SPECIFICATION FOR THE HVAC INSTALLATION FOR SARS BROOKLYN

CONTENT OVERVIEW

PART 1

PROJECT SPECIFICATION

FOR THE

HVAC INSTALLATION

FOR

SARS BROOKLYN

PART 1

PROJECT SPECIFICATION FOR THE HVAC INSTALLATION FOR SARS BROOKLYN

CONTENT OVERVIEW

PAGE

1. GENERAL

NOTES

The project specification together with all other documentation such as the conditions of tender and contract, the standard specifications, and all schedules and drawings as described in this tender document, constitute the specification and will be the basis of the contract.

Scope of Work

The Work to be performed under this contract includes the supply, procurement, delivery, erection, testing, commissioning and handover of a complete HVAC installation for the SARS Brooklyn, operational to SARS and the guarantee and comprehensive maintenance thereof for a further period of 12 months. The installation shall be complete and shall include all material and equipment necessary for the proper functioning thereof. For all electrical installations, the contractor should have a competent electrician with a valid wireman's license certificate. The contractor should protect the ceiling by safe removal and reinstatement to its original condition after the works are completed. It is the responsibility of the contractor to ensure no damages involved to ceilings and equipment when performing their duties.

The work involves the following:

- Supply, installation and commissioning of fan coil units;
- Supply, installation and commissioning of associated ducting;
- Supply, installation and commissioning of toilet extract fans;
- Decommissioning, removal of all of the equipment that is being replaced under this contract.

SPECIFICATIONS

This project specification is specifically applicable to this installation and will have preference over the Standard Specifications. The latest revision of applicable SANS standards will be applied to all work and material supplied under this contract. The contractor is required to be familiar with the standards and have their own copies available for reference. No claims in this regard will be accommodated.

The Contractor shall ensure that the Installation, including all equipment used, is designed, installed, and maintained in compliance with the following regulations:

(a) SANS 10142: Code of Practice for Wiring of Premises.
(b) Occupational Health and Safety Act - Act 85: 1993 as amended by the Occupational Health and Safety Amended Act No. 181 of 1993 and the labour Relations Act, No. 66 of 1995.
(c) National Building Regulations - Act 103 of 1977 a.a. as deemed to be satisfactory in terms of SANS 10400-2010 a.a.
(e) Municipal, Local or where applicable other authorities by laws and regulations with regard to building, electrical, fire, gas, water, traffic

and health requirements.
(h) General Machinery Regulations GNR 1521 of 5 August 1988.
(i) SANS 10400 Part O: Lighting and Ventilation

RESPONSIBILITY OF THE CONTRACTOR

The Installation referred to in this Tender is for the Principal contract, the word "Contractor" refers to the Subcontractor responsible for the Installation.

PRELIMINARIES AND GENERAL

The contractor will familiarize himself with all site conditions during the site visit and include all cost to successfully complete the Scope of Work. No additional claims for P&G's are allowed. P&G's will be fixed.

QUALITY & RELEVANT EXPERIENCE

The HVAC Contractor will be required to ensure that work is always executed under supervision of a competent, qualified and experienced site foreman who is able to receive instructions on behalf of the Contractor and is approved by the Engineer.

The contractor should take special note of the high-risk environment in which work will be executed. The contractor should allow adequate time and resources to ensure that all planning and safety meetings can be attended.

The contractor shall issue a planned resource list before each work package is executed. It will be the contractor's responsibility to ensure that sufficient man power and the required equipment is available to ensure that work is executed as planned. Some of the work will be executed after office hours and over weekends.

The contractor needs to have relevant experience in executing project in the HVAC Chilled Water environment. A reference list of projects completed in the last 5 years will be submitted with the tender, the list should include contact details of reference clients. The reference list will be evaluated as part of the evaluation criteria during tender adjudication.

Hold Points:

To assist the Contractor in order that corrective action can be taken in good time, the following hold points are deemed critical. The following hold points shall be adhered to at all times:

	HOLD POINT REQUIRED
Approval of all major equipment prior to order placement.	YES
Approval of samples	Fan Coil Units & Toilet Extract Fans
Shop/For Construction drawings of	

HVAC Installation	YES

SITE, SITE CONDITIONS & SITE FACILITIES

Site Location

This site is located at 299 Bronkhorst St, Brooklyn, Pretoria, Gauteng, 0181

Site Visit

A compulsory site visit is planned. The contractor must attend the site visit and ensure that the site visit register is completed. Failure to attend the site visit will result in disqualification.

Site Conditions

The Contractor shall acquaint himself fully to the prevailing site conditions, access to the site, storage and other facilities prior to submitting a tender since no claim in this regard will be considered.

The contractor shall make sufficient precautions to ensure that the work is executed without any interruptions to the existing operations in the facility. The contractor shall provide his own site office and/or storage facilities .Tenderers shall acquaint themselves of the security and other site procedures to be adhered to.

PROJECT MANAGEMENT AND PLANNING

The successful tenderer shall compile a construction program for approval by SARS and the Engineer.

DRAWINGS

Available Drawings

The Contractor shall acquaint himself fully with the available information on the following drawings:

- Architect's drawings
- Drawings available of all other services such as HVAC Proposed Layouts

Drawing Standards

All drawings shall be of sufficient quality to ensure - clear and legible copies at all times.

Detail Design Drawings (Shop Drawings)

The Contractor shall submit to the Engineer, in accordance with the construction programme, electronic copies of each shop drawing for approval.

A marked-up copy with the Engineer's and SARS's comments will be returned to

the Contractor. The Contractor will update the original accordingly resubmit to the Engineer for final approval.
The Engineer's approval shall not relieve the Contractor of his responsibility for erection or installation or of errors or omissions in the shop drawings.

The drawings shall be sufficiently detailed to enable SARS's staff to maintain, dismantle, reassemble and adjust all parts of the works. The layouts shall indicate the location of all manual and automatic control devices, control panels, sensors, etc. A copy of the wiring and chilled water diagram shall be mounted in the plant room in a glass fronted frame. The diagrams shall be printed by a non-fading process.

"As Installed" Drawings

Drawings shall be updated as work progresses in order that the "As-Installed" Drawings on completion reflect the final Installation.

One set of hard copy and soft copy drawings shall form part of each O&M manual. Soft copy drawings shall be compatible with AUTOCAD & .pdf software

Three (3) sets of paper prints As-Installed drawings forming part of the approved O & M manual shall be supplied to the Engineer prior to the Practical Completion of the Project.

RESPONSIBILITY OF OTHER PARTIES

The HVAC Contractor shall co-ordinate his activities with SARS. The HVAC Contractor is responsible for the installation of all associated cabling and power supplies.

OPERATING AND MAINTENANCE MANUALS

Three complete & colour printed sets of O&M manuals including "As Installed" drawings must be supplied to the Engineer. The contractor will also issue three electronic copies of the O&M Manuals on CD.

INSPECTION, TESTING, COMMISSIONING AND HANDOVER

The Contractor is primarily responsible for his quality and shall compile the necessary snaglists. The contractor shall also arrange for the necessary inspections and tests with the Consulting Engineer and shall supply all test equipment. The Contractor's attention is drawn to the relevant clauses in the attached Standard Specification for General Requirements and Procedures - A-SPES-00-01.

Progress Inspections

The Engineer will hold inspections at his discretion during the contract to ensure that the Contractor meets the requirements of the Specification and that the Contractor is fulfilling his responsibility regarding quality control.

Should remedial action be required the Engineer will notify the Contractor, and the Contractor shall rectify this work within 7 days.

"Hold Point" Inspections and Tests

"Hold Point" inspections and Tests are listed above and the Contractor requires written approval to proceed.

The Engineer is required to inspect and test certain equipment listed in the specification under "Hold Points" at their place of manufacture and such equipment may not be delivered to the Contract site, nor may the Contractor proceed with the manufacture and/or installation of such equipment without prior written consent from the Engineer.

The Contractor must give the Engineer at least 7 days advance notice of the date at which such tests and inspection are to be carried out unless otherwise agreed by both parties.

Completion and Take-Over Procedures

In terms of the Conditions of Contract the following procedure will apply to the "take-over" of the Installation, or if required by the Employer to the sectional completion of a portion thereof.

Form A: Application for Practical Completion Inspection

After the physical completion of manufacturing and upon completion of the installation, the Contractor shall carry out his own internal quality control checks on all the various items of the installation, where after such "Contractor's Inspection List" shall be signed off by the Contractor and be submitted to the Engineer together with a "Form A" to apply to the Engineer within one week for the Practical Completion Inspection List.

Subject to the discretion of the Engineer detailed in writing, the Installation may be divided into different sections for the application of the above inspection procedure. Any inspection carried out by the Engineer on the request of the Contractor without the above documentation will be regarded as unofficial, and the cost may be recovered from the Contractor.

Form B: Practical Completion Inspection Certificate

Once the Engineer has received a "Form A" from the Contractor he will officially inspect the Installation, listing all minor outstanding items still to be rectified on a Practical Completion List - Form B1.

Commissioning:

All site testing and all commissioning activities as specified shall be carried out in close cooperation with the Engineer. It is a requirement of this Contract that the Contractor shall submit a complete testing and commissioning procedure to the Engineer for approval, at least two weeks prior to the commencing of the actual testing and commissioning activities on Site.

All testing and commissioning shall be carried out in the presence of the Engineer or his duly authorised representative and shall at all times be thorough and in strict accordance with the specified requirements and approved procedures. All tests carried out without the Engineer been duly notified, will be regarded as unofficial and may at the discretion of the Engineer have to be repeated at the cost of the Contractor.

Form C: Works Completion Certificate

The Engineer will issue Form C, after the items listed on Form B1 have been completed to his satisfaction, together with his Final Completion List containing all outstanding and unacceptable work (except undetected patent and latent defects). The Contractor shall complete all items listed within 20 working days.

The Engineer will only issue Form C if all O&M manuals, and "As-Installed" drawings have been received and training of personnel has taken place.

Form D: Final Completion Certificate

The Engineer will issue, on request by the Contractor, a Final Completion Certificate at the end of the Defects Liability (Retention) Period.

Cost of Re-inspections

Should the Engineer, after an inspection or test, find that the number of outstanding defects is of such a nature that he is unable to issue a meaningful list or certificate, or that due to the Contractor not attending to previous lists or reports, re-inspections are required, such re-inspections will be charged to the Contractor and deducted from the balance of his account by means of a variation order. The Engineer will be compensated accordingly by SARS.

TRAINING OF EMPLOYERS PERSONNEL

Once the Contractor has completed and commissioned the Installation and issued the O & M manuals to the satisfaction of the Engineer, he shall train the Employer's personnel the proper operation and maintenance of the plant.

The Contractor shall prepare and submit a recommended training program to the Engineer for approval. The Contractor shall give the Engineer sufficient time to make the necessary arrangements.

TOOLS, EQUIPMENT, TEST INSTRUMENTS AND MAINTENANCE TOOLS

The Contractor shall provide all tools and equipment necessary for the proper and efficient execution of the work.

The Contractor shall provide all test instruments necessary for the proper testing of equipment or systems to ensure that the specified requirements are met.

The Contractor shall provide valid calibration certificates for all instruments.

CODING, LABELING, NOTICES AND NAME BOARDS

The language shall be English, or as specified by the Engineer.

To reduce the possibility of incorrect wording the Contractor shall submit a proposed "Schedule of Labels and Notices" to the Engineer for approval prior to manufacture and at least 4 (four) weeks in advance thereof.

Manufacturer's Nameplate

All equipment shall be provided with a manufacturer's nameplate, which shall be a copper, anodised aluminium or stainless steel tag, welded or riveted to the equipment. (No "glue-on" plates will be accepted.) The lettering thereon shall be suitable to withstand the climatic or other conditions under which the equipment is to operate.

The nameplates shall display the information required by the relevant SANS specifications. At least the following shall be shown:

Manufacturer's name
Model number
Volume where applicable
Size, Speed, Power input, Power output, FLA,
All letters shall be hard stamped and at least 4 mm.
Supply Voltage, etc whichever may be applicable.

Identification Tag

The Contractor shall provide an identification tag or label with the equipment identification code, in approved format, screwed or riveted next to each piece of equipment (no 'glue on' attachment will be accepted).

Black engraved letters on a white background shall be used.

The minimum height of letters shall be as follows:
Equipment identification = 10 mm

Notices

The Contractor shall install all notices required in terms of Statutory Regulations and shall amongst others include the following:

- Prohibiting unauthorised persons from entering specific areas during construction.
- Prohibiting unauthorised persons from handling or interfering with electrical apparatus.
- Directions and procedures to be followed in case of fire or emergency.
- Directions as to resuscitation of persons suffering from the effects of electrical shock.

GUARANTEE PERIOD

The HVAC Contractor will be responsible to guarantee the installation for a period of 12 months after the Form of Acceptance, Form C, has been issued.

CERTIFICATE OF COMPLIANCE

The Engineer will not issue a Final Completion Certificate - Form D until he is in receipt of such a Certificate of Compliance.

2. FAN COIL UNITS

The standard specifications shall be applicable. All units shall be of the recirculating type. The location of the units are indicated on the drawings.

All existing piping shall be re-used, minor adjustments shall be required to fit the new equipment. The HVAC contractor shall allow for the extra piping and labour accordingly. The new Fan Coil Units will be installed in the position of the previous Fan Coil Units which will limit the amount of additional piping required.

All Fan Coil Units shall be fitted with Primary (G4) filters. The face velocity of the filters shall not exceed the maximum velocity as recommended by the supplier nor 2,5m/s. Existing rigid ducting, flexible ducting, diffusers, supply air grilles and return air grilles will be repurposed.

All drain pans shall be manufactured from stainless steel.

No thermal bridging shall be allowed on Fan Coil units.

The supply and return air shall have a flanged connection with a flexible collar to the ducting.

The units shall be fitted with element heaters with a minimum of three steps. The chilled water coil inlet and outlet temperatures shall be 6°C/10.5°C

Each Fan Coil Unit shall be fitted with a new 2-way control valve complete with all associated piping, fittings, lagging, etc. The valve shall be of the modulating type and will be controlled by the Fan Coil Unit to ensure that the correct off coil temperatures are achieved.

The old equipment that will be replaced must be disposed of by the HVAC contractor.

3. ELECTRICAL INSTALLATION

It will be the responsibility of the air conditioning contractor to supply and install all cables from the various HVAC equipment to the nearby isolator for all units, as well as all interconnecting communication wiring between indoor and outdoor units. SABS 1042 1981 a.a. will be applicable. The Contractor shall confirm all electrical supplies within two weeks after the tender is awarded.

4. FANS

FAN SELECTION

Each fan shall be able to handle the required air flow rate, against the system resistance and under the operating conditions indicated in the Detail Specification. Fans shall be selected for maximum efficiency without causing unstable operating conditions. Where fans are connected to duct systems, the fans shall be capable of handling 10% more than the specified air flow rates to allow for possible leakages.

FAN IDENTIFICATION

Apart from the general information specified for the manufacturer's nameplate the following is also required:

- Size (Diameter / Width x Depth x Length)
- Air Flow Volume
- Selected Rotation Speed
- Selected Absorbed Power
- Indicating arrows for both the direction of rotation and air flow.

FAN DOWN TIME

Fans shall be so constructed and installed to permit the safe and easy removal of any sub-component, by a qualified building manager/technician, in the following maximum time:

- Axial Fan: 1 Day
- In-Line Duct Fan: 2 Hours
- Propeller Fan: 2 Hours
- Roof Extract Fan: 2 Hours

FAN INSTALLATION CONSTRAINTS

All fans shall be installed according to the supplier's recommendations and requirements.

FAN PRE-COMMISSIONING REQUIREMENTS

No fan shall be started for any purpose such as temporarily ventilation, testing or commissioning, unless all ducts and plenums have been cleaned, filters installed if applicable and the total system checked for loose material.

FAN COMMISSIONING

All fans shall be commissioned in accordance with CIBS Commissioning Code A.

AXIAL FANS

Vane axial fans shall be axial fans with individually adjustable multiple aerofoil blades. Fans shall be selected for the lowest practicable blade tip speed and noise level but shall never exceed 1450 rpm. Casings shall be fabricated from mild steel with a minimum thickness of 3 mm.

Predrilled flanges shall be welded to both the inlets and outlets. When the Vane axial fan-inlet and outlet are both connected to ducting, the long casing type shall be used, such that the casing completely shrouds the impeller and motor. Where bifurcated casings are specified, the bifurcation shall be streamlined, and a shaft seal shall be provided.

Impellers shall be statically and dynamically balanced, in accordance with ISO 21940-11:2016 within G6, 3. Impeller blades shall be either cast aluminium, steel, stainless steel or moulded reinforced plastic, to suit the application and conditions specified in the Detailed Specification. Fans fitted with bearings requiring regular lubrication, shall be fitted with extended lubrication lines to the outside of the casings.

Vane axial fans shall be directly coupled, and impellers shall be overhung on the motor shafts. Motors shall be totally enclosed squirrel cage induction motors and shall comply to SANS 1804, with a protection rating of IP 55. Motors shall be selected to be continuously rated at a maximum operating temperature of 55 °C for Class "F" insulation in accordance with IEC 85.

Only fans with long casings shall be used for outside applications. An external weatherproof terminal box shall be mounted to the casing with a sealing gasket fitted between the terminal box and lid.

All fans shall be selected to handle at least the quantity of air specified against the relevant system static pressure. Motors and starters/VSD's shall be suitable for local and remote starting and for remote status indication as specified. Axial flow fans shall be mounted on anti-vibration mountings and shall be connected with flexible connections to ducts, silencers, etc.

5. WEATHER LOUVRES

The weather louvres shall be manufactured of extruded Type 50S grade aluminium and have a natural anodised finish if not specified otherwise on the drawings. All blades shall be 50mm and of the fixed horizontal type. Blades shall be spaced 50 mm apart.

Ingress by birds, leaves, etc. shall be prevented by a galvanised, small-aperture wire-mesh screen fitted to the back (inside) of the louvre. All fixtures shall be concealed and the louvres shall be installed into a 25 mm thick industrial plywood frame.

6. AIR FILTERS FRAMES AND CLIPS

The supply air filter plenums shall accommodate 50 mm thick washable pleated filters housed in galvanised steel frames. The plenums shall be constructed from 1.2 mm thick galvanised steel plate and feature access panels to the filters. The filters shall be of a standard proprietary type with pleated media bonded into galvanised steel channel surrounds. The filters shall have a minimum efficiency of 20% (EN779) and arrestance of 90% (EN779).

The filters shall be supported in galvanised steel holding frames fitted with sealing strips or gaskets and four galvanised clips per frame to prevent air bypass of the filter media. A suitable, easily read manometer shall be permanently mounted against the filter plenum and shall be installed to show the differential pressure drop across the filters. The manometer shall be graduated in Pa and shall indicate when a filter change or wash is required. The manometer must have PVC tubes connected to the measuring points.

The tubes are to be installed in Ega-tubing securely fixed along their route. Stickers shall be fitted onto the manometer to indicate the maximum pressure drop across each filter bank. An extra spare set of filters shall be supplied on completion. The face velocity of the filters shall not exceed 2.5 m/s.

7. SOUND ATTENUATORS (SILENCERS)

Sound attenuators shall be supplied and installed in the positions shown on the Drawings. The sound attenuators shall be procured and supplied from an approved and reputable specialist manufacturer, shall be in accordance with the specifications and shall be selected and installed so that sufficient sound attenuation is obtained to limit the noise level created by the ventilation Plant to below the specified standard. The units shall generally be manufactured from galvanised mild steel with mineral wool faced with non-woven glass fibre media retained behind a galvanized wire mesh. Insertion loss measured in accordance with ISO 7235. The acoustic media shall have a Class 1 fire rating to EN 13501. The unit shall be compatible with the fan diameter and at least twice the length of the fan diameter unless calculated otherwise by the manufacturer.

The Contractor shall recalculate the pressure rating requirements of fans at the specified air flow rate to consider the pressure drop across sound attenuation

Plant proposed. Sound attenuators in the ductwork before and after the fans shall be designed for an insertion loss large enough to limit the total sound pressure level of the noise at a distance of 1.5 meters directly in front on the first air outlet in the duct system to the noise level specified. The discharge noise from the attenuators shall not exceed 65 dB(A).

8. DOOR LOUVRES

Door louvres shall be the "Trox Type AGS-T" type or equal approved and shall be standard type manufactured of extruded Type 50S grade aluminium with fixed inverted V blades and have a natural anodised finish. The blades shall be spaced tightly so as to ensure that the louvre is non-vision.

9. NOISE & VIBRATION CONTROL

The Contractor shall be responsible for limiting noise and vibration transmission from the Plant to the building structure and adjacent rooms within the limits specified in SANS 10103: "The measurement and rating of environmental noise with respect to annoyance and speech communication":

- Noise levels inside the Chiller plant room shall not exceed 75 dB;
- Noise levels in the Occupied spaces shall not exceed 40 dB;

The Contractor shall submit noise estimating sheets for all HVAC components as well as the insertion loss ratings of sound attenuators to the Engineer for approval. Failure to do so will result in replacement of Plant at the Contractor's cost should the noise levels in any area exceed the limits specified above. The installed noise levels on the HVAC components will be measured with the pumps in operation. Noise generating HVAC Plant such as fans, compressors, pumps, motors etc. shall be selected to operate as close to the point of maximum efficiency as possible.

10. DUCTWORK

All ductwork shall be manufactured according to SANS 1238: 2005 Standard Specification for Air Conditioning Ductwork. Unless otherwise specified or noted, ductwork casings and plenum chambers shall be made of galvanised sheet metal.

Air conditioning ducting manufactured from galvanized sheet metal shall be insulated as follows, unless otherwise specified:

Low and medium pressure supply and return air ducts in roof voids under sheet metal roofing	**25 mm internal Insulation**
Low and medium pressure supply and return air ducts in ceiling voids under concrete slabs	**25 mm external insulation**
High pressure ducting	**25 mm external insulation**
Ducting exposed to weather (external)	**25 mm internal insulation and ducting must be painted to spec.**

Ducting supplying high risk areas such as hospital theatres and isolation rooms (Internal and External Ducting).	25 mm External insulation (Internal) 25 mm External Insulation protected by sheet metal cladding on all four sides (External)

The maximum air velocity for internal insulation is 15 m/s. Internal insulation shall be FIBRE GLASS SONIC LINER (glass fibre insulation faced with a woven glass fibre layer) glued to the exposed surface. The minimum requirements for the insulating material are:

Thermal conductivity = 0,037 W/m deg K at 0 deg C
Density = 24 kg / m^3

Spigots to diffusers and grilles need not be insulated unless such spigots are longer than 1000 mm in which case they will be considered to be ducts. External insulation shall be DUCT WRAP with a foil laminated covering reinforced with bi-directional mineral fibre yarn with the same or better conductivity as specified above. The insulating material and liner at heaters shall be protected, for a distance of 500mm upstream and 1000mm downstream of the heater.
If ducts are internally insulated, the membrane shall be folded over the opening edges and shall be sandwiched between the spigot and the duct when fixing the spigot to the duct.

Spigots to grilles shall have 100 mm, 45° shoes unless the Engineer approves straight spigots. Where spigots have to be cut through stiffeners, or where cross breaking of ducts causes excessive malalignment of spigots, a stiffener shall butt into one side of the spigot in the case of spigots with a width (dimension in direction of air flow) of less than 400mm and onto both sides of the spigot if the width exceeds 400mm.

The spacing in bends of which the throat radius exceeds 100 mm, shall be selected using Figure B.1 – Turning vane spacing selection chart in Annex B, in the SANS 1238

Access panels shall be 500 x 500, similar to TROX Type BS. Access panels installed in internally insulated ducting shall be of double wall construction. Each panel shall be hinged or fitted with a latch on all sides.

All ducting joints on the outside of the buildings shall be sealed with a reinforcing waterproofing mesh membrane, coated with an acrylic paint and painted with a UV resistant silver metallic paint ("Lap & Pap").

All duct sections shall be identified by duct sequence erection numbers which shall also appear on the duct layout drawings. The flow direction shall be marked on each duct section.

Ducts which are not painted shall be thoroughly cleaned and all markings removed once approved.

The flexible duct connectors shall be Clim or Europair or similar and shall be for heavy duty, low pressure systems and extra heavy duty for high pressure

systems. Flexible joints exposed to the weather, shall be protected by means of galvanised sheet metal covers. The butt joints of the flexible material shall be glued and stitched. All flexible joints shall have a copper earthing strap fitted.

Duct connections to mixing boxes, fan air terminals and diffusers shall be of spiral aluminium flexible ducting. Flexible ducts longer than 1000 mm shall be insulated. Flexible ducts shall not have more than two 90°, long radius bends and shall these not flatten or distort. Flexible ducts shall not be longer than 1,5 m. The flexible ducting shall be fire rated in accordance with SANS 10177-3 and shall comply with municipal fire regulations.

11. PAINTING AND CORROSION PROTECTION

Where not indicated otherwise in this Section, corrosion protection of cabinets, enclosures, materials and Plant shall be as specified in the Section 37 – Painting and Corrosion Protection, Schedules and Drawings. Any damaged galvanised coatings or corrosion protection coatings shall be repaired in accordance with Section 37 – Painting and Corrosion Protection. All steelwork, piping, lagging, etc. supplied under this Contract shall be painted as follows except if galvanised.

All exposed metal parts, materials and Plant items such as pumps, belt guards, all piping, pipe lagging, fittings, dampers, fans, coils, motors, pumps, packaged units, control panels, steelwork, exposed ducts and lagging, expansion tanks, make-up tanks, cooling tower, unit shelters, etc. shall be cleaned, primed, and finished in a high quality two pack epoxy plus top coat of re-coatable polyurethane, except if specified to be anodised, galvanised or epoxy power coated. All Plant shall be generally painted as indicated in SANS 10140 - Identification Colour Marking.

12. INSTALLATION AND OPERATING REQUIREMENTS

GENERAL

All Plant shall be installed and erected flush, level and square as required. No Plant shall be damaged during the installation. Damaged Plant shall be replaced at the Contractor's expense. All installed Plant shall be securely fixed and fastened, taking into account the life span, the weight and the local conditions. The installations shall, at all times, comply as a minimum to the manufacturer's specification and guidelines.

BUILDING WORKS

The Contractor shall install all wall and floor sleeves for louvres, ductwork, pipework, conduit as required for the installation of the HVAC systems.

POWER SUPPLY AND ELECTRICAL INSTALLATION

The Contractor shall provide 50 Hz power points in close proximity to the positions shown on the Drawings or as required by the final installation position of the HVAC systems. The power supply shall terminate in a suitable isolator from where the control panel and switches as applicable and HVAC Plant shall be wired. The electrical installation shall include for all cabling, conduits, cable

racks, trays, switchgear, panels, distribution boards, etc., necessary for the satisfactory operation of the HVAC system. Plant intended for outdoor installation shall be rated IP65 and for indoor use IP55.

WIRING

Wiring of the Plant shall be carried out by the Contractor in surface work. All electrical material and installation work shall be as required in Section – Electrical General and – Electrical Plant and Installation.

CABLE TRAYS

The Contractor shall supply and install all cable trays or ladders as specified or as required by the cable routes including the necessary supports, clamps, hangers, fixing materials, bends, angles, junctions, reducers, T-pieces, etc.

EARTHING

The whole installation shall be efficiently earthed to the satisfaction of the Engineer, the Inspector of Factories, the Supply Authority, and strictly in accordance with the Code of Practice for the Wiring of premises as required (Earthing and Lightning Protection). Any points proposed as earthing points by the Contractor shall first be approved by the Engineer before connection.

13. OPERATION AND MAINTENANCE MANUALS

Submission of O&M Manuals shall be as required. These Manuals shall contain the following information:

a) A comprehensive description of the installation; and
b) Operating Instructions:
i) Starting and stopping instructions;
ii) Prestart checks; and
iii) Plant running checks.

The following information shall be provided in full for each item of Plant:
a) General information - Description, Make, Model Number, Name and Address of Supplier, Manufacturer, etc.;
b) Design information - Design Data Sheet containing all design and selection parameters, calculations, selection curves, etc.;
c) Settings and values recorded during commissioning;
d) Test certificates, inspections certificates;
e) Manufacturer's Brochures and Pamphlets;
f) Maintenance Data and Schedules - The lapse of time between services and the description of the service required of each part, lubrication requirements, etc.; and
g) Detailed contact information of suppliers.

APPENDIX TO SPECIFICATION

FORM A: Application for Practical Completion Inspection

FORM B : **B:** Practical Completion Certificate)

B1: Practical Completion List

FORM C: Works Completion Certificate

FORM D: Final Completion Certificate

FORM A

APPLICATION FOR PRACTICAL COMPLETION INSPECTION

PROJECT : .....

INSTALLATION : .....

PORTION : .....

CONTRACTOR : .....

REFERENCE NO. : .....

As Contractor responsible for the erection of the abovementioned Installation, I hereby certify that the Installation has been completed in full accordance with the Specification and the Engineer's instructions, and that initial commissioning has been completed.

As responsible person of the Contractor I hereby certify that I have inspected the installation and that all the items as listed on my "Contractor's Inspection List", a copy of which is attached, have been completed to my satisfaction.

I therefore officially request that the "Practical Completion Inspection" in terms of the contract be performed by the Engineer. I accept that should the inspection prove fruitless due to false declarations in the above paragraphs, I will be liable for the Engineer's cost in performing additional inspections.

I herewith hand over draft copies of the Operation and Maintenance Manual, "As Installed Drawings" and Commissioning Procedures for the Engineer's comments.

SIGNED : _____ _____
For Contractor Print Name

DATE : ...../...../.....

COPIES:

1. _____
Engineer

2. _____
Employer

3. _____
Principal Contractor

FORM B

PRACTICAL COMPLETION CERTIFICATE

PROJECT : .....

INSTALLATION : .....

PORTION : .....

CONTRACTOR : .....

REFERENCE NO. : .....

NOTE: A Practical Completion Certificate will be issued for each portion for sectional completion.

The installation is substantially completed and can be used for the purposes intended and has passed the initial tests.

ENGINEER'S REPORT

Contractor's Final Inspection List received?	NO/YES	DATE : ...../...../.....
Draft O & M Manual received?	NO/YES	DATE : ...../...../.....
Draft "As Installed Drawings" received?	NO/YES	DATE : ...../...../.....
Commissioning Data received?	NO/YES	DATE : ...../...../.....

The items listed on the attached Practical Completion List (Form B1) shall be rectified before the Contractor requests a Works Completion Inspection.

The Principal Agent shall ensure that the items marked as the responsibility of other parties be attended to by such parties.

SIGNED:

_____ _____

Engineer Date

COPIES:

1. _____

Employer

2. _____

Contractor

FORM B1

QUALITY REPORT / PRACTICAL COMPLETION LIST

PROJECT : .....

INSTALLATION : .....

PORTION : .....

CONTRACTOR : .....

REFERENCE NO. : .....

NOTE: This Quality Report gives a "running" record of quality and other matters which require attention and rectification and the outstanding items at date of the issue of the Practical Completion Certificate, becomes the Practical Completion List.

ITEM	DESCRIPTION	RESPONSIBLE PARTY	DATE OF INSPECTION	DATE ACCEPTED

SIGNED:

Engineer _____ Date _____

FORM C

WORKS COMPLETION CERTIFICATE (

PROJECT : .....

INSTALLATION : .....

PORTION : .....

CONTRACTOR : .....

REFERENCE NO. : .....

1. The items marked for the responsibility of the Contractor on the Practical Completion List (Form B1) have been rectified and completed.
2. The defects liability period will commence on the date of this Certificate.
3. Three hard & soft copies of the Operation and Maintenance Manual were received and that two copies have been handed to the Employer ..... NO/YES DATE: .....
4. Three hard and soft copies of the "As-Installed" drawings have been received and two sets has been handed over to the Employer ..... NO/YES DATE: .....
5. The Employer's personnel have been trained by the Contractor to operate the Installation. NO/YES DATE: .....
6. The Contractor has satisfactorily completed all his contractual commitments in terms of the Contract with the exception of his responsibilities during the maintenance and guarantee period, which he undertakes to do punctually.
7. All rights of equipment guarantees and warranties are hereby ceded by the Contractor to the Employer.
8. All parties accept the final contract sum to be R..... including VAT, as the full and final payment regarding the Contract signed, and declares that no further claims will be submitted. Refer to the attached Final Contract Sum Summary.
9. The Employer shall take cognisance of the expiry date of the one year maintenance and guarantee period by the Contractor and will be responsible for all maintenance of the Installation from .....
10. The Employer shall take cognisance that from the date of this Certificate he is fully responsible for the Installation and the safe operation thereof in terms of the Occupational Health and Safety Act (Act 85 of 1993).
11. Admission to the installation for retention and maintenance work shall be under the full control and authority of the Employer and the Contractor shall approach the Employer in order to make arrangements for admission for such work during the Guarantee and Maintenance period.
12. The Employer shall record all complaints regarding the operation of the Installation in the "Maintenance Log Book" and notify the Contractor thereof.
13. Dates of all visits and reports on written complaints recorded by the Employer or User shall be signed by both the Contractor and the representative or the Employer in the "Maintenance Log Book" held on site.
14. Final Completion List: The following additional remedial items shall be attended to by the Contractor within 20 days.

ITEM	DESCRIPTION	DATE ACCEPTED

SIGNED:

1. _____ _____
Engineer Date

2. _____
Employer

3.

4. _____
Contractor

Copies: Issued to all above

FORM D

FINAL COMPLETION CERTIFICATE

PROJECT : .....

INSTALLATION : .....

CONTRACTOR : .....

REFERENCE NO. : .....

It is hereby certified that the Contractor has completed his obligations during the Defects Liability Period (Defects Notification Period – FIDIC) and will be relieved of further responsibilities upon acceptance by the Engineer of the following defects identified during the said period.

ITEM	DESCRIPTION	DATE OF ACCEPTANCE
For JBCC contracts	The Contractor shall complete all his responsibilities in respect of the 12 month maintenance and guarantee period for the remaining 9 months.	As per Contract

Liability for Latest Defects will be in accordance with the Contract.

SIGNED:

_____ _____

Engineer Date

COPIES:

1. _____
Employer

2. _____
Contractor

PART 2

SCHEDULE OF EQUIPMENT

FOR THE

HVAC INSTALLATION

FOR

SARS BROOKLYN

PART 2

HVAC INSTALLATION FOR SARS BROOKLYN

SCHEDULE OF EQUIPMENT OFFERED

EQUIPMENT	SUPPLIER/ MANUFACTURER	TYPE
1. Fan Coil Units		
2. Axial Fans		
3. Axial Fan VSD's		
4. Chilled Water Pumps		

SIGNED BY TENDERER: .....

DATE: .....

PART 3

SCHEDULE OF DRAWINGS

FOR THE

HVAC INSTALLATION

FOR

SARS BROOKLYN

Drawing Number (Numbering Description in Bold & Underlined)	Description	Size	Scale		2021/06/02
				I	
A2121-31	**BUILDING HVAC LAYOUT**			S	
A2121-31-01-100 RA	BLOCK A - GROUND FLOOR	A1	1:100	S	AA
A2121-31-01-101 RA	BLOCK A - FIRST FLOOR	A1	1:100	U	AA
A2121-31-01-102 RA	BLOCK A - SECOND FLOOR	A1	1:100	E	AA
A2121-31-02-100 RA	BLOCK B - GROUND & FIRST FLOOR	A1	1:100		AA
A2121-31-03-100 RA	BLOCK C - GROUND & FIRST FLOOR	A1	1:100	F	AA
A2121-31-04-100 RA	BLOCK D - GROUND FLOOR	A1	1:100	O	AA
A2121-31-04-101 RA	BLOCK D - FIRST FLOOR	A1	1:100	R	AA
A2121-31-04-102 RA	BLOCK D - SECOND FLOOR	A1	1:100		AA
A2121-31-05-100 RA	BLOCK E - GROUND FLOOR	A1	1:100	+	AA
A2121-31-05-102 RA	BLOCK E & F - FIRST FLOOR	A1	1:150		AA
A2121-31-06-100 RA	BLOCK F - GROUND FLOOR	A1	1:100	R	AA
A2121-31-07-100 RA	BLOCK G - GROUND FLOOR	A1	1:100	E	AA
A2121-31-07-101 RA	BLOCK G & H - FIRST FLOOR	A1	1:150	V	AA
A2121-31-08-100 RA	BLOCK H - GROUND FLOOR	A1	1:100	I	AA

PART 4

SCHEDULE OF PRICES

FOR THE

HVAC INSTALLATION

FOR

SARS BROOKLYN

GENERAL NOTES TO BILLS OF QUANTITIES FOR HVAC INSTALLATIONS

1. The attached Bills of Quantities form part of the Tender Document and shall be read in conjunction therewith.

2. Reference shall be made to the Specifications for the full meaning and description of work to be done and material/equipment to be used.

3. The Bills of Quantities shall be fully completed and returned to form part of a valid tender before the tender closing time.

4. No alterations, addition or erasure may be made to the text of the Bills. If such an alteration, addition or erasure is made it shall not be acknowledged and the original wording of the text shall apply.

5. All prices or rates shall be given against each item of the Bills of Quantities irrespective of any quantities given or not. The cost of items if not priced shall be taken as being included in other price or rates in the Bills of Quantities.

6. "Rates only" items, as all other rates and item prices will be used for costing variations.

7. Provisional Amounts and Contingency Sums are budgetary costs for use by the Engineer at his discretion and may be omitted in total without any compensation to the Contractor whatsoever.

8. Since the Specifications call for complete operational systems, the rates submitted shall cover the cost of associated items not specifically listed, but which are required for a complete operational installation in terms of the Specifications. Should the Tenderer wish to list such items separately, or if any requirements of the Specifications are not specifically covered by items in the Bills of Quantities, the Tenderer shall allow for these as additional items or in his Tender covering letter.

9. Unless otherwise measured all rates shall include for the detail design, engineering, procurement, supply, delivery, erection, waste, storage,

commissioning, testing, maintenance and guarantee of material or equipment in terms of the Specifications.

10. Quantities in the Bills are nett and Tenderers shall allow in their rates for wastage, off cuts, "slack" or over excavations.

11. The Engineer will use his discretion to correct conspicuous arithmetical errors when adjudicating the tenders. The price entered against an item shall be accepted as being the correct price tendered for, for the completion of the work involved. Should any difference appear between the Rate times the quantity and the total item price, the Client shall have the right to adjust the individual unit rate as he may deem necessary in order that the Rate times quantity agrees with the total item price.

12. All unit rates entered in the Bills of Quantities shall exclude Value Added Tax. 15% Value Added Tax shall however be added to the Total Net Tender sum and this value including Value Added Tax shall be carried over to the Form of Tender as the TENDER SUM.

13. The Contractor shall allow in his costing for out of sequence work and re-programming due to unforeseen circumstances during construction.

14. No orders shall be placed on the basis of the quantities in the Bills but shall be verified on site by the Contractor prior to placement of orders.

15. The final Contract price shall be measured to the actual installed net quantities of materials and work done and priced to the unit rates as stated in the Bills of Quantities, adjusted for escalation if applicable.

16. The Employer shall reserve the right to free issue consumables, the contractor shall ensure that the installation rates allow for free issued materials.