public works
& infr structure
Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

MAINTENANCE TO BE DONE IN ACCORDANCE WITH TECHNICAL SPECIFICATION ADHERANCE

MAINTENANCE OF AIR CONDITIONERS FOR 12 MONTHS

Cluster:		
Tender No.:		
Sch No.	**Description**	**Amount**
1	SCHEDULE 1: PRELIMINARIES AND GENERAL	
2	SCHEDULE 2: SERVICES	
3	SCHEDULE 3: BREAKDOWNS	
4	SCHEDULE 4:PROVISIONS	
5	SCHEDULED 5:EPWP	
	Total carried to total summary table	

Summary Table

	Totals	
	Total of Schedule 1-5 excl VAT	
	Value added Tax (VAT) The Tenderer shall add 15% of the Total of Schedule of Quantities above	
	Tender Sum incl of VAT carried to: 'Form of Offer and Acceptance' DPW-07-EC	

Upon written notice to the Supplier, DPWI shall be e ntitled:
a) to cede, assign and transfer its right, title and interest in the provision of ***Maintenance of Air Conditioners*** to the client depa
b) notify the Service Provider of such cession to ensure that the performance of the payment for services

Bidder Signature **Date**

Schedule 1 Prelimlnarv and General

Item no.	Item DHcriptlon		QTY	Rate	Total
	As-built Infonnatlon and Qperatlna and Maintenance Manuals:				
1	Obtaining of all available Informafon, compiling, reproducing (1) one sel of hardeopy as-built and operating & maintenance manuals *fo r* **each** sHe as specified In Technical Speci eation. Documenls to be handed over to the Departmental **Reoresentative**	each	1		
2	Submit (1) one set *of* as-built drawings and operating & maintenance manuals In electronic fonnat. The eop:es shall be In PDF and AutoCAD 2014 fonnat with no pauwords oroteclion.	each	1		
3	Logging and rea,rding of operating of conditions, se,vlces. mainlenanca visits, repor1s, breakdowns, samples, inspeetions. tests etc.	each	1		
4	Health and Sefetv Plan fSafetv Flie\	each	1		
	Total to be carried to Summary Page				

Schedule 2 Service

Item no.	Item Description	Unit	QTY	Rate	Total
Supply rates as per Technical Specification. Sum given In the bill below shall be Inclusive of all labour, supplies, material, transport and equipment required to complete the service					
	MONTHLY SERVICES				
1	Service of Diffusers as per Technical Specification	each	1		
2	Service of Chillers as per Technical Specification	each	1		
3	Service of Filter Banks as oer Technical Soeclfication	each	1		
4	Service of VRV as oer Technical Soecification	each	I		
	THREE MONTHLY SERVICES				
5	Service of Pumps as per technical specification	each	1		
6	Service of Belt Driven Fans es per technical specification	each	1		
7	Service of Air Handling Units as per technical specification	each	1		
8	Service of Cooling Towers as per technical specification	**each**	1		
9	Service of Cooling and Heating coils as per Technical SoecificaUon	each	1		
10	Service of Split UniVCassetle technical specification	each	1		
	SIX MONTHLY SERVICES				
11	Service of Hepa Fliters as per technical specification	each	1		
12	Service of Distribution Boards as per technical specification	each	1		
13	Service of Chilled and Condensing water lines as per technical soecification	each	1		
14	Service of Chillers as per Technical Specification		I		
	Service of VRV as per Technical Specification		I		
	YEARLY SERVICES				
15	Service of Cooling Towers as per Schedule technical soecificatlon	each	1		
16	Service of roller bearings as per Technical Specification	each	1		
17	Service of sleeve bearings as per Technical Specification	each	1		
18	Service of electrical motors and gearboxes as per Technical Soecification	each	1		
	Total to be carried to Summary Page				

Schedule 3 Breakdown

Item no.	Item Description	Unit	QTY	Rate	Total
Supply rates as per Technlcal Specification. Sum given in the bill **below shall be Inclusive of all labour, supplies, material, transport and equipment required to complete the breakdown**					

	CONTROLS				
1	Valve Actuator M7425A3005	each	1,00		
2	Modutrol Motor M985A	each	1		
3	Steam valve V5011R1042-1/2"	each	1		
4	Steam valve V5011R1042-3/4"	each	1		
5	Sail switch SA43A	each	1		
6	Damper Motor ML6194E	each	1		
7	Thermostat T92-A-1183	each	1		
8	Micronic 100 Humidity Controller R7420F-1037	each	1		
9	Micronic 100 Humidity display S7004C-1019	each	1		
10	Micronic 100 Module Q642Q-1005	each	1		
11	Micronic 100 Temperature display S7004B	each	1		
12	Micronic 100 Temperature controller R7420F-1045	each	1		
13	Step Controller 5984-A-F	each	1		
14	Three-way mixing valve V5011R1065 PN 16 DN 25 KVS ?i:.	each	1		
15	Balance relay assembly 24337OB	each	1		
16	Valve repack kit 14003294-001	each	1		
17	Pneumatic Controller RP 920C 1054	each	1		
18	Valve Actuator ML7421A1008	each	1		
19	ML 6194C-1000 Damper Actuator	each	1		
20	ML7425A3005 Actuator	each	1		
21	M9185A1018 Modutrol motor	each	1		
22	M9185E1019 Modutrol motor	each	1		
23	M9174D1007 Modutrol motor	each	1		
24	Sail Switch S43A1037	each	1		
25	T921A1183 Thermostat	each	1		
26	MP953E-1376-1 Actuator	each	1		
27	14003295001 Repack Kit	each	1		
28	R43176754001 Valve kit	each	1		
29	S984F1088 Step Controller	each	1		
	FILTERS				
30	600x600x50 Filter BFW washable 85% arrestance 26 pleats	each	1		
31	500x500x50 Filter BFW washable 85% arrestance 26 pleats	each	1		
32	10mm X 25mm filter gasket	Roll	1		
33	600X600X300 Microcell Fillers F8	each	1		
34	600X300X300 Microcell Filters F8	each	1		
35	600X500X300 Microcell Filters F8	each	1		
36	600X600X50 Washable Panel Filter External Wire Support	each	1		
Schedule 3: Continuation					
37	600X300X50 Washable Panel Filter External Wire Support	each	1		

38	500X500X50 Washable Panel Filter External Wire Support	each	1		
39	Neoprene Filter Gasket	each	1		
40	Split air con unit Filters	each	1		
41	Cassette Filter F9 600X300X292	each	1		
42	Cassette Filter F9 600X600X292	each	1		\
43	Cassette Filter F8 600X600X292	each	1		
	COMPRESSORS				
44	9,000 BTU Piston	each	1		
45	12,000 BTU Piston	each	1		
46	18,000 BTU Piston	each	1		
47	24,000 BTU Piston	each	1		
48	36,000 BTU Piston	each	1		
49	48,000 BTU Piston	each	1		
50	60,000 BTU Piston	each	1		
51	Bristol H2NG184DPEF	each	1		
52	Bristol H2NG294DPE	each	1		
53	Copeland 2R16M3TWD570	each	1		
54	Copeland 4RK2 2500 FSD	each	1		
55	Copeland 06 FJJ 4000 BWM	each	1		
56	Copeland 08 OJI 6000 BWM	each	1		
57	Maneurop MT160 R22	each	1		
58	Maneurop MT 80 R22	each	1		
59	Maneurop MT 50 R22	each	1		
60	CopelandCRK 3-8325-TFD	each	1		
61	Carrier 06EF299-4-610	each	1		
62	9000 BTU Rotary Compressor	each	1		
63	12000 BTU Rotary Compressor	each	1		
64	18000 BTU Rotary Compressor	each	1		
65	24000 BTU Rotary Compressor	each	1		
66	36000 BTU Rotary Compressor	each	1		
67	44000 BTU Rotary Compressor	each	1		
68	58000 BTU Rotary Compressor	each	1		
69	Hitachi scroll compressor 401 RH	each	1		
70	Hitachi compressor 753-FITB-T	each	1		
71	Copeland Compressor 4 **RK2** 2500 FSD	each	1		
72	Copeland Compressor 06 FJ-4000	each	1		
73	Copeland Compressor D8 DHI 5000 BWM	each	1		
74	Copeland Compressor 08 DJI 6000 BWM	each	1		
75	Maneurop Compressor MT50HV4	each	1		
76	Maneurop Compressor MT80HV4	each	1		
77	Maneurop Compressor MT160HW	each	1		
78	Carrier Compressor 06EF299-4- 610A-EE	each	1		
79	Carrier Compressor 06DA8242-BA3601	each	1		
80	Copland CRK 3-8325-TFD/552	each	1		
81	Tecumseh AG5573 E	each	1		

82	Bristol H2NG294DPE	each	1		
83		each	1		
Schedule 3: Continuation					
	EXTRACTORS				
84	G x 9 Extract Fan	each	1		
85	G x 12 Extract Fan	each	1		
86	GX 6 Extractor fan	each	1		
87	GX 9 Extractor fan	each	1		
88	GX 12 Extractor fan	each	1		
	V BELTS				
89	13N1725	each	1		
90	13X1100	each	1		
91	13X1860	each	1		
92	13X1150	each	1		
93	1725x17	each	1		
94	13 X 2900	each	1		
95	13N 1800	each	1		
96	13 X 8 X 1130	each	1		
97	13 X 2120	each	1		
98	10N 2280	each	1		
99	13N 1700	each	1		
100	13 X 8 X 1030	each	1		
101	17 X 2890	each	1		
102	10N 950	each	1		
103	16N 2280	each	1		
104	17 X 2080	each	1		
105	17 X 4060	each	1		
106	17 X 3950	each	1		
107	17 X 3500	each	1		
108	17 X 1820	each	1		
109	10N 1420	each	1		
110	10N 1900	each	1		
111	13N 1600	each	1		
112	13N1140	each	1		
113	13 X 1530	each	1		
114	16 N 3170	each	1		
115	13 X 1150	each	1		
116	13 X 2020	each	1		
117	16 N 2150	each	1		
118	16N 2530	each	1		
119	16N 3550	each	1		
120	16 N 2280	each	1		
121	17 X 2250	each	1		
122	17 X 2460	each	1		
123	17 X 2580	each	1		
124	17 X 2890	each	1		
125	17 X 3090	each	1		
126	17 X 3500	each	1		
127	17 X 3800	each	1		
128	10N1320	each	1		
129	10N2990	each	1		
130	10N1760	each	1		
131	10N1800	each	1		
132	10N2037	each	1		
133	10N950	each	1		
134	10N720	each	1		
	COPPER TUBING				

135	Copper tubing ¼	p/m	1		
136	Copper tubinci ½	p/m	1		
137	Coooer tubing 3/8	p/m	1		
138	Flare Nut½	each	1		
139	Flare Union ½	each	1		
140	Flux 250 gram	each	1		
141	Rob Silver Solder Fluxed	each	1		
142	Rob coooer to copoer		1		
Schedule 3: Continuation					
	WAY REVERSE VALVES PANASONIC				
143	Reverse valve for 9000 BTU unit	each	1		
144	Reverse valve for 12000 BTU unit	each	1		
145	Reverse valve for 18000 BTU unit	each	1		
146	Reverse valve for 24000 BTU unit	each	1		
147	Reverse valve for 44000 BTU unit	each	1		
	MISC				
148	Maonehelic Gauoe 0-250Pa	each	1		
149	Maonehelic Gauqe 0-500Pa	each	1		
150	Maonehelic Gauoe 0-700Pa	each	1		
151	Magnehelic Gauge 0-100Pa	each	1		
152	Electrodes Mild Steel Each	each	1		
153	R141B FLUSHING AGENT	Per	1		
154	R404 Refriqerant	Per	1		
155	R410a Refrigerant	Per	1		
156	WF 68 Refrioeration Oil	Per	1		
157	WF 32 Refrigeration Oil	Per	1		
158	Refrigeration Oil Emkarate Ester	Per litre	1		
159	ALVANIA EP-2 GREASE	Per	1		
160	Pump Oil	Per	1		
161	Paraffin	Per	1		
162	Deoreaser	Per	1		
163	Coil Brite	Per	1		
164	Duct tape	each	1		
165	Insulation Tape	each	1		
166	RCW 48 Drier Core Std capacity	each	1		
167	RCW 48 Drier Core High capacity	each	1		
	ELECTRICAL				
168	220V Multi Function Timer	each	1		
169	220V 11 Pin Relay	each	1		
170	5.5KW Contactor With Coil	each	1		
171	7.5KW Contactor With Coil	each	1		
172	11KW Contactor With Coil	each	1		
173	15KW Contactor With Coil	each	1		
174	Overload relay 6-10 amp	each	1		
175	Overload relay 10-16 amp	each	1		
176	Overload relay 16-24 amp	each	1		
177	Overload relay 18-36 amp	each	1		
178	Overload relay 63-75 amp	each	1		
179	Circuit Breaker 3 pole - 10 A	each	1		
180	Circuit Breaker 3 pole	each	1		

181	Circuit Breaker 3 pole	each	1		
182	Circuit Breaker 3 pole	each	1		
183	Circuit Breaker 3 pole	each	1		
184	Circuit Breaker 3 pole	each	1		
185	Circuit Breaker 1 pole	each	1		
186	Circuit Breaker 1 pole	each	1		
187	Circuit Breaker 1 pole	each	1		
188	Circuit Breaker 1 pole	each	1		
189	50 VA TRANSFORMER 220/24	each	1		
190	30 VA TRANSFORMER 220/24	each	1		
Schedule 3: Continuation					
	PIPE SPARES				
191	Socket 15mm steam	each	1		
192	Socket 20mm steam	each	1		
193	Socket 25mm steam	each	1		
194	Socket 32mm steam	each	1		
195	Socket 40mm steam	each	1		
196	Steam safety Valve 15mm	each	1		
197	Steam safety Valve 20mm	each	1		
198	Steam safety Valve 25mm	each	1		
199	Steam safety Valve 32mm	each	1		
200	Steam safety Valve 40mm	each	1		
201	Elbow 15 mm steam	each	1		
202	Elbow 20mm steam	each	1		
203	Elbow25mm steam	each	1		
204	Elbow 32 mm steam	each	1		
205	Elbow 40mm steam	p/m	1		
206	St aight Brass Pipe Thermometer	each	1		
207	Pipe 15mm steam per meter	IP/m	1		
208	Pipe 20mm steam per meter	p/m	1		
209	Pipe 25mm steam per meter	IP/m	1		
210	Pipe 32mm steam per meter	IP/m	1		
211	CoPPer Tube 15mm	each	1		
212	Copper Tube 20mm	each	1		
213	CoPoer Tube 25 mm	each	1		
214	15mm Conex Elbow	each	1		
215	20mm Conex Elbow	each	1		
216	25mm Conex Elbow	each	1		
217	Steam reducinq Valve 25mm	each	1		
218	Steam reducinq Valve 32mm	each	1		
219	Drier 25 gram all gasses	each	1		
220	Thermostat Double	each	1		
221	Thermostat Single	each	1		
222	Pu Foam	each	1		
223	Electronic Temperature Controller including sensor	each	1		
224	Check valve 20mm	p/m	1		
225	Check valve 25 mm	p/m	1		
	Total for Schedule 3 to be carried to Summary				

Schedule D Provisions

Item no.	Item Description	Unit	QTY	Rate	Total
	Labour- for all areas.				
	The rates for labour will be deemed to include for statutory minimum labour rates				
	Working hours (7:30-16:30)				
1	Technician	R /hr	1		
2	Technician in Training	R /hr	1		
3	Artisan	R /hr	1		
	After Hours (17:00-7:00)				
4	Technician	R /hr	1		
5	Technician in Training	R /hr	1		
6	Artisan		1		
	Transport				
7	LDV transport	R/Km	1		
	Starting point for Ehlanzeni Region sites is Nelpruit Post Office				
	Starting point for Nkangala Region sites is Witbank Post Office				
	Starting point for Gert Sibande Region sites is Ermelo Post Office				
	Non- scheduled materials				
8	Allow for the amount of R 200,000,00 for the provisional cost of non-listed material that may be used. The above labour and transport rates will apply. Supplier material slip to be provided	sum	1	R 400 000,00	R 400 000,00
9	Percentage mark- up on non-listed materials that may be used. (Percentage (%)	%	20%		
	Total carried to Summary page				R

PROJECT NAME: Scheduled and Unscheduled Maintanance of air conditioners for 24 Months Cluster 5: Emalahleni & victor Khanye Municipalities

public works & infrastructure
Department: Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

EXPANDED PUBLIC WORKS PROGRAMME

ITEM NO	DESCRIPTION	UNIT	QUAN-TITY	RATE	AMOUNT
200	**SECTION NO __**				
	BILL BO __				
	EMPLOYMENT AND TRAINING OF LABOUR ON THE EPWP-NYS				
	PREAMBLES				
	Tenderers are advised to study the Additional Specification SL: Employment and Training of Labour on the Expanded Public Works Programme (EPWP) Infrastructure Projects: National Youth Service, as bound elsewhere in the Bills of Quantities, and then price this Bill accordingly				
200,01	**TRAINING OF YOUTH WORKERS: EXPERIENCIAL LEARNING (TARGET: 2 YOUTH WORKERS)**				
	Orientation, Life skills development and technical training:				
200.01.01	Orientation and Life skills development training for youth workers for an average of **1** month per youth worker (ref. SL 11.01.01)				
200.01.02	Technical skills training for youth workers for an average of **11** months per youth worker (ref. SL 11.01.02)				
	The above items are only applicable if NYDA do not fund the specific training.				
200.01.03	Payment Reduction due to not meeting the training target (ref. SL 11.03)	Youth-worker	-2 500		
200.01.04	Profit and attendance on condition that services and cost has been incurred (on items 200.01.01 and 200.01.02 above)	%	R -		-
200,02	**TRAVELING DURING ON-SITE TRAINING:**				
200.02.01	**Practical Work based Experiential training for 10 days each (ref. SL 11.02.01)**				
	.01 Traveling (based on R40 per day return trip/youth worker)	PC		Sum	12 751,71
	.02 Profit and attendance on condition that services and cost has been incurred (on item .01 above)	%	R 12 752		0,00
	Carried forward			R	**12 751,71**

ITEM NO	DESCRIPTION	UNIT	QUAN-TITY	RATE	AMOUNT
	Brought forward			R	**12 751,71**
200,03	**EMPLOYMENT OF YOUTH WORKERS**				
200.03.01	Employment of youth workers The unit of measurement shall be the number of youth workers at the labour rate of **R 150.00** per day on Training as per EPWP Ministerial Determination multiplied by the period employed in months and the rate tendered shall include full compensation for all costs associated with the employment of youth workers and for complying with the conditions of contract. The cost for the training shall be excluded from this item. This item is based on 9 months appointment for youth workers	PC		Sum	95 637,86
200.03.02	Profit and attendance on condition that services and cost has been incurred (ref. SL 11.04.02)	%	95 637,86		-
200,04	**PROVISION OF EPWP DESIGNED OVERALLS AND HARD HATS TO YOUTH WORKERS**				
200.04.01	Supply EPWP branded 2 x overalls, safety boots and 1 x EPWP branded hard hat to youth workers (ref. SL 11.05.01)	PC		Sum	3 622,65
200.04.02	Profit and attendance on condition that services and cost has been incurred (ref. SL	%	3 623		-
200,05	**PROVISION OF BASIC TOOLS FOR YOUTH WORKERS**				
200.05.01	Provide all youth workers with prescribed tools for their respective trades. Specification for the mentioned tools to be provided by the Service Provider. These tools will become the property of the youth workers after the completion of the programme (ref. SL 11.06.01)	PC		Sum	4 347,18
200.05.02	Profit and attendance on condition that services and cost has been incurred (ref. SL 11.06.02)	%	4 347		-
Carried to Final Summary				**R**	**116 359,39**

public works
& infrastructure
Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

Specification

for the

Priced rates for servicing, repairs and maintenance on Air Conditioning and Ventilation Installations

At

VARIOUS INSTITUTIONS SITUATED IN NELSPRUIT REGIONAL OFFICE

Contract Period: 24 months

PART 1

SCOPE OF CONTRACT

PART 1

1. SCOPE OF CONTRACT

1.1 This contract calls for the price rates for the servicing, repairs, maintenance of the Air conditioning and ventilation Installations at Various Institutions in accordance with the requirements as laid down in the specifications. It, furthermore, entails the servicing, maintenance and repair of said installations, in accordance with the requirements of the Department of Public Works and Infrastructure (DPWI).

It furthermore requires that all the machinery covered in this specification initially be repaired and brought to an acceptable working condition.

1.2 The systems/equipment covered by this tender/contract are the following:

- Fan Coil Units.
- Heating and cooling coils.
- Chiller Plants.
- Cooling tower units.
- Extraction fan units.
- Air Conditioning control units.
- Window units.
- Split air conditioning units.
- Cassette units, consoles etc.
- Maintenance inside plant rooms (for air conditioning equipment).
- All air filters banks in the system.
- Diffusers right through the installations.
- Air compressors and air dryers where applicable (Air controls purpose).
- Chemical dosing systems used at cooling towers.
- Condensers and chilled water pumps.
- Chilled water and condenser water reticulation.
- Building Management System
- Yearly test for legionnaires disease on water cooled systems
- Adherence to the Safety Regulations
- Meetings with Management of DPWI.
- Monthly reports to the DPWI.
- Supply of al lubricants and cleaning material needed.
- Supply of all hand tools and equipment needed for contract.

1.3 COMPETENT PERSON

The person appointed as such under the Machinery and Occupational Safety Act no 6 of 1983. (Refer to Annexure C)

a) The successful Tenderer shall be required to maintain the complete installation and equipment in a proper and safe operating condition, to clean, adjust and lubricate the equipment as required in terms of the Contract, repair or replace all electrical and mechanical parts as necessary due to wear and tear.

b) This shall include, but not be limited to the following:

i. Examine the system in accordance with any applicable regulation Promulgated under the Occupational Health and Safety Act 85 of 1993 and any amendment thereof.
ii. Properly maintain, adjust and keep the installation and equipment in a safe and proper operating condition at all times,
iii. Repair/replace all parts of the installation which may become necessary for the proper use and/or operation of the installation
iv. Examine, adjust and lubricate the complete installation, supply of all lubricants, replacement parts and the cleaning of material as required for proper maintenance of the equipment.
v. Any malfunction or defect occurring within a period of 60 days after any service or repair being executed will be for the account of the Contractor.
vi. Examine, periodically and when necessary, all devices and perform any statutory safety tests at or before the expiring of the required intervals
vii. Complete the services, maintenance or repair action report, which shall be submitted with any invoice(s)
viii. Cooling water test in accordance with SANS 10147

1.4. CONDITIONS IN AIR CONDITIONING SPACES

The contractor will ensure that all the various plants are operating satisfactorily to give the following conditions in the relevant areas.

AREAS	***TEMPERATURE RANGE***
Courtroom and Chambers	20-26º
Office Space	22-28º
Server Room	18-22º
Hospitals and Medical Storage	20-26º
Controls in general may vary not more than	2º
Relative humidity in wards	48%p2%
Relative humidity in courtroom and chambers	50 to 55%p3%
Relative humidity in burns ward	Not less than 55% or as otherwise requested by the Medical Superintendent

The contractor must undertake maintenance and adjustments, etc., in such a manner as to cause the least inconvenience to clients. Permission to work in any client site must be obtained from the client site manager.

1.5 DESCRIPTION OF PLANTS TO WHICH THIS TENDER / CONTRACT APPLIES

The following main items of equipment shall be checked, serviced and repaired as necessary at the intervals as stipulated. Plant consisting of compressors, cooling towers, cooling and heating coil fans and fan motors, filters, ducting and control systems and split and window units and Extraction fans.

All material and spares used during these services will be covered on rates as quoted for in this specification on the scheduled spares list where applicable or the % mark-up where applicable.

NOTE: ALL WORK IN THIS CONTRACT SHALL BE DONE ACCORDING TO THE STANDARD QUALITY SPECIFICATION FOR AIR CONDITIONING INSTALLATIONS.

PART 2

TECHNICAL SPECIFICATIONS

PART 2

TECHNICAL SPECIFICATIONS

2.1 SERVICE INTERVALS AND SERVICES

Item	Monthly	Three Monthly	Six Monthly	Yearly
Chillers	X		X	X
Diffusers	X			
Centrifugal pumps	X			X
Filter Banks	X			
Hepa Filters			X	
Chilled water pumps	X			X
Belt driven fans	X		X	X
Electrical boards			X	X
Cooling and heating coils	X		X	
Direct expansion units	X		X	X
Window & split units		X		
Cooling towers	X			X
Air Handling units	X			
BMS			X	

2.2 The successful contractor must visit all sites covered under this contract and obtain the signature of the head of the site in a service book that must be kept for this purpose.

2.3 MONTHLY SERVICES

2.3.1 SCHEDULE A – DIFFUSERS:

- Check and clean diffusers and return air louvers
- Check condition of Temperature sensors and Humidity sensors.

2.3.2 SCHEDULE B - FILTER BANKS:

- All washable filters must be cleaned monthly.
- Primary, secondary and tertiary filters must be replaced when the airflow resistance over the filter bank reaches the maximum resistance as prescribed by the manufacturer of the filters.

2.3.3 SCHEDULE C – CHILLERS:

- Check oil temperatures
- Check for any oil leaks and repair
- Check oil level and replenish if needed
- Check for any refrigerant leaks and repair
- Check refrigerant level and re-fill if required
- Check condensing pressure
- Test oil pressure cut-out

- Test refrigerant low temperature cut-out
- Test recycle thermostat
- Test control centre
- Test flow switches
- Test temperature control

2.3.4 SCHEDULE D - CONDENSOR WATER AND CHILLED WATER PUMPS

- Check for water leaks
- Check all guards and secure bolts
- Check fluctuations in pressure and amperage
- Check coupling and drivers
- Attend to all other aspects

For monthly and yearly services see maintenance on specific components

2.3.5 SCHEDULE E - BELT DRIVEN FANS

- Check whether belts are tight and in good condition
- Check tightness of bolts on guards, motors and bearings
- Attend to all other aspects

For monthly and yearly services see maintenance on specific components

2.3.6 SCHEDULE F – AIR HANDLING UNITS:

- Clean filters if required.
- Check belts for proper tension and pulleys for proper adjustment. Rectify as necessary.
- Check fan shaft for end play, vibration and bearing wear.
- Check coils for cleanliness, and clean accordingly.
- Check fan blades for looseness and dirty condition. Rectify as necessary.
- Clean and flush condensate pain and its drain lines properly.
- Test heating valves, cooling valves and humidity valves for correct operation.
- Clean in and outside of the units properly.
- All plant rooms shall be properly cleaned after completion of the service.

2.3.7 SCHEDULE G – COOLING TOWERS:

- Clean and remove all debris from unit without removing the fill packs.
- Clean and flush sump properly.
- Inspect spray nozzles, clean and report any damages.
- Check condition and tension of v-belts and adjust the tension accordingly.
- Lubricate fan shaft bearings.
- Lubricate motor base adjusting screw.
- Check motors for any loose electrical connections and tighten.
- Check speed drives (if applicable) for any loose electrical connections and tighten. Clean speed drives properly with air.

- Check operation off speed drives and correct where required. The contractor shall make sure that all sensors where applicable, are in correct position and function properly.

2.4 THREE MONTHLY

2.4.1 SCHEDULE H – SPLIT TYPE AIR CONDITIONING UNITS

- Check for undue noises or vibration and repair.
- Check remote control / selector switch operation.
- Check filter media and clean.
- Check and observe operation of reversing solenoid valve and replace where required.
- Check compressor termination and overload and repair if required.
- Check and lubricate fan motor bearings where applicable.
- Check all 'start' and / or 'run' capacitors and replace if required.
- Clean all condensers properly with coil cleaner
- Check for refrigerant leaks / restrictions and repair if necessary. Recharge units to the correct working pressure.
- Check for any loose electrical connections and tighten.
- Check all drain pipes and unblock if necessary.
- Check for any water leaks and repair.
- Clean all indoor and outdoor units properly.
- Replace batteries on remote controls as required
- Report all faults found during the service in writing to the Inspector handling the service.

2.5 SIX MONTHLY SERVICES:

2.5.1 SCHEDULE I - HEPA FILTERS:

Every six months penetration test using hot emery 3004 and the correct testing equipment i.e.,

- TDA-ZA Particle detection apparatus and TDA-56
- Hot aerosol generator must be carried out on all Hepa Filter installations and test certificates must be issued to the Department.

NB: ONLY FILTERS APPROVED BY DPWI REPRESENTIVE MAY BE USED

2.5.2 SCHEDULE J – CHILLERS:

- Check oil temperatures
- Check for any oil leaks and repair
- Check oil level and replenish if needed
- Check for any refrigerant leaks and repair
- Check refrigerant level and re-fill if required
- Check condensing pressure
- Test oil pressure cut-out
- Test refrigerant low temperature cut-out
- Test recycle thermostat
- Test control centre
- Test flow switches

- Test temperature control
- Change compressor oil (new oil)
- Change oil filter
- Change refrigerant filter
- Clean condenser tubes (Chemical wash)
- Renew filter dryers
- Conduct meg-ohm stator winding test of compressor motors
- Check motor and starter plugs and tighten as required.

2.5.3 SCHEDULE K - ELECTRICAL DISTRIBUTION BOARDS SUPPLY TO AIR CONDITIONING INSTALLATIONS THROUGHOUT THE INSTITUTION

- Vacuum inside of boards thoroughly
- Ensure that all indicator lights are working
- Clean outside of panel
- Check all bus-bar connections and ensure they are tight
- Ensure that all connections to contacts are tight
- Attend to all other aspects

2.5.4 SCHEDULE L – CHILLED WATER AND CONDENSING WATER LINES

- Visually inspect all chilled water lines and lagging for any defects and report to Department
- Visually inspect all condensing water lines for any defects and report to Department
- Clean all strainers on chilled water and condensing water lines

2.6 YEARLY SERVICES:

2.6.1 SCHEDULE M - COOLING TOWERS

- Remove side panels of cooling towers, remove fill packs and clean properly with chemicals and high pressure water. Re-install fill packs in position. Re-install side panels of cooling towers and make sure no water leaks are present. The contractor must allow for sealant on the panels.
- Clean and flush sump properly.
- Inspect spray nozzles, clean properly and report any damages.
- Replace v-belts on cooling towers and adjust the tension accordingly.
- Lubricate fan shaft bearings.
- Lubricate motor base adjusting screw.
- Check motors for any loose electrical connections and tighten.
- Check speed drives for any loose electrical connections and tighten. Clean speed drives properly with air.
- Check operation off speed drives and correct where required. The contractor shall make sure that all sensors where applicable, are in correct position and function properly.
- All units shall be in good working condition after completion of the services.
- The site shall be cleaned after completion of the service.

2.7 MAINTENANCE ON SPECIFIC COMPONENTS

Maintenance on components listed below shall be carried out as follows:

2.7.1 ROLLER BEARINGS

a) Check for any excessive bearing vibration, noise and temperature. The normal operating temperature of a ball/roller bearing is between 40ºC to 60ºC in an ambient temperature of approximately 20ºC.
b) Should excessive vibration be present, check for external factor which may be the cause of the vibration such as the misalignment or out of balance rotating parts and condition of mountings. Defective bearings shall be replaced.
c) Should excessive noise be present the bearing shall be removed, washed out in clean spirit and checked for damage. Undamaged bearings shall be re-packed with grease and re-fitted. Damaged bearings shall be replaced.
d) Should bearings run at excessive temperatures, check for over greasing, incorrect assembly, misalignment, excessive belt pull, excessive end thrust and position of bearing on shaft. Excessive loads on the bearing shall be reduced.
e) Bearing housings fitted with grease nipples shall be greased.
f) Plummer block housings with no provision for lubrication shall be greased by removal of the housing cap. Alternatively the housing shall be drilled and tapped to take a grease nipple.

NOTE

Unless bearing failure is expected, bearings shall not be removed for detail inspections during normal inspection services. Bearings in difficult accessible positions within enclosed assemblies such as gearboxes shall not be inspected individually unless the assembly is stripped for scheduled maintenance or repairs.

2.7.2 SLEEVE BEARINGS

a) Check for excessive bearing vibration, noise and play
b) Lubricate bearing. If oil wells are fitted check oil level and top up

2.7.3 ELECTRIC MOTORS

a) Carry out the required inspections on bearings.
b) Ensure that motor is not overheating. The maximum permitted temperature for class B insulation is 120ºC and for class F insulation 140ºC as measured by increase in stator winding resistance.

c) Compare measured full load current with nameplate value when supplied at rated volts and frequency

d) Check that terminal connections are clean and tight and that motor is soundly earthed. Ensure that the plastic terminal base is clean and undamaged.

e) Examine motor for corrosion and mechanical damage

f) Ensure free unobstructed ventilation. Examine cooler tubes if the motor is of the closed air circuit air (CACA) type.

g) Check that motor is free from dirt, oil, chemical or any contaminant that can be detrimental to the satisfactory operation.

h) Remove drain plugs and re-fit after draining any condensate.

i) For slip ring motors, in addition to the above:

  i) open slip ring inspection cover and check absence of sparking between brush and slip ring when the motor is operating on full load

  ii) with the motor isolated from the supply, ensure that the slip rings are not worn, grooved or pitted in any way

  iii) examine the brushes for wear, grooving or pitting etc., and for freedom of movement in their holders

  iv) unless the motor is fitted with constant pressure type brushes, check brush pressures using a spring balance. The pressure should be in the order of 750kPa.

  v) Ensure that the slip rings, brush holders and their enclosure is clean and free from any accumulation of carbon dust

2.7.4 GEARBOXES (including geared motors)

a) Check for any excessive vibration, noise and temperature

b) Check for possible overloads or excessive shock loads on gearbox

c) Check oil level and ensure that housing is accurately filled with lubricant to the specified level

d) Grease oil seals on units equipped with grease nipples

e) Check for blockages in breather lines. Clean breather in a solvent.

f) Check grade of oil and oil condition. Oxidized, dirty or oil with a high sludge content shall be drained and replaced with the correct grade as specified by the manufacturer. Clean oil filter.

g) On forced feed systems ensure that oil pump is functioning. Check that oil passages are clear and permit free flow of lubricant. Inspect oil-line pressure regulators, nozzles and filters to be sure they are free of obstructions. Ensure that pump is not sucking air.

h) Check for oil leaks:

  i) Replace worn oil seals. Check condition of shaft under seal and polish if necessary

  ii) Adjust or replace stuffing box packing. Tighten packing gradually to break in. Check condition of shaft and polish if necessary

iii) Reduce excessive flow of force-feed lubricant to bearing by adjusting orifices and/or

iv) Tighten cap screws or bolts. If not entire effective, remove housing cover and caps, clean mating surfaces and apply new sealing compound and re-assemble

i) Check for excessive play between drive and driven shafts
j) Clean gearbox externally
k) Check housing for signs of mechanical failure

NOTE

Should it be necessary to remove the housing cover in order to repair an oil leak, the complete gearbox shall thoroughly inspected as required for the scheduled maintenance.

2.7.5 PUMPS

The following pumps shall be included where applicable:

a) Condenser water pumps
b) Chilled water pumps

MAINTENANCE REQUIREMENTS

a) Check pumps for leaks
b) Check bearing temperatures
c) Check pump for excessive noise and vibration
d) Check and adjust glands as necessary to maintain slight leakage
e) Check oil level and top up if required
f) Check pump coupling pins and bushes for wear
g) Clean pump suction strainers
h) Check condition of flexible suction and delivery connections
i) Clean pump and pump base

2.8 ANNUAL SERVICE CHECK LIST

2.8.1 ROLLER BEARINGS

Wash out old grease with white spirit and examine bearing and bearing housing. Replace rough bearings. Re-grease sound bearings with the manufacturer's recommended lubricant.

NOTE

Re-lubrication of small bearings, particularly deep groove ball bearings, fitted with shields or seals are not required. These bearings shall however be thoroughly examined during the scheduled maintenance service.

2.8.2 SLEEVE BEARINGS

Replace oil in oil wells and/or sumps

2.8.3 **ELECTRIC MOTORS (Fractional kW motors excluded)**

a) Strip the motor down completely, removing rotor from stator
b) Blow out the stator, rotor, terminal box and fan cowl with an air jet to remove any internal dust etc. If contaminated with oil or grease, etc., wash with a recommended detergent.
c) Carry out the required maintenance on bearings as specified in paragraphs 1 and 2
d) Measure winding insulating resistance using a 500 volt merger. If the reading is low, or if there is evidence of damp present (corrosion, etc.,) then consideration should be given to fitting motor heaters or at least, to giving the winding a double impregnation and baking.
e) If oil seals are fitted, these shall be replaced, taking extreme care not to damage the lip of the seal when fitting.
f) Re-assemble and ensure free rotation of the shaft.
g) For slip ring motors, in addition to the above:

i) If the slip rings are grooved or pitted etc., skim the rings in a lathe, true to the bearing seating on the shaft. Finish with a polished surface;

ii) If the brushes are little worn and in a good condition, simply ensure freedom of movement in their holders and replace the brushes in exactly the same position from which they were removed

iii) If new brushes are necessary, these shall be fitted such that they move freely in their holders and are bedded in after the motor has been re-assembled

iv) Adjust the brush pressures to approximately 750kPa using a spring balance.

v) Log details of inspections, replacements and repairs as well as parts recommended for replacement

2.8.4 **GEARBOXES (including geared motors)**

a) Remove housing cover and caps
b) Carry out the required inspections on bearings as specified in paragraphs 1 and 2
c) Check for misalignment of gears. The contact pattern on teeth must be over approximately 75% of face, preferably in the centre area.
d) Check condition of teeth
e) Check backlash and adjust to the manufacturers requirements
f) Check that all shafts spin freely when disconnected

g) Disconnect couplings and check alignment. Re-align as required.
h) Check lateral float on coupling. Adjust spacing between drive motor to eliminate end pressure on shaft or arrange for the replacement of the flexible coupling with a type allowing the required lateral float.
i) Re-assemble gearbox and re-connect couplings
j) Drain oil and replace with the correct grade oil as recommended by the gear manufacturer.
k) Log details of inspections, replacements and repairs as well as parts recommended for replacement.

2.8.5 **PUMPS**

a) Strip pump completely
b) Check condition of impeller(s) or diaphragm
c) Carry out the required inspections on bearings as listed in paragraphs 1 and 2
d) Examine gland and renew packing if required
e) Examine condition of mechanical seals
f) Check coupling alignment
g) Re-assemble pump and ensure that mating surfaces are cleaned properly and provided with a durable sealing compound
h) Replace lubricant with a grade as recommended by the pump manufacturer.
i) Log details of inspections, replacements and repairs as well as parts recommended for replacement.

2.9 **COOLING AND HEATING COILS**

Monthly schedule

- Check for leaks and general conditions
- Check door gaskets

Six monthly schedule

- Clean coil with appropriate solution and high pressure water
- Remove all rusts and treat

2.10 **CONTRACTOR'S / INSPECTORS MONTHLY REPORT**

A random inspection/s will be performed by a representative of the Department of Public Works and Infrastructure at which the contractor must be present.