and be provided complete with pipe and gauge connections

1.3.4 Air Filters and Vacuum Bottles

Two anti-bacterial filter and 2-bottle 5 litre vacuum trap shall be installed on the vacuum line before the air receiver.

1.3.5 Auto Drain

The receiver tank shall be provided with an auto-drain for condensate disposal and piped to the nearest drain.

1.3.6 Controls

The control panel located in the vacuum plantroom shall incorporate but not be limited to the following;

- phase failure protection,
- contactors for each motor,
- thermal overload protection for each motor,
- off/manual/auto selection switch for each pump,
- lead/lag selection switch,
- running/trip lamps for each pump,
- Ammeters for each phase,
- Voltmeter and phase selector switch,
- power on lamp.

The pumps shall automatically start and stop via vacuum switches. The line pressure shall be maintained at 250mmHg below atmospheric pressure with the lower and upper limits set at 200 and 275mmHg.

1.4.0 OXYGEN INSTALLATION

An existing 2 x 5 oxygen cylinder bank serving the Special Clinic Ward is currently located in a building which is to be demolished to make way for the new psychiatric ward. This oxygen bank shall be relocated under this contract to a new location adjacent to the workshop and reconnected to the special clinic which is adjacent to the workshop.

The existing AFROX bulk oxygen tank shall be relocated to a new location and reconnected to the hospital mains supply.

A new 2 x 8 oxygen cylinder bank shall be supplied and installed in the plantroom located within the new Psychiatric Ward and piped to the bulk supply from the tank and to six outlet points in the Psychiatric ward. The bulk oxygen yank shall be the primary oxygen supply source and cylinders the secondary source.

The installation shall be complete with cylinder bank changeover valves, pigtail connections,1st and2nd stage pressure reducing valves, etc. The bottles shall be supplied by the hospital. The contractor shall, however, provide temporary cylinders for commissioning, testing and handover purposes.

In addition to the above banks, holding racks shall be provided for 8 off empties and 8 of full cylinders. The racks shall comprise of restraining chains with hooks connecting on to angle sections fixed to the wall.

The regulators shall be Draeger, Regent, Afrox-Minor or other approved.

The existing bulk oxygen tank shall be relocated under this contract by AFROX. A provisional amount is allowed in the contract price for the work to be carried out by AFROX. The contractor will be required to obtain a quotation from AFROX at the beginning of the contract. The connecting of the bulk supply to the hospital main shall form part of this contract and carried out by the Main contractor's medical gas contractor.

The bulk oxygen tank and related equipment shall remain the property of AFROX.

All piping shall be of medical grade copper in accordance with SABS 460/85 as amended.

All piping shall be painted to colour code given elsewhere (including those in roof or ceiling void).

Piping in shall be supported on cable trays using PVC saddles and hung using galvanised trapeze type hangers.

The break in services to the hospital shall be kept to not more than one hour, and only to one occasion. This process shall be carefully coordinated with the hospital, to suit the hospital.

1.5.0 MEDICAL GAS ALARM/STATUS PANELS AND CONTROL PANELS

The oxygen and Vacuum alarm panels and switchboard shall be supplied as indicated below and located as shown on the drawings.

Reference	Description	Location
OAP1	Oxygen alarm panel to monitor status of Bulk supply from Tank, Left and right Cylinder bank	In Oxygen bottle plantroom in Psychiatric ward
VP1	3 phase, Vacuum Control panel to control the standby and duty pumps, phase failure and low voltage protection with voltage display, Ammeters per phase, Auto/Manual rotary switch per pump, Auto flip/flop for lead/lag Pump selection, run/fail status lamp per pump, lockable mains isolator, bottom entry panel	In vacuum plantroom in Psychiatric ward
MGAP/1	Oxygen and vacuum alarm panel to monitor • status of supply down stream of valve box, (Vac and O_2 fail/normal), • Plant status (Left/Right O_2 bank and • O_2 bulk supply from Tank (signal from master panel OAP1); • Vacuum plant pump 1 and 2 normal/fail status (Signal from VP1 in plantroom)	In Oxygen bottle plantroom in Psychiatric ward
MGAP/2		Female Nurse's station - Ground Floor
MGAP/3		Male Nurse's station - Ground Floor
MGAP/4		Occupational Staff Clinic Reception – First Floor

Each panel shall be provided with dedicated pressurestats for monitoring purposes, and shall be located downstream side of the relevant valve boxes.

The panels shall be of electronic type, such as that manufactured by "Mechanolec", and shall operate from a 220V, 50Hz. Electrical supply shall be provided under the electrical section of the contract. Final connection shall be allowed for under this medical gas section.

1.6.0 ELECTRICAL SWITCHBOARDS AND CONTROLS

All air conditioning and ventilation switchboards to be manufactured by specialist manufacturers.

All electrical work shall be carried out in accordance with SANS standards, and what is considered as good practice. An electrical compliance certificate will be required.

All starting and stopping of equipment shall be sequenced as recommended by the supplier of the relevant equipment.

Emergency mushroom head type isolators shall be provided at each remote equipment, such as pumps, cooling towers and fans.

1.14.6 GENERAL:

The control panels shall be built in accordance with the SABS Wiring Code of Practice SABS 0142, and the SABS Specification for Low Voltage Switchgear and Control Gear Assemblies SABS 60439-1.

Load carrying equipment installed within the control panels must comply with the following specifications:

- IsolatorsIEC 60947-3
- ContactorsIEC 60947-1
- MCBsIEC 60947-2

- TerminalsIEC 6097-7-1
- FusesIEC 60269-1-2
- Thermal OverloadsIEC 947-4
- Manual Motor StartersIEC 947-4-1

Notwithstanding the requirements herein, the tenderer shall nevertheless include in his tender for all components and circuitry to ensure that the system operates correctly and safely, is to regulations, and is in accordance with the recommendations of the suppliers of the plants offered.

b. Cable Connections

Cable ends shall be finished off in the type of boxes as recommended by the manufacturers.

The steel wire cable protection shall be properly clamped between conical bushes and kept in position with lock nuts. Cable ends shall be properly earthed.

d. Wiring Channels

Channels must be current catalogued products of a reputable make and shall be complete with bends, T-pieces, corner-pieces, internal dividing plates, knock-out sections, etc. and all other accessories as may be required for the installation.

Channels shall be galvanised or properly cleaned and painted with a lead primer and finished off with two coats of approved enamel paint with colour to match the existing installation.

Wiring channels shall be provided with snap-on lids or if channels are too wide, lids will be neatly screwed on.

Knock-out holes for conduits will be provided on the sides of wiring channels in positions as shown on the drawings or as may be required.

g. Fault Level

The fault level of the distribution and protection system shall be in accordance with the fault level of the general electrical installation in the building.

The air conditioning Sub Contractor shall arrange with the Engineer for the witnessing of the testing of the boards at the manufacturer's workshop prior to they being transported to site and the Engineer must be notified in good time as to when the boards will be available for inspection.

A complete and detailed circuit diagram for each board shall be issued, in good time, to the Engineer for his approval prior to manufacturing. The Engineer reserves the right to request a resubmission of the diagrams for his approval.

Final CAD drawn circuit diagrams, drawn to European standards with grid and component references shall be produced and approved by the Engineer. These shall be included in the operating and maintenance manuals. In addition, a copy of the chiller plantroom switchboard circuit diagram shall be mounted on a frame and bolted on the plantroom wall adjacent to the board.

c. Pilots Lights

Pilot lights shall be flush mounted on panel doors and shall have coloured glasses which shall be removable from the front of the door for replacement of lamps. Provide one spare lamp for every five pilot lights. The colour of the lenses shall be:

RUN:Green
FAIL:Red
INDICATION:Amber

d. Starters, Contactors and Relays

Contactors shall be sized to take 10% higher load than the actual imposed load.

Contactors shall also be able to withstand the following:

Over current and fault currents that may occur for the time required for its own tripping device to operate.

All fault currents until the back-up fuses or circuit breakers trip.

All contactors shall be provided with at least two auxiliary contactors for interlocking and indication.

Starters, contactors and relays of a similar make and type shall be employed wherever possible to reduce the number of spares to be kept.

e. Labelling

All labels shall be of the engraved type with black letters on white/silver background.

f. Access

All equipment mounted in the electrical switchboards shall have sufficient space to be easily accessible for removal, repair and maintenance.

g. Wiring and Terminals

Copper stranded conductors with Polyvinyl Chloride Insulation shall be used for all small wiring in the switchboard.

Wiring inside the compartments shall be neatly bundled together and fastened with patented PVC bands and shall run in near horizontal or vertical lines wherever possible. Wiring from one compartment to another shall be done in wiring channels with clip on lids.

Wiring shall be connected to terminal blocks and no more than two wires shall be connected to any one terminal. Provide 10% spare terminals for possible future extensions or additions to the board. Identification of small wiring shall be in accordance with BS 158. Wiring connected to panel doors shall be protected by a plastic spiral wrapped around the conductor bundle and sufficient slack of wire shall be provided to allow easy opening of doors without putting any strain on the terminal connections.

Multi-core incoming cables shall be connected to the switchboard wiring by means of terminal blocks. All cables entering the switchboard shall be neatly finished off.

h. Switchgear

All switchgear shall comply with the relevant SABS and BS standards such as SABS 152 and 156 and BS 5419.

I. Isolators

All isolators shall be load break switches and shall be pad lockable off.

1.14.4 ELECTRICAL WIRING

All the wiring between localised motor control centres installed under this contract and from isolators provided by the electrician shall form part of this air conditioning contract. See enclosed tender drawings for the position of the Motor control centres.

All electric wiring reticulation is to be carried out in strict accordance and in compliance with the South African Bureau of Standards wiring code SABS 0142.

All electric reticulation must either be drawn in steel conduit or laid in a steel trunking/cable racks.

Upon completion of the Works, the Contractor shall issue a Certificate of Compliance for all electrical work undertaken.

a. Cables

Wiring shall be multi-strand silicone insulated copper wiring. Wire ways and layouts shall be planned in advance to minimise cable crossings. Wiring shall be installed parallel to one another and shall be properly fixed. Joining of cables will not be acceptable.

Each cable shall be identified with a metal tag bolted to the cable ends and identification numbers will be stamped on the tags.

b. Local Isolators

Provide local isolators adjacent to motor driven equipment remote from switchboards.

c. Cable Racks

Where cable racks are used the cables shall be laid on factory manufactured cable racks. Cable racks shall be current catalogued products of a reputable make complete with all bends, tee pieces, reductions, take-offs and clamps.

All cable racks shall be galvanised and painted with a lead primer and two coats of approved enamel paint with colour to match the existing installation. Sufficient support brackets shall be provided to prevent sagging of cable racks.

Cables and wires shall not be fitted directly to cable racks. All cable racks shall have earthing continuity

e. Conduit

Conduits shall be galvanised steel and shall bear the SABS mark. The minimum diameter of conduits used shall be 20mm.

Conduits shall be screwed and socketted and bends shall be of the long radius type. PVC conduits are not acceptable.

f. Draw Boxes

Draw boxes shall be installed so that not more that two bends occur between a draw box and the end of the conduit or between two draw boxes.

1.7.0 TESTING & COMMISSIONING

1.7.1 Testing and commissioning shall be generally done in accordance with the Standard Specifications.

1.8.0 PLANT LABELLING

1.8.1 Allowance must be made to provide perspex labels on all plantrooms, plants, panels, componentsinside of panels, valves, etc. Size and content of labels shall be obtained from the Engineer.

1.8.2 Piping shall be provided with flow direction arrows and identification of gas at 4m intervals and where piping changes direction.

1.9.0 PAINTING

1.9.1 Allowance shall be made for painting of concrete bases with gloss paint, for plants installed under this contract.

1.9.2 All piping shall be painted as specified in the standard specifications.

1.9.3 All brackets exposed to the weather shall be galvanized and primed and painted.

1.10.0 LOGBOOK

1.10.1 A hard covered log book shall be supplied on site. All events shall be logged following practical handover or beneficial use being passed to the client.

1.11.0 CORROSION PROTECTION

1.11.1 The tenderer shall note that the installation being at the coast and shall select appropriate material to ensure longevity of the installation.

1.11.2 All metal surfaces, unless otherwise stated shall be hot dipped galvanized to SANS121 (ISO 1461).

1.11.3 All nuts, bolts and washers exposed to the weather shall be stainless steel.

1.12.0 INSPECTIONS AND HANDOVER

Inspections of the works during installation and the handing over procedure shall be as stipulated in the Standard Specification of Part 2.

1.13.0 SERVICE AND MAINTENANCE

All equipment installed under this contract shall be serviced and maintained for 12 months following practical handover.

A monthly maintenance inspection schedule shall be completed and signed off by the building manager and submitted to the Engineer. The schedule shall include all plants and verification of correct operations. Abnormal noise, vibrations, high operating temperature, leaks, sweating, rust shall be reported and rectified.

Tests shall generally be done in accordance with the Standard Specification.

A hard covered log book shall be supplied and chained to the wall bench in each plantroom.

1.14.0 COMMISSIONING

Comprehensive pre-commissioning, commissioning as well as quality monitoring shall be performed on the Medical Gas and Vacuum system and associated systems in a systematic manner and as per statutory requirements.

The Contractor will be required to ensure the following information is available:

- Definitive commissioning specifications/Design intent report;
- Requirements for witnessing including full details of tolerances applicable to all parameters;
- A commissioning program, including time for witnessing;
- Health and Safety risk assessment and method statements for the tasks to be completed;
- Commissioning method statements for each system;
- Pre-commissioning checklists for each system;
- Commissioning checklists;
- As-built drawings;
- Operational and Maintenance Manuals;
- Commissioning certification for each system countersigned by the contractor including the record sheets.

Further information is provided:

The Commissioning Report and Records:

- Must have a record of commissioning dates, records of all functional testing undertaken, a list of future seasonal testing requirements and a list of outstanding issues.
- Must include any changes made to the building as a result of the commissioning process – and recommended changes.

Operations and Maintenance Manual:

- Must describe how the facility will be operated and by whom, as well as the desired level of training and orientation required for the building occupants to understand and use the building systems.

Training:

- Training provided must include:
- Information provided in the Design Intent Report (including energy/environmental features);
- Review of controls set up, programming, alarms and troubleshooting;

- Review of O&M manuals;
- Building Operation (start up, normal operation, unoccupied operation, seasonal changeover, shutdown);
- Measures that can be taken to optimize energy efficiency;
- Occupational Health and Safety (OH&S) issues;
- Maintenance requirements and sourcing replacements; and
- Obtaining and addressing occupant satisfaction feedback.

1.15.0 STANDARDS

The following standards shall apply:

The entire new installation shall be carried out in accordance with.

The application of the National Building Regulations SABS 0400 (including all SABS addenda).

The South African Bureau of Standards Code of Practice for the Wiring of Premises SABS 0142 (including all SABS addenda).

The Occupational Health and Safety Act No. 85 of 1993.

SABS 1409 - Outlet, sockets and probes for medical (gas and vacuum) services used in Hospitals;

SABS 0224 - Non-flammable medical gas pipeline systems;

CKS 605 - Pressure regulators for medical gas;

SABS 460 - Copper tubes for domestic plumbing services.

SABS 1453 - Copper tubes for medical gas and vacuum services.

SABS 087 - The handling, storage and distribution of liquified petroleum gas in domestic, commercial and industrial installations.

SABS 1237 - Single-stage low-pressure regulators for liquified petroleum gas (LPG).

SABS 199 - Cylinder shut-off valves for liquefied petroleum gas (LPG)

CKS 40 - Oxygen for medical use.

SABS ISO 9002 - Quality Systems.

SABS 1804 - 2: Three - phase induction motors - Low Voltage - standard.

SABS 1804 - 3: Three - phase induction motor - Low voltage - intermittently rated slip-ring.

SABS 1804 - 4: Single - phase induction motors.

SABS IEC 60335 - Part 2 - (as applicable) Safety of circulatory pumps and motor compressors.

SABS 1409:1986 - Outlet sockets and probes for medical (gas and vacuum) services used in hospitals.

SABS 1453:1988 - Copper tubes for medical gas and vacuum services.

SABS 087 - The handling, storage and distribution of liquefied petroleum gas in domestic, commercial, and industrial installations.

SABS 087 - Part 1: 1975 - Consumer liquified petroleum gas cylinder installations

SABS 1237:1990 - Single-stage low-pressure regulators for liquefied petroleum gas (LPG)

SABS 199: 1972 - Cylinder shut-off valves for liquefied petroleum gas

CKS 40: 1982 - Oxygen for medical use

SABS ISO 9002:1994 -Quality Systems - Model for quality assurance in production, installation and servicing.

The Municipal By-Law and any special requirements of the Supply Authorities of the area or district concerned.

The Municipal Fire Regulations.

Telkom Regulations.

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

SABS 981:1973 - High-pressure down-draught steam sterilizers (autoclaves) (with independent steam supply)

SABS 982:1990 (1995) - High-pressure high-vacuum steam sterilizers (autoclaves) for automatic sterilizers(vacuum and steam type) that may be used in hospitals, in conjunction with an independent steam supply, for sterilizing unwrapped utensils, instruments, hollow ware, wrapped goods (packs), porous loads and when so required (by special modification to the sterilizer) fluids.

No claims for extras will be entertained due to the Contractor failing to comply with any of the provisions of this Clause.

1.16.0 TYPICAL MAINTENANCE SCHEDULES

These schedules shall not be taken as being conclusive and service contractor shall be as guided by the equipment suppliers requires and recommendations.

A. Vacuum and Oxygen Plants, Alarm and Control Panels

	Description of inspection/test	Frequency	Checked ✔ = OK x= not OK	Comments
1	Check operation of Vacuum Pump	monthly		
2	Check for any abnormalities	monthly		
3	Check operation of all alarms and safety trips	monthly		
4	Lubricate pump as necessary	monthly		
5	Check operation of auto drain	monthly		
6	Check operation of flip/flop relay	6 monthly		
7	Check operation of alarm panels	6 monthly		
8	Check outlets for operations and leaks	6 monthly		
9	Tighten all electrical terminals	annually		
10	Check control panels for correct operation, contactors, circuit breakers, overloads,	annually		

	ammeters, controllers, etc. (by qualified electrician)			
11	Clean inside and outside of DB	annually		
12	Check bank changeover valve for correct operation	annually		

1.17.0 INFORMATION SCHEDULE

	EQUIPMENT	MAKE AND MODEL
1.	Vacuum pump	
2.	Make of alarm Panels	
3.	Make of Oxygen manifold	
4.	Gas outlet points (DOH approved)	