



**SCOPE OF WORK FOR SUPPLY, REPAIRS,
TESTING & COMMISSIONING OF THE AIR
CONDITIONED SPRAYBOOTH BAY 22 AT THE
DURBAN MAIN CENTRE, FOR TRANSNET
ENGINEERING.**




311 SOLOMON MAHLANGU DRIVE, ROSSBURGH.

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DOCUMENT AUTHORITIES

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INTRODUCTION

This document is for the:

#	TASK	REQUIRED
1	Engineering survey, structural assessment	
2	Manufacture	
3	Design	✓
4	Supply	✓
5	Delivery	✓
6	Installation	✓
7	Documentation	✓
8	Testing	✓
9	Training	✓
10	Commissioning	✓
11	AIA Report	

1. SITE INSPECTION

- 1.1 All prospective contractors shall be required to undertake a compulsory site inspection to fully acquaint themselves with all aspects involved.
- 1.2 Arrangements to visit the site and confirmation of the date and time of the site inspection shall be made with Transnet Engineering Contract Manager.
- 1.3 The site inspection certificate shall be completed and countersigned by the Contract Manager on the day of the visit and must be submitted with the tender documents.

2. INFORMATION REQUIRED

- 2.1 Offers will not be considered unless full particulars and sufficient returnable tender documents are provided at the tendering stage to enable Transnet Engineering Technical Officers the opportunity to assess each technical offer properly.

3. TECHNICAL REQUIREMENTS

The following regulation and codes must be complied with:

- 3.1 **SANS 10142-1: The wiring of premises Part 1: Low-voltage installations.**
- 3.2 Except where otherwise provided for in the specification, all equipment offered will comply with the requirements of the relevant standard specifications of the SABS, if published, otherwise with the relevant standard of the British Standards Institution in force at the time of tendering.
- 3.3 Where equipment offered complies with the recognized standards of the country of manufacture and not specifically with the standards required by this specification, such equipment will be considered at the discretion of Management. In this case, tenders shall state fully all respects in which the equipment departs from the standard laid down in this specification.
- 3.4 The successful tender will at the conclusion of the installation provide a document along the lines “that the installation complies with national/international requirements and that all selected /designed items are compliant with Act 85 of 1993 and SABS practices applicable to the installation. The equipment has been commissioned/ calibrated, and employees as specified have been trained and found competent to operate the plant.”

4. SPECIFIC REQUIREMENTS

4.1 Scope of work

Carryout repairs, supply, installation, repairs, testing & commissioning of the air-conditioned spray booth unit in Bay 22 at the Durban Main Centre, for Transnet Engineering.

4.2 Description of operational requirements

- The spray booth consists of a single skin booth with dimensions 26,35m long, 5,4m wide and 5,25m high.
- The supply air consists of two filtered supply air fan systems on one of the long sides of the booth with motorized dampers on the return air ducting for heating purposes. Electric heating elements are installed in the supply air ducting above the supply air fans. The supply air is provided to the booth by means of a plenum box and filters at roof level.
- The extract air system consists of four extract air systems, each consisting of inlet baffles above ground level inside the booth along the long wall, extract ducting on the outside of the booth above floor level, fan and discharge ducting discharging air above roof level.
- This booth is used for the application of non-hazardous (water based) and hazardous (solvent based) paints. In terms of the OSH Act and General Safety Regulations 4 (4)b air velocity (down draft) on the booth should be 0,4m/s at the level of the platform on which persons stand to work.
- Heating elements for the drying cycles must be provided in each of the two supply air duct systems to heat the air. During the heating cycle the motorized dampers on the return air duct on the supply air system open at an angle of 45° to mix hot return air from the booth with fresh air, heated and supplied to the booth via the plenum at roof level.

4.3 Cooling/Hot gas reheat/Electric heating requirements.

- Altitude: Sea Level
- Ambient summer :29 degrees Cdb-26degrees Cwb
- Ambient winter: 10 degrees Cdb
- Operating Range :10 to-80 degrees Cdb
- Humidity Range :20 to 70%
- Control set point :25 degrees Cdb-55%RH
- Air flow :11m³/
- Electric Heating:108kw
- 1st step: 36kw
- 2nd step 36kw
- 3rd step 36kw
- Hot gas reheating coil model: 1 step with modulating bypass damper
- Hot gas reheating coil model: ½ CU 44-2-7-3300(2x24)
- Cooling capacity :324kW
- Hot gas reheating: primary

- Electric reheating: secondary
- Washable filters: 12x600x600x50
12x600x600x50
- Booth type: Down draft with spray mode, pre-heating mode and baking mode
- Average down draft velocity according to OSH Act 0,4m/s
- Supply air quantity required for above requirement 62,6m³/s
- Exhaust air quantity required to comply with OSH Act 57m³/s
- Over pressure in booth Slightly positive
- Down draft air velocity at 1 500mm AFFL or platform level 0,4m/s
- Lighting levels at work surface 500Lux
- Noise level in booth < 80dBa

Item no.	Minimum Requirements
5.1	<p>Replace two Air cooled packaged condensers (½Cu36-3-10-2100) (18) Condenser coil - ACC015</p> <ul style="list-style-type: none"> • Replace two air cooled packaged condenser, condenser coil: 1/2 CU 36-3-10-2100(18), • The air-cooled packaged condenser supplied with 3 x 500mm diameter condenser fan fitted on each unit, Fan capacity to be 0,55Kw, 380 volts, 1330/1030rpm, IP54, 50 HZ, VDK 4I.6S,03105331. • The dimension of each air-cooled packaged Condenser unit shall be Size (1000x1203x2160) <p>Air cooled packaged condenser similar or equivalent to the above specification will be acceptable.</p>
5.2	<p>Replace two Air cooled packaged condensers (½ CU 36-4-10-236018), Condenser coil ACC025</p> <ul style="list-style-type: none"> • Replace two air cooled packaged condenser, Condenser coil: ½ CU 36-4-10-2360(18), • The air-cooled packaged condenser with 4 x 500mm diameter condenser fan fitted on each unit, Fan capacity to be 0,55Kw, 380 volts, 1330/1030rpm, IP54, 50 HZ VDK 4I.6S,03105331. • The dimension of each air-cooled packaged Condenser unit shall be Size (1000x2420x1203) <p>Air cooled packaged condenser similar or equivalent to the above specification will be acceptable.</p>
5.3	Refrigeration gas system
5.3.1	Flush the existing old gas and re-gas.
5.3.2	Detect the system gas leak and repair all leaks.
5.3.3	Connection of refrigeration gas pipeline to all new system including air-cooled condensers, compressors, switches and valves.
5.4	<p>Compressors</p> <p>Supply and install 8 air conditioning hermetic reciprocating compressors with the following operating parameters:</p> <ul style="list-style-type: none"> • Gross weight: 71.5 kg • Volume: 107.333liters • Operating technique: Reciprocating compressor • Capacitor control: Fixed speed • Compressor power supply: 380 -400 V 50HZ • Connection type: Roto lock • Cylinder:4 • Diameter:352mm • Discharge:125mm • Discharge connection pipe:3/4in / 20 mm. • Discharge connection size :1 1/4 in / 70 mm. • Factory Hp(bar):25bar • Factory LP (bar):25bar • Frequency:50 HZ • Glass Torque (Nm):50Nm • GP LP torque (Nm):15Nm • High side TS Max 150degrees C • High side Volume:1,2L • High value of nominal voltage at 50HZ:400V • IP Protection class: IP54 (With cable gland) <p>Compressors similar to the existing Maneurop MT144HV4VE hermetic reciprocation compressor or equivalent will be acceptable.</p>

5.5	Switches and Valves
5.5.1	<ul style="list-style-type: none"> Supply and replace four HP/LP switch hermetic filter drier – MWP500PSIG/35BAR,7/8” Temperature Range: -40 to +160degreesF OR -40 TO +70 degrees C.
5.5.2	<ul style="list-style-type: none"> Supply and replace four low ambient pressure controllers – (Ambient temp 80 °C/176 °F for max 120 min, Ambient temp range(max) 65 °C, Max working pressure 510psig, ambient temperature range(min) -40 °C, Contact ratings 10A at 400V, Differential(bar):3bar, Differential (psi):43psi, Regulation range(bar)(max):32bar, Regulation range(bar)(min):8bar, Insulation:400V, Pollution degree:3, Rated impulse voltage:4kv, Short circuit prot., fuse:16A.
5.5.3	<ul style="list-style-type: none"> Supply and replace four expansion valves – (10Ft, VIF6A) Alco TER-26), similar or equivalent will be acceptable.
5.5.4	<ul style="list-style-type: none"> Supply and replace four H/S valve 7/8 sweab, similar or equivalent will be acceptable.
5.5.7	<ul style="list-style-type: none"> Supply and replace four filter air pressure switches compatible with the existing DPS 200, similar or equivalent will be acceptable.
5.6	Supply Air Blower fans system and Electrical heating elements
5.6.1	<ul style="list-style-type: none"> Supply and replace the two existing motors, - 1440RPM 5,5 KW, 4 Pole 380V and replace 2 x pillow bearing 3/8in ID,3x V-belt on the perimeter zone. The replacement motors must be compatible to meet the specified supply air quantity requirements of 62,6m3/s
5.6.2	<ul style="list-style-type: none"> Repair and balance two blower fans in the perimeter zone. Fan speed 610 rpm, the repairs must enable the system to meet the air quantity requirements of 62,6m3/s
5.6.4	<ul style="list-style-type: none"> Repair Drive details, Motor pulley:2 off SPA-106-2gr, motor bush:38mm, Fan pulley:2 off SPA-250-2GR., Fan bush:35mm, Belts:4Xspa-1250, Bearings:4 off UCP-207
5.6.6	<ul style="list-style-type: none"> Replace/repair 8x pressure switch 17BAR, Regulation range. LP:0,9-7Bar, HB 8-32Bar, Max working pressure: 17 bar/245 psig 35 bar/510 psig
5.6.7	<ul style="list-style-type: none"> Repair motorized dampers to meet the requirement of the supply air
	<ul style="list-style-type: none"> Repair all electrical heating elements on the supply air ducting
5.7	Electrical Panel
5.7.1	<ul style="list-style-type: none"> Supply and replace circuit breaker with capacity icu100ka at400v,2.5A-4A X6 Icu:100Ka.
5.7.2	<ul style="list-style-type: none"> Supply and replace triple single breaker 16 Amps MN116Z 444702 0,230 vac X5
5.7.3	<ul style="list-style-type: none"> Supply and Replace Input 400Vac, Output 110Vac,50/60Hz stepdown transformer.
5.7.4	<ul style="list-style-type: none"> Supply and Replace 80Amps,3phase contactor,2NO,2NC with auxiliaries with 230vac coil voltage x6.
5.7.5	<ul style="list-style-type: none"> Supply and Replace step down transformer input voltage 0-230V ac output 0-24Vac rating100VA X1
5.7.6	<ul style="list-style-type: none"> Supply and Replace relay 10A,250Vac,24vac coil voltage, coil current :53mA, coil resistance 190ohmsX25.
5.7.7	<ul style="list-style-type: none"> Single pole breaker 16Amps,230vacX4
5.7.8	<ul style="list-style-type: none"> Supply and Replace contactor:3pole,4kw,9A,24Vcoil X6
5.7.9	<ul style="list-style-type: none"> Supply and Replace contactor - 3P (3 NO) - AC-3 - <= 440 V 32 A - 24 V AC coil X6.
5.7.10	<ul style="list-style-type: none"> Supply and Replace contactor 400vac,32Amps,220coilvoltage with1n/o and 1n/c X5.
5.8	PLC Control System and drive
5.8.1	<ul style="list-style-type: none"> Supply, install and program drive,18,5kw which control the speed of the extractor fan motor with the same or compatible drive and wiring.
5.8.2	<ul style="list-style-type: none"> Supply, install and program PLC control system for the complete operation of the spray booth, including all application modes for spray painting mode, pre- heating mode, and baking mode
5.9	Cooling Coil perimeter blower unit
2.9.1	<ul style="list-style-type: none"> Repair and flush Air on coil evaporator:1/2 CX 6-3-8-3850(2x27)
2.9.2	<ul style="list-style-type: none"> Repair and flush Air off coil evaporator:1/2 CX 6-4-10-3850(2x36)
2.9.3	<ul style="list-style-type: none"> Restoration of Saturated suction temperature :8 degrees C
2.9.4	<ul style="list-style-type: none"> Restoration of Saturated condensing temperature :50 degrees C
2.9.5	<ul style="list-style-type: none"> Clean any residues of melted coil insulation from other parts of the device or replace such parts.
2.9.6	<ul style="list-style-type: none"> Check for cracks, breaks or deep erosion. Arc hoods and chutes should be repaired or replaced if damaged or deeply eroded.

6	Filters perimeter
6.1	<ul style="list-style-type: none"> Supply and replace 12 x 600 x 600 x 50(x2) filters
6.2	<ul style="list-style-type: none"> Supply and replace 61cmx61cmx18 filters in the perimeter zone.
7	Extractor Fan
7.1	<ul style="list-style-type: none"> Supply, replace and repair motor rated output:18,5kw, speed:1470r/min, supply:380/3/50, frame size:180M, Enclosure: IP55, REARING:6311-C3, NDE Bearing:6211-Z-C3 the replacement motor must be compatible to meet the exhaust air quantity of 57m³/s
7.2	<ul style="list-style-type: none"> Repair and balance fan, series BC90, size 800C/1.0, impeller diameter:800mm, Fan speed:1177r/min, cass:2, op. temp:20degrees C, Max temp:40degrees C, de bearing SNL22210, NDE Bearing SNL C2210, the repairs must enable the system to meet the exhaust air quantity of 57m³/s
7.3	<ul style="list-style-type: none"> Supply and repair belt drive Fan pulley: diameter200-4SPA Bore:45mm, Motor Pulley diameter160-4SPA Bore48mm, Vee-belts:13N (2800) qty per set4, Tension Force 35N, Belt deflection:18mm
8	Testing and Commissioning
8.1	Issue a COC for the Electrical work that was done.
8.2	Test, commission and hand over to production.
8.3	The electrical installation and issuing of certificate of compliance shall bein accordance with SANS 10142-1.
9	<ul style="list-style-type: none"> Make and supply 2 sets of hardcopy drawings and 1 set of pdfdrawings in a USB memory stick. The drawing shall have the components symbols recognized inelectrical and mechanical engineering. The drawing shall have the legends and notes. The drawing shall show the component's rating, sizes, capacity, e.gamperage, voltage, capacitance, etc.
10	Test and commission.
11	The entire air-condition system shall be fully functional on handover.
12	Training
12.1	Training must be provided on the operation and maintenance of the entire air conditioning unit
13	Project plan:
13.1	The contractor shall submit, a full program showing all aspects of the work to be carried out as part of this contract. The program shall also be updated as the project evolves on site, to reflect the true situation of the site progress, on a weekly basis. With special attention being given to critical path items.

Item no.	Minimum Requirements
14	Site Meetings.
14.1	The contractor shall include for attending all site progress meetings, and site inspections which may be called.
15	Site Access.
15.1	The contractor shall be aware that the contract shall be completed during normal working hours, and in the event of unplanned necessities, The Project Manager must be notified.
16	Guarantee Period.
16.1	The contractor shall allow for a guarantee period, of twelve (12) months 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.
17	Maintenance.
17.1	The contractor shall provide for maintenance of the entire installation for a three (3) year period and shall transfer knowledge to two Transnet Engineering maintenance employees.
18	Documentation.
18.1	Documentation required before any work commence:
18.1.1	Detailed electrical drawings regarding electrical control panel and wiring to equipment.
18.1.2	Documentation on day of commissioning: 4 sets off hard copies with a disc containing documentation in PDF Format for each of:
18.1.3	Operating Manual.
18.1.4	Maintenance Manual.
18.1.5	Electrical Schematics.
18.1.6	Parts List.
18.1.7	Hard Copy of PLC Program.
18.1.8	Hard copy of Parameters of all systems including PLC
18.1.9	Backup of PLC Program.
18.1.10	Electrical COC for electrical installation.
18.2	General:
18.2.1	No metal or material belonging to TE shall be removed from the premises. (To be handed over to TE).
18.2.2	Damage to any existing services shall be repaired by the supplier.
18.2.3	All workmanship shall be of a high standard in all aspects.
18.2.4	Area to be cleaned and neat on completion.
18.2.5	Schematic diagram and block diagram of the existing unit including controllers will be provided to the successful contractor.

19. HEALTH AND SAFETY REQUIREMENTS

19.1 All equipment and installation whether detailed in this specification or not shall comply with the requirements of the Occupational Health and Safety Act 85 of 1993 as amended and all other applicable legislation including specific set of regulations and local authority bylaws where applicable.

19.2 The contractor shall hold monthly safety meetings with staff and records of minutes shall be kept on file on site.

19.3 The contractor shall be available for monthly meetings with Transnet Management. A schedule for these meetings may be agreed upon.

20. SHE SPECIFICATION

- Prior to commencement of contract, the contractor shall be issued with a SHE specification in order to compile a SHE files in line with TE requirements.
- Prior to establishing on site, it is an explicit requirement of this contract that all of the Contractor's personnel directly involved with this contract, including those of sub-contractors, attend a Safety induction course. Transnet will provide the course free of charge and attendance is compulsory for all personnel under the control of the Contractor who, during the duration of the contract, will be present on site whether on a full time or ad hoc basis.
- The contractor must allow for all additional charges because of these requirements as no claims for extras will be accepted in connection with the foregoing.

21. AS PART OF THE LEGISLATIVE AND TE SHE REQUIREMENTS.

- The successful contractor is required to conduct a Risk assessment to ascertain all potential risks associated with this project. The completed risk assessment is to potential risks associated with this project. The completed risk assessment is to be formally submitted to the Risk department via the project manager at least two weeks prior to the commencement of the actual project.
- A safety file and associated documents will be required from a successful tenderer and such will be communicated by the Risk department.