SECTION 210533 - HEAT TRACING FOR FIRE-SUPPRESSION PIPING

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

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. Section includes heat tracing for fire-suppression piping with the following electric heating cables:

Plastic insulated, series resistance.

Self-regulating, parallel resistance.

* + - * 1. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 210700 “Fire-Suppression System Insulation.”

* + - 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, and furnished specialties and accessories.

Schedule heating capacity, length of cable, spacing, and electrical power requirement for each electric heating cable required.

* + - * 1. Shop Drawings: For electric heating cable.

Include plans, elevations, sections, and attachment details.

Include diagrams for power, signal, and control wiring.

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 special warranty.
			1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For electric heating cables to include in operation and maintenance manuals.
			2. WARRANTY

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

* + - * 1. Special Warranty: Manufacturer agrees to repair or replace electric heating cable that fails in materials or workmanship within specified warranty period.

Verify available warranties and warranty periods for electric heating cable. Special warranties often exclude labor.

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

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.

* + - 1. PLASTIC-INSULATED, SERIES-RESISTANCE HEATING CABLES
				1. Comply with IEEE 515.1 “Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications”.
				2. Heating Element: Single- or dual-stranded resistor wire. Terminate with waterproof, factory-assembled nonheating leads with connectors at both ends.
				3. Electrical Insulating Jacket: Minimum 4.0-mil Kapton with silicone, Tefzel, or polyolefin.

Outer jacket in "Cable Cover" Paragraph below is optional feature and is required for waterproof applications; verify availability with manufacturer.

* + - * 1. Cable Cover: Aluminum braid[**and silicone or Hylar outer jacket or TPR overjacket**].
				2. Maximum Operating Temperature (Power On): [**150 deg F**] <**Insert temperature**>.

Verify temperature of circulated media in freeze-protected piping in "Maximum Exposure Temperature (Power Off)" Paragraph below.

* + - * 1. Maximum Exposure Temperature (Power Off): [**185 deg F**] <**Insert temperature**>.
				2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 “Standard for Electrical Safety in the Workplace” and NFPA 13 “Standard for the Installation of Sprinkler Systems”, to be tested by the “Manufacturer’s Company Field Advisor” , and marked for intended location and application. Will be assisted by the installing contractor which is the Company Field Advisory and witness by the Director’s Representative.

If Project has more than one type or configuration of electric heating cable, delete "Capacities and Characteristics" Paragraph below and schedule on Drawings. See Evaluations for a sample schedule.

* + - * 1. Capacities and Characteristics:

Maximum Heat Output: [**6 W/ft.**] [**7.5 W/ft.**] <**Insert value**>.

Piping Diameter: <**Insert NPS**>.

Number of Parallel Cables: <**Insert number**>.

Spiral Wrap Pitch: <**Insert inches**>.

Electrical Characteristics for Single-Circuit Connection:

Verify available voltages and heat-output ratings with manufacturer.

Volts: [**120**] [**208**] [**240**] [**277**] [**480**] <**Insert value**>.

Phase: <**Insert value**>.

Hertz: <**Insert value**>.

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

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

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

* + - 1. SELF-REGULATING, PARALLEL-RESISTANCE HEATING CABLES
				1. Comply with IEEE 515.1 “Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications”.
				2. Heating Element: Pair of parallel [**No. 16**] [**No. 18**] AWG, [**tinned**] [**nickel-coated**], stranded copper bus wires embedded in crosslinked conductive polymer core, which varies heat output in response to temperature along its length. Terminate with waterproof, factory-assembled, nonheating leads with connectors at one end, and seal the opposite end watertight. Cable shall be capable of crossing over itself once without overheating.
				3. Electrical Insulating Jacket: Flame-retardant polyolefin.

Outer jacket in "Cable Cover" Paragraph below is optional feature and is required for waterproof applications; verify availability with manufacturer.

* + - * 1. Cable Cover: [**Tinned-copper**] [**Stainless-steel**] braid[**and polyolefin outer jacket with ultraviolet inhibitor**].
				2. Maximum Operating Temperature (Power On): [**150 deg F**] <**Insert temperature**>.

Verify temperature of circulated media in freeze-protected piping in "Maximum Exposure Temperature (Power Off)" Paragraph below.

* + - * 1. Maximum Exposure Temperature (Power Off): [**185 deg F**] <**Insert temperature**>.
				2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 “Standard for Electrical Safety in the Workplace”, to be tested by the “Manufacturer’s Company Field Advisor”, and marked for intended location and application. Will be assisted by the installing contractor which is the Company Field Advisory and witnessed by the Director’s Representative.

If Project has more than one type or configuration of electric heating cable, delete "Capacities and Characteristics" Paragraph below and schedule on Drawings. See Evaluations for a sample schedule.

* + - * 1. Capacities and Characteristics:

Maximum Heat Output: [**3 W/ft.**] [**5 W/ft.**] [**8 W/ft.**] [**10 W/ft.**] [**12 W/ft.**] <**Insert value**>.

Piping Diameter: <**Insert NPS**>.

Number of Parallel Cables: <**Insert number**>.

Spiral Wrap Pitch: <**Insert inches**>.

Electrical Characteristics for Single-Circuit Connection:

Verify available voltages and heat-output ratings with manufacturer.

Volts: [**120**] [**208**] [**240**] [**277**] [**480**] <**Insert value**>.

Phase: <**Insert value**>.

Hertz: <**Insert value**>.

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

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

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

* + - 1. CONTROLS
				1. Remote bulb unit with adjustable temperature range from [**30 to 50 deg F**] <**Insert temperature range**>.
				2. Snap action; open-on-rise, single-pole switch with minimum current rating adequate for connected cable.
				3. Remote bulb on capillary, resistance temperature device, or thermistor for directly sensing pipe-wall temperature.
				4. Corrosion-resistant, waterproof control enclosure.
			2. ACCESSORIES
				1. Cable Installation Accessories: Fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips all furnished by manufacturer or as recommended in writing by manufacturer.
				2. Warning Tape: Continuously printed "Electrical Tracing"; vinyl, at least 3 mils thick, and with pressure-sensitive, permanent, waterproof, self-adhesive back.

Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches: 3/4 inch minimum.

Width for Markers on Pipes with OD, Including Insulation, 6 Inches or Larger: 1-1/2 inches minimum.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine surfaces and substrates to receive electric heating cables for compliance with requirements for installation tolerances and other conditions affecting performance.

Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.

* + - * 1. Proceed with installation only after unsatisfactory conditions have been corrected.
			1. INSTALLATION

Indicate location of controls on Drawings.

Most manufacturers of heat-tracing cable for fire suppression recommend that the cables be installed on standpipe and sprinkler piping main lines, between buildings, on piping in unheated areas, or on piping through coolers or freezers. Manufacturers recommend against using the heat-tracing cables on branch lines as protection against freezing of branch lines and sprinklers.

* + - * 1. Install electric heating cable where indicated and according to NFPA 70 “Standard for Electrical Safety in the Workplace” and NFPA 13 “Standard for the Installation of Sprinkler Systems”.
				2. Install electric heating cable across expansion joints according to manufacturer's written instructions; use cable to allow movement without damage to cable.
				3. Install electric heating cables after piping has been tested and before insulation is installed.
				4. Install electric heating cables according to IEEE 515.1 “Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications”.
				5. Install insulation over piping with electric cables according to Section 210700 "Fire-Suppression Systems Insulation."
				6. Install warning tape on piping insulation where piping is equipped with electric heating cables.
				7. Set field-adjustable switches and circuit-breaker trip ranges.
			1. CONNECTIONS
				1. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
				2. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

Indicate location of controls on Drawings. According to NFPA 13, heat tracing must be monitored by a fire-alarm system.

* + - * 1. Connect heat-tracing controls to fire-alarm system according to NFPA 13 “Standard for the Installation of Sprinkler Systems”.
			1. FIELD QUALITY CONTROL

Retain "Testing Agency," "Manufacturer's Field Service," and "Perform the following tests and inspections" paragraphs below to identify who shall perform tests and inspections. If retaining second option in "Testing Agency" Paragraph or if retaining "Manufacturer's Field Service" or "Perform the following tests and inspections" Paragraph, retain "Field quality-control reports" Paragraph in "Informational Submittals" Article.

* + - * 1. Installation, testing, and final acceptance shall be in accordance with all applicable codes and standards. Company Field Advisor from the manufacturer for testing & inspections stated below.

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

* + - * 1. Manufacturer's Field Service: Contractor’s Project Manager shall 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 representative and witnessed by the “Director’s Representative”**]:

Perform tests after cable installation but before application of coverings such as insulation, wall or ceiling construction, or concrete.

Test cables for electrical continuity and insulation integrity before energizing.

Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.

* + - * 1. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.
				2. Cables will be considered defective if they do not pass tests and inspections.
				3. Prepare test and inspection reports.
			1. PROTECTION
				1. Protect installed heating cables, including nonheating leads, from damage during construction.
				2. Remove and replace damaged heat-tracing cables.
			2. DOCUMENTS
				1. Provide a written statement to the effect that all work covered under the contract has been completed and tested in accordance with the specifications and plans and manufacturers installation & testing manual and all inspection and test reports. Also include the operating and maintenance instructions of the controllers. These are to be provided to the Director’s Representative and include copies to be inserted into a clear waterproof envelope holder fasten at the location of the heat tracing system controller.
			3. DEMONSTRATION OF HEAT TRACING SYSTEMS
				1. Demonstrate equipment, specialists, and accessories. Review operating and maintenance information.
				2. Schedule demonstration with at least five (5) business days advance notice to the Director’s Representative to contact building facility personnel.

END OF SECTION 210533