SECTION 235533.13 - OIL-FIRED UNIT HEATERS

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on Masterworks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on Masterworks/Supporting Information.

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. Section includes oil-fired unit heaters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of oil-fired unit heater.

1. Include rated capacities, operating characteristics, and accessories.

B. Shop Drawings: For oil-fired unit heaters[**; signed and sealed by a qualified professional engineer**]. Include plans, elevations, sections, and attachment details.

1. Prepare by or under the supervision of a qualified professional engineer detailing fabrication and assembly of oil-fired unit heaters, as well as procedures and diagrams.
2. Design Calculations: Calculate requirements for selecting vibration isolators[**and seismic restraints**] and for designing vibration isolation bases.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
4. Include diagrams for power[**, signal, and control**] wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, elevations, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which equipment will be attached.
2. Items penetrating roof and the following:

    a. Vent and oil piping rough-ins and connections.
    b. <**Insert item**>.

B. Seismic Qualification Certificates: For oil-fired unit heaters, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For oil-fired unit heaters to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fan Belts: [**One**] <**Insert number**> for each belt-driven fan size.

1.7 QUALITY ASSURANCE

A. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace heat exchanger of oil-fired unit heater that fails in materials or workmanship within specified warranty period.

1. Warranty Period: [**Two**] [**Five**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Oil-fired unit heaters shall withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

1. Seismic Fabrication Requirements: Fabricate and reinforce suspension attachments of oil-fired unit heaters, accessories mountings, and components with reinforcement strong enough to withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC" when oil-fired unit heater is anchored to building structure.
2. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified[**and the unit will be fully operational after the seismic event**]."
3. <**Insert requirements for Component Amplification Factor and Component Response Modification Factor**>.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Capacities and Characteristics:

1. Oil Input: <**Insert gph (L/s)**>.
2. Heat Output: <**Insert Btu/h (kW)**>.
3. Annual Fuel Utilization Efficiency: [**80**] <**Insert number**> percent.
4. Minimum Airflow: <**Insert cfm (L/s)**>.
5. External Static Pressure: <**Insert inches wg (kPa)**>.
6. Motor Enclosure: Totally enclosed, fan cooled.
7. Electrical Characteristics:

    a. Motor Size: <**Insert horsepower**>.
    b. Motor Speed: <**Insert number**> rpm.
    c. Volts: [**120**] [**208**] [**230**] <**Insert value**>.
    d. Phase: [**Single**] [**Poly**].
    e. Hertz: 60.
    f. Full-Load Amperes: <**Insert value**>.
    g. Minimum Circuit Ampacity: <**Insert value**>.
    h. Maximum Overcurrent Protection: <**Insert amperage**>.

2.3 MANUFACTURED UNITS

A. Description: Factory assembled, piped, and wired, and complying with UL 731.

B. Housing: Steel, with inserts for suspension mounting rods.

1. External Casings and Cabinets: [**Baked enamel**] [**Powder coating**] over corrosion-resistant-treated surface.
2. Discharge Louvers: Independently adjustable, [**horizontal**] [**vertical**] blades.
3. Discharge Nozzle: Discharge at [**25 to 65 degrees (0.44 to 1.13 radians)**] [**50 to 90 degrees (0.87 to 1.57 radians)**] from horizontal.

C. Accessories:

1. Oil Booster Pump: [**30-gph (108-L/h)**] [**70-gph (252-L/h)**] capacity; motor and two-stage fuel unit with pressure-regulating valve and strainer.
2. Oil safety valve.
3. Outdoor Combustion-Air Adapter: Sealed to housing and fitted with quick access cover or door and fitting for terminating outdoor-air duct.

D. Heat Exchanger: Minimum 0.09-inch (2.2-mm) steel.

E. Burners: Flame-retention, pressure-atomizing, forced-draft, gun type; with integral fuel pump and electronic spark ignition and flame safety.

1. Safety Device: Oil-pressure switch.

F. Propeller Unit Fan:

1. Aluminum blades dynamically balanced and resiliently mounted.
2. Steel fan-blade guard.

G. Centrifugal Unit Fan:

1. Steel, centrifugal fan dynamically balanced and resiliently mounted.
2. Belt driven with adjustable-pitch motor sheave.

H. Motors:

1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Enclosure Materials: Rolled steel.
3. Motor Bearings: <**Insert requirements**>.
4. Unusual Service Conditions:

    a. Ambient Temperature: <**Insert deg C**>.
    b. Altitude: <**Insert feet ((m))**> above sea level.
    c. High humidity.
    d. <**Insert conditions**>.

5. Efficiency: Premium efficient.
6. NEMA Design: <**Insert designation**>.
7. Service Factor: <**Insert value**>.

I. Controls: Factory piped and prewired to electrical junction box mounted on unit, including the following:

1. Control Transformer: Integrally mounted, 120- to 24-V ac.
2. Cad-cell safety system.
3. Manual reset safety.
4. Automatic Fan Thermal Switch: Fan operates with heat-exchanger temperature more than 135 deg F (58 deg C).
5. Thermostat: Devices and wiring are specified in Section 230923.27 "Temperature Instruments."
6. [**Wall**] [**Unit**]-Mounted Thermostat:

    a. [**Single**] [**Two**] stage.
    b. Fan on-off-automatic switch.
    c. 24-V ac.
    d. 50 to 90 deg F (10 to 32 deg C) operating range.

J. Electrical Connection: Factory wire motors and controls for a single electrical connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and connect oil-fired unit heaters and associated fuel and vent piping according to [**NFPA 31**] [**CSA B139**], applicable local codes and regulations, and manufacturer's written instructions.

3.2 EQUIPMENT MOUNTING

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

1. Threaded Rods, Spring Hangers, and Building Attachments: Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" and Section 230548 "Vibration and Seismic Controls for HVAC."
2. Threaded Rods, Spring Hangers, Building Attachments, and Seismic Restraints: Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment." and Section 230548 "Vibration and Seismic Controls for HVAC"
3. Anchor the unit to resist code-required horizontal acceleration.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to oil-fired unit heater, allow space for service and maintenance.

C. Fuel Oil Piping: Comply with Section 231113 "Facility Fuel-Oil Piping." Connect to fuel oil supply and return piping with shutoff valve and union at each connection.

D. Vent Connections: Comply with Section 235123 "Gas Vents."

E. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

F. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections[**with the assistance of a factory-authorized service representative**]:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Verify bearing lubrication.
3. Verify proper motor rotation.
4. Test Reports: Prepare a written report to record the following:

    a. Test procedures used.
    b. Test results that comply with requirements.
    c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Oil-fired unit heater will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Adjust burner and other unit components for optimum heating performance and efficiency.

3.6 DEMONSTRATION

A. [**Engage a factory-authorized service representative to train**] [**Train**] Owner's maintenance personnel to adjust, operate, and maintain oil-fired unit heaters.

END OF SECTION 235533.13