

## SECTION 23 62 00

### PACKAGED COMPRESSOR AND CONDENSER UNIT

#### **PART 1 GENERAL**

##### **1.01 COMPLIANCE**

- A. Comply with Colorado Department of Health Regulation 15 and all applicable EPA rules and regulations regarding the purchase, disposal and handling of refrigerants.

##### **1.02 SUBMITTALS**

- A. Product Data:
  - 1. Component and accessories list.
    - a) Include mounting information.
  - 2. Ratings and nameplate information.
    - a) Include unit capacity, entering and leaving water temperatures, ambient air temperature, electrical connection requirements, clearances, unit weight.
- B. Quality Assurance Data:
  - 1. Certified production test reports or mill test reports.
  - 2. Test reports for previous design, and documentation showing previous design ratings and configurations.
- C. Project Record Documents:
  - 1. Shop Drawings:
    - a) Certified elevation and outline drawings with dimensions.
    - b) Certified plan view drawings with dimensions.
    - c) Wiring and termination drawings.
- D. Operation and Maintenance Data:
  - 1. Operating and maintenance procedures.
  - 2. Complete set of manufacturers drawings.
  - 3. Complete documentation of inspections and tests performed, including any logs, curves, and certificates. Documentation shall note any replacement of equipment or components that failed during testing.
  - 4. Spare parts lists.
  - 5. Data sheets updated to reflect field installation conditions.

##### **1.03 WARRANTY**

- A. Provide compressor warranty information.

##### **1.04 COMMISSIONING**

- A. Require that a factory representative be employed for start-up of chiller.

##### **1.05 COMPRESSOR REQUIREMENTS**

- A. Compressors Over 100 ton Capacity:
  - 1. Motors and Starters:
    - a) Dual winding, wye-delta design with matching two-step, closed transition, time-delay starting switchgear is preferred. (An auxiliary timer in the starting circuit is required.)
    - b) Specify that timer be set to limit starts to a minimum of 30 minutes apart, or greater as recommended by the manufacturer.
    - c) An auto-transformer with reduced voltage start is an acceptable alternate starter.

- d) All motors shall have heat sensors in the windings for thermal protection.
- 2. Full-running Protection:
  - a) Specify compressors equipped with high- and low-pressure safety cutouts, external overload protection, inherent thermal protection, and low oil pressure.
  - b) Manual reset-type safeties which cause an electrical lock-out of the starting circuit when it has tripped, with an indication of which safety device has operated.
- 3. Gauges and Lubrication:
  - a) Compressor package to include gauges indicating high side, low side and oil pressures. Not required if unit is equipped with microprocessor control that shows pressure at control panel.
  - b) Forced-feed lubrication system with filter, cooler and visual inspection port in the oil reservoir.
- 4. Heaters:
  - a) Specify crankcase heaters wired on a separate electrical circuit.
  - b) Specify oil pump starter wired on a separate electrical circuit.
- 5. Refrigerant Transfer:
  - a) Unit should have provisions for pump out/down into unit-mounted receiver if application warrants it. (DPS authorization is required for exception).
- 6. Pressure Relief:
  - a) Show on drawings safety valve pressure relief piping vented to outdoors in accordance with ANSI/ASHRAE Standard 15-78. Pressure relief valves shall be self-closing, resealing type.
- 7. Hail Guards:
  - a) Specify hail guards to protect exposed coils in unit (DPS authorization required for exception).
- B. Compressors of 60 to 100 ton Capacity:
  - 1. Semi-hermetic, reciprocating-type, helical rotor or scroll.
  - 2. Full running protection as described for larger compressors.
  - 3. Suction, discharge and oil pressure gauges.
  - 4. Crankcase heaters.
  - 5. Oil reservoir sight glass.
  - 6. Replaceable refrigerant filter dryers in liquid line.
  - 7. Hydraulic capacity control by cylinder unloading for adjustments to load fluctuations.
  - 8. Positive unloaded start.
  - 9. An adequate discharge muffler.
  - 10. Internal vibration isolation to provide minimum vibration transmission.
  - 11. Closed-transition starting switchgear, determined by the electrical requirements for the particular sizes of motors. Part-winding start is acceptable.
  - 12. As described on larger air-cooled units, specify a receiver on the condenser and provisions for pumping the full refrigerant charge into the receiver. If condenser will hold the full charge, this is an acceptable alternative.
  - 13. Extended five (5) year warranty on compressor(s).
- C. Compressors under 60 but over 15 ton Capacity:
  - 1. Hermetic or semi-hermetic reciprocating, scroll or helical rotor.
  - 2. Inherent thermal overload protection for motors.
  - 3. Suction, discharge and oil pressure gauges.

4. Crankcase heaters.
  5. Oil reservoir sight glass.
  6. Replaceable refrigerant filter-dryers.
  7. Hydraulic capacity control by cylinder unloading or staging of multiple compressors.
  8. Positive unloaded start.
  9. Adequate discharge muffler.
  10. Internal vibration isolation.
  11. Closed-transition starting switchgear determined by the electrical requirements for the particular sizes of motors.
  12. A receiver on the condensers and provisions for pumping the full refrigerant charge into the receiver. If condenser will hold the full charge, this is an acceptable alternative.
  13. Extended five (5) year warranty on compressor(s).
- D. Compressors between 7-½ and 15 ton Capacity:
1. Same requirements as 15 to 60 ton compressors, except that cylinder unloading and unloaded start features are not required on these units.
- E. Compressors below 7-½ tons Capacity:
1. Same requirements as 7-½ to 15 ton compressors, except that gauges are not required.

## **PART 2 PRODUCTS**

### **2.01 RECIPROCATING COMPRESSORS (HERMETIC)**

- A. Acceptable Manufacturers:
1. Bristol
  2. Carrier
  3. Copeland
  4. Tecumseh
  5. Trane
  6. York
- B. Unit performance certified in accordance with latest edition of ARI Standard 520.
- C. Unit construction in accordance with ANSI B9.1 Safety Code.
- D. Factory-wired control panel in accordance with NEC.

### **2.02 RECIPROCATING COMPRESSORS (OPEN DRIVE)**

- A. Acceptable Manufacturers:
1. McQuay
  2. Carrier
  3. Trane
  4. York

### **2.03 WATER-COOLED CONDENSING PACKAGED UNITS**

- A. Acceptable Manufacturers
1. Carrier
  2. McQuay
  3. Trane

- 4. York
- B. Unit performance certified in accordance with latest edition of ARI Standard 520.
- C. Unit construction in accordance with ANSI B9.1 Safety Code and ASME Code.
- D. Factory-wired control panel in accordance with NEC.
- E. Connect to Integrated Building Automation System. Refer to Section 25 50 00 – Integrated Building Automation System (IBAS) for interface requirements.

**2.04 WATER-COOLED RECIPROCATING CHILLER (REMOTE CONDENSER)**

- A. Acceptable Manufacturers:
  - 1. Carrier
  - 2. Trane
  - 3. York
  - 4. McQuay
- B. Unit performance certified in accordance with latest edition of ARI Standard 590.
- C. Unit construction in accordance with ANSI B9.1 Safety Code and ASME Code.
- D. Factory-wired control panel in accordance with NEC.
- E. Connect to Integrated Building Automation System. Refer to Section 25 50 00 – Integrated Building Automation System (IBAS) for interface requirements.
- F. Units UL-listed and CSA certified.

**2.05 WATER-COOLED CONDENSERS**

- A. Acceptable Manufacturers:
  - 1. Carrier
  - 2. Trane
  - 3. York
  - 4. McQuay
- B. Unit performance certified in accordance with latest edition of ARI Standard 450.
- C. Unit construction in accordance with ANSI B9.1 Safety Code and ASME Code.
- D. Factory-wired control panel in accordance with NEC.
- E. Connect to Integrated Building Automation System. Refer to Section 25 50 00 – Integrated Building Automation System (IBAS) for interface requirements.

**2.06 VALVES**

- A. Isolation valves shall be provided by manufacturer in order to allow servicing of major refrigerant components (e.g., compressor, receiver, condenser, filter-dryer, expansion valve) with no loss of refrigerant; the filter dryer shall have a three-valve arrangement with bypass.

**PART 3 EXECUTION**

**3.01 DEMOLITION:**

- A. All refrigerant be removed, recovered and reclaimed prior to demolition of any equipment containing refrigerant, such as rooftop units, split-system condensing units, air conditioning units and chillers. Specify that Contractor notifies DPS HVAC shop supervisor prior to commencing demolition work. DPS personnel will either remove refrigerant from equipment or direct contractor to remove refrigerant. All handling of refrigerant will be by certified refrigeration technicians, approved by the U.S. EPA.

**3.02 INSTALLATION**

- A. Chillers:

1. Install water chillers on concrete base. Concrete materials and installation requirements are specified in Division 3.
  2. Vibration Isolation: Mount water chiller on vibration isolation equipment base as specified in Specification Section 15240 Mechanical Sound and Vibration Control.
  3. Maintain manufacturer's recommended clearances for service and maintenance.
  4. Charge water chiller with refrigerant if not factory charged.
  5. Install separate devices furnished by manufacturer.
- B. Condensers:
1. Select air-cooled condensers with sufficient capacity to compensate for altitude deration of 5,400 feet and 105°F inlet air temperature.
  2. Vertical blow-type condenser fans shall not be specified for systems that are operated during winter.
  3. A horizontal blow with a weather-protecting shroud designed to prevent possible blade icing and unbalance during cold weather is required.
  4. Orient fans to discharge eastward where practicable.

### **3.03 STARTUP SERVICE**

- A. Engage a factory-authorized service representative to perform startup service.
- B. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
- C. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
  1. Verify that refrigerant charge is sufficient and water chiller has been leak tested.
  2. Verify that pumps are installed and functional.
  3. Verify that thermometers and gages are installed.
  4. Operate water chiller for run-in period according to manufacturer's written instructions.
  5. Check bearing lubrication and oil levels.
  6. Verify that refrigerant pressure relief is vented outside (for water-cooled water chillers).
  7. Verify proper motor rotation.
  8. Verify static deflection of vibration isolators, including deflection during water chiller startup and shutdown.
  9. Verify and record performance of water chiller protection devices.
  10. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
- D. Prepare a written startup report that records results of tests and inspections.
- E. Occupancy Adjustments: when requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose.
  1. Label the amount of refrigerant in the system in pounds, on each piece of equipment.

### **3.04 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train owner's maintenance personnel to adjust, operate, and maintain cooling towers. Refer to Division 1 Section Demonstration and Training.

**END OF SECTION 23 62 00**