SECTION 235533 - FUEL-FIRED UNIT HEATERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gas fired unit heaters.

B. Oil fired unit heaters.

C. Tubular infrared heaters.

1.2 RELATED REQUIREMENTS

A. Section 230513 - Common Motor Requirements for HVAC Equipment: Fan motors.

B. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 230713 - Duct Insulation: Duct Liner.

D. Section 235100 - Breechings, Chimneys, and Stacks.

E. Section 233100 - HVAC Ducts and Casings.

F. Section 230913 - Instrumentation and Control Devices for HVAC: Thermostats, 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. ASHRAE Std 103 - Methods of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1993 with 1996 Errata.

C. NFPA 31 - Standard for the Installation of Oil Burning Equipment; National Fire Protection Association; 2006.

D. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2009.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2009.

F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; National Fire Protection Association; 2009.

G. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; National Fire Protection Association; 2010.

H. UL 727 - Oil-Fired Central Furnaces; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 013300 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and locations and sizes of field connections.

D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Project Requirements, for additional provisions.
2. Extra Filters: One set.

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.

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 five year manufacturers warranty for heat exchangers.

PART 2 PRODUCTS

2.1 UNIT HEATER MANUFACTURERS

A. Modine Manufacturing Company: www.modine.com.

B. Sterling HVAC/Mestek Technology, Inc: www.sterlinghvac.com.

C. Reznor/Thomas & Betts Corporation: www.reznoronline.com.

D. Substitutions: See Section 016000 - Product Requirements.

2.2 GAS FIRED UNIT HEATERS

A. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, burner, controls, and accessories:

1. Heating: Natural gas fired.
2. Discharge Louvers: Individually adjustable horizontal and vertical louvers to match cabinet finish.
3. Downturn Nozzle: 30 degree nozzle to match outlet and cabinet finish.
4. Poly-Tube Outlet Adapter: Transition duct to adapt from unit outlet to round outlet flange for polyethylene tube duct.
5. Air Filters: Filter cabinet with 1 inch (25 mm) thick glass fiber, disposable type filters.

B. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors, glass fiber insulation and reflective liner.

C. Supply Fan: Propeller type with direct drive, variable pitch motor pulley.

D. Heat Exchanger: Aluminized steel welded construction.

E. Gas Burner:

1. Atmospheric type with adjustable combustion air supply,
2. Gas valve, two stage 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 electric spark igniter.
4. Combustion air damper with synchronous spring return damper motor.
5. Non-corrosive combustion air blower with permanently lubricated motor.

F. 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.

G. 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.

H. Performance:

1. Ratings: Energy Efficiency Rating (EER)/Coefficient of Performance (COP) not less than requirements of ASHRAE Std 90.1; seasonal efficiency to ASHRAE Std 103.
2. Refer to Furnace Schedule. Gas heating capacities are sea level ratings.

2.3 OIL FIRED UNIT HEATERS

A. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, waste oil burner, controls, and accessories:

1. Discharge Louvers: Individually adjustable horizontal and vertical louvers to match cabinet finish.
2. Downturn Nozzle: 30 degree nozzle to match outlet and cabinet finish.
3. Air Filters: Filter cabinet with 1 inch (25 mm) thick glass fiber, disposable type filters.

B. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors, glass fiber insulation and reflective liner.

C. Supply Fan: Propeller type with direct drive, variable pitch motor pulley.

D. Combustion Chamber: UL 727; welded stainless steel.

E. Oil Burner: High pressure atomizing type, rubber mounted, adjustable combustion air blower, integrated fuel pump, hinged flame inspection port, cadmium sulfide flame sensor, electrodes, ignition transformer, oil nozzle.

1. Barometric draft regulator in flue.
2. Non-corrosive combustion air blower with permanently lubricated motor.

F. Oil Burner Safety Controls:

1. Time delay relay limits time for establishment of main flame.

2. Flame sensor monitors flame continuously during burner operation and stops burner on flame failure with manual reset.
3. Solenoid operated oil delay valve opens after burner motor is energized and closes instantly when burner motor is de-energized.
4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.

G. Burner 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 fixed timed on delay, with manual switch for continuous fan operation.

H. Performance:

1. Ratings: Energy Efficiency Rating (EER)/Coefficient of Performance (COP) not less than requirements of ASHRAE Std 90.1; seasonal efficiency to ASHRAE Std 103.
2. Refer to Furnace Schedule. Waste oil heating capacities are sea level ratings.

2.4 INFRARED HEATER MANUFACTURERS

A. Roberts Gordon:

B. Solaronics, Inc; Model _____: www.solaronicsusa.com.

C. Space-Ray Infrared Gas Heaters; Model _____: www.spaceray.com.

D. Superior.

E. Substitutions: See Section 016000 - Product Requirements.

2.5 TUBULAR INFRARED HEATERS

A. Units: Packaged, partially factory assembled, pre-wired unit consisting of cabinet, burner, heat exchanger, radiant tube, reflector, controls; for natural gas.

B. Heat Exchanger: Aluminized tubular steel combustion chamber with aluminized steel tube with aluminum reflector.

C. Gas Burner:

1. Gas Burner: Forced draft type with adjustable combustion air supply.
2. Gas valve 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 electric spark igniter.

4. Non-corrosive burner air blower with permanently lubricated motor.

D. Gas Burner Safety Controls: Thermo-couple sensor prevents opening of solenoid gas valve until pilot flame is proven and stops gas flow on ignition failure.

E. Operating Controls: Low voltage room thermostat cycles burner to maintain room temperature setting.

F. Performance:

1. Refer to Schedule. Gas heating capacities are sea level ratings.

2.6 ROOM THERMOSTATS

A. Manufacturers:

1. Honeywell: www.honeywell.com.
2. Johnson Controls, Inc: www.johnsoncontrols.com.
3. Siemens Building Technologies, Inc: www.sbt.siemens.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Adjustable Room Thermostat: Low voltage, to control burner operation, compressor and condenser fan and supply fan to maintain temperature setting. Include system selector switch (heat-off-cool) and fan control switch (auto-on).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that space is ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available.

C. Verify that proper fuel supply is available for connection.

3.2 INSTALLATION

A. Install in accordance with NFPA 90A.

B. Install gas fired units in accordance with NFPA 54 and applicable codes.

C. Install oil fired units in accordance with NFPA 31 and applicable codes.

D. Provide vent connections in accordance with NFPA 211. Refer to Section 235100.

E. Install unit heaters with vibration isolation. Refer to Section 230548.

F. Provide operating controls; refer to Section 230913.

END OF SECTION