**PART 1 – GENERAL**

* 1. **SUMMARY**
		1. This Section includes a UL Listed heat trace system for domestic hot water temperature maintenance that consists of a self-regulating heating cable, connection kits, and accessories.
		2. Related Sections
			1. Section 22 07 19 – Plumbing Piping Insulation
			2. Section 22 08 00 – Commissioning of Plumbing
			3. Section 22 09 00 – Instrumentation & Control for Plumbing
			4. Section 22 10 00 – Plumbing Piping
			5. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
			6. Section 26 05 26 – Grounding and Bonding for Electrical Systems
	2. **REFERENCES**
		1. Underwriter’s Laboratories (UL)
		2. National Electric Code (NEC)
	3. **SYSTEM DESCRIPTION**
		1. System for domestic hot water temperature maintenance.
		2. System consists of a self-regulating heating cable, connection kits, and accessories. **[Select all that apply]**
		3. The heating cable shall have a modified polyolefin jacket.
	4. **ACTION SUBMITTALS**
		1. Product Data
			1. Heating cable data sheet
			2. UL certificates for domestic hot water temperature maintenance heat trace.
			3. Heating Cable Installation and Maintenance Instructions
			4. Connection kit and accessory instructions. **[Select all that apply]**
			5. Electrical Wiring Diagram of System
	5. **QUALITY ASSURANCE**
		1. Manufacturers’ Qualifications
			1. Manufacturer to show minimum of thirty (30) years of experience in manufacturing self-regulating heating cables.
			2. Manufacturer to provide products consistent with IEEE 515.1 requirements.
		2. Installer Qualifications
			1. System installer shall have complete understanding of product and product literature from manufacturer or authorized representative prior to installation.
			2. Electrical connections shall be performed by a licensed electrician.
		3. Regulatory Requirements and Approvals
			1. All components shall be UL Listed
			2. Electrical Components, Devices, and Accessories: Listed and labelled as defined in NFPA 70 and marked for intended use.
	6. **DELIVERY, STORAGE AND HANDLING**
		1. General Requirements: Deliver, store and handle products to prevent their deterioration or damage due to moisture, temperature changes, contaminates or other causes.
		2. Delivery and Acceptance Requirements: Deliver products to site in original, unopened containers or packages with intact and legible manufacturers’ labels identifying the following:
			1. Product and Manufacturer
			2. Length/Quantity
			3. Installation and Maintenance Instructions
		3. Storage and Handling Requirements
			1. Store the heating cable in a clean, dry location with a temperature range -40°F to 140°F (-40°C to 60°C).
			2. Protect products from mechanical damage and water ingress.
	7. **WARRANTY**
		1. Extended Warranty
			1. Manufacturer shall make available a minimum two (2) year warranty for heating cable and connection kits.
			2. Contractor shall submit to owner the results of all installation tests required by the manufacturer.

**PART 2 – PRODUCTS**

* 1. **MANUFACTURER**
		1. Contract Documents are based on manufacturer and products named below to establish a standard of quality.
		2. Manufacturer
			1. Manufacturer shall be Emerson – Nelson
			2. Manufacturer to show minimum of thirty (30) years of experience in manufacturing self-regulating heating cables.
			3. Manufacturer shall provide UL approval certificates.
	2. **MATERIALS**
		1. Heating Cables **[Select all that apply]**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Cable** | **Service Voltage, VAC** | **Max. Segment Length, ft (m)** | **Nominal Maintenance Temperature, °F (°C)** | **Ambient Temperature Range, °F (°C)** | **Color Code** |
| LT-A | 208 | 810 (246) | 105 (41) | 74-79 (23-26) | Blue |
| LT-B | 208 | 770 (234) | 115 (46) | 70-78 (21-26) | Green |
| LT-C | 208 | 720 (219) | 125 (52) | 70-78 (21-26) | Yellow |
| LT-D | 208 | 715 (217) | 140 (60) | 70-78 (21-26) | Red |
| LT-C1 | 120 | 330 (100) | 125 (52) | 70-78 (21-26) | Purple |

* + - 1. Heating Cable
				1. Shall be a self-regulating heater cable with a parallel circuit electric heater strip.
				2. Shall feature an irradiation cross-linked conductive polymer core material that is extruded over the multi-stranded, tin-plated, 16-gauge copper bus wires.
				3. The conductive core material shall increase or decrease its heat output in response to temperature changes.
				4. Shall be able to maintain a hot water pipe temperature of: **[Select all that apply]**

At 208 VAC: 105°F (LT-A), 115°F (LT-B), 125°F (LT-C), or 140°F (LT-D)

At 120 VAC: 125°F (LT-C1)

* + - * 1. Two inner thermoplastic jackets shall be extruded over and bonded to the core material for extra dielectric strength, moisture resistance, and protection from impact and abrasion damage.
				2. A stranded copper braid shall be installed over the inner jackets, providing a continuous ground path.
				3. A color-coded modified polyolefin over jacket shall cover the braid for added dielectric strength, moisture resistance, and protection from impact and abrasion damage.
		1. Connection Kits – Nelson PLT-BC, PLT-LP, PLT-BS, PLT-LPS, and/or PLT-BY **[Select all that apply]**
			1. Power Connection Kit
				1. Shall be suitable for connecting up to two heating cables to customer supplied power wiring.
				2. Kit type: **[Select all that apply]**

Type PLT-BC: Shall include a junction box, universal base, box adapter, one molded silicon power termination and cable end seal with adhesive sealant, terminal blocks, pipe clamps, and associated hardware.

Type PLT-LP: Shall include a universal base, box adapter, and associated hardware. No junction box included with kit.

Type PLT-LPS: Shall include a universal base, box adapter, one shrink tube cable termination, and associated hardware. No junction box included with kit.

* + - 1. PLT-BS Splice Connection Kit **[Select if applicable]**
				1. Shall be suitable for connecting two heating cables in an in-line splice configuration.
				2. Shall include a junction box, universal base, box adapter, two molded silicon power terminations with adhesive sealant, terminal blocks, pipe clamps, and associated hardware.
			2. PLT-BY Tee Connection Kit **[Select if applicable]**
				1. Shall be suitable for connecting three heating cables in a tee splice configuration.
				2. Shall include a junction box, universal base, box adapter, three molded silicon power terminations and two cable end seal with adhesive sealant, terminal blocks, pipe clamps, and associated hardware.

**PART 3 – EXECUTION**

* 1. **EXAMINATION**
		1. Verification of Conditions
			1. Prior to installation of heating cable system, verify that all piping which will have heat trace has passed all hydrostatic/pressure test and is signed off by plumbing inspector.
		2. Preinstalling Testing
			1. Prior to installing heating cable on the piping an insulation resistance test shall be performed by the installing contractor to ensure integrity of heating cable as describe in the installation & maintenance manual.
	2. **INSTALLATION**
		1. Acceptable Installers
			1. Subject to compliance with requirements of Contract Documents, installer shall be familiar with installing pipe trace cables and equipment.
		2. The hot water maintenance system shall conform to all local building codes including but not limited to NFPA70, IEEE 515.1 Commercial Heat Tracing Applications.
		3. The installer shall layout heating cable per approved shop drawings.
		4. Grounding of the heat trace system shall be in accordance with section 26 05 26 “Grounding & Bonding for Electrical Systems”
		5. Connections of all electrical wiring shall be in accordance with section 26 05 19 “Low-Voltage Electrical Systems”
		6. Comply with the following manufacturer’s recommendations:
			1. Self-Regulating Heating Cable Installation & Maintenance Instructions (GA-1765).
			2. PLT-BC Power Connection Kit Instructions (GA-1859). **[Select if applicable]**
			3. PLT-LP Power Connection Kit Instructions (GA-1888). **[Select if applicable]**
			4. PLT-LPS Power Connection Kit Instructions (GA-1889). **[Select if applicable]**
			5. PLT-BS Splice Connection Kit Instructions (GA-1860). **[Select if applicable]**
			6. PLT-BY Tee Connection Kit Instructions (GA-1861). **[Select if applicable]**
	3. **FIELD QUALITY CONTROL**
		1. Initial start‐up and field testing (commissioning) of the system shall be performed by a technician per the owner’s requirements.
		2. Field Tests and Inspections in accordance with the Self-Regulating Heating Cable Installation & Maintenance Instructions (GA-1765), recorded and included in submittals to owner:
			1. The following test shall be performed before the heat cable has been installed:
				1. Continuity test on reel
				2. Insulation resistance on reel – 2500 VDC
			2. The following test shall be performed after the heat cable has been installed but before the insulation and after insulating the piping:
				1. Continuity test
				2. Insulation resistance – 2500 VDC, 5 megaohm minimum
	4. **MAINTENANCE**
		1. Maintenance Service
			1. Comply with manufacturer’s recommendations in the applicable Installation and Maintenance Instructions.

**END OF SECTION**