SECTION 235400 – SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following furnaces and accessories complete with controls:

1. Electrical furnaces.
2. Air filters.
3. Refrigeration components.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each of the following:

1. Furnace.
2. Thermostat.
3. Refrigeration components.
4. Condensers.

B. Operation and maintenance data.

1.3 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. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

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

D. Comply with NFPA 70.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the following components of furnaces that fail in materials or workmanship within specified warranty period:

1. Warranty Period, Commencing on Date of Substantial Completion:

a. Furnace Heat Exchanger: 20 years.
b. Entire Unit: Five years.

PART 2 - PRODUCTS

2.1 ELECTRIC FURNACES

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.
4. Trane.

B. General Requirements for Electric Furnaces: Factory assembled, piped, wired, and tested.

C. Cabinet: Steel, with duct liner downstream from cooling coil.

1. Duct Liner: Fiberglass, minimum 3/4 inch thick, complying with ASTM C 1071 and having a coated surface exposed to airstream complying with NFPA 90A or NFPA 90B and with NAIMA's "Fibrous Glass Duct Liner Standard."

a. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

2. Factory paint external cabinets in manufacturer's standard color.

D. Fan: Centrifugal, factory balanced, resilient mounted, direct drive.

1. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.

E. Electric-Resistant Heating Elements: Helix-wound, nickel-chromium wire-heating elements in ceramic insulators mounted on steel supports.

F. Heating-Element Control: Sequencer relay with relay for each element; switches elements on and off, with delay between each increment; initiates, stops, or changes fan speed.

G. Summer Fan Switch: Connected to permit independent on-off switch of unit fan.

H. Capacities and Characteristics: Refer to the “Split-System AC Unit Schedule” for additional specifications.

2.2 THERMOSTATS

A. Solid-State Thermostat: Wall-mounting, programmable, microprocessor-based unit with manual 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. No. 24 AWG, 100 ohm, four pair.

2.3 AIR FILTERS

A. Disposable Filters: 1-inch- thick fiberglass media in sheet metal frame.

2.4 REFRIGERATION COMPONENTS

A. General Refrigeration Component Requirements:

1. Refrigeration compressor, coils, and specialties shall be designed to operate with CFC-free refrigerants.

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. Include condensate drain pan with accessible drain outlet.

1. 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. Refrigerant Piping: Comply with requirements in Division 23 Section "Refrigerant Piping."

E. Air-Cooled, Compressor-Condenser Unit:

1. Casing: Galvanized steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass 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 Charge: R-22.

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 operation down to 0 deg F.
8. Mounting Base: Polyethylene.

F. Capacities and Characteristics:

1. Refer to the “Split-System AC Unit Schedule on the drawings for additional specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gas-fired furnaces and associated fuel and vent features and systems according to NFPA 54.

B. Suspended Units: Suspend from structure using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

1. Install seismic restraints to limit movement of furnace by resisting code-required seismic acceleration.

C. Base-Mounted Units: Secure units to substrate. Provide optional bottom closure base if required by installation conditions.

1. Anchor furnace to substrate to resist code-required seismic acceleration.

D. Controls: Install thermostats and humidistats at mounting height of 60 inches above floor.

E. 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.

F. Install ground-mounted, compressor-condenser components on 4-inch- thick, reinforced concrete base; 4 inches larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete." Coordinate anchor installation with concrete base.

G. Install roof-mounted, compressor-condenser components on equipment supports specified in Division 07 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

3.2 CONNECTIONS

A. Gas piping installation requirements are specified in Division 23 Section "Facility Natural-Gas Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect gas piping with union or flange and appliance connector valve.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Vent Connection, Noncondensing, Gas-Fired Furnaces: Connect Type B vents to furnace vent connection and extend outdoors. Type B vents and their installation requirements are specified in Division 23 Section "Breechings, Chimneys, and Stacks."

D. 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. 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.

E. Connect ducts to furnace with flexible connector. Comply with requirements in Division 23 Section "Air Duct Accessories."

F. Connect refrigerant tubing kits to refrigerant coil in furnace and to air-cooled, compressor-condenser unit.

1. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

G. Comply with requirements in Division 23 Section "Refrigerant Piping" for installation and joint construction of refrigerant piping.

H. Complete installation and startup checks and start units according to manufacturer's written instructions.

I. Verify proper operation of capacity control device.

J. Adjust airflow and initial temperature and humidity set points.

K. Set controls, burner, and other adjustments for optimum heating performance and efficiency. Adjust heat-distribution features, including shutters, dampers, and relays, to provide optimum heating performance and system efficiency.

L. After completing installation, clean furnaces internally according to manufacturer's written instructions.

M. Install new filters in each furnace within 14 days after Substantial Completion.

3.3 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 systems with refrigerant and oil and test for leaks. Repair leaks, replace lost refrigerant and oil, and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
4. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

END OF SECTION 235400