

SECTION 235513.16 - GAS-FIRED DUCT 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 gas-fired duct heaters.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of gas-fired duct heater.
 - 1. Include rated capacities, operating characteristics, and accessories.
- B. Shop Drawings: For gas-fired duct 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 gas-fired duct 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 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. Duct, vent, and gas piping rough-ins and connections.
 - b. **<Insert item>**.

B. Seismic Qualification Certificates: For gas-fired duct 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 gas-fired duct heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

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

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace heat exchanger of gas-fired duct 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: Gas-fired duct 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 gas-fired duct heaters, accessories mountings, and components with reinforcement strong enough to withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC" when gas-fired duct 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. Heat Exchanger: [Aluminized] [Stainless] steel.
 2. Burner Material: [Aluminized steel with stainless-steel inserts] [Stainless steel].
 3. Venting: [Gravity] [Power] vented.
 4. Venting: Indoor, separated combustion, power vented.
 - a. Concentric, Terminal Vent Assembly: Combined combustion-air inlet and power-vent outlet with wall or roof caps. Include adapter assembly for connection to inlet and outlet pipes, and flashing for wall or roof penetration.
 5. Flue Outlet: <Insert inches (mm)> in diameter.
 6. Gas Input: <Insert Btu/h (kW)>.
 7. Gas Output: <Insert Btu/h (kW)>.
 8. Gas Control Valve: [Single stage] [Two stage] [Modulating].
 9. Annual Fuel Utilization Efficiency: [80] <Insert number> percent.
 10. Minimum Airflow: <Insert cfm (L/s)>.
 11. External Static Pressure: <Insert inches wg (kPa)>.

2.3 MANUFACTURED UNITS

- A. Description: Factory assembled, piped, and wired; and complying with ANSI Z83.8/CSA 2.6.
- B. Fuel Type: Design burner for [natural] [propane] gas having characteristics same as those of gas available at Project site.
- C. Indoor External Housing: Steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.
1. External Casings and Cabinets: [Baked enamel] [Powder coating] over corrosion-resistant-treated surface.

- D. Outdoor External Housing: Weatherproof steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.
 - 1. External Casings and Cabinets: **[Baked enamel]** **[Powder coating]** over corrosion-resistant-treated surface.
- E. Internal Casing: Aluminized steel, arranged to contain airflow, with duct flanges at inlet and outlet.
- F. Power Venter: Integral, motorized centrifugal fan interlocked with gas valve.
- G. Controls: Regulated redundant gas valve containing pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.
 - 1. Ignition: **[Standing pilot]** **[Electronically controlled electric spark with flame sensor]**.
 - 2. Fan Thermal Switch: Operates fan on heat-exchanger temperature.
 - 3. Vent Flow Verification: **[Flame rollout switch]** **[Differential pressure switch to verify open vent]**.
 - 4. Control transformer.
 - 5. High Limit: Thermal switch or fuse to stop burner.
 - 6. Thermostat: Devices and wiring are specified in Section 230923.27 "Temperature Instruments."
 - 7. Thermostat: Single-stage, wall-mounted type with **50 to 90 deg F (10 to 32 deg C)** operating range and fan on switch.
 - 8. Thermostat: Two-stage, wall-mounted type with **50 to 90 deg F (10 to 32 deg C)** operating range and fan on switch.
 - 9. Thermostat: Single-stage type with duct-mounted sensor and **50 to 90 deg F (10 to 32 deg C)** operating range.
 - 10. Thermostat: Two-stage type with duct-mounted sensor and **50 to 90 deg F (10 to 32 deg C)** operating range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and connect gas-fired duct heaters and associated fuel and vent features and systems according to **[NFPA 54]** **[CSA B149.1]**, applicable local codes and regulations, and manufacturer's written instructions.
- B. 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. Spring hangers are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
 - 2. Comply with requirements in Section 230548 "Vibration and Seismic Controls for HVAC" for spring hangers and seismic restraints.
 - 3. Restrain the unit to resist code-required horizontal acceleration.

3.2 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 gas-fired duct heaters, allow space for service and maintenance.
- C. Gas Piping: Comply with [Section 231123 "Facility Natural-Gas Piping."] [Section 231126 "Facility Liquefied-Petroleum Gas Piping."] Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.
- D. Vent Connections: Comply with Section 235123 "Gas Vents."
- E. Duct Connections: Comply with [Section 233113 "Metal Ducts."] [Section 233116 "Nonmetal Ducts."]
- F. Electrical Connections: Comply with applicable requirements in electrical Sections.
 - 1. Install electrical devices furnished with heaters but not specified to be factory mounted.

3.3 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. Gas-fired duct heater will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Adjust burner and other unit components for optimum heating performance and efficiency.

3.5 DEMONSTRATION

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

END OF SECTION 235513.16