

## SECTION 236313 - AIR-COOLED REFRIGERANT CONDENSERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes packaged, air-cooled condensers.

#### 1.3 SUBMITTALS

- A. Product Data: For each air-cooled condenser, include rated capacities, operating characteristics, furnished specialties, and accessories. Include equipment dimensions, weights and structural loads, required clearances, method of field assembly, components, and location and size of each field connection.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For air-cooled condensers to include in emergency, operation, and maintenance manuals.
- D. LEED Submittal:

Retain subparagraph below for LEED-NC Credit EA 4; coordinate with requirements selected in Part 2 for refrigerants.

- 1. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Fabricate and label refrigeration system according to ASHRAE 15, "Safety Code for Mechanical Refrigeration."

LEED-NC Prerequisite EA 2 requires minimum efficiency equal to requirements in ASHRAE/IESNA 90.1-2004.

- C. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

## 1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."
- C. Coordinate location of refrigerant piping and electrical roughins.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Bohn Refrigeration Products; Heatcraft, Inc.
  - 2. Carrier Corporation; Carrier Air Conditioning Div.
  - 3. Dunham-Bush, Inc.
  - 4. McQuay International.
  - 5. Trane Co. (The); Worldwide Applied Systems Group.
  - 6. York International Corp.

### 2.2 PACKAGED, OUTDOOR AIR-COOLED CONDENSERS

- A. Description: Factory assembled and tested; consisting of casing, condenser coils, condenser fans and motors, and unit controls.
- B. Condenser Coil: Seamless copper-tube, finned coil; factory tested at 425 psig (2930 kPa).
  - 1. Coil Fin: Aluminum.
  - 2. Circuit: To match compressors with liquid subcooling coil.
  - 3. Refrigerant Accessories: Provide receiver, pressure control, and solenoid valve for each circuit.
- C. Condenser Fans and Drives: Propeller fans with aluminum or galvanized-steel fan blades, for vertical air discharge; directly driven with permanently lubricated ballbearing motors with integral current- and thermal-overload protection.
- D. Operating and Safety Controls: Include condenser fan motor thermal and overload cutouts; 115-V control transformer, if required; magnetic contactors for condenser fan motors and a

nonfused factory-mounted and -wired disconnect switch for single external electrical power connection.

Retain paragraph below for low ambient operation.

- A. Low Ambient Controller: Cycles condenser fans or controls condenser fan speed to permit operation down to 0 deg F (minus 18 deg C).
- B. Unit Casings: Galvanized or zinc-coated steel treated and finished with manufacturer's standard paint coating, designed for outdoor installation with weather protection for components and controls, and with the following:
  - 1. Removable panels for access to controls, condenser fans, motors, and drives.
  - 2. Plated-steel fan guards.
  - 3. Lifting eyes.
  - 4. Removable legs.

### 2.3 PACKAGED, INDOOR AIR-COOLED CONDENSERS

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  - 1. Coil Fin: Aluminum.
  - 2. Circuit: To match compressors with liquid subcooling coil.
  - 3. Refrigerant Accessories: Provide receiver, pressure control, and solenoid valve for each circuit.
- C. Condenser Fans and Drives: Forward-curved centrifugal fans for horizontal air discharge.
  - 1. Fan on steel shaft with self-aligning ball bearings.
  - 2. V-belt drive with minimum of two belts; variable pitch drive pulley.
  - 3. Motor mounted on adjustable slide base.
- D. Operating and Safety Controls: Include condenser fan motor thermal and overload cutouts; 115-V control transformer, if required; magnetic contactors for condenser fan motors and a nonfused factory-mounted and -wired disconnect switch for single external electrical power connection.

Retain paragraph below for low ambient operation.

- E. Low Ambient Controller: Cycles condenser fans or controls condenser fan speed to permit operation down to 0 deg F (minus 18 deg C).
- F. Unit Casings: Galvanized or zinc-coated steel treated and finished with manufacturer's standard paint coating, designed for indoor installation, and with the following:
  - 1. Removable panels for access to controls, condenser fans, motors, and drives.
  - 2. 1-inch- (25-mm-) thick inlet filter.

## 2.4 MOTORS

Motor characteristics such as NEMA designation, temperature rating, service factor, enclosure type, and efficiency are specified in Division 23 Section "Common Motor Requirements for HVAC Equipment." If different characteristics are required, add paragraphs below to suit Project.

- A. General requirements for motors are specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
  - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
  - 2. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.

## 2.5 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate air-cooled condensers according to ARI 460.
- B. Testing Requirements: Factory test sound-power-level ratings according to ARI 270.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of air-cooled condensers.
- B. Examine roughing-in for refrigerant piping systems to verify actual locations of piping connections before equipment installation.
- C. Examine walls, floors, and roofs for suitable conditions where air-cooled condensers will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.
- B. Install air-cooled condensers on concrete base. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.
- C. Install roof-mounting units on equipment supports specified in Division 07.

- D. Vibration Isolation: Mount air-cooled condensers on rubber pads with a minimum deflection of 1/4 inch (6.35 mm). Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration Controls for HVAC Piping and Equipment."
- E. Maintain manufacturer's recommended clearances for service and maintenance.
- F. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Refrigerant Piping: Connect piping to unit with pressure relief, service valve, filter-dryer, and moisture indicator on each refrigerant-circuit liquid line. Refrigerant piping and specialties are specified in Division 23 Section "Refrigerant Piping."

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Perform electrical test and visual and mechanical inspection.
  - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Complete manufacturer's starting checklist.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 5. Verify proper airflow over coils.
- B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
- C. Remove and replace malfunctioning air-cooled condensers and retest as specified above.

### 3.5 STARTUP SERVICE

- A. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
  - 1. Inspect for physical damage to unit casing.
  - 2. Verify that access doors move freely and are weathertight.
  - 3. Clean units and inspect for construction debris.
  - 4. Verify that all bolts and screws are tight.

5. Adjust vibration isolation and flexible connections.
  6. Verify that controls are connected and operational.
- B. Lubricate bearings on fans.
  - C. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
  - D. Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.
  - E. Measure and record airflow over coils.
  - F. Verify proper operation of capacity control device.
  - G. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
  - H. After startup and performance test, lubricate bearings.

### 3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain air-cooled condensers.

END OF SECTION 236313