TECHNICAL SPECIFICATIONS 2023

MECHANICAL MAINTENANCE CONTRACT
KENTUCKY COMMUNITY AND TECHNICAL COLLEGE SYSTEM

NOTE: This technical specification is representative of the types of equipment found in KCTCS facilities. Mechanical Maintenance Service Provider is responsible for servicing all maintainable equipment whether or not included in this specification document. Included below each type of equipment are recommended minimum preventive maintenance requirements as a guideline only. The original equipment manufacturer's recommendations will the authority on what is required for all covered equipment.

01 AIR COOLED CONDENSING UNITS

A. MOTOR (S) - SPRING START-UP, INSPECT MONTHLY

1. Inspect starter coils and contacts.
2. Tighten all electrical connections.
3. Check operating current and voltage.
4. Lubricate bearings.
5. Check motor insulation resistance (Megger) annually or after any current protection device failure.

B. FAN (S) - SPRING START-UP, INSPECT MONTHLY

1. Check blades and clean dirt accumulations.
2. Lubricate bearings.
3. Check and adjust drive pulleys, couplings, and belts.

C. COIL - SPRING START-UP

1. Clean with hose, vacuum, and/or compressed air as required.
2. Straighten fins.
3. Check for leaks.

02 ELECTRIC STEAM BOILERS

A. SEASONAL - START-UP AND MONTHLY DURING OPERATION

1. Blow down low water fuel cut-off.
2. Check proper setting of operating control and high limit.
3. Check operation of step controller.
4. Check operation of make-up water controller and make-up valve.
5. Check heating elements-Replace as required.
6. Check fuses, replace as required.
7. Check relief valve.
8. Check condensate return pump for proper operation.
9. Lubricate as required.

03 TEMPERATURE CONTROL SYSTEMS/BAS CONTROL SYSTEMS

A. KCTCS has initiated a project to upgrade all KCTCS College BAS Systems to an adopted standard as described in the "Mechanical Maintenance Service Requirements for KCTCS Building Automation Systems", which are incorporated into this request for proposals and will become part of the service contract. Some colleges have legacy systems in isolated buildings that will be maintained per this section of technical specifications.

B. Control equipment to be maintained includes, but is not limited to, the following: thermostats, sensors, hydrostats, pressure controls, control valves, damper motors, relays, pressure switches, DDC control systems, hardware, software, etc.

C. Replace or repair all defective or marginal control equipment found.

D. Replaced equipment, HVAC controls, components, boards, etc. shall comply with the requirements

described in the "Mechanical Maintenance Service Requirements for KCTCS Building Automation Systems".

E. As changes are made to the control system at the building level, a backup of that controller needs to be updated to the college server and a message needs to be delivered to Owner's point of contact notating the changes made. The area supervisor for each region will be given access to upload backups to the college's server.

1.03 MINIMUM REQUIRED DDC CONTROL SYSTEM MAINTENANCE

Service Procedure	Function	Benefit	Frequency Required
Check sequence of Mechanical Operations	Verify that controlled equipment properly cycles from full heat to full cool.	Ensures that system operates as designed to provide proper occupant comfort.	Biannually Heating in Fall Cooling in Spring
Check Room Sensor Accuracy	Verify operational accuracy of room sensor within +/- 0.5 degrees F.	Ensure comfort of occupants is provided.	Annually
Check Zone Occupancy Override Operation	Verify that controlled systems switch from unoccupied to occupied modes.	Ensures after-hours comfort of occupants. Verifies proper input to after-hours billing programs. Maximizes energy efficiency of systems by employing scheduled control operations.	Annually

04 CHILLERS – RECIPROCATING

A. CONTROL CENTER - MONTHLY DURING OPERATION

1. Calibrate and clean controls and safety devices.
2. Inspect and clean electrical contacts.
3. Check set point of controls and limits.
4. Sequence test all controls.

B. MOTOR - SPRING START-UP AND MID-SEASON

1. Check operating current and voltage.
2. Inspect starter coils and contacts.
3. Check motor insulation resistance (Megger).

C. COMPRESSOR - MONTHLY DURING OPERATION

1. Check refrigerant charge.
2. Check for refrigerant and oil leaks.
3. Test for proper operation and efficiency.
4. Observe bearings and surface operating temperatures.
5. Check oil heater operation.
6. Check oil level and condition.
7. Perform acid test.

D. COOLER AND CONDENSER - SPRING START-UP

1. Inspect and clean tubes as required.
2. Inspect rupture disc for corrosion or leaks.
3. Check GPM through unit.

05 AIR COMPRESSORS – RECIPROCATING

A. EACH COMPRESSOR-MONTHLY

1. If duplex, set lead-lag switch to equalize running hours on each compressor.
2. Check air cleaners-Replace as needed.
3. Check oil level-Replenish as required.
4. Change oil as required.
5. Check condition and alignment of drive section.
6. Sequence test all controls.
7. Calibrate and clean controllers and safety controls.
8. Check set point of controls and limits.
9. Sequence test all controls.
10. Check belts for tension, wear and deterioration-Replace as required.
11. Operate try lever on relief valve on tank.
12. Drain tank.

B. AIR DRYER-MONTHLY

1. Check operation of condensate drain trap.
2. Check condition and operation of crankcase heater.
3. Check discharge air temperature.
4. Check air after filter-Replace as required.

06 SHOP HEAT AND VENT UNITS

A. Perform items listed two times per year and routine inspection each month of operation.

1. Lubricate fan and motor as required.
2. Clean fan.
3. Clean coil and straighten fins.
4. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.
5. Lubricate and adjust face and by-pass dampers and operator as required.
6. Lubricate and adjust return and fresh air dampers and operator as required.
7. Check pulleys for proper alignment, internal wear and security to shaft.
8. Check belts for tension, wear, and deterioration-Replace as required.

B. Once each year, perform a complete test and adjustment of all controls associated with H &V units.

07 FAN COIL UNITS

A. Perform items listed two times per year-Perform routine inspections each month.

1. Run thermostat through its range and check operation of hot water and chilled water control valves.
2. Lubricate fan and motor bearings as required.
3. Clean fan and check for alignment.
4. Clean coils and straighten fins.
5. Replace filter as required. Date installed must be written on filter edge and easily viewable if possible.

08 DUST COLLECTORS

A. Perform items listed two times per year-Perform routine inspections each month.

1. Lubricate fan and motor as required.
2. Check condition and alignment of drive section.
3. Check operation of mechanical or pneumatic media cleaning equipment.
4. Check belts for tension, wear, and deterioration-Replace as required.

B. Empty hoppers once a month and dispose of waste properly.

C. Replace filter media as required or every 3 months (whichever comes first). Date installed must be written on filter edge and easily viewable if possible.

09 CIRCULATING PUMPS

A. BASE MOUNTED CIRCULATING - Perform items listed two times per year-Perform monthly inspection during each month of operation.

1. Inspect starter coils and contacts.
2. Check motor current.
3. Lubricate motor bearings.
4. Check proper alignment and condition of coupling and inspect for wear and shaft security.
5. Lubricate drive shaft section.
6. Check packing and mechanical seals for leakage.
7. Inspect gaskets for leakage and deterioration.
8. Check condition and operation of water specialties as applicable.

B. IN-LINE CIRCULATING - Perform items listed two times per year. Perform monthly inspection each month of operation.

1. Check motor mount resiliency.
2. Lubricate motor bearings.
3. Check proper alignment and condition of coupling and inspect for wear and shaft security.
4. Lubricate drive shaft section.
5. Check packing and mechanical seals for leakage.
6. Inspect gaskets for leakage and deterioration.
7. Check condition and operation of water specialties as applicable.

10 EMERGENCY GENERATORS

All service documentation will be uploaded to the Owners workorder system within 48 hours after service. A service schedule will also be submitted at the start of this contract and with each annual renewal detailing the date and level of service planned for that visit.

A. Perform items listed monthly.

1. Check oil level-Replenish as required.
2. Exercise and load test unit. Load bank testing will be performed by owner.
3. Check operation of crankcase heater.
4. Check operation of battery charger.
5. Check specific gravity of batteries.
6. Check coolant level.
7. Fill out monthly maintenance log as required by NFPA 110 CH 8.

B. Perform routine maintenance as recommended by the manufacturer to include but not be limited to the following.

1. Change oil and oil filter.
2. Change air cleaner.
3. Change fuel filter
4. Check and drain water separator
5. Change plugs and points.
6. Replace any other items required to assure proper operation.

C. The first year and every other year thereafter, drain and flush cooling system and fill with a 50/50 anti-freeze mixture.

D. Maintenance of emergency generators must comply with and satisfy all requirements of NFPA 110 CH 8.

11 UNIT HEATERS/CABINET HEATERS

A. UNIT - TWICE YEARLY PLUS MONTHLY INSPECTION

1. Run thermostat up and check for proper fan operation.
2. Lubricate fan and motor bearings.
3. Clean fan and check alignment.
4. Clean coils and straighten fins.
5. Replace filter as required. Date installed must be written on filter edge and easily viewable if possible.

12 GAS FIRED HOT WATER BOILERS

A. CONTROLS AND SAFETIES - MONTHLY DURING OPERATION

1. Blow down low water fuel cut-off.
2. Assure proper setting and correct operation of operating control and high limit.
3. Check system fill valve operation.
4. Check operation of relief valve.
5. Check operation of gas valve.
6. Check for water leaks and repair.
7. Check controls, barometric dampers, etc.
8. Verify combustion air is not obstructed.

13 DX COOLING UNITS

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Run thermostat through its range and check operation of fan and condensing unit.
2. Lubricate fan and motor bearings as required.
3. Clean fan and check alignment.
4. Clean coil and straighten fins.
5. Replace filter as required. Date installed must be written on filter edge and easily viewable if possible.
6. Check drive belts - Replace as required.

14 SELF-CONTAINED UNIT VENTILATORS

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Run the thermostat through its range and check operation of all dampers, control, and compressor.
2. Ensure dampers shut when unit is not running.
3. Lubricate fan and motor bearings as required.
4. Clean coils and straighten fins.
5. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.
6. Check condition of belt-Replace as required.

B. Once each year perform a complete test and adjustment of all controls associated with unit.

15 MAKE-UP AIR UNITS

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Lubricate fan and motor as required.
2. Clean fan.
3. Clean coils and straighten fins.
4. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.
5. Check belts for tension, wear and deterioration- Replace as required.
6. Lubricate and adjust temperature control operators.
7. Check pulleys for proper alignment, internal wear and security to shaft.

B. Once each year perform a complete test and adjustment of all controls associated with unit.

16 HVAC UNITS

A. PERFORM ITEMS LISTED TWO TIMES PER YEAR AND ROUTINE INSPECTIONS EACH MONTH.

1. Lubricate fans and motors as required.
2. Clean fans.
3. Clean coils and straighten fins.
4. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.
5. Lubricate and adjust all dampers.
6. Check pulleys for proper alignment, internal wear, and security to shaft.
7. Check belts for tension, wear, and deterioration-Replace as required.
8. Check operation of temperature control valves.
9. Check UV light operation and replace as required

B. Once each year perform a complete test and adjustment of all controls associated with the HVAC units.

17 ROOFTOP UNITS

A. Motor(S) - SPRING START-UP, INSPECT MONTHLY

1. Inspect starter coils and contacts.
2. Tighten all electrical connections.
3. Check operating current and voltage.
4. Lubricate bearings.
5. Check motor insulation resistance.

B. FAN(S) - SPRING START-UP, INSPECT MONTHLY

1. Check blades and clean dirt accumulations.
2. Lubricate bearings.
3. Check and adjust drive pulleys, couplings and belts.

C. COIL - SPRING START-UP

1. Clean with hose, vacuum, and/or compressed air as required.
2. Straighten fins.
3. Check UV light operation and replace as required
4. Check for leaks.

D. COMPRESSOR(S) - SPRING START-UP

1. Check refrigerant, add Freon if required.
2. Check oil heater.

E. FILTERS – MONTHLY

1. Check - Replace as required. Date installed must be written on filter edge and easily viewable if possible.

18 AIR HANDLING UNITS

A. Perform items listed at spring start-up and do routine inspection each month of operation.

1. Lubricate fan and motor as required.
2. Clean fan.
3. Clean coil and straighten fins.
4. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.
5. Check pulleys for proper alignment, internal wear and security to shaft.
6. Check belts for tension, wear and deterioration-Replace as required.
7. Check UV light operation and replace as required

B. Once each year, perform a complete test and adjustment of all controls associated with H & V units.

C. Check operation of freeze stat prior to heating operation annually.

19 MIXING BOXES WITH ELECTRIC REHEAT

A. Perform items listed two times per year and do routine inspections each month.

1. Run thermostat through its range and check operation of damper operation.
2. Check and lubricate operator and linkage as required.
3. Check reheat coil air proving switch.
4. Check each coil electric circuit for continuity.
5. Replace fuses and overloads as required.

B. Once each year, perform a complete test and adjustment of all controls associated with mixing boxes.

20 ELECTRIC REHEAT COILS

A. Perform items listed two times per year and do routine inspections each month.

1. Check reheat coil air proving switch.
2. Check each coil electrical circuit for continuity.
3. Replace fuses and overloads as required.

21 ROOFTOP MULTI-ZONE UNITS

A. COMPRESSOR / CONDENSER - MONTHLY DURING OPERATION

1. Check refrigerant charge.
2. Check for leaks.
3. Check oil heater operation
4. Check operating current and voltage.
5. Inspect starter coil and contacts.
6. Lubricate bearings.

B. FANS – MONTHLY

1. Lubricate fan and motor as required.
2. Check pulleys for proper alignment, internal wear, and security to shaft.
3. Check belts for tension, wear, and deterioration. Replace as required.
4. Check motor current and voltage.

C. COILS - TWO TIMES PER YEAR

1. Check coil for leaks.
2. Clean and straighten fins.
3. Check downstream temperatures.
4. Check UV light operation and replace as required.

D. UNIT – MONTHLY

1. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.
2. Check operation of RA/FA dampers.

E. UNIT – YEARLY

1. Shutdown system and vacuum clean fresh air, return air, and supply plenums.
2. Clean interior of supply and return fans.
3. Touch-up paint on all equipment.
4. Perform a complete test and adjustment of all controls associated with the RIT unit.

22 UNIT HEATERS - GAS FIRED

A. UNIT - TWICE YEARLY PLUS MONTHLY INSPECTION

1. Run thermostat up and check for proper firing and fan operation.
2. Lubricate bearings.
3. Clean fan and check alignment.
4. Check safety controls.

23 CLOSED CIRCUIT EVAPORATIVE COOLERS

A. MOTOR - SPRING START-UP AND MID-SEASON

1. Inspect starter coils and contacts.
2. Tighten all electrical connections.
3. Check operating current and voltage.
4. Lubricate bearings.
5. Check motor insulation resistance.

B. FAN - SPRING START-UP AND MID-SEASON

1. Check blades and clean dirt accumulation.
2. Lubricate bearings.
3. Check and adjust drive pulleys, couplings and belts.

C. TOWER - START-UP AND MID-SEASON

1. Clean strainer, check baffles, clear overflow, check for leaks.
2. Check operation of make-up water float and valve.
3. Lubricate vane linkage.

D. PUMP - START-UP AND MID-SEASON

1. Adjust flow rate to correct water flow.
2. Check motor current.
3. Lubricate motor and pump bearings.
4. Check seals for leakage.

E. FALL SHUTDOWN

1. Turn off sump heaters.
2. Drain basin and clean.
3. Ensure that coil freeze protection systems are activated.

24 WATER SOURCE HEAT PUMPS

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Run thermostat through its range and check operation of compressor, reversing valve and fan.
2. Lubricate fan and motor bearings as required.
3. Clean coils and straighten fins.
4. Replace filter as required. Date installed must be written on filter edge and easily viewable if possible.
5. Ensure proper condensate drainage.
6. Check and clean any connected strainers or filtering devices connected to water lines.
7. Once each year perform a complete test and adjustment of all controls associated with unit.

25 SELF-CONTAINED FAN COIL UNITS

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Run thermostat through its range and check operation heating and cooling cycles.
2. Lubricate fan and motor bearings as required.
3. Clean coils and straighten fins.
4. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.

26 ROOFTOP HEAT RECOVERY UNITS

A. UNIT OPERATIONS - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Lubricate exhaust and supply motor and fan bearings as required.
2. Replace supply and exhaust filters as required. Date installed must be written on filter edge and easily viewable if possible.
3. Clean supply and exhaust fans.
4. Check belts for tension, wear, and deterioration. Replace as required.
5. Check pulleys for proper alignment, internal wear, and security to shaft.
6. Lubricate reducer as required.
7. Clean, oil and adjust tension of chain drive.
8. Vacuum clean inside of housing.
9. Touch-up paint exterior surfaces with good epoxy paint.

B. Once each year in January, preferably on a day when the outside temperature is 20 degrees F. or lower, perform a complete test and adjustment of all controls associated with heat recovery unit. Test shall include cfm and air temperature readings.

27 KITCHEN HOOD SUPPLY/EXHAUST UNITS

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Lubricate fan and motor bearings as required.
2. Clean fans.
3. Check belts for tension, wear, and deterioration. Replace as required.

4. Check pulleys for proper alignment, internal wear, and security to shaft.
5. Check make-up air filters - Replace as required. Date installed must be written on filter edge and easily viewable if possible.
6. Check grease filters in hood. Cleaning is responsibility of College or kitchen user.
7. Check operational and safety controls on gas heater.

B. Once each year perform a complete test and adjustment of all controls associated with unit.

28 BLOWER COIL AND FAN COIL SYSTEMS

A. RETURN AIR FAN-MONTHLY

1. Lubricate fan and motor bearing as required.
2. Check condition and alignment of drive section.
3. Check inlet damper control for proper operation.

B. RETURN AIR, FRESH AIR AND EXHAUST AIR DAMPERS – MONTHLY

1. Lubricate if required.
2. Check for proper operation and close off.
3. Tighten loose sections and operating rods.

C. FILTER MAINTENANCE-MONTHLY

1. Check operation of advance mechanism of roll filters if applicable.
2. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.

D. SUPPLY FANS-MONTHLY

1. Lubricate fan, motor, and inlet vane bearings as required.
2. Check motor current at full load.
3. Check inlet vane control for proper operation.

E. COOLING COILS-TWO TIMES PER YEAR

1. Check three-way valve for proper operation.
2. Check coil for leaks.
3. Check cold deck temperature.

F. FAN TERMINAL BOXES-TWO TIMES PER YEAR

1. Run thermostat through its range and check operation of damper operator and reheat coil control.
2. Ensure fan operates on night setback as required.
3. Lubricate fan/motor as required.
4. Replace filter as required. Date installed must be written on filter edge and easily viewable if possible.

G. REHEAT COIL TWO TIMES PER YEAR

1. Check reheat coil air proving switch.
2. Check each coil electrical circuit for continuity.
3. Replace fuses and overloads as required.

H. SYSTEM-YEARLY

1. Shutdown system and vacuum clean supply and return plenums.
2. Clean interior and exterior of supply and return fans.
3. Clean cooling coils and straighten fins.

4. Perform a complete test and adjustment of all controls associated with the VAV system.

29 STEAM PRESSURE REDUCING STATION

1. Record steam pressure on inlet and outlet of steam pressure reducing station quarterly. If steam is only used seasonally, test shall be done at beginning and end of season.
2. If outlet pressure does not meet desired pressure, take steps prescribed by manufacturer to resolve issue.
3. All parts, labor and processes will comply with the requirements of the AHJ representing the Commonwealth of Kentucky and National Board Inspection Code.

30 STEAM TRAPS

1. Test annually to determine if unit is operating properly. If steam is blowing through trap or otherwise found to be faulty, replace the trap.

31 MAKE-UP AIR UNITS WITH HEAT RECOVERY UNITS

A. UNIT OPERATIONS WITH HEAT RECOVERY UNIT

1. Lubricate exhaust and supply motor and fan bearings as required.
2. Replace supply and exhaust filters as required.
3. Clean supply and exhaust fans.
4. Check belts for tension, wear, and deterioration. Replace as required.
5. Check pulleys for proper alignment, internal wear, and security to shaft.
6. Inspect heat exchanger and clean. Check for leakage between sections.
7. Check hot water coil, clean, and straighten fins.
8. Vacuum clean inside of housing.
9. Clean drains.

B. Once each year in January, preferably on a day when the temperature is 20 degrees F. or lower, perform a complete test and adjustment of all controls associated with heat recovery unit. Test shall include cfm and air temperature readings.

32 ELECTRONIC AIR CLEANERS

A. PERFORM ROUTINE INSPECTIONS MONTHLY.

1. Remove, clean and replace pre-filter and after filter as required.
2. Clean ionizer in accordance with manufacturer's written instructions.
3. Clean collecting cell in accordance with manufacturer's written instructions.

B. Every three months clean Ionizer and Collecting Cell contact springs and insulators.

C. Once a year, or as required, lubricate fan and motor.

D. Once a year, check belt for tension, wear and deterioration. Replace as required.

33 SINGLE DUCT VAV INDUCTION TERMINAL REHEAT SYSTEMS WITH RETURN AIR FAN

A. RETURN AIR FAN-MONTHLY

1. Lubricate fan and motor bearing as required.
2. Check condition and alignment of drive section.
3. Check inlet damper control for proper operation.

B. RETURN AIR, FRESH AIR AND EXHAUST DAMPERS-MONTHLY

1. Lubricate if required.
2. Check for proper operation and close off.
3. Tighten loose sections and operating rods.

C. ROLL FILTERS-MONTHLY

1. Check operation of advance mechanism.
2. Replace filters as required.

D. SUPPLY FANS-MONTHLY

1. Lubricate fan, motor, and inlet vane bearings as required.
2. Check motor current at full load.
3. Check inlet vane control for proper operation.

E. COOLING COILS-TWO TIMES PER YEAR

1. Check three-way valve for proper operation.
2. Check coil for leaks.
3. Check cold deck temperature.

F. INDUCTION AND VAV TERMINAL BOXES-TWO TIMES PER YEAR

1. Run thermostat thru its range and check operation of damper operator and reheat coil control.
1 Replace filter as required.

G. REHEAT COIL-TWO TIMES PER YEAR

1. Check reheat coil three-way valve for proper operation.
2. Check each coil for leaks.
3. Check discharge temperature with valve full open.

H. SYSTEM-YEARLY

1. Shutdown system and vacuum clean supply and return plenums.
2. Clean interior and exterior of supply and return fans.
3. Clean cooling coils and straighten fins.
4. Touch-up paint on all equipment.
5. Perform a complete test and adjustment of all controls associated with the VAV system.

34 VAV BOXES WITH ELECTRIC REHEAT

A. PERFORM ITEMS LISTED TWO TIMES PER YEAR AND DO ROUTINE INSPECTIONS EACH MONTH.

1. Run thermostat through its range and check operation of damper operation.
2. Check and lubricate operator and linkage as required.
3. Check reheat coil air proving switch.
4. Check each coil electric circuit for continuity.
5. Replace fuses and overloads as required.

B. ONCE EACH YEAR - Perform a complete test and adjustment of all controls associated with VAV boxes.

35 HEAT PUMPS - SINGLE ZONE

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Run thermostat through its range and check operation of fan and condensing unit.
2. Lubricate fan and motor bearings as required.
3. Clean fan and check alignment.
4. Clean coil and straighten fins.
5. Replace filter as required. Date installed must be written on filter edge and easily viewable if possible.
6. Check drive belts - Replace as required.
7. Check electric heat coils.

36 SELF CONTAINED FAN COIL UNITS - HEAT PUMP (PTAC)

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

1. Run thermostat through its range and check operation heating and cooling cycles.
2. Lubricate fan and motor bearings as required.
3. Clean coils and straighten fins.
1. Replace filters as required. Date installed must be written on filter edge and easily viewable if possible.

37 PAINT BOOTH FILTERS

A. Replace filters as required with type originally installed. Exhaust filters shall be made especially for paint booth application and shall reduce particulate emissions to an acceptable level. Dispose of filters in a manner meeting latest regulations.

38 PAINT SPRAY BOOTHS

A. MOTORS - INSPECT MONTHLY

1. Inspect starter coils and contacts.
2. Tighten all electrical connections.
3. Check operating current and voltage.
4. Lubricate bearings.
5. Check motor insulation resistance.

B. FANS - INSPECT MONTHLY

1. Check blades and clean dirt accumulations.
2. Lubricate bearings.
3. Check and adjust drive pulleys, couplings and belts.

C. BURNER - FALL START-UP AND MID-SEASON

1. Set appliance regulator to proper gas pressure.
2. Adjust main burner to give proper flame.
3. Adjust pilot/igniter to Manufacturer's Specifications.

D. FILTERS - PERFORM ROUTINE INSPECTIONS MONTHLY

1. Replace filter media as required or every 3 months (whichever comes first).
2. Replace filters exactly meeting the Manufacturer's Specifications.
3. Dispose of filters in a manner meeting latest regulations.

39 PAINT SPRAY BOOTHS – DOWNDRAFT

A. EVERY 30 HOURS

1. Check fan belt tension. Adjust to ¾" depression.
2. Check pre-filter. Replace if necessary. Never blow filter off.
3. Check paint-arrestor filters under floor grille.
4. Replace is necessary.

B. EVERY 120 HOURS

1. Replace pre-filter.
2. Check main burner for proper flame.
3. Check floor corner filters for loading.

C. EVERY 720 HOURS

1. Replace fan belts.
2. Remove flue pipe cap and clean soot.
3. Adjust main burner.
4. Replace corner filters.

D. EVERY 1040 HOURS

1. Replace all plenum filters in ceiling.
2. Clean combustion chamber.

E. FILTER REPLACEMENT

1. This system uses pre-filters and ceiling filters on the entering airside. It uses floor pit, floor pan, and two types of extraction filters on the air leaving side. Replacement filters must be the exact filters recommended by the Booth Manufacturer. Dispose of used filters in a manner meeting latest regulations.

40 VAV/CONSTANT VOLUME BOXES WITHOUT REHEAT

A. Perform items listed two times per year and do routine inspections each month.

1. Run thermostat through its range and check damper valve operation.
2. Check and lubricate damper operation and linkage as required.

B. ONCE EACH YEAR - Perform a complete test and adjustment of all controls associated with the boxes.

41 DOMESTIC WATER HEATERS - GAS FIRED

A. Controls and Safeties

1. Assure proper setting and correct operation of operating control
2. Check operation of relief valve.
3. Check operation of gas valve.

B. Burner

1. Set appliance regulator to proper gas pressure.
2. Adjust pilot/igniter to manufacturer's specifications.
3. Adjust main burner.

42 HOT WATER BOILERS - GAS FIRED, WATER TUBE

A. BOILER - START-UP AND MONTHLY DURING OPERATION

1. Blow down low water cut-off.
2. Check setting of operating control and high limit.
3. Check operation of relief valve.

B. BURNER - START-UP AND MID-SEASON

1. Set appliance regulator to proper gas pressure.
2. Adjust main burner to give proper flame.

43 AIR CURTAIN FANS

A. PERFORM ITEMS LISTED TWO TIMES PER YEAR AND ROUTINE INSPECTIONS MONTHLY.

1. Clean internal dirt accumulation.
2. Inspect and clean fan.
3. Lubricate as required.
4. If belt driven, check belt for tension, wear, and deterioration. Replace if required.
5. Check full load motor current.

44 DOMESTIC WATER HEATERS – ELECTRIC

A. Check relief valve, heating elements, and thermostats yearly.

45 WINDOW A/C UNITS

A. Perform routine maintenance monthly during operation. Replace/clean filters as required.

46 KITCHEN REFRIGERATION UNITS

A. MOTOR (S) - ONCE PER YEAR - INSPECT MONTHLY

1. Inspect starter coils and contacts.
2. Tighten all electrical connections.
3. Check operating current and voltage.
4. Lubricate bearings.
5. Check motor insulation resistance.

B. FAN (S) - ONCE PER YEAR - INSPECT MONTHLY

1. Check blades and clean dirt accumulations.
2. Lubricate bearings.
3. Check and adjust drive pulleys, couplings and belts.

C. COIL - ONCE PER YEAR

1. Clean with hose, vacuum, and/or compressed air as required.
2. Straighten fins.
3. Check for leaks.

D. COMPRESSOR - MONTHLY DURING OPERATION

1. Check refrigerant charge.
2. Check for refrigerant and oil leaks.
3. Test for proper operation and efficiency.
4. Observe bearing and operating surface temperature.
5. Check oil heater operation.
6. Check oil level and condition.
7. Perform acid test.

47 CONVECTORS – RADIATION

A. Check temperature control device and clean interior yearly.

48 CONDENSATE PUMPS

A. Perform maintenance monthly. Once a year check operation and condition of float control.

49 WALL HEATERS – ELECTRIC

A. Check temperature control device twice yearly.

50 MEDICAL VACUUM PUMPS

A. Perform routine maintenance monthly. Lubricate as required.

51 MEDICAL AIR COMPRESSORS

A. Perform routine maintenance monthly. Lubricate as required.

52 HUMIDIFIERS

A. Sequence test twice yearly. Perform routine maintenance monthly.

53 SMOKE FILTERS

A. Check monthly, clean and/or replace as necessary.

54 ELECTRIC BASEBOARD HEATERS

A. Check temperature control device and overloads yearly.

B. Clean as required.

55 SUMP PUMPS

A. Perform routine maintenance monthly. Check operating controls twice yearly.

56 BACKFLOW PREVENTERS

A. TEST ANNUALLY ALL BACKFLOW PREVENTERS IN BUILDING AS PRESCRIBED BY LOCAL CODE OFFICIALS. PROVIDE RECORD OF TEST TO OWNER AFTER EACH TEST.
B. Testing shall be performed on all backflow preventers in the building. This list includes but is not limited to:
    1. HVAC water systems
    2. Domestic Hot Water systems
    3. Fire Protection systems

57 CHILLERS – CENTRIFUGAL

A. CONTROL CENTER - MONTHLY DURING OPERATION

1. Calibrate and clean controls and safety devices.
2. Inspect and clean electrical contacts.
3. Check set point of controls and limits.
4. Sequence test all controls.

B. MOTOR-SPRING START-UP AND MID SEASON

1. Check operating current and voltage.
2. Inspect starter coils and contacts.
3. Check motor insulation resistance (Megger).

C. COMPRESSOR - MONTHLY DURING OPERATION

1. Check refrigerant charge.
2. Check for refrigerant and oil leaks.
3. Test for proper operation and efficiency.
4. Observe bearings and surface operating temperatures.
5. Check oil heater operation.
6. Check oil pump, oil level and oil condition.
7. Perform acid test.

D. COOLER/CONDENSER - SPRING START-UP

1. Inspect and clean tubes as required.
2. Inspect rapture disc for corrosion or leaks.
3. Check GPM through unit.
4. Check pipe connections for leaks.

E. VANES - MONTHLY DURING OPERATION

1. Lubricate linkage.
2. Check control for proper operation.

58 COOLING TOWERS

A. MOTOR - SPRING START-UP AND MID-SEASON

1. Inspect starter coils and contacts.
2. Tighten all electrical connections.
3. Check operating current and voltage.
4. Lubricate bearings.
5. Check motor insulation resistance.

B. FAN(S) - SPRING START-UP AND MID-SEASON

1. Check blades and clean dirt accumulation.
2. Lubricate bearings.
3. Check and adjust drive pulleys, couplings, and belts.

C. TOWER - START-UP AND MID-SEASON

1. Clean strainer, check baffles, clear overflow, check for leaks.
2. Check operation of float switch and valve.
3. Lubricate vane linkage.

D. FALL SHUT-DOWN

1. Turn off sump heaters.
2. Drain basin and clean.
3. Drain all condenser water pipes - Use pump and air pressure as required.

59 CONDENSER WATER CHEMICAL FEED SYSTEMS

A. CONTROLLER - SPRING START-UP AND MONTHLY DURING OPERATION

1. Check condition and conductivity of carbon electrodes.
2. Check calibration of conductivity unit.
3. Check condition of PH control reference point
4. Check PH calibration.
5. Check all display lamps.

B. EQUIPMENT - SPRING START-UP AND MONTHLY DURING OPERATION

1. Check flow switch for proper operation.
2. Check chemical pumps for leaks and operation.
3. Adjust biocide programmer during season.
4. Check proper operation of auto bleed valve.

C. FALL SHUTDOWN

1. Turn off power to controller and pumps.
2. Clean equipment.

D. CHEMICAL SOLUTION AND SUPPLY

1. Maintain automatic and closed loop water treatment systems as well as glycol solutions.
2. Furnish all chemicals necessary to maintain mechanical systems and antifreeze protection.
3. See Section 1.67 for comprehensive water treatment specification.

60 AIR COMPRESSORS – SCREW

A. COMPRESSOR – MONTHLY

1. Check operation of water inlet valve.
2. Check air cleaners, replace as required.
3. Check oil level, replace as required.
4. Change oil and oil filter as required.
5. Check motor amp draw under full load.
6. Calibrate and clean controllers and safety controls.
7. Check operation of modulating discharge control.

B. AUXILIARY EQUIPMENT – MONTHLY

1. Check operation of water inlet valve on after cooler.
2. Check operation of electric drain valves on coalescing filter.

3. Operate try lever on relief valve on storage tank.
4. Drain tank.

C. AIR DRYER – MONTHLY

1. Check water cooling inlet valve.
2. Check operation of condensate drain trap.
3. Check the condition of operation of crankcase heater.
4. Check discharge air temperature.
5. Check refrigerant sight glass for refrigerant condition.

61 DUAL DUCT SYSTEMS WITH RETURN FAN

A. RETURN AIR FAN – MONTHLY

1. Lubricate fan and motor bearing as required.
2. Check condition and alignment of drive section.
3. Check fan blade pitch control for proper operation.

B. RETURN AIR, FRESH AIR, AND EXHAUST – MONTHLY

1. Lubricate if required.
2. Check for proper operation and close off.
3. Tighten loose sections and operating rods.

C. ROLL FILTERS – MONTHLY

1. Check operation of advance mechanism.
2. Replace filters as required.

D. SUPPLY FANS – MONTHLY

1. Lubricate fan, motor, and inlet vane bearings as required.
2. Check pulleys for proper alignment, internal wear and security to shaft.
3. Check belts for tension, wear and deterioration, replace as required.
4. Check motor current at full load.
5. Check inlet vane control for proper operation.

E. HEATING AND COOLING COILS - TWO TIMES PER YEAR

1. Check three-way valve for proper operation.
2. Check coil for leaks.
3. Check hot and cold deck temperature.
4. Run thermostat through its range and check operation of damper operator.
5. Check and lubricate operator and linkage as required.

F. SYSTEM YEARLY

1. Shutdown system and vacuum clean supply and return plenums.
2. Clean interior and exterior of supply and return fans.
3. Clean heating and cooling coils and straighten fins.
4. Touch-up paint on all equipment.
5. Perform a complete test and adjustment of all controls associated with the VAV system.

62 EXHAUST FANS

A. Perform items listed two (2) times per year and routine inspections monthly.

1. Clean internal dirt accumulation.
2. Inspect and clean impeller.
3. Lubricate fan bearings.
4. Check pulleys for proper alignment, internal wear, and security to shaft.
5. Check belts for tension, wear and deterioration, replace if required.
6. Inspect starter coils and contacts.
7. Check current at full load.
8. Lubricate bearings on motor.

63 ADJUSTABLE (VARIABLE) FREQUENCY DRIVES

A. GENERAL

1. Perform maintenance in accordance with manufacturer's recommendations.

64 DUAL DUCT SYSTEMS

A. RETURN AIR, FRESH AIR, AND EXHAUST DAMPERS – MONTHLY

1. Lubricate if required.
2. Check for proper operation and close offs.
3. Tighten loose sections and operating rods.

B. ROLL FILTERS – MONTHLY

1. Check operation of advanced mechanism.
2. Replace filters as required.

C. SUPPLY FAN – MONTHLY

1. Lubricate fan and motor bearings as required.
2. Check pulleys for proper alignment, internal wear and security to shaft.
3. Check bolts for tension, wear, and deterioration, replace as required.
4. Check motor at full load.

D. HEATING AND COOLING COILS - TWO TIMES PER YEAR

1. Check three-way valve for proper operation.
2. Check coil for leaks.
3. Check hot and cold temperature.

E. MIXING BOXES - TWO TIMES PER YEAR

1. Run thermostat through its range and check operation of damper operator.
2. Check and lubricate operator and linkage as required.

F. SYSTEM – YEARLY

1. Shutdown system and vacuum clean supply and return plenums.
2. Clean interior and exterior of supply fan.
3. Clean heating and cooling coils and straighten fins.
4. Touch-up paint on all equipment.
5. Perform a complete test and adjustment of all controls associated with the system.

65 FUME HOOD FANS

A. Perform routine maintenance on fan monthly. Clean and lubricate yearly. Replace belt as

required.

B. If applicable verify that, in un-occupied mode, the system is either off or air flow is reduced.

66 CHILLERS - RECIPROCATING, AIR COOLED

A. CONTROL CENTER - MONTHLY DURING OPERATION

1. Calibrate and clean controls and safety devices.
2. Inspect and clean electrical contacts.
3. Check set point of controls and limits.
4. Sequence test all controls.

B. MOTOR- SPRING START-UP AND MID-SEASON

1. Check operating and current voltage.
2. Inspect starter coils and contacts.
3. Check motor insulation resistance.

C. COMPRESSOR - MONTHLY DURING OPERATION

1. Check refrigerant charge.
2. Check for refrigerant and oil leaks.
3. Test for proper operation and efficiency.
4. Observe bearing and operating surface temperature.
5. Check oil heater operation.
6. Check oil level and condition.
7. Perform acid test.

D. COOLER AND CONDENSER - SPRING START-UP

1. Inspect and clean tubes as required.
2. Inspect rupture disc for corrosion or leaks.
3. Check GPM through unit.

67 WATER TREATMENT

All service documentation will be uploaded to the Owners workorder system within 48 hours after service. A service schedule will also be submitted at the start of this contract and with each annual renewal detailing the date and level of service planned for that visit.

A. The water treatment contractor shall do the following on their monthly visit:
   1. Inspect chemicals
   2. Inspect chemical feeders
   3. Inspect and verify water condition
   4. Inspect and verify the control bleed offs
   5. Ensure chemicals are stored in the proper locations based on the MSDS and manufacture guidelines.
   6. Maintain water treatment records and test results.
   7. Ensure proper dosage of chemicals.
   8. Test system for proper pH, total amount of dissolved solids, conductivity, scale, and corrosion inhibitors.
   9. Test supply water for base conditions.
   10. Have all water systems tested by a certified laboratory for a complete analysis of water such as pH, aluminum, calcium, copper, bromide, fluoride, molybdenum, nitrite, nitrate, orthophosphate, silica, strontium, iron, lead, magnesium, sodium, chloride, and total suspended solids etc.
   11. Monitor and test corrosion coupons as applicable.
   12. Must provide owner with an annual schedule for when service will be performed at each building.

B. The following water systems will be maintained under this contract:

1. Chilled water loops
2. Open Condenser water Loops
3. Closed Condenser Water Loops
4. Hot Water Loops
5. Aluminum Boiler Hot Water Loops
    a. pH levels shall be maintained per Boiler Manufacturer recommendations.
6. Water Source Heat Pump Loops
7. Geothermal Heat Pump Loops

C. Provide and maintain glycol concentrations to the level that they were originally designed to. Ensure that glycol type is matched to existing glycol type. If designed concentration level is not available ensure freeze protection to 0 F.

D. Provide documentation of the water quality reports to owner after each visit.

E. Maintain water softeners were present.

68 ROLL FILTERS

A. Check operation of advanced mechanism monthly.

B. Replace filter roll as required.

69 HOT WATER BOILERS - CONDENSING, GAS FIRED

A. CONTROLS AND SAFETIES – MONTHLY

1. Blow down low-water cut-off.
2. Assure proper operation of modulating burner control.
3. Check make-up water valve.
4. Check operation of backflow preventer.
5. Check operation of relief valve.

B. SYSTEM – YEARLY

1. Check and adjust gas pressure.
2. Check electronic igniter.
3. Check and adjust flame.
4. Remove backflow preventer. Adjust/repair in accordance with manufacturer's instructions.

70 SEWAGE PUMPS

A. Perform routine maintenance monthly.

B. Check level control operation yearly.

71 CENTRIFUGAL FILTRATION UNITS

A. Blow down monthly until clear and twice yearly thereafter.

72 CHEMICAL POT FEEDERS

A. Maintain chemical pot feeders and closed loop water treatment systems as well as glycol solutions.

B. Furnish all chemicals necessary to maintain mechanical systems and antifreeze protection.

C. See Section 67 for comprehensive water treatment specification.

73 ELECTRIC HOT WATER BOILERS

A. FALL- START-UP AND MONTHLY DURING OPERATION

1. Blow down low water fuel cut-off.
2. Check proper setting of Operating Control and High limit.
3. Check operation of step controller.
4. Check system fill valve operation.
5. Check heating elements, replace as required.
6. Check fuses, replace as required.
7. Check relief valve.

74 CHILLERS – SCREW

A. CONTROL CENTER - MONTHLY DURING OPERATION

1. Calibrate and clean controls and safety devices.
2. Inspect and clean electrical contacts.
3. Check set point of controls and limits.
4. Sequence test all controls.

B. MOTOR - SPRING START-UP AND MID-SEASON

1. Check operating current and voltage.
2. Inspect starter coils and contacts.
3. Check motor insulation resistance.

C. COMPRESSOR - MONTHLY DURING OPERATION

1. Check refrigerant charge.
2. Check for refrigerant and oil leaks.
3. Test for proper operation and efficiency.
4. Observe bearing and operating surface temperature.
5. Check oil heater operation.
6. Check operation of unloading device.
7. Check oil level and condition.
8. Perform acid test.

D. COOLER AND CONDENSER - SPR!NG START-UP

1. Inspect and clean tubes as required.
2. Inspect rupture disc for corrosion or leaks.
3. Check GPM through unit.

75 GLYCOL MAKE-UP UNITS

A. Check operation of pump control monthly. Ensure system pressure is maintained.

B. Furnish all chemicals necessary to maintain antifreeze protection/mechanical systems.

C. See Section 1.67 for further Water Treatment Maintenance.

76 PACKAGED HVAC UNITS

A. MOTOR (S) - SPRING START-UP, INSPECT MONTHLY

1. Inspect starter coils and contacts.
2. Tighten all electrical connections.

3. Check operating current and voltage.
4. Lubricate bearings.
5. Check motor insulation resistance.

B. FAN (5) - SPRING START-UP, INSPECT MONTHLY

1. Check blades and clean dirt accumulations.
2. Lubricate bearings.
3. Check and adjust drive pulleys, couplings and belts.

C. COIL - SPRING START-UP

1. Clean hose, vacuum, and/or compressed air as required.

D. COMPRESSOR (5) - SPRING START-UP

1. Check refrigerant, add Freon if required.
2. Check oil heater.

E. FILTERS – MONTHLY

1. Check - replace as required.

F. GAS FURNACE - FALL START-UP

1. Check gas control assembly for proper operation and leaks.
2. Check operation of high temperature limit, airflow switch, flame rod, flame safeguard relay, igniter, and firestat.
3. Check burner orifices and clean if necessary.
4. Clean igniter and flame rod and examine porcelain for cracks.

77 VAV/CONSTANT VOLUME BOXES WITH HOT WATER REHEAT

A. Perform items listed two (2) times per year and do routine inspections each month.

1. Run thermostat through its range and check damper and water valve operation.
2. Check and lubricate damper operation and linkage as required.
3. Check and ensure actuator action on hot water valve as required.

B. ONCE EACH YEAR - Perform a complete test and adjustment of all controls associated with the boxes.

78 DUCT HEATERS - GAS FIRED

A. UNIT - TWICE YEARLY PLUS MONTHLY INSPECTION

1. Check air, proving switch operates properly.
2. Operate thermostat and check for proper firing and burner adjustment.
3. Check safety controls.

END OF DOCUMENT