

## SECTION 23 6213

### PACKAGED AIR-COOLED REFRIGERANT COMPRESSOR AND CONDENSER UNITS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Condensing unit package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Refrigerant piping connections.
- E. Motor starters.
- F. Electrical power connections.

##### 1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete bases.
- B. Section 22 0513 - Common Motor Requirements for Plumbing Equipment.
- C. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment: Placement of vibration isolators.
- D. Section 23 0513 - Common Motor Requirements for HVAC Equipment.
- E. Section 23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment: Placement of vibration isolators.
- F. Section 23 0993 - Sequence of Operations for HVAC Controls.
- G. Section 23 2300 - Refrigerant Piping.
- H. Section 23 7313 - Modular Central-Station Air-Handling Units.
- I. Section 23 8101 - Terminal Heat Transfer Units: Fan-coil units.
- J. Section 23 8200 - Convection Heating and Cooling Units: Air Coils.
- K. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

##### 1.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.
- B. AHRI 365 - Commercial and Industrial Unitary Air-Conditioning Condensing Units; 2009.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2013.
- D. ASHRAE Std 23.1 - Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units; 2010.
- E. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Addenda.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- G. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

##### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Include equipment served by condensing units in submittal, or submit at same time, to ensure capacities are complementary.
- C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing

condensing units, cooling coils, refrigerant piping, and accessories required for complete system.

- D. Design Data: Indicate pipe and equipment sizing.
- E. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- F. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.
- G. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.
- H. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

#### **1.05 QUALITY ASSURANCE**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

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

#### **1.07 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year warranty to include coverage for refrigerant compressors.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Carrier, a part of UTC Building and Industrial Systems, a unit of United Technologies Corp; \_\_\_\_\_: [www.carrier.com](http://www.carrier.com).
- B. Trane, a brand of Ingersoll Rand; \_\_\_\_\_: [www.trane.com](http://www.trane.com).
- C. York International Corporation/Johnson Controls, Inc; \_\_\_\_\_: [www.york.com](http://www.york.com).
- D. Substitutions: See Section 01 6000 - Product Requirements.

#### **2.02 PERFORMANCE REQUIREMENTS**

#### **2.03 MANUFACTURED UNITS**

- A. Units: Self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver, wind deflector, and screens.
- B. Construction and Ratings: In accordance with AHRI 210/240. Test in accordance with ASHRAE Std 23.1.
- C. Performance Ratings: Energy Efficiency Rating (EER) and Coefficient of Performance (COP) not less than prescribed by ASHRAE Std 90.1.

#### **2.04 CASING**

- A. House components in welded steel frame with galvanized steel panels with weather resistant, baked enamel finish.
- B. Mount starters, disconnects, and controls in weatherproof panel provided with full opening access doors. Provide mechanical interlock to disconnect power when door is opened.
- C. Provide removable access doors or panels with quick fasteners and piano hinges.

#### **2.05 CONDENSER COILS**

- A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits. Air test under water to 425 psig, and vacuum dehydrate. Seal with holding charge of nitrogen.

- B. Coil Guard: Expanded metal with lint screens.

## **2.06 FANS AND MOTORS**

- A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Equip with roller or ball bearings with grease fittings extended to outside of casing.
- B. Weatherproof motors suitable for outdoor use, single phase permanent split capacitor or 3 phase, with permanent lubricated ball bearings and built in current and thermal overload protection. Refer to Section 23 0513.

## **2.07 COMPRESSORS**

- A. Compressor: Semi-hermetic reciprocating type.
- B. Mounting: Statically and dynamically balance rotating parts and mount on spring vibration isolators.
  - 1. Internally isolate hermetic units on springs.
  - 2. Refer to Section 22 0548.
- C. Lubrication System: Reversible, positive displacement oil pump with oil charging valve, oil level sight glass, and magnetic plug or strainer.
- D. Motor: Constant speed 1800 rpm suction gas cooled with electronic sensor and winding over temperature protection, designed for across-the-line starting. Furnish with starter.
- E. Capacity Reduction Equipment: Suction valve unloaders, with lifting mechanism operated by electrically actuated solenoid valve, with unloaded compressor start; controlled from suction pressure.
- F. Sump Oil Heater: Evaporates refrigerant returning to sump during shut down. Energize heater continuously when compressor is not operating.

## **2.08 REFRIGERANT CIRCUIT**

- A. Provide each unit with one refrigerant circuit, factory supplied and piped. Refer to Section 23 2300.
- B. For each refrigerant circuit, provide:
  - 1. Filter dryer replaceable core type.
  - 2. Liquid line sight glass and moisture indicator.
  - 3. Thermal expansion valve for maximum operating pressure.
  - 4. Insulated suction line.
  - 5. Suction and liquid line service valves and gage ports.
  - 6. Liquid line solenoid valve.
  - 7. Charging valve.
  - 8. Discharge line check valve.
  - 9. Compressor discharge service valve.
  - 10. Condenser pressure relief valve.
- C. For heat pump units, provide reversing valve, suction line accumulator, discharge muffler, flow control check valve, and solid-state defrost control utilizing thermistors.

## **2.09 CONTROLS**

- A. On unit, mount weatherproof steel control panel, NEMA 250, containing power and control wiring, molded case disconnect switch, factory wired with single point power connection.
- B. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection. For each condenser fan, provide across-the-line starter with starter relay.
- C. Provide safety controls arranged so any one will shut down machine:
  - 1. High discharge pressure switch (manual reset) for each compressor.
  - 2. Low suction pressure switch (automatic reset) for each compressor.
  - 3. Oil Pressure switch (manual reset).

- D. Provide the following operating controls:
  - 1. Refer to Section 23 0993.
- E. Provide controls to permit operation down to 0 degrees F ambient temperature.
- F. Gages: Piped for suction and discharge refrigerant pressures and oil pressure for each compressor.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's installation instructions.
- B. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.
- C. Provide connection to refrigeration piping system and evaporators. Refer to Section 23 2300. Comply with ASHRAE Std 15.

#### **3.02 SYSTEM STARTUP**

- A. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.
- B. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.
- C. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.
- D. Provide cooling season start-up, and winter season shut-down for first year of operation.

**END OF SECTION 23 6213**