

SECTION 15626 – PROCESS WATER CHILLERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. Furnish and install high efficiency packaged electric chillers with remote air-cooled condensers.
- B. The system shall be complete with compressor, condenser and evaporator sections.
- C. The units shall be installed in accordance with all local and State codes.

1.3 RELATED SECTIONS

- A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.4 REFERENCES

- A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.
 - 1. ANSI/ARI 550/590- Standard for Water Chilling Packages using the Vapor Compression Cycle
 - 2. ASHRAE 15 – Safety Code for Mechanical Refrigeration
 - 3. ASHRAE 90.1 – Energy Efficient Design of New Buildings
 - 4. ASHRAE 90.2 – Energy Efficient Design of New Low-Rise Residential Buildings
 - 5. ASME (BPV VIII, 1) – Boiler and Pressure Vessel Code, Section VIII, Division 1 – Rules for Construction of Pressure Vessels; 1995.
 - 6. NEMA MG1 – Motors and Generator.
 - 7. UL 465 – Central Cooling Air Conditioners.
 - 8. ANSI/AFBMA 9- Load Ratings and Fatigue Life for Ball Bearings. Bearings must have life of not less than L10 200,000 hours.
- B. Material standards shall be as specified or detailed hereinafter and as follows:

9. ASTM B117 - Standard Method of Salt Spray (Fog) Testing
10. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
11. ASTM A525 - Zinc (Hot-Dip Galvanized) Coatings on Sheet Steel Products
12. ASTM D1654 - Evaluation of Painted or Coated Specimens, Subjected to Corrosive Environments

1.5 SUBMITTALS

- A. See Section 15050 and General Conditions for Additional Requirements.
- B. Product Data: Provide rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.
- C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances and location and size of field connections. Indicate equipment, piping and connections, valves, strainers and thermostatic valves required for complete system.
- D. Test Reports: Indicate energy input versus cooling load output from 0 to 100 percent of full load.
- E. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- F. Manufacturer's Certificate: Certify that components of package not furnished by manufacturer have been selected in accordance with manufacturer's requirements.
- G. Operation and Maintenance Data: Include start-up instructions, maintenance data, parts lists, controls and accessories. Include trouble-shooting guide.
- H. Product data shall be submitted for approval as follows:
 1. Water chiller, remote condenser and accessories.
 2. All other auxiliaries.
 3. Full load and part load performance data by manufacturer's computer.
- I. The chiller manufacturer shall provide to the Owner the following: A complete set of installation drawings, wiring diagrams and instructions for the equipment, the manufacturer's installation instructions, plus catalog indicating recommended wiring, piping, etc.
- J. The electrical connections shown on the electrical design drawings are based upon a single manufacturer. Additional electrical requirements for other manufacturers for pumps, controls, etc., shall be the responsibility of the HVAC Contractor to coordinate and carry the additional cost to furnish and install all electrical equipment necessary to provide a complete operable system. Additional charges to the Owner will not be acceptable for substitute equipment.
- K. Chillers shall be factory performance tested.

- L. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years of documented experience.
- B. Provide certification of inspection for conformance to requirements of authority having jurisdiction.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE AND PROTECTION

- A. Comply with manufacturer's installation for rigging, unloading and transporting units.

1.8 MAINTENANCE SERVICE

- A. Provide service and maintenance of chillers for a period of one (1) year from Date of Substantial Completion, including a minimum of three (3) preventative maintenance visits by a factory authorized service agent.

1.9 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ARI 550/590-98 Standard for testing and certified rating of Water Chilling Packages using the Vapor Compression Cycle.
- B. Conform to ANSI/UL 1995 code for construction of water chillers. In the event the unit is not UL approved, the manufacturer shall, at his expense, provide for a field inspection by an UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative.
- C. Conform to ANSI/ASME SEC 8 Boiler and Pressure Vessel Code for construction and testing of water chillers.
- D. Conform to ANSI/ASHRAE 15 code for construction and operation of water chillers.

1.10 STORAGE AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Protect units from physical damage. Factory coil shipping covers shall be kept in place until installation.
- C. Unit controls shall be capable of withstanding 203 Deg F (95 Deg C) storage temperatures in the control compartment for an indefinite period of time.

1.11 WARRANTY

- A. A parts warranty for one year from date of start-up shall be provided at no additional cost.
- B. A 5-year Parts and Labor Warranty shall be provided on any reciprocating compressor.

PART 2 - PRODUCTS

2.1 PROCESS CHILLER SYSTEMS

- A. Provide a closed loop process chiller system as shown on the Drawings and as herein specified with the capacity to remove 150,000BTU/Hr of heat while recirculating water at 45 degrees F, at a flow rate of 30 GPM/40 psi. Chiller shall be Filtrine Model TPCP-1000-122AR-RED equipped with dual 10 HP compressors, dual circuit remote air cooled condenser, dual 1-1/2 HP pumps, stainless steel cooling tanks and evaporators, piping and controls for automatic operation. Chiller shall be capable of operating independently at half capacity on one refrigeration system while the other system is shut down for maintenance or repair and shall be capable of automatic switching to emergency back up cooling when required. Chiller shall include UL label. Chiller shall be manufactured by Filtrine Manufacturing, Keene, NH or approved equal.
- B. Condensing Unit and Controls
 - 1. Refrigeration system shall consist of dual 10 HP lifetime lubricated hermetic compressors designed to handle the varied operational load requirements of the system. Refrigeration system shall pump down and shut off during no load conditions to minimize energy consumption. Compressors shall operate on a lead/lag basis controlled by a 7 day time clock automatically alternating lead/lag refrigeration systems. A Remote/Local Start-Stop switch shall be provided to enable remote operation of chiller. Each compressor shall be equipped with it's own receiver and will utilize one circuit of the dual circuit, fan cooled remote condenser. Each refrigeration circuit will be supplied with high/low pressure stat, adjustable thermostat with temperature stability of $\pm 1.5^{\circ}\text{F}$ and variable differential, pump down solenoid valve, thermostatic expansion valve, suction

accumulator, vibration isolators, refrigerant sight glass and dehydrator. Hot gas bypass will not be accepted. Remote air cooled condenser and controls shall be properly protected against moisture, wind, and low ambient conditions to - 20 deg. F. Remote condenser shall be capable of removing the indicated heat load in 100 deg. F. ambient. Remote condenser shall be Filtrine Model WCS-022.

2. Provide the following options:
 - a. Low flow interlock with dry contact – flow switch lights a warning light if flow rate drops below safe flow limit – initiates automatic switchover to back up pump. If low flow condition continues, system shall activate back-up city water cooling for cryo-compressors at MRI.
 - b. High temperature interlock with dry contact – thermostat lights a warning light if cooling temperature rises above safe high limit.
 - c. Lead/Lag pump/refrigeration system selector switch.

C. Cooling Tank

1. The cooling tanks shall be welded stainless steel and designed for 125 pound working pressure. Tanks shall have a minimum volume of 100 gallons of storage to help increase energy efficiency during minimal load conditions. Tanks shall be equipped with immersion type 0.049” wall stainless steel evaporator cooling coils (shell and tube evaporators or open tanks with float valves not acceptable). Storage tanks shall be supplied with drain connection and insulated with closed cell thermo-elastomer, with R factor of 3.7.

D. Circulating Pumps

1. Chiller shall be supplied with dual pumps designed to operate on a lead/lag basis and will be controlled by a 7 day time clock. Pumps shall automatically switch from Lead to Lag on a Low Flow condition and will activate a Pump Failure indication on the control panel. Failure of the secondary pump shall activate the Automatic Switchover to the emergency back up city water system and activate the City Water indicator on control panel. Pumps shall be 1-1/2 HP stainless steel, centrifugal type mounted on rubber pads over stainless steel condensation trays and supplied with unions, service valves and a bypass regulating valve.

E. Refrigerant/Gauges

1. Gauges with dampeners or shut off valves shall be flush mounted on exterior of cabinet to indicate refrigerant head and suction pressures. Refrigerant shall be a HFC-507.

F. Failsafe Operation

1. Chiller shall be supplied with an integral Automatic Switchover system to city water on pump(s), compressor(s) or power failure. Switchover system to include normally open solenoids for city water and drain lines, High Temperature sensor and Low Flow Switch. Activation of the system by a Low Flow or High Temperature condition will cause the chiller to simultaneously shut down while opening city water supply and drain line

solenoids. Supply and drain line solenoids shall open upon power failure to insure uninterrupted cooling of critical equipment.

G. Alarms and Indicators

1. Chiller shall be equipped with High Temperature, Low Temperature, Low Flow, City Water On and Pump Failure interlocks with alarm condition indicator lights on control panel and dry contacts for connection to remote building monitoring system. Chiller shall also be supplied with Dial Thermometers and Pressure Gauges on chilled water supply, chilled water return, city water supply and city water return lines and shall be flush mounted on exterior of chiller cabinet above control panel.

H. Cabinet

1. Cabinet shall be constructed of 18 gauge white enameled aluminum panels on a welded galvanized steel angle frame, stainless steel corner legs and top. Panels shall be removable without tools for access to all components.

I. Quick Connect Panel QCP -3/4

1. Provide a pre-piped and pre wired quick connect panel to function as an interface between the chiller package and the cryo-compressor to be cooled. Quick Connect Panel shall include the following items:
 - a. Supply and return water temperature gauges
 - b. Supply and return water pressure gauges
 - c. Solenoid valves for city water and drain connection
 - d. Water flow meter
 - e. 50 micron bag filter

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install chiller and Quick Connect Panel in accordance with manufacturer's installation instructions.
- B. Install chiller and Quick Connect Panel plumb and level, firmly anchored, and maintain manufacturer's recommended clearances for servicing and maintenance.

3.2 PIPING CONNECTIONS

A. Piping installation requirements are specified in other sections of Division 15. The Drawings indicate the general arrangement of piping, fittings, and specialties. The following are additional connection requirements:

1. Install piping adjacent to machine to allow servicing and maintenance.
2. Chilled Water Piping: Connect inlet and outlet with, shutoff valve and union. or flange. Insulate as required.
3. Mount and pipe "Quick Connect Panel" as shown on the plans.
4. Refrigerant piping to remote condensers shall be leak checked and evacuated prior to arranging for start-up. Contractor shall have on hand sufficient refrigerant to compensate for length of piping run.

3.3 ELECTRICAL CONNECTIONS

A. Electrical installation requirements are specified in Div.16. The following are additional connection Requirements:

1. Control wires, (115V) shall be wired between the outdoor chiller and indoor Quick connect Panel.
2. Main power disconnect switch is to be provided for chiller and mounted in accordance with local codes.

3.4 DEMONSTRATION

A. Provide the services of a factory authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below.

B. Start-up Service:

1. Factory Authorized Start-up Agent will balance, leak check, test and adjust controls, safeties and pumps in accordance with manufacturer's recommendations. Agent shall replace damaged or malfunctioning controls and equipment as required.

C. Training:

1. Train the Owner's maintenance personnel on start-up and shut- down procedures, troubleshooting procedures, and servicing and preventative maintenance schedules and procedures. Review with the Owner's personnel, the data contained in the Operating and Maintenance Manuals specified in PART 1 of this Section and in Division One.
2. Schedule training with Owner through the Architect/Engineer with at least 7 days prior notice.

END OF SECTION