

SECTION 235400 - FURNACES

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

- A. Product Data
 - 1. Furnace.
 - 2. Thermostat.
 - 3. Air filter.
 - 4. Refrigeration components.
- B. Shop Drawings
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Wiring Diagrams: Power, signal, and control wiring.

1.2 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Disposable Air Filters: Furnish two complete sets.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Bryant Heating & Cooling Systems; Div. of United Technologies Corp.
 - 2. Carrier Corporation; Div. of United Technologies Corp.
 - 3. Lennox Industries Inc.
- B. Cabinet: Galvanized steel.
 - 1. Cabinet interior around heat exchanger shall be factory-installed insulation.
 - 2. Lift-out panels shall expose burners and all other items requiring access for maintenance.
- C. Fan: Centrifugal, factory balanced, resilient mounted or direct drive.

1. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Section 23 05 13 "Common Motor Requirements for HVAC Equipment," and with internal thermal protection and permanent lubrication.

2.2 GAS-FIRED FURNACES, NONCONDENSING

- A. Type of Gas: Natural Gas.
- B. Heat Exchanger: Stainless steel.
- C. Burner:
 1. Gas Valve: 100 percent safety two-stage main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.
- D. Gas-Burner Safety Controls:
 1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
 3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.
- E. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.

2.3 THERMOSTATS AND HUMIDISTATS

- A. Solid-State Thermostat: Wall-mounting or Wireless, programmable, microprocessor-based unit with automatic switching from heating to cooling, preferential rate control, seven-day programmability with minimum of four temperature presets per day, and battery backup protection against power failure for program settings.
- B. Control Wiring: Unshielded twisted-pair cabling.
 1. No. 24 AWG, 100 ohm, four pair.
 2. Cable Jacket Color: Blue.

2.4 AIR FILTERS

- A. Disposable Filters: 1-inch-thick (minimum) fiberglass media with ASHRAE 52.2 MERV rating of 6 or higher, in sheet metal frame.

2.5 REFRIGERATION COMPONENTS

- A. General Refrigeration Component Requirements:

1. Refrigeration compressor, coils, and specialties shall be designed to operate with CFC-free refrigerants.
 2. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."
- B. Refrigerant Coil: Copper tubes mechanically expanded into aluminum fins. Comply with ARI 210/240, "Unitary Air-Conditioning and Air-Source Heat Pump Equipment." Match size with furnace.
1. Include condensate drain pan with accessible drain outlet complying with ASHRAE 62.1.
 2. Refrigerant Coil Enclosure: Steel, matching furnace and evaporator coil, with access panel and flanges for integral mounting at or on furnace cabinet and galvanized sheet metal drain pan coated with black asphaltic base paint.
- C. Refrigerant Line Kits: Annealed-copper suction and liquid lines factory cleaned, dried, pressurized with nitrogen, sealed, and with suction line insulated. Provide in standard lengths for installation without joints, except at equipment connections.
1. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I, 1 inch thick.
- D. Air-Cooled, Compressor-Condenser Unit:
1. Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide bronze service valves, fittings, and gage ports on exterior of casing.
 2. Compressor: Hermetically sealed scroll type.
 - a. Crankcase heater.
 - b. Vibration isolation mounts for compressor.
 - c. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - d. Two-speed compressor motors shall have manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - e. Refrigerant: R-407C or R-410A.
 3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
 4. Heat-Pump Components: Reversing valve and low-temperature air cut-off thermostat.
 5. Fan: Aluminum-propeller type, directly connected to motor.
 6. Motor: Permanently lubricated, with integral thermal-overload protection.
 7. Low Ambient Kit: Permits cooling operation down to 0 deg F.
 8. Mounting Base: Polyethylene.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Wiring Method: Install control wiring in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal control wiring except in unfinished spaces.
- B. Install roof-mounted, compressor-condenser components on equipment supports.
- C. Vent and Outside-Air Connection, Condensing, Gas-Fired Furnaces: Connect plastic piping vent material to furnace connections and extend outdoors. Terminate vent outdoors with a cap and in an arrangement that will protect against entry of birds, insects, and dirt.
 - 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - 3. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - c. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 4. Slope pipe vent back to furnace or to outside terminal.
- D. Connect refrigerant tubing kits to refrigerant coil in furnace and to air-cooled, compressor-condenser unit.

END OF SECTION 235400