

SECTION 235400 - FURNACES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Forced air furnaces.
- B. Controls.

1.2 RELATED REQUIREMENTS

- A. Section 230513 - Common Motor Requirements for HVAC Equipment: Additional requirements for fan motors.
- B. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- C. Section 230713 - Duct Insulation: Duct Liner.
- D. Section 221005 - Plumbing Piping: Natural gas piping.
- E. Section 235100 - Breechings, Chimneys, and Stacks: Flue or stack.
- F. Section 233100 - HVAC Ducts and Casings.
- G. Section 230913 - Instrumentation and Control Devices for HVAC: Thermostats, humidistats, time clocks.

1.3 REFERENCE STANDARDS

- A. ASHRAE Std 90.1 - Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2007.
- B. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2007.
- C. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2009.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2009.
- E. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; National Fire Protection Association; 2009.
- F. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; National Fire Protection Association; 2010.

1.4 SUBMITTALS

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- E. Project Record Documents: Record actual locations of components and connections.
- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Filters: One for each furnace.
 - 3. Extra Pilot Thermocouples: One.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience and approved by manufacturer.

1.6 REGULATORY REQUIREMENTS

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

1.7 WARRANTY

- A. See Section 017700 - Closeout Procedures, for additional warranty requirements.
- B. Provide three year manufacturers warranty for solid state ignition modules.
- C. Provide five year manufacturers warranty for heat exchangers.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Carrier Corporation: www.carrier.com.
- B. Trane Inc: www.trane.com.
- C. YORK: www.york.com.
- D. Substitutions: See Section 016000 - Product Requirements.

2.2 GAS FIRED FURNACES

- A. Annual Fuel Utilization Efficiency (AFUE): 97.7.
- B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating element, controls, air filter, and accessories; wired for single power connection with control transformer. Horizontal air flow configuration.
- C.
 - 1. Safety certified by CSA in accordance with ANSI Z 21.47.
 - 2. Venting System: Direct.
 - 3. Combustion: Sealed
 - 4. Heating: Natural gas fired.
 - 5. Accessories:
 - a. Condensate drain.
 - b. Concentric wall termination kit.
- D. Performance:
 - 1. Refer to Furnace Schedule. Gas heating capacities are sea level ratings.
- E. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner. If not certified for combustible flooring, please provide additional steel base.
- F. Primary Heat Exchanger:
 - 1. Material: Hot-rolled steel
 - 2. Shape: Tubular type.
- G. Secondary Heat Exchanger:
 - 1. Material: Stainless steel.
 - 2. Shape: tube

H. Gas Burner:

1. Atmospheric type with adjustable combustion air supply,
2. Gas valve, variable capacity provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
3. Electronic pilot ignition, with hot surface igniter.
4. Combustion air damper with synchronous spring return damper motor.
5. Non-corrosive combustion air blower with permanently lubricated motor.

I. Gas Burner Safety Controls:

1. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
2. Flame rollout switch: Installed on burner box and prevents operation.
3. Vent safety shutoff sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.

J. Supply Fan: Centrifugal type rubber mounted with direct drive with adjustable variable pitch motor pulley.

K. Motor: Refer to Section 230513; 1750 rpm variable/multiple speed, ECM, permanently lubricated, hinge mounted.

L. Air Filters: 1 inch (25 mm) thick glass fiber, disposable type arranged for easy replacement.

M. Operating Controls

1. Room Thermostat: Cycles burner to maintain room temperature setting.
2. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.

2.3 THERMOSTATS

A. Manufacturers:

1. Carrier Corporation: www.carrier.com.
2. Trane Inc: www.trane.com.
3. YORK: www.york.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Room Thermostat: Low voltage, electric solid state microcomputer based room thermostat

with remote sensor:

1. System selector switch (heat-off) and fan control switch (auto-on).
2. Preferential rate control to minimize overshoot and deviation from setpoint.
3. Set-up for four separate temperatures per day.
4. Instant override of setpoint for continuous or timed period from one hour to 31 days.
5. Short cycle protection.
6. Programming based on weekdays, Saturday and Sunday.
7. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
8. Battery replacement without program loss.
9. Thermostat display:
 - a. Time of day.
 - b. Actual room temperature.
 - c. Programmed temperature.
 - d. Programmed time.
 - e. Duration of timed override.
 - f. Day of week.
 - g. System mode indication: heating, cooling, fan auto, off, and on, auto or on, off.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and located correctly.
- C. Verify that proper fuel supply is available for connection.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.
- B. Install in accordance with NFPA 90A.
- C. Install gas fired furnaces in accordance with NFPA 54.
- D. Provide vent connections in accordance with NFPA 211.

END OF SECTION