SECTION 235513.16 - GAS-FIRED DUCT HEATERS

This Section includes requirements for sustainable design systems. However, equipment specified in this Section may not qualify. Verify, with manufacturers, that the requirements can be met. To comply, HVAC system design alternatives that do not include duct heaters may be required.

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section includes gas-fired duct heaters.
			2. SUMMARY
				1. Section includes gas-fired duct heaters.
				2. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				3. Manufacturer's installation instructions shall be provided along with product data.
				4. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				5. Product Data: For each type of gas-fired duct heater.

Include rated capacities, operating characteristics, and accessories.

Retain subparagraph below if thermostat is specified in this Section; delete if thermostats for these units are specified in Section 230923.27 "Temperature Instruments."

Include diagrams for signal and control wiring.

Retain "Coordination Drawings" paragraph below for situations where limited space necessitates maximum utilization for efficient installation of different components or if coordination is required for installation of products and materials by separate installers. Coordinate paragraph with other Sections specifying products listed below. Preparation of coordination drawings requires the participation of each trade involved in installations within the limited space.

* + - * 1. 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:

Structural members to which equipment will be attached.

Items penetrating roof and the following:

Duct, vent, and gas piping rough-ins and connections.

<**Insert item**>.

Retain "Seismic Qualification Certificates" paragraph below if required by seismic criteria applicable to Project. Coordinate with Section 230548 "Vibration and Seismic Controls for HVAC." See ASCE/SEI 7 for certification requirements for equipment and components.

* + - * 1. Seismic Qualification Certificates: For gas-fired duct heaters, accessories, and components, from manufacturer.

Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

* + - * 1. Field quality-control reports.
				2. Sample Warranty: For special warranty.
			1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For gas-fired duct heaters to include in emergency, operation, and maintenance manuals.
			2. QUALITY ASSURANCE

Retain "ASHRAE/IES 90.1 Compliance" Paragraph below to require compliance with ASHRAE/IES 90.1. Sustainable design systems require compliance with ASHRAE/IES 90.1.

* + - * 1. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
			1. WARRANTY

When warranties are required, verify with Owner's Director’s Representative's counsel that warranties stated in this article are not less than remedies available to Owner Director’s Representative under prevailing local laws. Coordinate with Section 016000 "Product Requirements."

* + - * 1. 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.

Verify available warranties and warranty periods for units and components. Two-year warranty is applicable to aluminized heat exchangers; five-year warranty, to stainless-steel heat exchangers.

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

1. PRODUCTS

See Editing Instruction No. 1 in the Evaluations for cautions about named manufacturers and products. For an explanation of options and Contractor's product selection procedures, see Section 016000 "Product Requirements."

* + - 1. MANUFACTURERS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=9373) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Lennox Industries, Inc.; Lennox International](http://www.specagent.com/Lookup?uid=123457051267).

[Modine Manufacturing Company](http://www.specagent.com/Lookup?uid=123457051268).

[REZNOR, a brand of Nortek Global HVAC](http://www.specagent.com/Lookup?uid=123457051269).

[Sterling HVAC Products; a Mestek company](http://www.specagent.com/Lookup?uid=123457051270).

Approved equivalent.

* + - 1. PERFORMANCE REQUIREMENTS

Retain "Seismic Performance" Paragraph below with "Seismic Qualification Certificates" Paragraph in "Informational Submittals" Article for projects requiring seismic design. Delete paragraph if performance requirements are indicated on Drawings. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Coordinate requirements with structural engineer.

* + - * 1. Seismic Performance: Gas-fired duct heaters shall withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

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.

Retain subparagraph below to define the term "withstand" as it applies to this Project. Definition varies with type of building and occupancy and is critical to valid certification. Option is used for essential facilities where equipment must operate immediately after an earthquake.

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**]."

See ASCE/SEI 7, Coefficients for Architectural Component Table and Seismic Coefficients for Mechanical and Electrical Components Table, for requirements to be inserted in subparagraph below.

<**Insert requirements for Component Amplification Factor and Component Response Modification Factor**>.

* + - * 1. 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.

If Project has more than one type or configuration of gas-fired duct heater, delete "Capacities and Characteristics" Paragraph below and schedule duct heaters on Drawings.

* + - * 1. Capacities and Characteristics:

Heat Exchanger: [**Aluminized**] [**Stainless**] steel.

Burner Material: [**Aluminized steel with stainless-steel inserts**] [**Stainless steel**].

Retain one of two "Venting" subparagraphs below.

Venting: [**Gravity**] [**Power**] vented.

Venting: Indoor, separated combustion, power vented.

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.

Flue Outlet: <**Insert inches (mm)**> in diameter.

Gas Input: <**Insert Btu/h (kW)**>.

Gas Output: <**Insert Btu/h (kW)**>.

Gas Control Valve: [**Single stage**] [**Two stage**] [**Modulating**].

Annual Fuel Utilization Efficiency: [**80**] <**Insert number**> percent.

Minimum Airflow: <**Insert cfm (L/s)**>.

External Static Pressure: <**Insert inches wg (kPa)**>.

* + - 1. MANUFACTURED UNITS
				1. Description: Factory assembled, piped, and wired; and complying with ANSI Z83.8/CSA 2.6.
				2. Fuel Type: Design burner for [**natural**] [**propane**] gas having characteristics same as those of gas available at Project site.

Retain "Indoor External Housing" or "Outdoor External Housing" Paragraph below. Retain both if units are installed indoors and outdoors.

* + - * 1. Indoor External Housing: Steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.

External Casings and Cabinets: [**Baked enamel**] [**Powder coating**] over corrosion-resistant-treated surface.

* + - * 1. Outdoor External Housing: Weatherproof steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.

External Casings and Cabinets: [**Baked enamel**] [**Powder coating**] over corrosion-resistant-treated surface.

* + - * 1. Internal Casing: Aluminized steel, arranged to contain airflow, with duct flanges at inlet and outlet.

Retain "Power Venter" Paragraph below for power-vented model.

* + - * 1. Power Venter: Integral, motorized centrifugal fan interlocked with gas valve.
				2. 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.

Ignition: [**Standing pilot**] [**Electronically controlled electric spark with flame sensor**].

Fan Thermal Switch: Operates fan on heat-exchanger temperature.

First option in "Vent Flow Verification" Subparagraph below is for gravity-vented units; second option is for units with a power venter.

Vent Flow Verification: [**Flame rollout switch**] [**Differential pressure switch to verify open vent**].

Control transformer.

High Limit: Thermal switch or fuse to stop burner.

Retain one of five "Thermostat" subparagraphs below.

Thermostat: Devices and wiring are specified in Section 230923.27 "Temperature Instruments."

Thermostat: Single-stage, wall-mounted type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.

Thermostat: Two-stage, wall-mounted type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.

Thermostat: Single-stage type with duct-mounted sensor and 50 to 90 deg F (10 to 32 deg C) operating range.

Thermostat: Two-stage type with duct-mounted sensor and 50 to 90 deg F (10 to 32 deg C) operating range.

1. EXECUTION
	* + 1. INSTALLATION

Retain first option in first paragraph below for projects in the United States; retain second option for projects in Canada.

* + - * 1. 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.
				2. 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.

Spring hangers are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

Comply with requirements in Section 230548 "Vibration and Seismic Controls for HVAC" for spring hangers and seismic restraints.

Retain subparagraph below if Project site is in a seismic area.

Restrain the unit to resist code-required horizontal acceleration.

* + - 1. CONNECTIONS

Coordinate piping installations and specialty arrangements with Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
				2. Where installing piping adjacent to gas-fired duct heaters, allow space for service and maintenance.
				3. 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.
				4. Vent Connections: Comply with Section 235123 "Gas Vents."
				5. Duct Connections: Comply with [**Section 233113 "Metal Ducts."**] [**Section 233116 "Nonmetal Ducts."**]
				6. Electrical Connections: Comply with applicable requirements in electrical Sections.

Install electrical devices furnished with heaters but not specified to be factory mounted.

* + - 1. FIELD QUALITY CONTROL

Retain "Manufacturer's Field Service" Paragraph below to require a factory-authorized service representative to perform tests and inspections.

* + - * 1. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

Retain "Perform the following tests and inspections" Paragraph below to require Contractor to perform tests and inspections.

* + - * 1. Perform the following tests and inspections[**with the assistance of a factory-authorized service representative**]:

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

Verify bearing lubrication.

Verify proper motor rotation.

Test Reports: Prepare a written report to record the following:

Test procedures used.

Test results that comply with requirements.

Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

* + - * 1. Gas-fired duct heater will be considered defective if it does not pass tests and inspections.
				2. Prepare test and inspection reports.
			1. ADJUSTING
				1. Adjust initial temperature and humidity set points.
				2. Adjust burner and other unit components for optimum heating performance and efficiency.
			2. DEMONSTRATION
				1. [**Engage a Company Field Advisor per OGS Spec Section 014216 to train**] [**Train**] Facility’s Owner's Director’s Representative's maintenance personnel to adjust, operate, and maintain gas-fired duct heaters.

END OF SECTION 235513.16