

## **MAINTENANCE EQUIPMENT SCHEDULE**

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1.01 [AIR COOLED CONDENSING UNIT](#)

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 for leaks.

1.02 [ELECTRIC STEAM BOILER](#)

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.  
Lubricate as required.

1.03 [TEMPERATURE CONTROL SYSTEM](#)

- A. In addition to the specific maintenance described under individual pieces of equipment, perform a sequence and diagnostic test once a year.
- B. Control equipment to be maintained includes, but is not limited to, the following: Thermostats, hydrostats, pressure controls, control valves, damper motors, relays, pressure switches, control air compressor, and air dryer.
- C. Replace or repair all defective or marginal control equipment found.

1.04 [CHILLER-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.

1.05 [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.

1.06 [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.
  - (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.

1.07 [FAN COIL UNITS](#)

- A. Perform items listed two times per year-Perform routine inspections each month.
- (1) Run thermostat through it's range and check operation of hot water and chilled water three-way 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.

1.08 [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. Check filter media once a year-Replace as required.

1.09 [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.

#### 1.10 EMERGENCY GENERATOR

A. Perform items listed monthly.

- (1) Check oil level-Replenish as required.
- (2) Exercise and load test unit.
- (3) Check operation of crankcase heater.
- (4) Check specific gravity of batteries.
- (5) Check coolant level.

B. Perform items listed as required by running hour meter.

- (1) Change oil and oil filter.
- (2) Change air cleaner.
- (3) Change plugs and points.
- (4) 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.

#### 1.11 Section11UNIT HEATER/CABINET HEATER

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.

#### 1.12 GAS FIRED HOT WATER BOILER

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.

#### 1.13 DX COOLING UNIT

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

- (1) Run thermostat thru 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.
- (6) Check drive belts - Replace as required.

1.14 [SELF-CONTAINED UNIT VENTILATOR](#)

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

- (1) Run thermostat thru its range and check operation of RA/FA dampers, heating control, and compressor.
- (2) Lubricate fan and motor bearings as required.
- (3) Clean coils and straighten fins.
- (4) Replace filters as required.
- (5) Check condition of belt-Replace as required.

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

1.15 [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.
- (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.

1.16 [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.
- (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.

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

1.17 ROOF-TOP A/C UNIT

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 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.

1.18 AIR HANDLING UNIT

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.
- (5) Check pulleys for proper alignment, internal wear and security to shaft.
- (6) 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.

1.19 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.

#### 1.20 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.

#### 1.21 ROOF-TOP MULTI-ZONE UNIT

##### 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 down stream temperatures.

##### D. UNIT - MONTHLY

- (1) Replace filters as required.
- (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 R/T unit.

#### 1.22 UNIT HEATER – 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.

- (5) Check safety controls.

### 1.23 STOKER FIRED WATER BOILER

#### 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. STOKER – START-UP AND MONTHLY DURING OPERATION

- (1) Check operation of hold-fire timer.
- (2) Adjust combustion air control setting.
- (3) Check belts for tension, wear, and deterioration. Replace as required.
- (4) Lubricate bearing as required.

### 1.24 COAL SCREW CONVEYOR

#### A. UNIT OPERATION – START-UP AND MONTHLY DURING OPERATION

- (1) Check operation of automatic control.
- (2) Check belts for tension, wear and deterioration. Replace as required.
- (3) Lubricate bearings as required.

### 1.25 DRAFT INDUCER

#### A. UNIT OPERATION – START-UP AND MONTHLY DURING OPERATION

- (1) Check operation of automatic control.
- (2) Check belts for tension, wear, and deterioration. Replace as required.
- (3) Lubricate bearings as required.

### 1.26 CLOSED CIRCUIT EVAPORATIVE COOLER

#### 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 SHUT--DOWN

- (1) Turn off sump heaters.
- (2) Drain basin and clean.
- (3) Insure that coil freeze protection systems are activated.

1.27 [WATER SOURCE HEAT PUMPS](#)

A. UNIT OPERATION - TWICE YEARLY PLUS MONTHLY INSPECTIONS

- (1) Run thermostat thru 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.
- (5) Insure proper condensate drainage.

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

1.28 [SELF-CONTAINED FAN COIL UNIT](#)

A. UNIT OPERATION – TWICE YEARLY PLUS MONTHLY INSPECTIONS

- (1) Run thermostat thru 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.

1.29 [ROOF-TOP HEAT RECOVERY UNIT](#)

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.
- (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.

1.30 KITCHEN HOOD SUPPLY/EXHAUST UNIT

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.
- (6) Check grease filters in hood. Cleaning is responsibility of Kitchen help.
- (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.

1.31 SINGLE DUCT VAV FAN TERMINAL REHEAT SYSTEM

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. FAN TERMINAL BOXES-TWO TIMES PER YEAR

- (1) Run thermostat thru its range and check operation of damper operator and reheat coil control.
- (2) Insure fan operates on night setback as required.
- (3) Lubricate fan/motor as required.

(4) Replace filter as required.

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) Touch-up paint on all equipment.
- (5) Perform a complete test and adjustment of all controls associated with the VAV system.

1.32 AIR COOLED CONDENSING UNIT

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 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.

1.33 SINGLE DUCT FAN TERMINAL REHEAT SYSTEM

A. 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.

B. FILTERS-MONTHLY

(1) Replace filters as required.

C. SUPPLY FANS-MONTHLY

- (1) Lubricate fan and motor as required.
- (2) Check motor current at full load.

D. COOLING COILS –TWO TIMES PER YEAR

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

E. FAN TERMINAL BOXES-TWO TIMES PER YEAR

- (1) Run thermostat thru its range and check operation of damper operator and reheat coil control.
- (2) Insure fan operates on night setback as required.
- (3) Lubricate fan/motor as required.
- (4) Replace filter 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 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.

1.34 [MAKE-UP UNIT WITH HEAT RECOVERY UNIT](#)

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.

1.35 [ELECTRONIC AIR CLEANER](#)

A. PERFORM ROUTINE INSPECTIONS MONTHLY.

- (1) Remove, clean and replace pre-filter and after filter.
- (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.

#### 1.36 SINGLE DUCT VAV INDUCTION TERMINAL REHEAT SYSTEM 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.
- (2) 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.

1.37 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.

1.38 SINGLE DUCT VAV INDUCTION TERMINAL REHEAT SYSTEM 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.
- (2) 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.

### 1.39 HEAT PUMP – SINGLE ZONE

#### A. UNIT OPERATION – TWICE YEARLY PLUS MONTHLY INSPECTIONS

- (1) Run thermostat thru 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.
- (6) Check drive belts – Replace as required.
- (7) Check electric heat coils.

### 1.40 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.

### 1.41 PAINT SPRAY BOOTH

#### 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/ignitor to Manufacturer's Specifications.

D. FILTERS - PERFORM ROUTINE INSPECTIONS MONTHLY

- (1) Replace filters as required with filters exactly meeting the Manufacturer's Specifications. Dispose of filters in a manner meeting latest regulations.

1.42 [PAINT SPRAY BOOTH – DOWNDRAFT](#)

A. EVERY 30 HOURS

- (1) Check fan belt tension. Adjust to  $\frac{3}{4}$ " depression.
- (2) Check pre-filter. Replace if necessary. Never blow filter off.
- (3) Check paint-arrestor filters under floor grille.  
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.

1.43 [VAV/CONSTANT VOLUME BOX WITH HOT WATER 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.

1.44 [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/ignitor to manufacturer's specifications.
- (3) Adjust main burner.

1.45 [HOT WATER BOILER, 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.

1.46 [AIR CURTAIN FAN](#)

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.

1.47 [DOMESTIC WATER HEATER – ELECTRIC](#)

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

1.48 [WINDOW A /C UNIT](#)

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

1.49 [REFRIGERATION UNIT](#)

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.

1.50 [CONVECTOR / RADIATION](#)

- A. Check temperature control device and clean interior yearly.

1.51 [CONDENSATE PUMP](#)

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

1.52 [WALL HEATERS – ELECTRIC](#)

- A. Check temperature control device twice yearly.

1.53 [MEDICAL VACUUM PUMP](#)

- A. Perform routine maintenance monthly. Lubricate as required.

1.54 [MEDICAL AIR COMPRESSOR](#)

- A. Perform routine maintenance monthly. Lubricate as required.

1.55 [HUMIDIFIER](#)

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

1.56 [SMOKE FILTERS](#)

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

1.57 ELECTRIC BASEBOARD HEATERS

- A. Check temperature control device and overloads yearly.  
Clean as required.

1.58 SUMP PUMP

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

1.59 ENERGY MANAGEMENT SYSTEM

- A. Perform diagnostic tests on the system once a year. Replace or repair all defective automation equipment found.
- B. Check and up-date load demand software. Insure that demand limits are properly set and that boilers, water heaters and other connected equipment drop off in proper sequences.
- C. Check Occupied-Unoccupied software and hardware. Determine that reduced unoccupied temperatures are maintained.
- D. Where remote monitoring is incorporated in the EMS or ATC System, the contractor may utilize this feature provided he provides and pays for the necessary phone service.

1.60 CHILLER, CENTRIFUGAL

A. CONTROL CENTER – MONTHLY DURING OPERATION

- (1) Calibrate and clean controls and safety devices.
- (2) Inspect and clean electrical contacts.
- (3) Check setpoint 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 rupture 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.

1.61 [COOLING TOWER](#)

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.

1.62 [CONDENSER WATER CHEMICAL FEED](#)

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 SHUT-DOWN

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

1.63 [AIR COMPRESSOR — 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 condition of operation of crankcase heater.
- (4) Check discharge air temperature.
- (5) Check refrigerant sight glass for refrigerant condition.

1.64 [DUAL DUCT SYSTEM 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.
- (4) Check inlet vane control for proper operation.

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 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.

1.65 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.

1.66 ADJUSTABLE FREQUENCY DRIVE

A. GENERAL

- (1) Check and document indicated fault conditions and fault history for trends. Adjust operating parameters to prevent future faults as required. (MONTHLY).
- (2) No Load Test (ANNUALLY).

- a. Disconnect and lockout power from the AFD, wait at least five minutes after disconnecting power. Verify that the DC Bus voltage is at a safe level by measuring the voltage between positive (+)

and negative (-) on Terminal Block X2, Labeled 'lade'. Check for zero volts at Terminals X50:21-29 before continuing.

- b. Disconnect the motor from the AFD.
- c. Power up the AFD 501.
- d. Set the HAND-OFF-AUTO switch to HAND to issue a start command. The Run Status indicator on the LCD Display displays the symbol "I".  
Turn speed pot fully clockwise. Frequency display should show 60 Hz.
- f. Press (Up Arrows) or (Down Arrows) to scroll through and check the Operating Data parameters. Check that Operating Data parameter 7 (Output Voltage) is equal to the input voltage.
- g. Set the HAND-OFF-AUTO switch to OFF and the speed pot fully counterclockwise. If the drive operated according to these steps, disconnect and lockout power to the AFD to prepare for the next test.
- h. If the drive does not operate according to these steps, proceed with fault tracing as recommended by manufacturer.

## 1.67 DUAL DUCT SYSTEM

### 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.

1.68 FUME HOOD

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

1.69 CHILLER, 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.

1.70 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.
- (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.

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

1.71 [ROLL FILTER](#)

- A. Check operation of advanced mechanism monthly.
- B. Replace filter roll as required.

1.72 [HOT WATER BOILER, 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.

C. 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 manufacturers instructions.

1.73 [SEWAGE PUMP](#)

- A. Perform routine maintenance monthly.
- B. Check level control operation yearly.

1.74 [CENTRIFUGAL FILTRATION UNIT](#)

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

1.75 [CHEMICAL POT FEEDERS](#)

- A. Provide chemicals and add as required by manufacturer.

1.76 [ELECTRIC HOT WATER BOILERS](#)

A. FALL — START-UP ANDMONTHLY 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.

1.77 [CHILLER, 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 — SPRING START-UP

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

1.78 [GLYCOL MAKE-UP UNIT](#)

- A. Check operation of pump control monthly. Insure system pressure is maintained.
- B. Replenish glycol as required.
- C. If unusual amount of make-up is noted, notify Owner so leak can be repaired.

1.79 [SLAB MOUNTED HVAC UNIT](#)

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

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.

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 fire stat.
- (3) Check burner orifices and clean if necessary.
- (4) Clean igniter and flame rod and examine porcelain for cracks.

#### 1.80 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 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.

#### 1.81 SELF CONTAINED FAN COIL UNIT/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.
- (4) Replace filters as required.

#### 1.82 DUCT HEATER, 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 TECHNICAL SPECIFICATIONS

