PART 2 PRODUCTS

1.01 CHILLER APPLICATIONS
   A. Chiller CH-1: Air-Cooled.
      1. Evaporator:
      2. Packaged Air-Cooled Condenser:

1.02 CHILLERS
   A. Chillers: Factory assemble and test module consisting of compressor(s), compressor motor(s),
      evaporator, condenser, enclosure, refrigeration circuits(s) and specialties, interconnecting
      piping, water circuit isolation valves, starters, and microprocessor-based controls.
      5. Products Requiring Electrical Connection: Listed and classified by Underwriters
         Laboratories Inc. or testing firm acceptable to the Authority Having Jurisdiction as suitable
         for the purpose specified and indicated.
      7. Enclosures:
         a. Frame:
            1) Heavy gage steel.
            2) Factory painted finish.
         b. Steel Chiller Cabinets:
            1) Factory baked on enamel finish.
         c. Electrical Equipment: NEMA 250 or UL 1995 as applicable.
      8. Motors: UL 984. See Section 23 0513 for additional requirements.

1.03 COMPRESSORS AND EVAPORATOR
   A. Compressors: Hermetic scroll type.
      1. Module: Fully hermetic with two, direct drive compressors, adequate valve types and
         specialties required for operation and servicing in accordance with manufacturer's
         recommendations.
      3. Oil Lubrication System: Initial oil charge, oil pump, oil level sight glass, and oil charging
         valve.
      4. Capacity Reduction System: Compressor staging with duty cycling based on run time.
   B. Evaporator: Brazed plate type.
      1. Plate Material: 316 stainless steel.
      4. Provide with flanged connections.
      5. Insulation for all cold surfaces.
         a. Insulation is factory or field installed on evaporator, connections, and suction piping.
         b. 0.75 inches minimum thick, closed cell, expanded polyvinyl chloride, polyurethane, or
            Armaflex II insulation with a maximum k value of 0.28.
      6. Provide factory or field installed vents and water drain connections on evaporator or piping.
      7. Provide factory or field installed fittings for temperature control sensors on evaporator or
         piping.

1.04 AIR-COOLED CONDENSER AND FANS
   A. Provide finned-tube type.
1. Mechanically bond aluminum fins to copper tubing and protect with corrosion resistant materials or coatings.
2. Clean, dehydrate and test.
3. Leak Test: 650 psig minimum.

B. Coil Guards: Provide corrosion proof, heavy gage wire panels, factory installed. Provide coil protection for shipping by enclosing entire condenser coil with heavy plastic to prevent coil damage during shipping or rigging.

C. Fans and Motors:
1. Fans: Dynamically balance propeller, shrouded-axial, or airfoil type fans of reinforced polymer or glass fiber reinforced composite corrosion resistant construction equipped with sealed, permanently lubricated ball bearings.
2. Discharge Fan Guards: Corrosion resistant, heavy gage, steel wire.
4. Motors: Direct drive, totally enclosed for outdoor use with current overload protection.

1.05 REFRIGERATION CIRCUITS
A. Provide two independent refrigeration circuits with one compressor per circuit.
B. Provide liquid line shut-off valve, filter-drier, thermal expansion valve, refrigerant relief device, and compressor discharge check valve for each independent circuit.

1.06 INTEGRATED MICROPROCESSOR BASED DDC CONTROLS PACKAGE
A. Pre-wire, assemble, factory mount, and test operating and safety control system consisting of a digital display or gages, on-auto-off switch, motor starting contactors, disconnect switches, power and control wiring. Provide controls, monitoring, programmable set-points, alarms, and BAS as defined below:
1. Automatic Adjustable Operating Controls:
   a. Allow system start-up and system operation at all outdoor air temperatures down to ________ degrees F.
   b. Temperature of chilled water leaving chiller.
   c. Number of compressor circuits required to operate based on set-points and system load.
   d. Compressor short-cycling prevention.
   e. Lead/lag operation for compressors. New lead compressor selected every 24 hours to equalize run time.
   f. Automatic reset on power source failure.
   g. Load limiting.
   h. Sequencing of condenser fans.
2. Normal Operation Monitoring and Open Cover-less Displays:
   a. Hours of operation.
   b. Suction and discharge refrigerant pressures.
   c. Automatic diagnostics.
   d. Number of starts.
   e. On/off compressor status.
   f. Entering and leaving chilled water temperatures.
   g. Status of operation.
   h. Compressor winding temperature.
   i. Suction temperature.
   j. Oil pressure.
3. Set-Points:
   a. Leaving chilled water temperature.
   b. Date/time.
4. Automatic Chiller Shut-Down Safety Controls and Alarm:
   a. Automatic Reset:
      1) Chilled water flow interlock.
2) Voltage protection (over/under).
3) Phase reversal protection.

b. Manual Reset:
   1) Low suction pressure.
   2) High motor winding temperature.
   3) Low chilled water temperature.
   4) Low chilled water flow.
   5) High condenser refrigerant discharge pressure.
   6) Motor current overload and phase loss.
   7) Low oil flow.


5. Building Automation System (BAS) Communications via Shielded Cable:
   a. Minimum Data Transmission to BAS:
      1) All system operating conditions.
      2) Capacity control information.
      3) Safety shutdown conditions.

   b. Minimum Operating Commands from BAS:
      1) Remote unit start/stop.
      2) Remote chilled water reset.

END OF SECTION 23 6429