SECTION 23 63 13
AIR COOLED REFRIGERANT CONDENSERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS
- A. The other Contract Documents complement the requirements of this section. The General Requirements apply to the work to this section.

1.2 SCOPE
- A. Provide material, equipment, labor, and supervision necessary to install air-cooled condensing units.
- B. Unit ratings, capacities, and characteristics shall be as scheduled on Mechanical Drawings.

1.3 REFERENCES
- A. AHRI 210/240 – Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment
- B. ASHRAE 14 - Measurement of Energy and Demand Savings
- C. ASHRAE 15 - Safety Standard for Refrigeration Systems
- D. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings
- E. STM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus
- F. Performance shall be in accordance with the applicable ARI Standards.
- G. Compressor motors, starters, wiring, and control wiring shall all conform to NEMA, UL, NEC, and local utility requirements.

1.4 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

1.5 SUBMITTALS
- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Submit shop drawings indicating components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections.
- C. Submit shop drawings indicating components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections.
- D. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.

1.6 OPERATION AND MAINTENANCE DATA
- A. Submit operation and maintenance data under provisions of Section 01 77 00.
- B. Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.

1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver products to site under provisions of Section 01 60 00.
- B. Store and protect products under provisions of Section 01 60 00.
- C. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- D. Protect units on site from physical damage.

1.8 WARRANTY
- A. Provide 5-year extended replacement warranty (parts and labor) on compressor, condenser coils, fans, controls, electrical devices and related system components.

1.9 COMMISSIONING
- A. Commissioning of a system or systems specified in this section is part of the construction process.
- B. Documentation and testing of these systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Owner's Representative and the Commissioning Authority.
- C. Project Closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure.
- D. Refer to Section 01 77 00 - Contract Closeout, for substantial completion details.
- E. Refer to Section 01 91 00 - Commissioning, for detailed commissioning requirements

PART 2 PRODUCTS

2.1 MANUFACTURERS
- A. Provide products by one of the following:
  1. Trane
  2. York
  3. Daikin
  4. Engineer and Owner approved equal.

2.2 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, and screens.
- B. Construction and Ratings in accordance with ARI 210/240
  1. Testing shall be in accordance with ASHRAE 14
- C. Provide energy Efficiency Rating EER of not less than 10.3 or as prescribed by ASHRAE 90A and the FBC: Energy Conservation, whichever is highest.
- D. See Schedule on Drawings for unit capacities, electrical characteristics, and performance criteria.
- E. Provide unit with a holding charge of refrigerant and oil.

2.3 CASING
- A. House components in welded frame with steel panels with weather resistant, baked enamel finish.
- B. Mount starters, disconnects, and controls in weatherproof panel provided with full opening access doors.
- C. Provide removable access doors or panels with piano hinges and quick fasteners.

2.4 CONDENSER COILS
- A. Coils
  1. Aluminum plate fins mechanically bonded to seamless copper tubing.
  2. Provide sub-cooling circuits.
  3. Air test under water to 425 psig, and vacuum dehydrate. Seal with holding charge of refrigerant
- B. All condenser coils shall have corrosion protective coating.
  1. Provide condenser coil coating as specified in design documents.
  2. Approved coil coating materials and methods shall include one of the following:
     a. Blygold PoluA1 XT by Bygold of Florida HVAC Corrosion Protection

b. Coating process by Eisenheiss
c. Field applied Oxiguard.
d. HVAC Armor by ECM Group of South Florida

C. All coating materials and methods must pass a minimum of 10000 hours of salt spray exposure in a testing performed by an independent laboratory in accordance with ASTM B117.
1. The company providing coating process shall also provide a five-year coil limited warranty.

2.5 FANS AND MOTORS

A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge.
1. 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 thermal overload protection.
C. High efficiency motors as indicated.

2.6 COMPRESSORS

A. Construction: Hermetic, scroll and reciprocating type with heat-treated forged steel or cast iron shafts, aluminum alloy connecting rods, automotive type pistons, rings to prevent gas leakage, suction and discharge valves, and sealing surface immersed in oil.
B. Mounting:
1. Statically and dynamically, balance rotating parts and mount on spring rubber-in-shear vibration isolators.
2. Internally isolate hermetic units on springs.
C. Lubrication System: Reversible, positive displacement oil pumps with oil charging valve, oil level sight glass, oil filter, and magnetic plug or strainer.
D. Motor: Constant speed suction gas cooled with electronic sensor and winding over temperature protection, designed for across-the-line starting, furnish with starter.
E. Crankcase Heater:
1. System evaporates refrigerant returning to crankcase during shut down.
2. Energize heater continuously even when compressor is not operating.

2.7 REFRIGERANT CIRCUIT

A. Provide each unit with two speed compressors or dual refrigerant circuit, factory supplied and piped.
B. If dual refrigerant circuits are used, circuit the AHU evaporator coil to provide individual circuits and expansion valves for each compressor, and individual piping runs installed.

2.8 CONTROLS

A. On unit, mount weatherproof steel control panel, NEMA 250, containing power and control wiring, factory wired with single point power connection.
B. For each compressor, provide across-the-line starter with dual pole contactor, minimum 3-minute (or manufacturer standard) anti-cycling time delay compressor overload relay, and control power transformer or terminal for controls power.
1. Provide manual reset current overload protection.
2. For each condenser fan, provide across-the-line starter with starter relay.
C. Provide the following safety controls arranged so that operating any one will shut down machine and require manual reset:
1. High discharge pressure switch (manual reset) for each compressor.
2. Low suction pressure switch (manual reset) for each compressor.
3. Oil Pressure switch (manual reset).
D. The installing contractor shall perform any control field wiring required.

PART 3 EXECUTION

3.1 INSTALLATION

A. The Contractor shall install equipment in accordance with manufacturer's instructions.
B. Provide for connection to electrical service. (Refer to Division 26)
C. Install units on concrete base as indicated.
D. Provide connection to refrigeration piping system and evaporators.
    1. The Contractor shall provide and install the following for each refrigerant circuit:
        a. Suction and liquid line filter dryer replaceable core type.
        b. A liquid line sight-glass and moisture indicator.
        c. Thermal expansion valve for maximum operating pressure.
        d. Insulated suction line
        e. Suction and liquid line service valves and gage ports.
        f. Charging valves
        g. Refrigerant and oil
E. Refer to Section 23 23 00. Comply with ASHRAE 15

3.2 CONTRACTOR'S FIELD SERVICES

A. Test refrigerant system for leaks including lines connecting the condensing unit with air handling unit.
B. Prepare and start systems.
C. Supply initial charge of refrigerant and oil for each refrigerant circuit.
    1. Replace losses of refrigerant and oil.
D. Inspect and test for refrigerant leaks quarterly during first year of operation.
    1. Repair all leaks and replace losses of refrigerant and oil to meet manufacturer's specifications.

3.3 FUNCTIONAL PERFORMANCE TESTING

A. System Functional Performance Testing is part of the Commissioning Process.
    1. The Contractor shall perform the Functional Performance Testing and the Commissioning Authority shall witness and document the test.
    2. Refer to Section 01 91 00, Commissioning, for functional performance tests and commissioning requirements.
B. Systems Readiness Checklists shall be completed and submitted for each piece of equipment included in this section.
C. Include the functional performance testing of Condensing Units as part of the Air-Cooled Split System Functional Performance testing.

3.4 DEMONSTRATION AND TRAINING

A. Training of the Owner’s operation and maintenance personnel is required in cooperation with the Owner's Representative.
B. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems.
C. Schedule the instruction in coordination with the Owner's Representative after submission and approval of formal training plans.
D. Refer to Section 01 91 00, Commissioning, for further contractor training requirements
E. Provide demonstrations and training for all types of Air-Cooled Split Systems installed in this project.

END OF SECTION