

Hot Water Temperature Maintenance System

1 General

1. Furnish and Install a UL Listed and FM Approved system of electric self-regulating heating cable, connection kits and electronic controller for maintaining hot water as indicated on the drawings. The cable shall utilize a radiation-crosslinked conductive polymer as the heating element, and the cable shall be specifically designed, manufactured and UL Listed and FM Approved for hot water temperature maintenance.
2. Submittals:
 - Manufacturer's catalog cuts showing materials and performance data

2 Materials

1. Construction: The self-regulating heating cable shall consist of two (2) 16 AWG nickel-coated copper bus wires embedded in a radiation-crosslinked conductive polymer core. It shall be covered by a radiation-crosslinked, polyolefin, dielectric jacket surrounded by a polymer-coated aluminum wrap and enclosed in a tinned copper braid of 14 AWG. The braid shall be covered with a (nominal) 40 mil polyolefin outer jacket, color coded for easy identification.
2. Connection Kits: All heating cable connection kits shall be UL Listed and FM Approved for use as part of the system to maintain hot water temperature. Component enclosures shall be rated NEMA 4X to prevent water ingress and corrosion
3. Controller: Installed system shall include at least one agency-approved electronic controller. The controller shall not be of line sensing over-limit design. The controller shall be capable of setting different pipe temperatures based on ambient and voltage with 24 hour, 7 day/week programmable options. The controller shall have the energy savings feature of lowering pipe temperature during low use periods and the ability to raise the temperature of the pipes for a programmed interval. The controller shall have BMS interface capabilities to set pipe temperatures and provide alarm relays in loss of power, incorrect water heater temperature and communication failure. The controller shall have flexible wiring configurations to operate individually or control up to eight additional controllers. Controller shall be HWAT-ECO or approved equal.

3 Performance

1. Maintain Temperatures: The system shall maintain temperatures between 105°F (40°C) and 140°F (60°C) at 208 V or 240 V. Temperature shall be maintained by utilizing an electronic controller with straight runs of heating cable on the pipe.
2. Insulation schedule shall be as follows:

Table 5.1 Insulation Thickness

Copper pipe size (in)	IPS insulation size (in)	Insulation thickness (in)
1/2	3/4	1/2
3/4	1	1
1	1 1/4	1
1 1/4	1 1/2	1 1/2
1 1/2	1 1/2	1 1/2
2	2	2
2 1/2	2 1/2	2 1/2
3	3	3

Note: For pipe 1 1/4 inches and smaller, use insulation that is oversized by 1/4 inch to allow room for installing over the heating cables. For pipes three inches and larger, the thickness of insulation can be equal to the pipe diameter with one heating cable or 1/3 the pipe diameter with two runs of heating cable.

4 Manufacturer

1. Experience: The manufacturer shall have more than twenty years experience with self-regulating heating cables for temperature maintenance of domestic hot water.
2. Acceptable product and manufacturer: Raychem HWAT by Tyco Thermal Controls (949) 223-9800 or approved equal prior to bid.

5 Execution

1. Installation: The system shall be installed according to the drawings and the manufacturer's instructions. The Plumber shall purchase material and is responsible for entire system, including testing. Installation, including all splices, tees and end terminations, shall be performed by plumbing contractor, with the exception of any power connections and GFI circuit breakers, which shall be installed and connected to power by a qualified electrical contractor.

2. Testing

i) Procedure: Measure the heater circuit continuity and the insulation resistance between the braid and the bus wires with a 2500 Vdc megohmmeter (megger).

ii) Timing: The tests should be performed by the Manufacturer's field service representative before and after the pipe insulation has been installed and prior to the installation of wall or ceiling panels, and shall be witnessed by the Construction Manager. A report indicating the success or failure of each test and any recommended corrections shall be forwarded to the Construction Manager by the field service representative.

iii) Acceptable results: The heater circuit shall be continuous and megger readings shall be at least 20 megohm regardless of the heater length. Circuits yielding unacceptable readings must be repaired or replaced as noted in the Manufacturer's field service report.

iv) Submittal of results: Submit records of the test data to the Construction Manager. Self-regulating heating cables and components to have a limited 10-year warranty extension from the date of installation if a properly completed online warranty form is completed within 30 days from the date of installation.