

ANNEXURE 6

**AIR CONDITION INVENTORY AND
MAINTENANCE PROGRAM**

PROVISION OF INTEGRATED FACILITIES MANAGEMENT AT
TRANSNET ESSELENPARK CAMPUS
FOR A PERIOD OF 3 YEARS

A. INTRODUCTION

The installed Air Con systems/ equipment require service and maintenance. The document seeks to address the inspection and repair thereof for a comprehensive preventive maintenance program for the units. The original equipment manufacturers maintenance manuals should be used in conjunction with this report. The contract will provide repairs to the equipment and related equipment (pumps, motors, condenser and evaporator coils). Transnet house rules shall apply to the maintenance contract.

- a) Original equipment manufacturers manuals should be used in conjunction with this document.
- b) Repairs to the equipment/ systems (and related equipment such as pumps, motors, condenser and evaporator coils) should be provided
- c) Transnet house rules shall apply to the maintenance contract.
- d) Contractor shall furnish all supervision, labour, materials, equipment, tools, chemicals, transportation and all effort necessary to perform the requirements herein.
- e) Components purchased relating to repairs shall be approved by Transnet.

B. EQUIPMENT SUMMARY

#	Equipment description and requirements	Qty	Maintenance/ service
1	Chiller Plant	1	
	Minor/Quarterly Preventative maintenance		3 x per annum
	Major/Annual Preventative maintenance		1 x per annum
2	Packed and split ducted system	0	
	Minor/Quarterly Preventative maintenance		4 x per annum
3	VRV/VRF system (80KW VRV)	2	
	Major/Annual Preventative maintenance		1 x per annum
4	Normal split units (Minor Equipment – 18000 BTU)	48	
	Minor Service - Mid Wall Split		2 x per annum
	Minor Service - Window Wall Split		2 x per annum
	Minor Service - Ceiling Cassette Split		2 x per annum
	Major Service - Midwall Splits		once every 2 years
	Major Service - Window Wall Split		once every 2 years
	Major Service - Ceiling Cassette Split		once every 2 years
5	Evaporative coolers (to be replaced with VRV/VRF)	9	1 x per annum
	Major/Annual Preventative maintenance		1 x per annum

C. EQUIPMENT/ SYSTEM DESCRIPTION AND REQUIREMENTS

1. CHILLER PLANTS

SERVICE SCHEDULE

Contractor shall perform three quarterly and one comprehensive annual service and inspection. Frequency of schedule may be altered by Transnet. The annual service shall be done in winter season and the three quarterly ones in summer season. A checklist of all inspections and tests performed (as listed below) shall be supplied to Transnet. Electronic checklists would be required and a signed hard copy shall be the preferred method for submission. It shall be the Contractor's responsibility to maintain the chiller (main body and all components attached to the body) and ancillary components in a manner that causes the machine to be fully functional in accordance to manufacturer's and industry standards

MINOR/QUATERLY PREVENTATIVE INSPECTION AND MAINTENANCE

Frequency	Activity
3 x per Annum	▪ Lubricate and adjust equipment (bearings) as required by manufacturer's recommendations ▪ Inspection of electric wiring from the line side starter to its respective motor ▪ Inspection of refrigerant piping between two or more pieces of equipment (excluding chilled water piping) and the insulation of the piping. ▪ Inspect all pressure and temperature controls, thermometers, gauges, linkages, control devices and thermostats located at equipment. ▪ Inspection of the starters.
3 x per Annum	Check all safety switches and alarms for proper operation. These include to: ▪ High-pressure cut-off ▪ Low-pressure cut-off ▪ Low oil pressure switch ▪ Oil pump timers ▪ Flow switches ▪ Pump interlocks ▪ System monitor timers ▪ System freeze stats ▪ Vane closing switches
3 x per Annum	Check operation of all operating controls:

	▪ Temperature control stats ▪ Motor load limit controls ▪ Vane operation controls ▪ Variable frequency drive units
3 x per Annum	Check compressor operation: ▪ Performance evaluation ▪ Check amperage balance ▪ Check terminal lug torque ▪ Check lubricating system, oil levels, and temperatures ▪ Check vane operation under various loaded conditions ▪ Check operation of expansion valve, superheat settings ▪ Check and evaluate performance of purge compressor unit
3 x per Annum	Check operation of chiller unit: ▪ Leak check compressor fittings and terminals ▪ Leak check purge compressor ▪ Leak check oil pump and fittings ▪ Leak check relief valves and rupture disk
3 x per Annum	Check operation of main starter: ▪ Examine contacts on all electrical connections ▪ Verify overload and trip settings
3 x per Annum	Check the operation of the Air Handling Units: ▪ Remove covers ▪ Check all V-Belts ▪ Check all pulleys ▪ Grease motor bearings ▪ Clean filters (Renew if necessary) ▪ Check drum fan bearings & grease ▪ Check and test contactors & overloads ▪ Check all electrical connections ▪ Check all electrical connections ▪ Check & test pressure switches ▪ Check and test controls ▪ Replace covers ▪ Check drum fan direction ▪ Test all electrical connections Clean the condenser and evaporator coils as well as general equipment surroundings.

MAJOR/ANNUAL PREVENTATIVE INSPECTION AND MAINTENANCE

Frequency	Activity
1 x per Annum	▪ Brush all the condenser tubes as per manufacturers' recommendation. ▪ Oil analysis as per SANS to determine wear and corrosion elements in the oil sample. This will include, but not limited to: iron, chromium, aluminium, lead, silicon, tin, and zinc. Reported results shall be in parts per million (ppm). ▪ Clean air cooled coils including chemical solution as recommended by the manufacturer. ▪ Eddy Current Test 100% of the condenser tubes at least once every two (2) years or when the condition requires the procedure. The technician performing such tests must be accredited to carry such an operation and proof must be submitted. ▪ Brush 100% of the evaporator tubes at least once every five (5) years or when the condition requires the procedure. ▪ Eddy Current Test 100% of the evaporator tubes at least once every five (5) years or when the condition requires the procedure. Please ensure that the tubes are brushed before each Eddy Current test is performed. ▪ Vibration Analysis shall be conducted on a quarterly basis and a baseline trend established, charted, and compared with the manufacturer's specifications for rectification if any is required. ▪ Megger Insulation Test on compressor motor. ▪ Complete leak check of chillers. ▪ Inspect starter panel and main contacts for pitting/burring. Torque all connections and clean starter. ▪ Copy of annual inspection report (Contractor's form) shall be forwarded to Facilities Management Department for formal review. ▪ Clean or back flush heat exchanger, replace oil filter and oil return filter or driers. ▪ Replace coolant after cleaning heat exchanger. ▪ Replace or clean filters as recommended by the manufacturer. ▪ Inspect repair or replace associated water pipe work. ▪ Inspect repair or replace air distribution system, including ductwork and fan casings. ▪ Inspect water quality and treat if applicable.
1 x per Annum	Check the operation of the Air Handling Units: ▪ Remove covers ▪ Check all V-Belts ▪ Check all pulleys

	▪ Grease motor bearings ▪ Clean filters (Renew if necessary) ▪ Check drums fan bearings & grease ▪ Check and test contactors & overloads ▪ Check all electrical connections ▪ Check all electrical connections ▪ Check & test pressure switches ▪ Check and test controls ▪ Replace covers ▪ Check drum fan direction ▪ Test all electrical connections
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2. PACKAGED AND SPLIT DUCTED SYSTEMS

SERVICE SCHEDULE

Frequency of schedule may be altered by Transnet. There shall be two services on newly installed equipment (not older than 2 years), and four services on old equipment. The Four quarterly services for old systems and two half yearly services on new systems shall be done in the space of 12 months. A checklist of all inspections and tests performed shall be supplied to Transnet. Electronic checklists would be required and a signed hard copy shall be the preferred method for submission. It shall be the Contractor's responsibility to maintain the unit and ancillary components in a manner that causes the machine to be fully functional in accordance to manufacturer's and industry standards

QUATERLY PREVENTATIVE INSPECTION AND MAINTENANCE

Frequency	Activity
4 x per Annum	Compressor assembly and operation: ▪ Check for leaks on compressor ▪ Test operation of compressor ▪ Check availability of refrigerant and pressure levels ▪ Chemical Clean compressor and associated ancillary ▪ Check condenser coils and fins ▪ Check for correct operation ▪ Check power connections
4 x per Annum	Evaporator assembly and operation: ▪ Test operation of evaporator ▪ Check for leaks ▪ Inspect drainage pipe waste point ▪ Clean condensate drain trap, flush with clean water and ensure water drains freely ▪ Check fins operation ▪ Check temperature settings against room temperature and installation results. ▪ Check power connections
4 x per Annum	Refrigerant pipes, duct work and ancillaries: ▪ Repair or replace air distribution system, including ductwork and fan casings. ▪ Repair or replace refrigerant distribution system, including pipework insulation. ▪ Clean the Filters(Renew if necessary)

3. VRF/VRV SYSTEMS

SERVICE SCHEDULE

The contractor shall perform one comprehensive annual service and inspection. Frequency of schedule may be altered by Transnet. The annual service shall be done in winter season. A checklist of all inspections and tests performed (as listed below) shall be supplied to Transnet. Electronic checklists would be required and a signed hard copy shall be the preferred method for submission. It shall be the Contractor's responsibility to maintain the unit (main body and all components attached to the body) and ancillary components in a manner that causes the machine to be fully functional in accordance to manufacturer's and industry standards.

ANNUAL PREVENTIVE INSPECTION AND MAINTENANCE

Frequency	Component	Activity
1 x per Annum	Refrigerant System	Compressor: - Check for acoustic sound and vibration at start and stop - Measure insulation resistance - Check the Looseness of terminals and Contact of wires
1 x per Annum	Refrigerant System	Pulse motor valve: - Check for operation - Check Operation sound at power ON/OFF
1 x per Annum	Refrigerant System	Refrigerant system: - Check for operation of 4 way valve and insulation performance - Check for Corrosion and abnormal sound
1 x per Annum	Refrigerant System	Heat Exchange: - Check clogging by dirt or damage - Check for Gas leakage
1 x per Annum	Electric Parts	Fan Motor: - Check acoustic sound - Measure insulation resistance
1 x per Annum	Electric Parts	Float switch: - Check for Operation - Check for the Breaking of wires
1 x per Annum	Moving and Removable Parts	Filter: Check dirt or snag

1 x per Annum	Moving and Removable Parts	Fan, fan casing, bell mouth: ▪ Check fluctuation & balance ▪ Check Stick of dirt and the overall Outlook
1 x per Annum	Structural Parts	▪ Check clogging dirt, or drain dirt ▪ Check peel or rise of paint on the cabinet ▪ Check dirt or damage on the make-up panel and louver ▪ Check dirt or damage on the front, top and side cabinet ▪ Check for hardening or deterioration of cushion rubber

4. NORMAL SPLIT UNITS (MINOR EQUIPMENT)

MINOR INSPECTION AND MAINTENANCE SERVICE

Frequency	Component	Activity
2 x per Annum	Mid wall Split	▪ Clean Filters ▪ Check Refrigerators ▪ Check for correct Operation
2 x per Annum	Window/ wall unit	▪ Clean Filter ▪ Check & Test Temperatures ▪ Check & Test correct operations of 4 way valve
2 x per Annum	Ceiling cassette	▪ Clean Filters ▪ Check & Test Temperatures

MAJOR INSPECTION AND MAINTENANCE SERVICE

Frequency	Component	Activity
Once every 2 years	Mid wall Split	▪ Chemical clean condenser & Evaporator ▪ Clean drip tray & Drain pipe ▪ Clean Evaporator & Condenser Fans ▪ Clean Filters on Evaporator (Renew if necessary) ▪ Check all Electrical Connections, Voltages & Currents ▪ Check LP & HP Pressures ▪ Top up Refrigerants ▪ Wash Condenser & Evaporator (Handy Andy & Water) ▪ Test Unit Heating & cooling for correct Operation.

Once every 2 years	Window/ wall unit	▪ Disconnect Unit, Remove from casing. ▪ Strip condenser covers. ▪ Brush & Blow out Unit. ▪ Chemical clean condenser & evaporator ▪ Replace Condenser Covers. ▪ Check all Electrical Corrections. ▪ Check correct operation of four way Valve ▪ Check Evaporator & Condenser Fans & Clean. ▪ Clean Filter (Renew if necessary) ▪ Check Temperatures (with Temp meter) ▪ Replace Unit in Casing & secure ▪ Connect and replace front Cover. ▪ Check for correct operation.
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D. WARRANTY

Responsibility for equipment room conditions or overall system performance shall be for contractors' accountability. The minimum warranty period shall be twelve (12) months for new parts; six (6) months for labour. Warranty repair and/or replacement shall be performed at no additional charge to Transnet. All warranty periods shall begin upon acceptance by the end user department.

E. MINIMUM STOCK HOLDING

The bidder should, at all times, stock any replacement part necessary for the execution of Works. The principle that applies to stock keeping is that downtime on equipment should be kept to a minimum. Therefore, all consumables that might be necessary for the execution of the works shall be readily available. The bidders should list exclusions, if any, to the above with the maximum time necessary to acquire this spare part.

Item name/ description	Time to acquire

F. MINIMUM SPECIAL EQUIPMENT

The bidder should list any special equipment, if any, that might be necessary for the execution of the Works, that will not be, either on site, or at the premises on daily basis. The bidder should indicate the maximum time necessary to acquire this equipment.

Item name/ description	Time to acquire

Staffing requirements:

- **The Esselenpark campus facility will require a minimum of 4 (including working supervisor) on site air condition staff members to attend to all reasonable maintenance requests, temperature adjustments and services.**