

## **Scheduled Maintenance Requirements Attachment, A**

College reserves the right to remove all contract personnel not adhering to LOTO and/or failing to meet the minimum requirements as outlined in the description of contractor responsibilities.

### **AIR COOLED CHILLER**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **ANNUAL MAINTENANCE** - Once a year a thorough preventive maintenance schedule will be performed including the following:
  - A. Leak check as required.
  - B. Detailed inspection of condenser.
  - C. Check condition of compressor contactors for wear, pitting, etc.
  - D. Check safety controls.
  - E. Meg compressor motor. Record readings.
  - F. Check and tighten electrical connections.
  - G. Tighten motor terminals and control panel terminals.
  - H. Check oil heater and heater operation.
  - I. Visually inspect condenser fans.
  - J. Check freeze protection if applicable
  - K. Check diagnostic alarms and programming, if applicable.
  - L. Report any deficiencies noted to customer.
  
2. **SCHEDULED PREVENTATIVE MAINTENANCE** – One inspections during the operating season will be made and include:
  - A. Check diagnostic alarms and programming if applicable.
  - B. Record operating log of temperatures, pressures, voltages and amperages.
  - C. Check compressor operation.
  - D. Take oil sample and have analyzed for acid, moisture and wear metals content, if applicable (One time per year)
  - E. Check customers log with operator discuss operation of the machine.
  
3. **COIL CLEAN** –Clean condenser coils once per year.
  
4. **START-UP** - Customer to schedule.
  - a. Check diagnostic alarms and programming if applicable.
  - b. Record operating log of temperatures, pressures, voltages and amperages.
  - c. Check compressor operation.
  - d. Check customers log with operator discuss operation of the machine.

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## **WATER COOLED MACHINES**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **SCHEDULED ANNUAL MAINTENANCE** - One time a year a thorough preventive maintenance schedule will be performed including the following:

- A. Leak check.
- B. Check condenser tubes contingent upon condenser isolation valves holding.
- C. Check condition of compressor contactors for wear, pitting, etc.
- D. Check safety controls.
- E. Check chilled water and condenser flow switches
- F. Meg compressor motor. Record readings.
- G. Check and tighten electrical connections.
- H. Tighten motor terminals and control panel terminals.
- I. Check oil heater and heater operation.
- J. Check freeze protection if applicable
- K. Check diagnostic alarms and programming, if applicable.
- L. Report any deficiencies noted to customer.

2. **SCHEDULED PREVENTATIVE MAINTENANCE** – One inspection during the operating season will be made and include:

- A. Check diagnostic alarms and programming if applicable.
- B. Record operating log of temperatures, pressures, voltages and amperages.
- C. Check compressor operation.
- D. Take oil sample and have analyzed for acid, moisture and wear metals content, if applicable  
(One time per year)
- E. Check customers log with operator discuss operation of the machine.

3. **CONDENSER TUBES** – Brush condenser tubes one time per year

4. **START-UP** - Customer to schedule.

- a. Check diagnostic alarms and programming if applicable.
- b. Record operating log of temperatures, pressures, voltages and amperages.
- c. Check compressor operation.
- d. Check customers log with operator discuss operation of the machine.

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## CENTRIFUGAL CHILLERS

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **ANNUAL MAINTENANCE** - Once a year a thorough preventive maintenance Schedule will be performed including the following:
  - A. Clean oil strainer; replace oil filter and gasket.
  - B. Leak check chiller if high purge minutes are present, and report conditions to owner.
  - C. Detailed inspection of purge system, including filter change. Service the purge as recommended  
by the manufacturer.
  - D. Clean contacts and check condition of contacts for wear, pitting, etc.
  - E. Check and calibrate safety controls.
  - F. Check chilled water and condenser flow switches
  - G. Meg compressor motor. Record resistance readings.
  - H. Check and tighten all electrical connections
  - I. Tighten motor terminals and control panel terminals.
  - J. Check oil heater leads, amp draw, and record oil temperature
  - K. Check operation of vane actuator and vanes.
  - L. Check diagnostic alarms and programming, if applicable
  - M. Check programming and diagnostic of VFD starter if applicable
  - N. Check electrical connections of VFD drive
  - O. Report any unit deficiencies to customer's representative
2. **SCHEDULED PREVENTATIVE MAINTENANCE** - One inspection during the operating season will be made and include:
  - A. Check readings of safety controls in panel and record readings.
  - B. Complete operating logs.
  - C. Check refrigerant charge and oil levels.
  - D. Run purge unit and check for proper operation.
  - E. Check starter operation, voltage and current.
  - F. Check operation of lubrication system including oil pump and oil pressure regulator.
  - G. Report any deficiencies to customer
  - H. *Take oil sample and have analyzed for acid, moisture and wear metals content, one time per year***
  - I. Provide a written report to customer's representative
3. **CONDENSER TUBES** – Brush condenser tubes one time per year contingent on water isolation valves holding
4. **START-UP** - Customer to schedule.
  - a. Check diagnostic alarms and programming if applicable.
  - b. Record operating log of temperatures, pressures, voltages and amperages.
  - c. Check compressor operation.
  - d. Check customers log with operator discuss operation of the machine.

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### **COOLING TOWER**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

#### **1. SEASONAL START-UP:**

- A. Clean debris from platform and surrounding area.
- B. Clean water sump and check condition.
- C. Clean float valve assembly and adjust for proper operation.
- D. Check and clean bleed off line and overflow.
- E. Clean tower strainers.
- F. Clean tower spray nozzles and eliminators.
- G. Flush cooling tower and cleaning.
- H. Check sump heaters and thermostats for calibration and operation.
- I. Check and adjust fan belts.
- J. Fill system after cooling tower has been cleaned.
- K. Check for leaks.
- L. Lubricate fan and motor bearings per manufacturer's recommendations.
- M. Check oil level in gear reducer per manufacturer's recommendations
- N. Check amperage on motors.
- O. Check VFD and programming
- P. Inspect electrical connections, contactors, relays and operating safety controls.
- Q. Meg compressor motor >10HP. Record resistance readings.

#### **2. SCHEDULED PREVENTATIVE MAINTENANCE:** One inspection during the operating season will be made to include:

- A. Inspect fan, motor and belts.
- B. Check oil level in gear reducer.
- C. Check intake strainer, bleed and overflow.
- D. Check VFD and operation
- E. Check operating conditions. Adjust as required.

### **SEASONAL PUMP MAINTENANCE**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

#### **1. SEASONAL START-UP**

- A. Clean pump strainers; contingent on isolation valves holding.
- B. Lubricate pump bearings.
- C. Lubricate motor bearings.
- D. Tighten all nuts and bolts. Check motor mounts and vibration pads (Replace and adjust as required).
- E. Visually check pump alignment and coupling.
- F. Check motor operating conditions.
- G. Inspect electrical connections and contactors.
- H. Inspect mechanical seals or pump packing. Adjust as required.
- I. Run pumps and check operation.
- J. Meg compressor motor >10HP. Record resistance readings.(Annual)
- K. Check VFDs (Adjustable Frequency Drives) if so equipped.

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2. **SCHEDULED PREVENTATIVE MAINTENANCE** – 3000 Hour inspection during the operating season

### **PUMP MAINTENANCE**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **SCHEDULED PREVENTATIVE MAINTENANCE** – Quarterly inspection.
  - A. Clean pump strainers; contingent on isolation valves holding.
  - B. Lubricate pump bearings.
  - C. Lubricate motor bearings.
  - D. Tighten all nuts and bolts. Check motor mounts and vibration pads (Replace and adjust as required).
  - E. Visually check pump alignment and coupling.
  - F. Check motor operating conditions.
  - G. Inspect electrical connections and contactors.
  - H. Inspect mechanical seals or pump packing. Adjust as required.
  - I. Run pumps and check operation.
  - J. Meg compressor motor >10HP. Record resistance readings.(Annual)
  - K. Check VFDs (Adjustable Frequency Drives) if so equipped.

### **VFD MAINTENANCE**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **ANNUAL MAINTENANCE** - Once a year a thorough preventive maintenance Schedule will be performed including the following:
  - A. Check condition of connections.
  - B. Check to be sure ventilation of drive is effective.
  - C. Check for acceptable temperature around drive controller.
  - D. Remove dust and debris from controller.
  - E. Check LED's for fault indication.
  - F. Check Motor Resistance
  - G. Observe relevant wave forms for best operation
  - H. Verify power supply tolerance

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### **REFRIGERANT MONITOR SERVICE**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

**SCHEDULED PREVENTIVE MAINTENANCE - ONE inspection during the operating season will be made and include**

- A. Check and tighten all electrical connections.
- B. Check chassis mounting in enclosure.
- C. Check operation of Clear Language Display.
- D. Check diagnostic alarms and programming.
- E. Replace sampling filter element/elements as sensing points.
- F. Visually check photo-acoustic sensing device.
- G. Check periodic re-zeroing if applicable.
- H. Clean unit including all printed circuit boards
- I. Check calibration with certified calibration kit

### **UNITARY EQUIPMENT**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **SCHEDULED PREVENTATIVE MAINTENANCE** – 1 annual inspection during the operating season will be made to include:
  - A. Check unit for refrigerant leaks.
  - B. Check controls and overloads.
  - C. Meg compressor motor >10HP. Record resistance readings.
  - D. Check main contactor; tighten all contactor terminals and check contacts.
  - E. Confirm oil level in compressor (where applicable).
  - F. Tighten motor terminals and controls panel terminals.
  - G. Check crankcase heater.
  - H. Verify external interlocks.
  - I. Lubricate fan bearings.
  - J. Inspect filters
  - K. Replace belt annually **Regardless** of condition and **align** motor
  - L. Confirm damper operation. Lubricate and adjust as required.
  - M. Check diagnostic alarms and programming, if applicable.
  - N. Make operating log of temperatures, pressures, voltages and amperages, etc.
  - O. Gas heat option.
    - 1 Check operation and calibration of gas train components.
    - 2 Confirm burner sequence of operation.
    - 3 Verify combustion blower and clean if required.
    - 4 Inspect heat exchanger.
    - 5 Verify operating controls.
  - P. Electric heat option.

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- 1 Inspect electrical connections and contactors.
  - 2 Confirm and calibrate all operating and safety controls.
  - Q. Heat pump option if applicable.
    - 1 Check reversing valve operation
    - 2 Check defrost operation
  - R. Check VFDs (Adjustable Frequency Drives) if so equipped.
  - S. Report any uncorrected deficiencies noted.
  - T. **COIL CLEAN –Clean condenser and Evaporator coils once per year.**
2. **SCHEDULED PREVENTATIVE MAINTENANCE** – 3 inspection(s) during the operating season in addition to the annual inspection will be made to include:
- A. Check coils
  - B. Check condensate pans
  - C. Check fan belt and tension
  - D. Check motor
  - E. Lubricate motor, if applicable
  - F. Check fan assembly
  - G. Lubricate bearing, if applicable
  - H. Check electrical connections
  - I. Check controllers
  - J. Check operation

### **AIR HANDLING Including EXHAUST FANS**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **SCHEDULED PREVENTIVE MAINTENANCE** - Once a year a thorough preventive maintenance schedule will be performed including the following:
  - A. Inspect coil, report condition.
  - B. Inspect drain pan and drain line.
  - C. Inspect fan wheels.
  - D. Inspect drive sheaves.
  - E. Replace belt annually **Regardless** of condition and **align** motor
  - F. Lubricate as required.
  - G. Check bearing and motor mounting.
  - H. Check motor operating voltage and amperages. Record readings.
  - I. Inspect Contactor for free operation
  - J. Clean starter and cabinet
  - K. Check diagnostic alarms and programming, if applicable.
  - L. Inspect filters
  - M. Check inlet vanes (where applicable) and dampers; adjust if necessary
  - N. Meg compressor motor >10HP. Record resistance readings.
  - O. Check VFDs (Adjustable Frequency Drives) if so equipped
  - P. **Clean condenser and evaporator coils once per year.**

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2. **SCHEDULED PREVENTATIVE MAINTENANCE** – 3 inspection(s) during the operating season in addition to the annual inspection will be made to include:
  - K. Check coils
  - L. Check condensate pans
  - M. Check fan belt and tension
  - N. Check motor
  - O. Lubricate motor, if applicable
  - P. Check fan assembly
  - Q. Lubricate bearing, if applicable
  - R. Check electrical connections
  - S. Check controllers
  - T. Check operation

### **PNEUMATIC TEMPERATURE CONTROL**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **SCHEDULED PREVENTIVE MAINTENANCE** - Once a year a thorough preventive maintenance schedule will be performed including the following:
  - A. Calibrate Major controls(Memorial Hall, Center for the Arts, Martin Luther, Walz Hall and Prosser Hall)
  - B. Check System operating sequences
  - C. Clean control Panel
  - D. Check Control air pressure at each system and location of lowest main air pressure. Adjust main PRV at compressed air system if necessary.
  - E. Visually check control valves for leaks
  - F. Check time clock settings and night and day settings
  - G. Inspect changeover control stations and record the mode system is in at time of inspection. Correct as necessary

### **Compressor**

- A. Check compressor run time
- B. Open Compressor drain valve and bleed off any water accumulated in tank
- C. Check air compressor pressure and final system pressure Adjust PRV if necessary
- D. Inspect compressor belts, and safety valves.(replace belts annually)
- E. Replace oil within the compressor(annually)
- F. Clean compressor tank, compressor , PRV and after filter(replace filter annually)
- G. Clean and Inspect the operation of refrigerated after cooler.
- H. Inspect filter and oil indicators, if available, for contamination
- I. Follow manufacturers recommended procedures for any other desiccant in use with system



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### **GLYCOL SYSTEMS**

**The following tasks are the minimum required services; any manufacturer recommended services not specifically mentioned below will also need to be included**

1. **SCHEDULED PREVENTIVE MAINTENANCE** - Once a year a thorough preventive maintenance schedule will be performed including the following.
  - A. Inspect pump system operation and controls
  - B. Clean electronic sensor
  - C. Document fluid level
  - D. Verify freeze point and document

### **DX COOLING SYSTEMS SYSTEMS**

1. **ANNUAL MAINTENANCE** - Once a year a thorough preventive maintenance schedule will be performed including the following:
  - A. Check unit charge, Leak check as required
  - B. Detailed **cleaning** and inspection of condenser and evaporator.
  - C. Check condition of compressor contactors for wear, pitting, etc.
  - D. Check safety controls.
  - E. Meg compressor motor (over 10 tons and Record readings).
  - F. Check and tighten electrical connections.
  - G. Tighten motor terminals and control panel terminals.
  - H. Check crankcase heater and heater operation.
  - I. Visually inspect condenser and evaporator fans.
  - J. Check low ambient operation if applicable.
  - K. Check diagnostic alarms and programming, if applicable.
  - L. Report any deficiencies noted to customer.
  - M. Inspect condensate drain or pump, and repair if applicable.