SECTION 235523.16 - HIGH-INTENSITY, GAS-FIRED, RADIANT HEATERS

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

If applying for LEED certification, LEED Prerequisite EA 2 requires compliance with ASHRAE/IESNA 90.1, in which Section 6.5.8 - "Radiant Heating Systems" requires that radiant heat be used to heat unenclosed spaces except loading docks equipped with air curtains.

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:

High-intensity, infrared, gas-fired, radiant heaters.

Gas-fired, outdoor, infrared patio heaters.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer's installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product.

Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

* + - * 1. Shop Drawings:

Retain first subparagraph below if equipment is required to withstand specific design loads and design responsibilities have been delegated to Contractor or if structural data is required as another way to verify equipment's compliance with performance requirements.

Include plans, elevations, sections, and [**mounting**] [**attachment**] details.

Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Detail fabrication and assembly of high-intensity, gas-fired, radiant heaters, as well as procedures and diagrams.

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

Include diagrams for power[**, 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.

Gas piping to heater installations

Retain first subparagraph below if thermostats are not specified in Section 230923.27 "Temperature Instruments."

Thermostats and wiring to heaters.

Heater locations and clearance requirements.

Other suspended ceiling components:

Lighting fixtures.

Air outlets and inlets.

Sprinklers.

<**Insert item**>.

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + - * 1. Field quality-control reports.
				2. Sample Warranty: For manufacturer's special warranties.
			1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For gas-fired, radiant heaters to include in emergency, operation, and maintenance manuals.
			2. MAINTENANCE MATERIAL SUBMITTALS
				1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Igniter: [**One**] <**Insert number**> hot-surface burner igniter(s) for each style of high-intensity, gas-fired, radiant heater furnished.

* + - 1. WARRANTY

When warranties are required, verify with Director’s Representative counsel that warranties stated in this article are not less than remedies available to Director’s Representative under prevailing local laws.

* + - * 1. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of radiant heaters that fail in materials or workmanship within specified warranty period.

See the High-Intensity, Radiant Heater Product Comparison Matrix in the Evaluations for a comparison of warranties offered among manufacturers listed. Verify available warranties and warranty periods.

Warranty Period: All warranty periods listed below are from date of Substantial Completion.

Ceramic Tiles: [**Three**] [**Five**] [**10**] [**15**] <**Insert number**> years.

Heater Components: [**One**] [**Three**] [**Five**] [**10**] <**Insert number**> year(s).

1. PRODUCTS

Manufacturers and products listed in SpecAgent and Masterworks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

* + - 1. PERFORMANCE REQUIREMENTS

Retain first option in first paragraph below for high-intensity, infrared heaters and second option for outdoor, high-intensity patio heaters.

* + - * 1. Comply with [**ANSI Z83.19A/CSA 2.35A**] [**ANSI Z83.26/CSA 2.37**].

Retain one of two subparagraphs below.

CSA certified, with CSA Seal and certification number clearly visible on units.

UL listed and labeled, with UL label clearly visible on units.

* + - * 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.

Copy this article and re-edit for each product. Insert drawing designation. Use these designations on Drawings to identify each product.

* + - 1. HIGH-INTENSITY, INFRARED, GAS-FIRED, RADIANT HEATERS <**Insert drawing designation**>

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=6993) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Combustion Research Corporation](http://www.specagent.com/Lookup?uid=123457044731).

[Detroit Radiant Products Company](http://www.specagent.com/Lookup?uid=123457044732).

[Roberts-Gordon, Inc](http://www.specagent.com/Lookup?uid=123457044733).

[Schwank Inc](http://www.specagent.com/Lookup?uid=123457044734).

[Solaronics, Inc](http://www.specagent.com/Lookup?uid=123457044735).

[Space-Ray; a division of Gas-Fired Products Inc](http://www.specagent.com/Lookup?uid=123457044736).

[Sterling HVAC Products; a Mestek company](http://www.specagent.com/Lookup?uid=123457044737).

[Superior Radiant Products Ltd](http://www.specagent.com/Lookup?uid=123457044740).

Approved equivalent.

* + - * 1. Factory-assembled, [**indoor**] [**outdoor**], overhead-mounted, electrically controlled, high-intensity, infrared, radiant heating units using gas combustion. Heater to have all necessary factory-installed wiring and piping required prior to field installation and startup.
				2. Fuel Type: Design burner for [**natural**] [**propane**] gas having characteristics same as those of gas available at Project site.
				3. Main Housing: Continuous, one-piece, [**aluminized**] [**stainless**]-steel unit without gaps between housing and reflectors.
				4. Burner Assembly:

Retain one of first two options in subparagraph below. Either material may be obtained with or without third option.

Modular, [**aluminized steel with powder-coat or similar finish**] [**stainless-steel**] plenum chamber [**coated with ceramic fiber insulation**]secured with stainless-steel retainers.

* + - * 1. Emitter: Perforated ceramic tiles.
				2. Reflector: [**One-sided, bright-polished aluminum**] [**High-grade steel with cold-bonded, polished-aluminum layer**] [**Aluminized steel**].
				3. Ignition:

Retain "Manual Pilot" Subparagraph below if heater is used in an indoor application.

Manual Pilot: Self-energizing with no external power connection.

Direct Spark: [**24/25**] [**115/120**]-V ac, solid-state ignition module with spark electrode and flame sensor.

"Potted circuitry" Subparagraph below is primarily for outdoor applications; however, it may be required for some indoor applications. Consult manufacturers for applications in environments with high humidity or moisture levels.

Potted circuitry.

* + - * 1. Accessories:

Verify that required accessories retained in subparagraphs below are available from manufacturers retained in "Manufacturers" or "Basis-of-Design Product" Paragraph above.

[**Parabolic reflector**] [**Reflector extensions**].

Wire grid or expanded metal secondary emitter for increased efficiency.

Protective screen and heat-deflector shield.

Stainless-steel flexible connector with manual valve for gas supply.

Hanger chain with "S" hooks.

Preassembled chain suspension kit.

Rigid mounting kits.

Clearance warning plaque.

"Two-stage operation" Subparagraph below requires two-stage thermostat option in "Controls and Safeties" Article.

Two-stage operation.

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

* + - * 1. Capacities and Characteristics:

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

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

Electrical Characteristics:

Volts: [**Millivolt**] [**24/25**] [**115/120**] <**Insert value**>.

Phase: Single.

Hertz: 60.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Retain "Mounting Angle" Paragraph below if heaters are all mounted at same angle. Delete paragraph if angle is indicated on Drawings. Heaters can be mounted horizontal or to any angle up to and including 35 degrees from horizontal.

* + - * 1. Mounting Angle: <**Insert value**> degrees.

Copy this article and re-edit for each product. Insert drawing designation. Use these designations on Drawings to identify each product.

* + - 1. GAS-FIRED, OUTDOOR, INFRARED PATIO HEATERS <**Insert drawing designation**>

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=6994) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Combustion Research Corporation](http://www.specagent.com/Lookup?uid=123457044741).

[Detroit Radiant Products Company](http://www.specagent.com/Lookup?uid=123457044742).

[Roberts-Gordon, Inc](http://www.specagent.com/Lookup?uid=123457044743).

[Schwank Inc](http://www.specagent.com/Lookup?uid=123457044744).

[Solaronics, Inc](http://www.specagent.com/Lookup?uid=123457044746).

[Space-Ray; a division of Gas-Fired Products Inc](http://www.specagent.com/Lookup?uid=123457044745).

[Sterling HVAC Products; a Mestek company](http://www.specagent.com/Lookup?uid=123457044747).

[Superior Radiant Products Ltd](http://www.specagent.com/Lookup?uid=123457044750).

Approved equivalent.

* + - * 1. Factory-assembled, [**indoor**] [**outdoor**], overhead-mounted, electrically controlled, high-intensity, infrared, radiant heating units using gas combustion. Heater to have all necessary factory-installed wiring and piping required prior to field installation and startup.
				2. Fuel Type: Design burner for [**natural**] [**propane**] gas having characteristics same as those of gas available at Project site.
				3. Main Housing: Continuous, one-piece, [**aluminized**] [**stainless**]-steel unit without gaps between housing and reflectors.

Air vents with cooling channels.

Air louvers.

Decorative grill.

* + - * 1. Burner Assembly:

Retain one of first two options in subparagraph below. Either material may be obtained with or without third option.

Modular, [**aluminized-steel with powder-coat or similar finish**] [**stainless-steel**] plenum chamber [**coated with ceramic fiber insulation**]secured with stainless-steel retainers.

* + - * 1. Emitter: Perforated ceramic tiles.
				2. Reflector: [**Polished stainless steel**] <**Insert material**>.
				3. Ignition:

Direct Spark: [**24/25**] [**115/120**]-V ac, solid-state ignition module with spark electrode and flame sensor.

"Potted circuitry" Subparagraph below is primarily for outdoor applications; however, it may be required for some indoor applications. Consult manufacturers for applications in environments with high humidity or moisture levels.

Potted circuitry.

* + - * 1. Accessories:

Verify that required accessories retained in subparagraphs below are available from manufacturers retained in "Manufacturers" or "Basis-of-Design Product" Paragraph above.

Wire grid or expanded metal secondary emitter for increased efficiency.

Protective screen and heat-deflector shield.

Stainless-steel flexible connector with manual valve for gas supply.

Hanger chain with "S" hooks.

Preassembled chain suspension kit.

Rigid mounting kits.

Clearance warning plaque.

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

* + - * 1. Capacities and Characteristics:

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

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

Electrical Characteristics:

Volts: [**24/25**] [**115/120**] <**Insert value**>.

Phase: Single.

Hertz: 60.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Heaters can be mounted horizontal or to any angle up to and including 35 degrees from horizontal. Retain "Mounting Angle" Paragraph below if angle is not indicated on Drawings.

* + - * 1. Mounting Angle: <**Insert value**> degrees.
			1. CONTROLS AND SAFETIES

Retain first option in "Failure Safeguards" Paragraph below if the unit has a manual pilot and there is no power supplied to the unit. Otherwise, retain second option below.

* + - * 1. Failure Safeguards: 100 percent main gas shutoff on [**pilot**] [**pilot or power**] failure.

Retain one of three "Thermostat" Paragraphs below. Note that thermostats may not be supplied with some units.

* + - * 1. Thermostat: Devices and wiring are specified in Section 230923.27 "Temperature Instruments."
				2. Thermostat: Single-stage, wall-mounted type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.

Control Transformer: Integrally mounted.

* + - * 1. Thermostat: Two-stage, wall-mounted type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.

Control Transformer: Integrally mounted.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine structures, substrates, areas and conditions, with Installer present, for compliance with requirements for installation tolerances, required clearances, and other conditions affecting performance of the Work.
				2. Examine roughing-in for fuel-gas piping to verify actual locations of piping connections before equipment installation.
				3. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
				4. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. INSTALLATION

Retain "Equipment Mounting" Paragraph below to require equipment to be suspended from structure.

* + - * 1. Equipment Mounting: Install gas-fired, infrared heaters with continuous-thread hanger rods and spring hangers[**with vertical-limit stop**] of size required to support weight of heaters.

Retain one of first two subparagraphs below. Retain first for projects in seismic areas; retain second for projects not in seismic areas. Indicate vibration isolation and seismic-control device type and minimum deflection in supported equipment schedule on Drawings.

Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

Comply with requirements for hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

* + - * 1. Equipment Installation: Install gas-fired, radiant heaters and associated gas features and systems according to [**NFPA 54**] [**CSA B149.1**].
				2. Suspended Units: [**Suspend from substrate using chain hanger kits and building attachments**] [**Mount to substrate using rigid mounting kits or brackets, supplied by manufacturer or manufactured**].

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

Restrain the unit to resist seismic acceleration. Comply with requirements for seismic-restraint devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

Comply with requirements for hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

* + - * 1. Maintain manufacturers' recommended clearances for combustibles.
			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. 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.

Gas Connections: Connect gas piping to radiant heaters according to [**NFPA 54**] [**CSA B149.1**].

* + - * 1. Where installing piping adjacent to gas-fired, radiant heaters, allow space for service and maintenance.
				2. Electrical Connections: Comply with applicable requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

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

* + - 1. ADJUSTING
				1. Adjust initial-temperature set points.
				2. Adjust burner and other unit components for optimum heating performance and efficiency.
			2. FIELD QUALITY CONTROL

Retain "Manufacturer's Field Service" Paragraph below to require a Company Service Field Advisor to perform tests and inspections.

* + - * 1. Manufacturer's Field Service: Engage a Company Field Advisor per OGS Spec Section 014216 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 Company Field Advisor per OGS Spec Section 014216**]:

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.

See Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

* + - * 1. Gas-fired, radiant heaters will be considered defective if they do not pass tests and inspections.
				2. Prepare test and inspection reports.

END OF SECTION 235523.16