

TRANSNET



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TECHNICAL MINUTES AND PRESENTATION:

DESCRIPTION: FOR THE DESIGN, SUPPLY,
INSTALLATION & COMMISSIONING OF THE HVAC
SYSTEM WITHIN TRANSNET ENGINEERING DURBAN
MAIN CENTRE

TRANSNET OPERATING DIVISIONS



Freight



Engineering



National Ports Authority



Port Terminals



Pipelines

Team Composition



TEAM COMPOSITION

- **Procurement**
- Nonhlanhla Mafoko—Category Specialist (SCM)
- **Technical End-users**
- Stanley Mchunu – Project Manager
- Mhlonipheni Nxumalo – Executive Manager

AGENDA

<i>Agenda Point</i>	<i>Presenter</i>
Technical Scope & requirements	Stanley Mchunu
Questions and closing	Nonhlanhla Mafoko
Site visit/walk	Stanley Mchunu

Procurement process briefing (Evaluation Methodology cont.)

Step 3: Technical Evaluation

Functionality Criteria

The functionality criteria and maximum score in respect of each of the criteria are as follows

Functionality Criteria/ Sub Criteria		Scoring in Points
Tenderers Experience		15 points
Proposed Organogram and Staffing		05 points
Experience of Key Resources in executing work of similar nature	Structural Engineer	05 points
	Mechanical Engineer	20 points
	Quantity Surveyor	05 points
	Electrical Engineer	10 points
	SAQCC Gas Authorized Practitioner	10 points
	Category C Designer	
Environmental Engineer		10 points
Preliminary Program		05 points
Approach and Methodology		10 points
Compliance to Transnet Engineering Scope of Works		05 points
Maximum possible score for functionality (Ms)		80 points
Total Weighting:		100 points
Qualifying score required:		80 points

Procurement process briefing (Evaluation Methodology cont.)

*Evaluation criteria will be adjudicated according to submissions made in accordance with the following schedule which is found in **Part T2.2: Returnable Schedules**:*

Functionality Scoring	Returnable Schedules
Tenderers Experience	<ul style="list-style-type: none"> • Experience of a Tenderer
Proposed Organogram and Staffing	<ul style="list-style-type: none"> • Proposed Organogram and Staffing
Experience of Key Resources in executing work of a similar nature	<ul style="list-style-type: none"> • Key Personnel • CVs with Experience of Key Personnel
Preliminary Programme	<ul style="list-style-type: none"> • Preliminary Programme
Approach and Methodology	<ul style="list-style-type: none"> • Approach • Methodology and Quality Control • Schedule of Proposed Sub-Contractors • Plant and Equipment
Compliance to Transnet Engineering Scope of Works	<ul style="list-style-type: none"> • Complete and mark Yes in all provided box under 'Compliance to Scope of Works' Part A

Unless otherwise stated, evaluation criteria will be adjudicated with respect to the contract specific Scope of Work as specified in Part C3. In this regard, the following definitions apply to the evaluation criteria prompt for judgement:



Procurement process briefing (Evaluation Methodology cont.)

- ❖ **Any tenderer that fails to meet the stipulated pre-qualifying criteria will be regarded as an unacceptable tender.**
- ❖ **The minimum threshold for technical/functionality [Step three] must be met or exceeded for a Respondent's Proposal to progress to next step evaluation.**



SCOPE OF WORKS – ADMIN BLOCK A

ADMIN BLOCK A. (AIR-COOLED ROOF-TOP CHILLED WATER AIR-CONDITIONING SYSTEM)

1. Design, supply, and installation of a new Air-cooled roof top air-conditioning chiller unit for the main admin Block-A building. The new chiller unit is required to replace the existing water cooled basement Chiller unit.
2. The new Air -cooled roof top chiller units must be integrated to the existing chilled water air-conditioning system including piping, existing ducting, existing circulation pumps, existing air handling units and all other usable existing auxiliary equipment. All corroded existing pipe shall be replaced.
3. The scope of work covers the provision for the completion of detailed and approved HVAC air-conditioning design for including drawings, and system layout. 4. The designs must cover the complete HVAC air-conditioning system, design including the integration of the new air-cooled chiller unit to the existing air-conditioning system. The new chiller unit is required to replace the existing basement Chiller unit and shall not be less than 1250KW and shall be selected to meet the required cooling capacity for the entire building.
5. The HVAC system is for the admin block A. This administration building is approximately 14m (w) x 70m (l), each office space is approximately 2.6m high per floor, there are 7 floors, wwhich consist of 73 offices, 11 boardrooms on various size, and 6 open plans.
6. The existing control panel must be integrated/upgraded or replaced to a compatible centralized control panel for the new air -cooled roof top chiller unit.
7. The scope of work shall include all piping, electrical installation and shall be commissioned, along with training of staff (training for 10 maintenance personnel) before hand over, with all relevant as-installed Drawings and Operating Manuals.



SCOPE OF WORKS – AUDITORIUM & RECREATION HALL

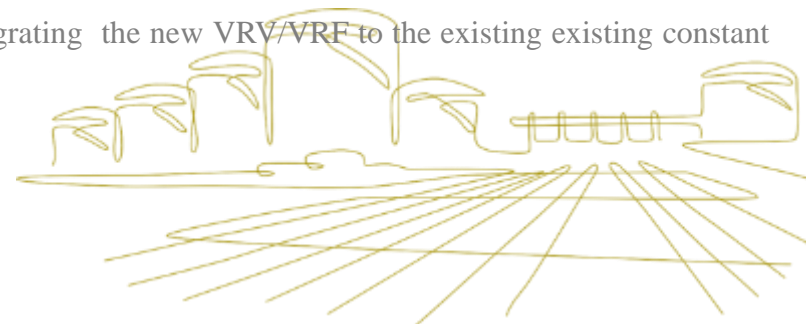
ADMIN BLOCK - B BUILDING. (VRV /OR VRF AIR-CONDITIONING SYSTEM)

1. This option is for the design, supply, and installation of a new Variable Refrigerant Volume (VRV) / or Variables Refrigerant Flow (VRF) air conditioning system for Auditorium and Recreational Hall . The new VRV/or VRF shall be selected to meet the full air-conditioning requirements for the Auditorium and Recreational hall which is approximately as follows:

- Auditorium is approximately 15m x 15m x 4.5m (h)
- Recreational hall is approximately 15m x 15m x 3.5m (h).

2. The scope of work shall include all piping, electrical installation and shall be commissioned, along with client training of staff before being handed over, with all relevant as-installed Drawings and Operating Manuals.

3. The scope of work covers the provision for the completion of detailed and approved air-condition design for VRV/OR VRF system, including drawings, and system layout. The designs must cover the complete air-conditioning system design including the possibility of integrating the new VRV/VRF to the existing existing constant volume low velocity supply air plant located in the basement plantroom.



SCOPE OF WORKS – ADMIN BLOCK B

Admin Block B – Office block

1. This option is for the design, supply, and installation of a new Variable Refrigerant Volume (VRV) / or Variables Refrigerant Flow (VRF) air conditioning system for Durban admin Block B Office building. The new VRV/or VRF shall be selected to meet the full air-conditioning requirements for admin block B offices which includes 24 offices, 2 boardrooms, 4 open plan offices.
2. The scope of work shall include all piping, electrical installation and shall be commissioned, along with client training of staff before being handed over, with all relevant as-installed Drawings and Operating Manuals.
3. The scope of work covers the provision for the completion of detailed and approved air-condition design for VRV/OR VRF system, including drawings, and system layout. The designs must cover the complete air-conditioning system design including the possibility of integrating the new VRV/VRF to the existing system.



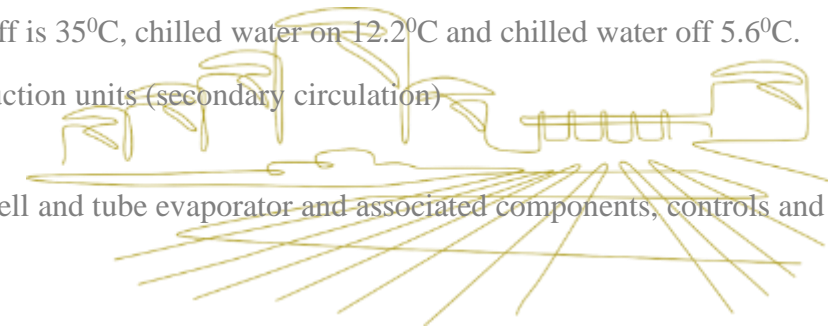
DESCRIPTION OF EXISTING CHILLED WATER SYSTEM

ADMIN BLOCK A

1. The existing chilled water system is for the administration block A, approximately 14m (w) x 70m (l), each office space is approximately 2.6m high per floor, there are 7 floors utilized as offices.
2. The next floor (top floor) has 2 rooms housing the elevators (there are 3 elevators in this office block), additional room, the remainder of the floor is open roof top.
3. Currently the ventilation is provided for office space, extraction in toilets, electrical substation, plant rooms and lift motor room.
4. The plant has the following design parameters:
 - Site conditions:

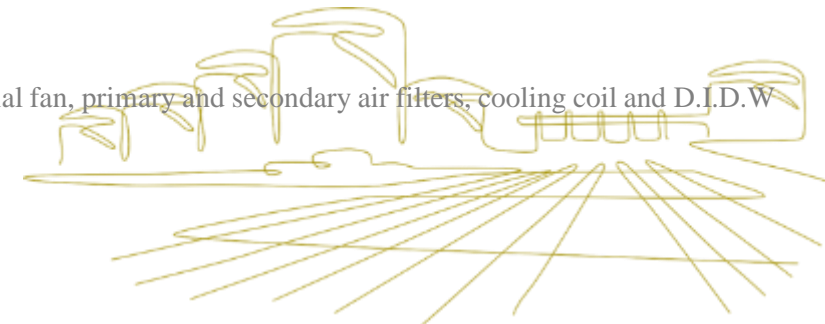
Altitude is at sea level, outside design conditions – summer 20°C db – 25°CWG
 - Inside control conditions

Temperature is 23°C, Humidity is 55% RH
5. The existing chiller unit has a cooling capacity of 1055 kw, condense water on is 29.4°C, condenser water off is 35°C, chilled water on 12.2°C and chilled water off 5.6°C.
6. The chilled water generating plant serves via the central air handling units (primary circulation) and the induction units (secondary circulation)
7. The plant is located within the basement plant room and comprise of the following components:
 - A single packaged condensing set incorporating a shell and tube condenser, compressor, shaft and tube evaporator and associated components, controls and safety devices, etc.
 - Duplicate primary chilled water pumps and pipework circuit.
 - Duplicate condenser water pumps and pipework circuit.



DESCRIPTION OF EXISTING CHILLED WATER SYSTEM

8. In association with the water chilling plant, the duplicate cooling towers are located on the roof of the administration block A.
9. The perimeter areas are served by a non-changeover induction system from a secondary chilling water supply and a medium pressure primary air supply plant within the basement plant room. The air-handling plant incorporates the components such as dampered fresh air intake, primary and secondary fresh air filters, cooling coil and double inlet double width (D.I.D.W.) centrifugal fan.
10. The air handling plant duct attenuators and zone electric duct heaters are included within the distribution system.
11. The secondary chilled water reverse return system and primary air duct distributions are run withing within the horizontal services voids at the building primer to serve the induction units located in the alternate window modules.
12. The exhaust air from the perimeter zone is conveyed via the horizontal services voids to reduce the build up of temperature and moisture within the voids connecting the vertical ducts to two centrifugal exhaust fans at seventh floor level.
13. The interior areas of the building are served from a constant volume low pressure air supply plant within the basement plant room connecting to the ductwork distribution system run within the ceiling space to terminal ceiling diffusers.
14. The air-handling plant incorporates components such as dampered fresh air intake, return air connection and axial fan, primary and secondary air filters, cooling coil and D.I.D.W centrifugal fan.
15. Existing pipe work as per drawing shared on email and both portal



DESCRIPTION OF EXISTING CHILLED WATER SYSTEM

Existing electrical equipment : Four (4) electrical panels exist, they are as follows:

1. Main power supply (1200 A, 400V AC 3 phase supply).

2. Control panel (Delta brand)

- Plant room vent fan control switch (Auto/off/Manual)
- Plant control
- After hours remote
- Internal zone AHU
- Chiller control



DESCRIPTION OF EXISTING CHILLED WATER SYSTEM

Existing electrical equipment : Four (4) electrical panels exist, they are as follows:

1. Main power supply (1200 A, 400V AC 3 phase supply).

2. Control panel (Delta brand)

- Plant room vent fan control switch (Auto/off/Manual)
- Plant control
- After hours remote
- Internal zone AHU
- Chiller control



DESCRIPTION OF EXISTING CHILLED WATER SYSTEM

ADMINISTRATION BLOCK B - AUDITORIUM

1. The Administration block B comprised of Auditorium, Recreational hall and 2 storey office building block, toilets and boardrooms.

- The auditorium is approximately 15m x 15m x 4.5m (h)
- The recreational hall is approximately 15m x 15m x 3.5m (h).

2. The auditorium is served from an independent constant volume low velocity supply air plant located in the basement plantroom. The air handling plant incorporates the following components:

3. Dampened fresh and return air connections.

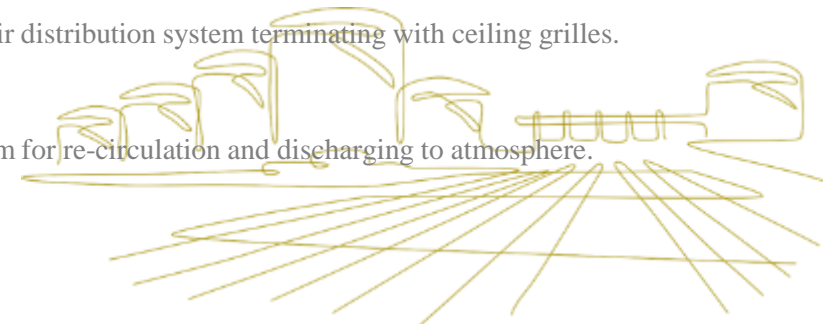
- Primary and secondary air .
- Direct expansion cooling coil.
- Encased Double Inlet Double Width (D.I.D.W.) centrifugal fan(s).

4. Associated with the air handling plant, the duct attenuators and a main duct electric heater are incorporated within the air distribution system terminating with ceiling grilles.

5. The associated water-cooled condensing set is served by the main condenser system located on the roof of the building.

6. The return / exhaust air from the auditorium is via the ceiling mounted registers, axial fan and ductwork to the plantroom for re-circulation and discharging to atmosphere.

Pressurisation to this room is achieved via the door mounted relief louvres.



DESCRIPTION OF EXISTING CHILLED WATER SYSTEM

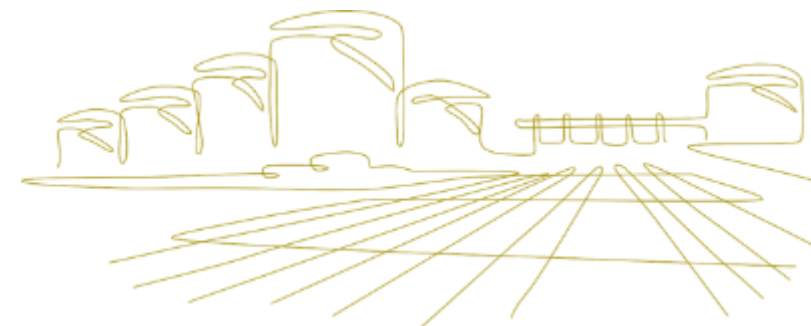
ADMISTRATION BLOCK B – RECREATION HALL

1. The **Recreational Hall** is served from an independent constant volume low velocity supply air plant located in the basement plantroom. The air handling plant incorporates the following components:
 - Dampered fresh and return air connections.
 - Primary and secondary air .
 - Direct expansion cooling coil.
 - Encased Double Inlet Double Width (D.I.D.W.) centrifugal fan(s).
2. Associated with the air handling plant, the duct attenuators and a main duct electric heater are incorporated within the air distribution system terminating with ceiling diffusers.
3. The associated water-cooled condensing set is served by the main condenser system located on the roof of the building.
4. The return / exhaust air from the auditorium is via the ceiling mounted grilles and ductwork to the plantroom. The return / exhaust from the **Recreational Hall** is via ceiling mounted registers, axial fan and ductwork to the plantroom for re-circulation and discharging to atmosphere.
5. The Boltimor Model FCT AZ cooling tower, situated at the roof of Admin B block , has the capacity of 6.85m³/s

Existing electrical equipment

The existing electrical panel are as follows:

- i. Main power supply (1200 A, 400V AC 3 phase supply).
- ii. Breakers
 - 1 x 70A breaker for auditorium compressor unit supply
 - 1 x 45A breaker for Recreational hall compressor unit supply



USER REQUIREMENT: ADMIN BLOCK A

AIR-COOLED ROOF-TOP CHILLED WATER AIR- CONDITIONING SYSTEM

Item No.	Required
1	Design, supply and installation of a new Air-cooled roof top air-conditioning chiller unit for the Durban main Centre admin Block-A building.
	Specific Specification.
2	The new chiller unit is required to replace the existing basement Chiller unit and shall not be less than 1250KW and shall be selected to meet the required cooling capacity for the entire building.
3	The new Air -cooled roof top chiller units must be integrated to the existing chilled water air-conditioning system including piping, existing ducting, existing circulation pumps, existing air handling units and all other usable existing auxiliary equipment.
4	<p>The project is a design and construct projects, all tenders shall make provision for the completion of detailed and approved HVAC air-conditioning designs including drawings, and system layout. The designs must cover the complete HVAC air-conditioning system and including the integration of the new air-cooled chiller unit to the existing air-conditioning system. The design shall cover future upgrade to enable variable/adjustable diffusers between cold and warm air from in each room.</p> <p>The final design to be signed off by a profession Engineer/ Air-conditioning designer accredited ECSA and SAQUA</p>
5	An air-cooled roof-top chilled water air-conditioning system shall be installed for this project. The chiller unit shall be selected to meet the legislative and compliance requirements covered under Part D
6	All companies tendering for this contract shall have the suitable qualified air-cooled roof top air-conditioning chiller unit Installers as covered under Part D and Clause 7 (Key Personnel) of this document, would be in possession of relevant certification.
	Existing Piping:
7	<p>All usable existing piping shall be integrated to the new air-cooled roof top chilled water unit. All corroded existing pipe shall be replaced</p> <p>All Piping not required for this contract shall be removed, from the building and securely stored, in a place of Transnet choosing. No sections of piping or brackets shall be left if not used.</p>

USER REQUIREMENT: ADMIN BLOCK A

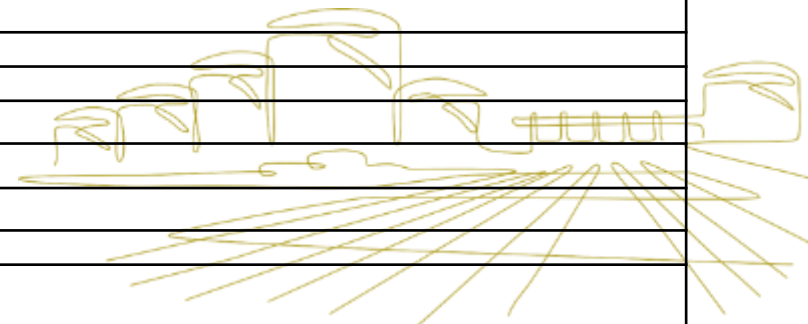
AIR-COOLED ROOF-TOP CHILLED WATER AIR- CONDITIONING SYSTEM

	Services Shaft Piping.
8	The existing vertical Mains, and branch pipework in the services shaft, leading top all the floors, shall remain in situ. A suitable weatherproof enclosure shall also be installed at roof level, which shall prevent rain and water ingress into the shat. Details of this enclosure shall be approved by the Transnet Project Manager, before installation.
	Ductwork:
9	All the existing Ductwork shall be integrated to the new roof-top air-cooled water chilled air- conditioning system.
	Electrical Equipment:
10	The supplier shall supply and install all electrical cables , control panel and wiring required for the complete installation of the new roof top air cooled chiller unit. The power cables and all components shall be correctly sized. The electrical protection equipment shall be correctly selected. The surge protection shall ensure that all areas that vulnerable to surges, are adequately protected.
11	The existing control panel must be integrated/upgraded or replaced to a compatible centralized control panel for the new air -cooled roof top chiller unit.
	Commissioning.
12	A full and detailed commissioning programme shall be drawn-up, to facilitate the full testing and commissioning of all the Plant. The commissioning shall be witnessed and certified by the project manager. A full commissioning report, with signed acceptance certificates for all Mechanical and electrical plant and equipment shall form part of the hand-over documentation.
	Training
13	Provision shall be made for the complete training of 10 maintenance staff, to assure that a thorough understanding of how the systems operate is understood by all. This training may involve multiple site visits after the system has been in operation. The training shall cover the aspects of service and maintenance of the equipment

USER REQUIREMENT: ADMIN BLOCK A

AIR-COOLED ROOF-TOP CHILLED WATER AIR- CONDITIONING SYSTEM

	Guarantee and Warrantee Period.
14	The contractor shall allow for a guarantee period, of one calendar year after the installation has been accepted by Transnet. This guarantee will include for the entire installation and controls, associated with this contract, and shall include for parts and labour.
	Documentation required before any work commence:
15	Detailed air-conditioning system design including all piping, ducting, and electrical drawings regarding electrical control panel and wiring to equipment.
	Documentation on day of commissioning:
16	2 Hard copies with a disc containing documentation in PDF Format for each of:
a.	Operating Manual.
a.	Maintenance Manual.
a.	Electrical Schematics.
a.	Mechanical Drawings.
a.	Parts List.
a.	Hard Copy of PLC Program.
a.	Hard copy of Parameters of all systems including PLC, CNC and Drives.
a.	Setup guides for Software on Computer.
a.	Passwords for all software.,
a.	Backup of PLC Program.
a.	Electrical COC for electrical installation.
	General:
17	No metal or material belonging to TE shall be removed from the premises. (To be handed over to TE).
18	Damage to any existing services shall be repaired by the supplier.
19	All workmen ship shall be of a high standard in all aspects.
20	Area to be cleaned and neat on completion.
21	Rubble to be removed on regular bases and be dump at suitable dumping site.



USER REQUIREMENT: ADMIN BLOCK B

VRV AND VRF AIR-CONDITIONING SYSTEM - (RECREATIONAL HALL AND AUDITORIUM)

Item No.	Required
1	Design, supply and installation of a new VRV/or VRF air-conditioning system for the Durban main center admin Block-B Recreational hall and Auditorium. The scope of work shall include all piping, electrical installation and shall be commissioned, along with client training of staff before being handed over, with all relevant as-installed Drawings and Operating Manuals.
2	The scope of work covers the provision for the completion of detailed and approved air-condition design for VRV/OR VRF system, including drawings, and system layout. The designs must cover the complete air-conditioning system design including the possibility of integrating the new VRV/VRF to the existing existing constant volume low velocity supply air plant located in the basement plantroom. The final design to be signed off by a profession Engineer/ Air-conditioning designer accredited ECSA and SAQUA.
	Specific Specification.
3	A VRF or VRV system shall be installed for this project.
4	All companies tendering for this contract shall have the suitable qualified air-cooled roof top air-conditioning chiller unit Installers as covered under Part D and Clause 7 (Key Personnel) of this document, would be in possession of relevant certification.
	Existing Piping:
5	Currently there exists, an entire chilled Water System within the building confines, as this piping shall no longer be utilised, the bulk of the piping system shall be left in situ. The branches should be removed, along with the upper sections of the piping leading out of the services shaft and brackets shall also be removed from the building.
	Obsolete Pipework, Brackets and Insulation,
6	All Piping not required for this contract shall be removed, from the building and securely stored, in a place of Transnet choosing. No sections of piping or brackets shall be left if not used.
	Services Shaft Piping.
7	The existing vertical Mains, and branch pipework in the services shaft, leading top to the Recreational Hall and Auditorium a, shall remain in situ. While the new VRV/VRF lines will be mounted on Trays adjacent to the existing pipes.

USER REQUIREMENT: ADMIN BLOCK B

VRV AND VRF AIR-CONDITIONING SYSTEM - (RECREATIONAL HALL AND AUDITORIUM)

	Evaporator Units:
8	The evaporator units must be integrated to the existing ducting and diffusers installed in the recreational hall and auditorium.
Item No.	Required
	Fresh Air Filter Section.
9	<p>The VAV/or VRF evaporator units shall include the introduction of fresh air in line with the requirement of an approved standard.</p> <p>The air filter frame shall be suitable for the fitting of the filter media from the exposed end of the unit.</p> <p>The air filter section shall include a suitable filter media</p>
	Supply air Ductwork:
10	All the supply air Ductwork leading from the evaporator Units shall have the existing supply Air Diffusers re-located to achieve maximum efficiency
	Electrical Equipment:
11	<p>The supplier shall make provision of the installation of all electrical cables and wiring required for the complete installation of the new VRV/or VRF air-conditioning system</p> <p>The power cables and all components shall be correctly sized. The electrical protection equipment shall be correctly selected. The surge protection shall ensure that all areas that vulnerable to surges, are adequately protected.</p>
	Commissioning.
12	A full and detailed commissioning programme shall be drawn-up, to facilitate the full testing and commissioning of all the Plant. The commissioning shall be witnessed and certified by the project manager. A full commissioning report, with signed acceptance certificates for all Mechanical and electrical plant and equipment shall form part of the hand-over documentation.

USER REQUIREMENT: ADMIN BLOCK B

VRV AND VRF AIR-CONDITIONING SYSTEM - (RECREATIONAL HALL AND AUDITORIUM)

	Controls.
13	As the units specified are complete with remote control panels, these units shall be installed as per Transnet instructions, a full test shall also be conducted as to the operation of the panels. Each of the units have a controller that shall be fitted in proximity to the unit in a predetermined location, these units' control only the associated unit and can be pre-set to the agreed temperature. Once the units have been pre-set, the controller can be locked, with only designated personnel being afforded access. Thereby avoiding tampering.
	Training
14	Provision shall be made for the complete training of 10 maintenance staff, to assure that a thorough understanding of how the systems operate is understood by all. This training may involve multiple site visits after the system has been in operation. The training shall cover the aspects of service and maintenance of the equipment
Item No.	Required
	Guarantee and warranties Period.
15	The contractor shall allow for a guarantee period, of one calendar year after the installation has been accepted by Transnet. This guarantee will include for the entire installation and controls, associated with this contract, and shall include for parts and labour.
	Documentation required before any work commence:
16	Detailed air-conditioning system design including all piping, ducting, and electrical drawings regarding electrical control panel and wiring to equipment.
	Documentation on day of commissioning:
17	2 sets off hard copies with a disc containing documentation in PDF Format for each of:
a.	Operating Manual.
b.	Maintenance Manual.
c.	Electrical Schematics.
d.	Mechanical Drawings.
e.	Parts List.
f.	Hard Copy of PLC Program.
g.	Hard copy of Parameters of all systems including PLC, CNC and Drives.
h.	Setup guides for Software on Computer.
i.	Passwords for all software.,
j.	Backup of PLC Program.
k.	Electrical COC for electrical installation.
	General:
18	No metal or material belonging to TE shall be removed from the premises. (To be handed over to TE).
19	Damage to any existing services shall be repaired by the supplier.
20	All workmen ship shall be of a high standard in all aspects.
21	Area to be cleaned and neat on completion.
22	Rubble to be removed on regular bases and be dump at suitable dumping site.

USER REQUIREMENT: ADMIN BLOCK B

VRV AND VRF AIR-CONDITIONING SYSTEM - ADMIN BLOCK B – OFFICE BLOCK

Item No.	Required
1	<p>This option is for the design, supply, and installation of a new Variable Refrigerant Volume (VRV) / or Variables Refrigerant Flow (VRF) air conditioning system for Durban admin Block B Office building. The new VRV/or VRF shall be selected to meet the full air-conditioning requirements for admin block B offices which includes 24 offices, 2 boardrooms, 4 open plan offices.</p> <p>The scope of work shall include all piping, electrical installation and shall be commissioned, along with client training of staff before being handed over, with all relevant as-installed Drawings and Operating Manuals.</p>
2	<p>The scope of work covers the provision for the completion of detailed and approved air-condition design for VRV/OR VRF system, including drawings, and system layout. The designs must cover the complete air-conditioning system design including the possibility of integrating the new VRV/VRF to the existing system.</p> <p>The final design to be signed off by a profession Engineer/ Air-conditioning designer accredited ECSA and SAQUA</p>
	Specific Specification.
3	A VRF/or VRV system with induced fresh air shall be installed for this project.
4	All companies tendering for this contract shall have the suitable qualified air-cooled roof top air-conditioning chiller unit Installers as covered under Part D and Clause 7 (Key Personnel) of this document, would be in possession of relevant certification.
	Existing Piping:
5	Currently there exists, an entire chilled Water System within the building confines, as this piping shall no longer be utilised, the bulk of the piping system shall be left in situ. The branches should be removed, along with the upper sections of the piping leading out of the services shaft and brackets shall also be removed from the building.
	Obsolete Pipework, Brackets and Insulation,
6	All Piping not required for this contract shall be removed, from the building and securely stored, in a place of Transnet choosing. No sections of piping or brackets shall be left if not used.

USER REQUIREMENT: ADMIN BLOCK B

VRV AND VRF AIR-CONDITIONING SYSTEM - ADMIN BLOCK B – OFFICE BLOCK

	Services Shaft Piping.
7	The existing vertical Mains, and branch pipework in the services shaft, leading top all the floors, shall remain in situ. While the new VRV/VRF lines will be mounted on Trays adjacent to the existing pipes. A suitable weatherproof enclosure shall also be installed at roof level, which shall prevent rain and water ingress into the shat. Details of this enclosure shall be approved by the Transnet Project Manager, before installation.
Item No.	Required
	Evaporator Units:
8	All the above-mentioned Evaporator Units shall be suspended from the soffit of the slab by means of mechanical fixings; these fixings_ shall consist of galvanised mild steel threaded Drop Rods, suspended by expansion rawl plug type fixings, not smaller than 8 mm in Diameter.
	Fresh Air Filter Section.
9	<p>The VAV/or VRF evaporator units shall include the introduction of fresh air in line with the requirement of an approved SANS standard.</p> <p>All evaporator units shall be fitted with a galvanised Sheet Steel filter-Box, this box shall be custom made for an air-tight fit to the evaporator unit intake. This filter frame shall be suitable for the fitting of the filter media from the exposed end of the unit, with the exception of the filter boxes which shall be fitted to the Fresh Air Supply evaporator units, these Fresh Air Units are enclosed on either side with ductwork, the filter media panel, shall be withdrawn from the side of the filter box, the filter box accommodate the filter cells into the air-Stream in the duct, allowing an air-tight seal,</p> <p>The air filter section shall include a suitable filter media</p>
	Supply air Ductwork:
10	All the supply air Ductvork leading from the evaporator Units shall have the existing supply Aid Diffusers re-located to achieve maximum efficiency

USER REQUIREMENT: ADMIN BLOCK B

VRV AND VRF AIR-CONDITIONING SYSTEM - ADMIN BLOCK B – OFFICE BLOCK

	Electrical Equipment:
11	<p>The supplier shall make provision of the installation of all electrical cables and wiring required for the complete installation of the new VRV/or VFR air-conditioning system</p> <p>The power cables and all components shall be correctly sized. The electrical protection equipment shall be correctly selected. The surge protection shall ensure that all areas that vulnerable to surges, are adequately protected.</p>
	Commissioning.
12	A full and detailed commissioning programme shall be drawn-up, to facilitate the full testing and commissioning of all the Plant. The commissioning shall be witnessed and certified by the project manager. A full commissioning report, with signed acceptance certificates for all Mechanical and electrical plant and equipment shall form part of the hand-over documentation.
Item No.	Required
	Controls.
13	As the units specified are complete with remote control panels, these units shall be installed as per Transnet instructions, a full test shall also be conducted as to the operation of the panels. Each of the units have a controller that shall be fitted in proximity to the unit in a predetermined location, these units' control only the associated unit and can be pre-set to the agreed temperature. Once the units have been pre-set, the controller can be locked, with only designated personnel being afforded access. Thereby avoiding tampering.
	Training
14	<p>Provision shall be made for the complete training of 10 maintenance staff, to assure that a thorough understanding of how the systems operate is understood by all.</p> <p>This training may involve multiple site visits after the system has been in operation. The training shall cover the aspects of service and maintenance of the equipment</p>

USER REQUIREMENT: ADMIN BLOCK B

VRV AND VRF AIR-CONDITIONING SYSTEM - ADMIN BLOCK B – OFFICE BLOCK

	Guarantee and warranties Period.
15	The contractor shall allow for a guarantee period, of one calendar year after the installation has been accepted by Transnet. This guarantee will include for the entire installation and controls, associated with this contract, and shall include for parts and labour.
	Documentation required before any work commence:
16	Detailed air-conditioning system design including all piping, ducting, and electrical drawings regarding electrical control panel and wiring to equipment.
	Documentation on day of commissioning:
17	2 sets off hard copies with a disc containing documentation in PDF Format for each of:
a.	Operating Manual.
a.	Maintenance Manual.
a.	Electrical Schematics.
a.	Mechanical Drawings.
a.	Parts List.
a.	Hard Copy of PLC Program.
a.	Hard copy of Parameters of all systems including PLC, CNC and Drives.
a.	Setup guides for Software on Computer.
a.	Passwords for all software.,
a.	Backup of PLC Program.
a.	Electrical COC for electrical installation.
	General:
17	No metal or material belonging to TE shall be removed from the premises. (To be handed over to TE).
18	Damage to any existing services shall be repaired by the supplier.
19	All workmen ship shall be of a high standard in all aspects.
Item No.	Required
20	Area to be cleaned and neat on completion.
21	Rubble to be removed on regular bases and be dump at suitable dumping site.

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COMPLIANCE REQUIREMENTS

The following **Legislation(s), Standards and Guidelines** shall be complied with:-

- SANS 10400-O:2011 The Application of the National Building Regulations, Part O Lighting and Ventilation (Clause 4.3.2, Artificial Ventilation & Table 2 — Air requirements for different types of occupancies).
- American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE), 2010.
- Guidelines for ventilation to prevent the spread of the SARS-CoV-2 virus (version 1: 15 August 2021).
- SANS 1424 – 2008: Filters for use in air-conditioning and general ventilation.
- EN779 Standard F8 Synthetic Air Filter Media Roll.
- ISO 16890: Air Filters for General Ventilation (ePM1 70-80% filtration).
- The Occupational Health and Safety Act – Act 85 of 1993.
- SANS 347 Categorization and conformity assessment criteria for all pressure equipment
- SANS 10147-2014 Refrigeration systems, including plants associated with air-conditioning systems.
- ASTM 8743 and 888. With a Copper Alloy Number of C12200



COMPLIANCE REQUIREMENTS

Legislation, Standards and Guidelines	Environmental Factor	Requirement
SANS 10400-O:2011 (Clause 4.3.2.9)	Air Velocity	Air Velocity of an artificially ventilated room must not be more than 0,5m/s
American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE), 2010	Temperature	Temperature (winter): 20°C - 23°C; Temperature (summer): 23°C - 26°C
American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE), 2010	Relative Humidity:	Relative Humidity: 30% - 60%.
Legislation, Standards and Guidelines	Environmental Factor	Requirement
Guidelines for ventilation to prevent the spread of the SARS-CoV-2 virus (version 1: 15 August 2021)	SARS-CoV-2 virus	Minimum outdoor air requirements - At least 10 L/s/person (litres of fresh outdoor air every second per room occupant). This means that if there are 4 people in a room, then the room must be supplied with at least 40 litres per second of outdoor fresh air.
SANS 10400-O:2011 (Clause 4.3.2, Artificial Ventilation, Table 2 — Air requirements for different types of occupancies)	Air	Minimum outdoor air requirements for kitchens - At least 17,5 L/s/person (litres of fresh outdoor air every second per room occupant)

COMPLIANCE REQUIREMENTS

SANS 10400-O:2011 (Clause 4.3.2, Artificial Ventilation, Table 2 — Air requirements for different types of occupancies)	Air Changes	Minimum outdoor air requirements - Air changes per hour for the different types of occupancies: Offices (General): 2, Offices (Meeting and waiting spaces): 2, Offices (Conference and boardrooms): 10, Public halls (Theatres [including lobbies and auditorium]): 10, Kitchens: 20
Guidelines for ventilation to prevent the spread of the SARS-CoV-2 virus (version 1: 15 August 2021)	Carbon Dioxide (CO2)	The carbon dioxide (CO2) level must be below 800 parts per million (ppm)
ISO 16890: Air Filters for General Ventilation; SANS 1424 – 2008: Filters for use in air-conditioning and general ventilation; EN779 Standard F8 Synthetic Air Filter Media Roll	Bacteria, Viruses and Contaminants	Filter Capacity: ePM1 70-80% filtration





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THANK YOU