

SECTION 5.0

SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT

	SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT	Document Section	5.0
		Issue Date	19/08/2021
		Revision No.	00
		Revision Date	-
		Page	1 of 13

SECTION 5.0 SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM, AND MECHANICAL VENTILATION SYSTEM

1. General

The work covered by this Specification is for the supply of all materials, appliances, labour and necessary incidentals for the service and maintenance of the Air- Conditioning System and Ancillary Equipment supplied and installed under this contract during Defects Liability Period of the Air Conditioning & Ventilation System installation.

All work to be performed under this Specification shall be in accordance with the best commercial practice and must be strict accordance with the Specification.

1.1 Workmanship and Materials

The Work described in this Specification shall be performed by workmen skilled in the service, maintenance and repair of all types of Air-Conditioning System and shall be executed in accordance with the best commercial practice.

All materials to be supplied in connection with work under this Specification shall be new and unused and shall generally be of the best quality as regards manufacture and performance.

1.2 Supervision

The Contractor shall have a Foreman in charge of service, maintenance and repair work to be carried out under this Specification. This Foreman must be thoroughly competent in supervising the service, maintenance and repair of all types of Air-Conditioning System and shall be in direct employ of the Contractor and acceptable to the Superintending Officer (S.O.).

2. SCOPE OF WORK

2.1 Duties of Contractor

The work to be performed shall include regular and systematic checking, cleaning and wherever necessary adjustment and balancing of the system. It shall be serviced and maintained in strict accordance with the Servicing and Maintenance Schedule as set in Clause 3.0 below.

The Contractor shall advise the Superintending Officer of any defects in any part or parts of complete Air-Conditioning System and Ancillary Equipment observed during routine inspection and service and shall repair such defects for S.O. satisfaction.

The Contractor shall also provide emergency repair service during normal working hours and also during overtime hours if required to do so by the Superintending Officer.

	SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT	Document Section	5.0
		Issue Date	19/08/2021
		Revision No.	00
		Revision Date	-
		Page	2 of 13

2.2 Maintenance Checklist

The Contractor shall provide complete Maintenance Schedule and Checklist for the S.O. approval in accordance to manufacturer's recommendation and maintenance schedule stated in this specification Section 5 (clause 3.0).

Maintenance Checklist shall be used as a guide to the service, maintenance and repair work to be carried out and shall in no way relieve the Air-Conditioning Contractor from executing any other work necessary.

2.3 Defects Report

It shall be the responsibility of the Air-Conditioning Contractor to report in writing to the S.O., any defects in the air conditioning equipment and ancillary equipment and perform corrective and preventive measures necessary. The report shall state the cause/s of the defect/s observed.

2.4 Maintenance Report

Monthly maintenance shall be prepared and submitted to the S.O./ S.O. Representative and shall be complete with verification and signed/witness by Maintenance Contractor/Nominated Sub Contractor/ /S.O. Representative.

3. SERVICING AND MAINTENANCE SCHEDULE

The Contractor shall inspect and service all machinery and equipment compromising the complete Air-Conditioning System and Ancillary Equipment at the above premises at least once a month, except where otherwise directed by the Superintending Officer.

As such monthly inspection and service of the complete Air-Conditioning System and Ancillary Equipment, the work detailed below shall be performed by the Contractor and but not limited to manufacturer's recommendation:

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
1	WATER COOLED CHILLER SYSTEM				
1.1	Chillers				
a	Check all seals and pipe lines for leaks and rectify as necessary.	X			
b	Take reading of current, voltage, pressure, temperature, etc. Compare with design readings. If abnormal, trace the faults and rectify as necessary.	X			
c	Check all refrigerant and oil levels, and charge the refrigerant and oil into the refrigerant system as necessary.	X			
d	Check the tension of the belt drives, and adjust as necessary.	X			
e	Check the operation of all refrigerant controls, and	X			



**SPECIFICATIONS FOR COMPREHENSIVE
SERVICE AND MAINTENANCE OF THE AIR
CONDITIONING SYSTEM AND ANCILLARY
EQUIPMENT**

Document Section	5.0
Issue Date	19/08/2021
Revision No.	00
Revision Date	-
Page	3 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
	clean, adjusts and lubricate as necessary.				
f	Check the operation of all safety devices, clean, adjust, calibrate and lubricate as necessary.	X			
g	Check the suction and discharge pressures of all refrigerant compressors and if abnormal trace the fault, rectify.	X			
h	Check all bolts and nuts for tightness and tighten as necessary.	X			
i	Check Purge Unit Operation	X			
j	Check and record all system interlocking sequence and timings. Rectify and adjust as necessary.	X			
k	Check and clean condenser tubes as necessary and as per manufacturer recommendation	X			
l	Major Chiller Servicing including compressor oil replacement, oil filter, calibration etc				X
1.2	Pumps				
a	Check all pump conditions and bearings for excessive noise, vibration and wear. Lubricate with oil grease and replace as necessary	X			
b	Check all motor bearings, lubricate with grease and replace as necessary.	X			
c	Check carbon brushes and slip rings of all motors. Clean, repair or replace as necessary.	X			
e	Check safety devices fitted to all motors. Clean, adjust, lubricate, repair or replace as necessary.	X			
f	Check all seals, glands and pipelines for leaks and rectify as necessary.	X			
g	Re-pack and adjust pump glands or mechanical seals as necessary.	X			
h	Check the alignment and condition of all rubber couplings between pumps and drive motors, and rectify as necessary.	X			
i	Check the tension of all belt drives, and adjust as necessary.	X			
j	Check and tighten all bolts and nuts. Replace necessary.	X			
k	Check and test pressure switches and gauges. Repair or replace as necessary.	X			
l	Check Chilled Water Pump Insulation and replace and repair as necessary.	X			
1.3	Cooling Towers				
a	Check all fan bearing and lubricate with grease as necessary.	X			
b	Check the tension of all belt drives, and adjust as necessary.	X			
c	Clean all water screens.	X			
d	Check the operation of all water nozzles and clean as necessary.	X			
e	Drain, clean and flush cooling tower basin and honey-comb in-fills.	X			
f	Check and clean float valve. Adjust water level. Replace as necessary.	X			
g	Check and service motors and controllers. Replace as	X			

	SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT	Document Section	5.0
		Issue Date	19/08/2021
		Revision No.	00
		Revision Date	-
		Page	4 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
	necessary.				
h	Check all motorized valves operation and function. Replace as necessary.	X			
i	Monitoring and measurement of Condenser Water quality parameter for pH, TDS, Corrosion Rate, Chloride, Alkalinity and Total Hardness		X		
1.4	Make Up Water Tank				
a	Check for any leakage, corrosion and repair as necessary.	X			
b	Check for water tank support (joist, I-beams, concrete beams) for structural integrity and cracks	X			
c	Check and clean float valve. Adjust water level. Replace as necessary.	X			
d	Check for sediment/sludge and scour as necessary	X			
1.5	Expansion Tank				
a	Check all expansion tanks, pipes and valves. Clean, service and flush as necessary	X			
b	Check pipe and tank insulation for any damage and repair as necessary.	X			
c	Check for water tank support (joist, I-beams, concrete beams) for structural integrity and cracks	X			
2	AIR COOLED CHILLER SYSTEM				
2.1	Chillers				
a	Check all seals and pipe lines for leaks and rectify as necessary.	X			
b	Take reading of current, voltage, pressure, temperature, etc. Compare with design readings. If abnormal, trace the faults and rectify as necessary.	X			
c	Check all refrigerant and oil levels, and charge the refrigerant and oil into the refrigerant system as necessary.	X			
d	Check the tension of the belt drives, and adjust as necessary.	X			
e	Check the operation of all refrigerant controls, and clean, adjusts and lubricate as necessary.	X			
f	Check the operation of all safety devices, clean, adjust, calibrate and lubricate as necessary.	X			
g	Check the suction and discharge pressures of all refrigerant compressors and if abnormal trace the fault, rectify.	X			
h	Check all bolts and nuts for tightness and tighten as necessary.	X			
	Check Purge Unit Operation	X			
i	Check and record all system interlocking sequence and timings. Rectify and adjust as necessary.	X			
j	Check and clean fan blades and surfaces	X			
k	Check all fan bearings, and lubricate with grease as necessary.	X			
l	Inspect condensing coil. Repair or replace as necessary. Clean coil and comb the fins as necessary.	X			
m	*Service Chiller including compressor oil replacement, oil filter, calibration etc complete with consumable items				X
2.2	Pumps				

	SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT	Document Section	5.0
		Issue Date	19/08/2021
		Revision No.	00
		Revision Date	-
		Page	5 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
a	Check all pump conditions and bearings for excessive noise, vibration and wear. Lubricate with oil grease and replace as necessary	X			
b	Check all motor bearings, lubricate with grease and replace as necessary.	X			
c	Check carbon brushes and slip rings of all motors. Clean, repair or replace as necessary.	X			
e	Check safety devices fitted to all motors. Clean, adjust, lubricate, repair or replace as necessary.	X			
f	Check all seals, glands and pipelines for leaks and rectify as necessary.	X			
g	Re-pack and adjust pump glands or mechanical seals as necessary.	X			
h	Check the alignment and condition of all rubber couplings between pumps and drive motors, and rectify as necessary.	X			
i	Check the tension of all belt drives, and adjust as necessary.	X			
j	Check and tighten all bolts and nuts. Replace necessary.	X			
k	Check and test pressure switches and gauges. Repair or replace as necessary.	X			
1.5	Expansion Tank				
a	Check all expansion tanks, pipes and valves. Clean, service and flush as necessary	X			
b	Check pipe and tank insulation for any damage and repair as necessary.	X			
c	Check for water tank support (joist, I-beams, concrete beams) for structural integrity and cracks	X			
3	WATER COOLED PACKAGE UNIT (WCP) SYSTEM				
3.1	WCPU				
a	Check WCP for any abnormalities. Trace the faults and rectify as necessary.				
b	Take reading of current, voltage, pressure, temperature, etc. Compare with design readings. If abnormal, trace the faults and rectify as necessary.	X			
c	Check all seals, gaskets and pipes for leaks. Replace as necessary.	X			
d	Check crankcase heater if available. Repair or replace as necessary.	X			
e	Check the operation of all safety devices. Clean, adjust, lubricate, repair or replace as necessary.	X			
f	Check the suction and discharge pressures of all refrigerant compressors. If abnormal, trace the faults and rectify as necessary.	X			
g	Check all refrigerant and oils levels. Charge refrigerant and oil into the refrigerant system as necessary.	X			
h	Check all air filters. Clean or replace as necessary.	X			
i	Check all bearings, pivots and other moving parts. Clean, adjust, lubricate and replace as necessary.	X			
j	Check operation of thermostat. Replace as necessary.	X			
k	Check insulation. Repair or replace as necessary.	X			
l	Check and clean condenser as necessary.	X			



**SPECIFICATIONS FOR COMPREHENSIVE
SERVICE AND MAINTENANCE OF THE AIR
CONDITIONING SYSTEM AND ANCILLARY
EQUIPMENT**

Document Section	5.0
Issue Date	19/08/2021
Revision No.	00
Revision Date	-
Page	6 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
m	Check all motor bearings, lubricate with grease. Replace as necessary.	X			
n	Check leakage or clogging at drain pan and line. Clean, flush, repair or replace as necessary.	X			
o	Check and Clean Condenser tubes	X			
3.2	Pumps				
a	Check all pump conditions and bearings for excessive noise, vibration and wear. Lubricate with oil grease and replace as necessary	X			
b	Check all motor bearings, lubricate with grease and replace as necessary.	X			
c	Check carbon brushes and slip rings of all motors. Clean, repair replace as necessary.	X			
e	Check safety devices fitted to all motors. Clean, adjust, lubricate, repair or replace as necessary.	X			
f	Check all seals, glands and pipelines for leaks and rectify as necessary.	X			
g	Re-pack and adjust pump glands or mechanical seals as necessary.	X			
h	Check the alignment and condition of all rubber couplings between pumps and drive motors, and rectify as necessary.	X			
i	Check the tension of all belt drives, and adjust as necessary.	X			
j	Check and tighten all bolts and nuts. Replace necessary.	X			
k	Check and test pressure switches and gauges. Repair or replace as necessary.	X			
3.3	Cooling Towers				
a	Check all fan bearing and lubricate with grease as necessary.	X			
b	Check the tension of all belt drives, and adjust as necessary.	X			
c	Clean all water screens.	X			
d	Check the operation of all water nozzles and clean as necessary.	X			
e	Drain, clean and flush cooling tower basin and honey-comb in-fills.	X			
f	Check and clean float valve. Adjust water level. Replace as necessary.	X			
g	Check and service motors and controllers. Replace as necessary.	X			
h	Check all motorized valves operation and function. Replace as necessary.	X			
i	Monitoring and measurement of Condenser Water quality parameter for pH, TDS, Corrosion Rate, Chloride, Alkalinity and Total Hardness	X			
3.4	Make Up Water Tank				
a	Check for any leakage, corrosion and repair as necessary.	X			
b	Check for water tank support (joist, I-beams, concrete beams) for structural integrity and cracks	X			
c	Check and clean float valve. Adjust water level. Replace	X			



**SPECIFICATIONS FOR COMPREHENSIVE
SERVICE AND MAINTENANCE OF THE AIR
CONDITIONING SYSTEM AND ANCILLARY
EQUIPMENT**

Document Section	5.0
Issue Date	19/08/2021
Revision No.	00
Revision Date	-
Page	7 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
	as necessary.				
d	Check for sediment/sludge and scour as necessary	X			
4	AIR COOLED SPLIT DUCTED UNIT				
4.1	Condenser				
a	Check crankcase heater. Repair or replace as necessary.	X			
b	Check the suction and discharge pressures of all refrigerant compressors. If abnormal, trace the faults and rectify as necessary.	X			
c	Check all refrigerant and oils levels. Charge refrigerant and oil into the refrigerant system as necessary	X			
d	Check refrigerant leaks at joints, fittings, piping and compressors. Repair or replace as necessary.	X			
e	Replace filter dryer.	X			
f	Check all fans and motors as necessary. Repair or replace as necessary.	X			
g	Check condensing coil. Repair or replace as necessary. Clean coil and comb the fins as necessary.	X			
h	Check all motor bearings, lubricate with grease. Replace as necessary.	X			
i	Check compressor units. Replace as necessary.	X			
5	VARIABLE REFRIGERANT FLOW				
5.1	Evaporator (Cooling Unit)				
a	Check unit for any abnormalities. Trace the faults and rectify as necessary.	X			
b	Check and clean all air filters.	X			
c	Check leakage or clogging at drain pan and drain line. Clean, flush, repair or replace as necessary.	X			
d	Check refrigerant piping, joints, fittings and insulation for leaks or damages. Repair and top up refrigerant as necessary.	X			
e	Check for any faulty/error code. Trace the faults and rectify.	X			
f	Check and Clean Cooling Coil as necessary	X			
5.2	Condenser				
a	Check the suction and discharge pressures of all refrigerant compressors. If abnormal, trace the faults and rectify as necessary.	X			
b	Check refrigerant leaks at joints, fittings, piping and compressors. Repair or replace as necessary.	X			
c	Check all fans and motors as necessary. Repair or replace as necessary.	X			
d	Check condensing coil. Repair or replace as necessary. Clean coil and comb the fins as necessary.	X			
e	Check all fans and motors as necessary. Repair or replace as necessary.	X			
f	Check filter dryer. Replace as necessary.	X			
g	Check compressor units. Replace as necessary.	X			
h	Check rubber padding. Replace as necessary.	X			
i	Check bracket or hanger. Repair or replace as necessary.	X			
j	Check and Clean condenser coil as necessary	X			
6	AIR COOLED SPLIT UNIT				



**SPECIFICATIONS FOR COMPREHENSIVE
SERVICE AND MAINTENANCE OF THE AIR
CONDITIONING SYSTEM AND ANCILLARY
EQUIPMENT**

Document Section	5.0
Issue Date	19/08/2021
Revision No.	00
Revision Date	-
Page	8 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
6.1	Evaporator (Cooling Unit)				
a	Check unit for any abnormalities. Trace the faults and rectify as necessary.	X			
b	Check and clean all air filters.	X			
c	Check leakage or clogging at drain pan and drain line. Clean, flush, repair or replace as necessary.	X			
d	Check refrigerant piping, joints, fittings and insulation for leaks or damages. Repair and top up refrigerant as necessary.	X			
e	Check and Clean Cooling Coil as necessary	X			
6.2	Condenser				
a	Check the suction and discharge pressures of all refrigerant compressors. If abnormal, trace the faults and rectify as necessary.	X			
b	Check refrigerant leaks at joints, fittings, piping and compressors. Repair or replace as necessary.	X			
c	Check all fans and motors as necessary. Repair or replace as necessary.	X			
d	Check condensing coil. Repair or replace as necessary. Clean coil and comb the fins as necessary.	X			
e	Check all fans and motors as necessary. Repair or replace as necessary.	X			
f	Check filter dryer. Replace as necessary.	X			
g	Check compressor units. Replace as necessary.	X			
h	Check rubber padding. Replace as necessary.	X			
i	Check bracket or hanger. Repair or replace as necessary.	X			
j	Check and Clean condenser coil as necessary	X			
7	PRECISION AIR CONDITIONING				
7.1	Evaporator/ Condenser				
a	Check and clean all air filters	X			
b	Check leakage or clogging at drain pan and drain line. Clean, flush, repair or replace as necessary.	X			
c	Check refrigerant piping, joints, fittings and insulation for leaks or damages. Repair and top up refrigerant as necessary	X			
d	Check remote control. Replace as necessary.	X			
e	Check and Clean cooling coil with suitable cleaning method as necessary.	X			
f	Check the suction and discharge pressures of all refrigerant compressors. If abnormal, trace the faults and rectify as necessary.	X			
g	Check refrigerant leaks at joints, fittings, piping and compressors. Repair or replace as necessary.	X			
h	Check all fans and motors as necessary. Repair or replace as necessary.	X			
i	Check condensing coil. Repair as necessary. Check and clean coil and comb the fins as necessary.	X			
j	Check filter dryer. Replace as necessary	X			
k	Check compressor units. Replace as necessary.	X			
l	Check bracket/ hanger. Repair or replace as necessary.	X			
m	Check rubber padding. Replace as necessary.	X			



**SPECIFICATIONS FOR COMPREHENSIVE
SERVICE AND MAINTENANCE OF THE AIR
CONDITIONING SYSTEM AND ANCILLARY
EQUIPMENT**

Document Section	5.0
Issue Date	19/08/2021
Revision No.	00
Revision Date	-
Page	9 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
8	EVAPORATORS/AIR HANDLING UNITS/FAN COILS				
a	Check all air handling unit/fan coils. If abnormal, trace the faults and rectify as necessary.	X			
b	Check all filters, clean and replace as necessary.	X			
c	Check all water coils, seals and pipelines for leaks and rectify as necessary.	X			
d	Purge air from all water coils.	X			
e	Check all fans and fan bearings, and lubricate with grease as necessary. Replace as necessary.	X			
f	Check operation of thermostat. Replace as necessary.	X			
g	Check the tension of all belt drives, and adjust and retension. Replace as necessary.	X			
h	Check the operation of all automatic water regulating valves, and clean, adjusts and lubricate and replace as necessary.	X			
i	Check the operation of all automatic multi blade face and by-pass dampers, and clean, adjusts and lubricate as necessary.	X			
j	Cleaning of cooling coil as necessary	X			
k	Clean all condensate pans, trays and drains as necessary	X			
l	Check leaks at joints, fittings and piping. Repair as necessary.	X			
m	Check all heater elements and other accessories. Repair or replace as necessary.	X			
n	Check the operation of CO ₂ probe and detector and damper (if available). Clean, adjust, repair or replace as necessary.	X			
o	Check insulation. Repair and replace as necessary			X	
p	Check and clean strainers. Repair or replace as necessary.			X	
9	TEMPERATURE CONTROL GEARS AND RELAYS				
a	Clean, adjust and lubricate all bearings, pivots and other moving parts as necessary.	X			
b	Renew electric fuses as necessary.	X			
10	VENTILATION FAN/EXHAUST FAN				
a	Check the function of the ventilation or any exhaust for any noise and vibration.		X		
b	Adjust air volume control dampers as necessary.		X		
c	Check all bearings, pivots and other moving parts. Clean, adjust, lubricate and replace as necessary.		X		
d	Check all belt drives. Adjust and retension. Replace as necessary.		X		
11	DUCTING, GRILLES AND DAMPERS				
a	Check all grilles, dampers including shutters if available are working correctly. Clean, adjust, repair or replace as necessary.			X	
b	Check ductwork for leaks, damage or corrosion. Repair or replace as necessary			X	
c	Check for moisture and condensation. Repair or replace insulation as necessary.			X	
d	Check duct insulation for tears and air leaks. Patch or			X	

	SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT	Document Section	5.0
		Issue Date	19/08/2021
		Revision No.	00
		Revision Date	-
		Page	10 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
	replace as necessary.				
e	Check external and internal insulation supply duct after AHU			X	
12	PIPING AND FITTINGS (EXPOSE AND ACCESSIBLE)				
a	Check the condition of every pipe. Repair or replace as necessary.	X			
b	Check the condition of the pipe supports, brackets, pipe sleeves and piping joints. Repair or replace as necessary.	X			
c	Check the condition of every valve and fitting. Repair or replace as necessary.	X			
d	Check and clean strainers. Repair or replace as necessary.	X			
e	Check for correct labeling. Clean and relabeling as necessary.	X			
f	Check chilled water pipe insulation. Repair or replace as necessary.	X			
g	Check painting anti-rust coating. Repaint as necessary.	X			
13	ELECTRIC MOTORS				
a	Check and clean all electric motors. Repair or replace as necessary.	X			
b	Check all motor bearings, lubricate with grease. Replace as necessary.	X			
c	Check safety devices fitted to motors. Clean, adjust, lubricate. Repair or replace as necessary.	X			
14	ELECTRIC STARTERS, CONTROL GEARS, ANCILLARY APPARATUS				
a	Clean, adjust and lubricate all bearings, pivots and other moving parts as necessary.	X			
b	Clean or renew electric contactors as necessary.	X			
c	Renew electric fuses as necessary.	X			
15	ELECTRICAL SWITCHBOARD/ CONTROL PANEL				
a	Check the condition of the panel and its housing. Repair or replace as necessary.	X			
b	Check and test the control wiring and circuitry. Retighten, repair or replace as necessary.	X			
c	Check the operation of selector switches. Repair or replace as necessary.	X			
d	Check the operation of auto-manual selector switches. Repair or replace as necessary.	X			
e	Check the operation of stop-start buttons. Repair or replace as necessary.	X			
f	Check or replace indicating bulbs and covers	X			
g	Check the routine operation of all electrical starters, electrical control gears and ancillary electrical apparatus. Repair or replace as necessary.	X			
h	Check all electrical contactors, relays. Clean or retighten all loose connections.	X			
i	Clean or replace electrical contactors, relays as necessary.	X			
j	Check electric fuses. Replace as necessary.	X			

	SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT	Document Section	5.0
		Issue Date	19/08/2021
		Revision No.	00
		Revision Date	-
		Page	11 of 13

No	Item	Frequency			
		Every Month	Every 3 Months	Every 6 Months	Every 9 Months
k	Check the condition of the conduits, supports and wires. Replace as necessary.	X			
Notes: 1) The above details item of servicing and maintenance schedule shall be performed by the contractor and but not limited to manufacturer's recommendation in accordance to the specification and to the S.O. satisfaction.					

Others:

- a) Check the performance of the complete air-conditioning system and adjust the air volume control dampers as necessary.
- b) Instruct the operators responsible for the operation of the plant and equipment on correct method of operating the plant and equipment, and on the maintenance points to be watched.

4. CONSUMABLE MATERIAL FOR SERVICE AND MAINTENANCE

The costs of these consumable materials and related services works shall be deemed to be included under this contract. Consumable material are goods or spare part used for service and maintenance that must be replaced regularly because they wear out or used up to or due to life span. The Contractor shall supply the following consumable materials as and when required but not limited to: -

- a) All oils and grease required for lubrication of compressors, fan bearings, motor bearings, pivots and other moving parts.
- b) All refrigerant required to replace refrigerant losses in the refrigerant system.
- c) All carbon brushes required to replace worn brushes in electric motors.
- d) All consumable filter elements including all HEPA filters
- e) All electric contact points required to replace worn electric contact points in switch gears, motor starter gears, electric control gears and electric relays.
- f) All electric fuses required to replace blown fuses.
- g) All cotton waste, soap detergent and other cleaning materials required for cleaning purposes.
- h) All chemicals used for water treatments.

The costs of these consumable materials and related services works shall be deemed to be included under this contract.

	SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT	Document Section	5.0
		Issue Date	19/08/2021
		Revision No.	00
		Revision Date	-
		Page	12 of 13

5. REPAIRS

The Air-Conditioning Contractor shall repair all defects in the air conditioning system including all ancillary equipment on the instructions of the S.O.

The Contractor shall at his own expenses, remedy, and supply/replace all defective parts or items, inclusive of all consumable items so that the complete mechanical system is maintained in accordance to the specification and to the S.O. satisfaction.

The defects, imperfection, shrinkages or any other fault during the one (1) year defects period shall be made good by the Contractor at his own costs and to be completed within reasonable time but in any case, not later than (3) months and fourteen (14) days from the expiration of the said Defects Liability Period, whichever is the later.

6. SERVICE AND MAINTENANCE RECORD

The Contractor shall provide a service and maintenance record book for the complete Air Conditioning Systems and Ancillary Equipment being serviced and maintained by Contractor. This record book shall be kept in the plant room or control room of the Air Conditioning System and Ancillary Equipment being serviced and maintained, and brief details of all service, maintenance and repairs carried out on the complete Air Conditioning System and Ancillary Equipment shall be entered by the Contractor into this book for checking purposes. The address and telephone number of the Contractor's service station shall also be entered into this record book to facilitate emergency service calls.

The Contractor shall also keep an accurate detailed record in duplicate of all service, maintenance and repair work carried out by Contractor on the complete Air Conditioning System and Ancillary Equipment. This record shall be in the form of a Maintenance/Repair Sheet, and shall be countersigned by the Superintending Officer each time the Air Conditioning Systems and Ancillary Equipment is attended to by the Contractor.

7. PAYMENT TO CONTRACTOR AND INTERIM CERTIFICATES

For the purpose of payments, the contractor shall submit to S.O., at such times and in such form as the S.O. may prescribe, a written application for the servicing and maintenance payments to claims for S.O. verification. The application for payment shall be accompanied by the documents evidencing the following: -

- a) The value of servicing and maintenance properly executed for that particular months;
- b) The Servicing and Maintenance reports for an air conditioning system and ancillary equipment mentioned in this scheduled of design requirement or other relevant documents as the S.O. may require, to substantiate the contractor written application for the monthly payments.

The S.O. have the right to adjust the prices and rates from the contract sum in respect of failure of execution of servicing and maintenance schedule or incomplete submission of Servicing and Maintenance records/sheets.

	SPECIFICATIONS FOR COMPREHENSIVE SERVICE AND MAINTENANCE OF THE AIR CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT	Document Section	5.0
		Issue Date	19/08/2021
		Revision No.	00
		Revision Date	-
		Page	13 of 13

8. PREVENTION OF MOLD GROWTH DURING OPERATION AND MAINTENANCE

The Contractor shall ensure all the operation and maintenance efficiently in accordance of design, manufacturer's recommendation for prevention of mold growth. The checklist as below shall be performed by the contractor as a guidance for prevention of mold growth:

-

- a) Systematic and periodic monitoring of room / area / space temperature. To ensure the temperature is within the design range.
- b) Systematic and periodic monitoring of the relative humidity (RH) of the room / area / space. To ensure the relative humidity is within the design range.
- c) Systematic and periodic monitoring of chilled water supply (CHWS) and chilled water return (CHWR) temperature readings on the chiller. To ensure the temperature is within the design range.
- d) To ensure the face velocity reading on the AHU and the total airflow of the AHU/FCU according to the design value.
- e) Systematic and periodic monitoring of chilled water supply flow rate readings.
- f) Check all sources of infiltration/openings such as doors and windows in air - conditioned spaces are closed at all times.
- g) To ensure control and monitoring system operate accordingly to design requirement.
- h) Effective maintenance for service and maintenance system for air conditioning parts (filters, cooling coil, modulating valve, chiller tube, piping, sensor and etc.)

9. SCHEDULE OF PRICES FOR THE COMPREHENSIVE SERVICE AND MAINTENANCE OF THE COMPLETE AIR-CONDITIONING SYSTEM AND ANCILLARY EQUIPMENT DURING DEFECTS LIABILITY PERIOD

The price for the service and maintenance of the complete Air Conditioning System and Ancillary Equipment shall be stated by the contractor in Schedule of Prices at the time he submits the tender.