This master should be used by designers working on Port of Portland construction projects and by designers working for PDX tenants (“Tenants”). Usage notes highlight a few specific editing choices, however the entire section should be evaluated and edited to fit specific project needs.

SECTION 220520 - PIPING SPECIALTIES FOR PLUMBING PIPING

1. GENERAL
	* + 1. DESCRIPTION
				1. This section describes piping specialties for plumbing piping systems.
			2. RELATED WORK SPECIFIED ELSEWHERE
				1. Section 220719, Plumbing Insulation
			3. REFERENCES
				1. IEEE: Institute of Electrical and Electronics Engineers

IEEE Bulletin 515: Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Industrial Applications

* + - * 1. NEC: National Electric Code
			1. SUBMITTALS
				1. For each item specified herein, submit product/material data; shop drawings; operation and maintenance data; as-constructed data; installation, startup, and testing manuals; operation and maintenance manuals; and as-constructed drawings.

Use only if Commissioning Section 019100 is included in the project manual.

* + - * 1. For the following items, submit commissioning plans and schedules; checkout, start up, operational, functional and final acceptance test plans, procedures, checklists, and reports; and operation and maintenance training plans.

Heat trace cables and accessories. Provide calculations for heat trace cable, including power requirements and points of connection.

1. PRODUCTS
	* + 1. STRAINERS
				1. Acceptable Manufacturers:

Armstrong, McAlear, Sarco, Steamflo, Mueller, R.P. & C. Company, Flow Design, or equal.

For grooved coupling systems: Gustin-Bacon, Mech-Line, or equal.

* + - * 1. Wye Pattern:

Bronze: Bronze body, 2-inch and below screwed, 250 psi, 1/16-inch perforated type 304 stainless screen.

Cast Iron: Cast iron body, 2-inch and below screwed, 2 1/2-inch and above flanged, 125 psi, 1/16-inch perforated type 304 stainless screen.

Cast Iron, High Pressure: Cast iron body, 2-inch and below screwed, 2 1/2-inch and above flanged, 250 psi, 1/16 inch perforated type 304 stainless screen.

* + - 1. HEAT TRACE CABLE (FREEZE PROTECTION)
				1. Acceptable Manufacturers: Nelson LT, Chromalox, Thermon, Raychem, or equal.
				2. General:

Provide a complete FM and UL listed heat tracing system to maintain insulated pipes at a fixed set point of 40ºF, including 208 volt, single phase heaters, components, controls and accessories.

Determine pipe heat loss using the standard heat loss equation published in IEEE bulletin 515 and specified design conditions with a 10 percent safety factor.

Heater selection and installation shall be based on a heater having a power output equal to or greater than the heat loss at maintain temperature. Selection shall be in accordance with heat tracing manufacturer’s published specifications.

Size breaker based on a heater start up temperature of 32ºF unless otherwise specified.

* + - * 1. Heat Trace Cable:

Low temperature self-regulating heaters shall be rated for continuous power-on at 165ºF (65ºC) and for intermittent exposure to 185ºF (85ºC). The heater shall have a radiation cross-linked semi-conductive heating core extruded continuously over two parallel bus wires. The heating cable shall vary power output inversely with temperature so that power output decreases as pipe temperature increases. Heater construction shall consist of a primary radiation cross-linked dielectric jacket thermally bonded to the heating core, a secondary dielectric jacket extruded over the primary jacket, a tinned copper braid, and fluoropolymer outer jacket. Heaters shall carry a 10-year warranty against factory defects.

Service: Water and waste piping exposed to ambient temperature of less than or equal to 40ºF.

Self-regulating heater power, splice and tee connections shall include terminal block and silicone power boot to prevent water ingress. End terminations shall use silicone cap.

* + - * 1. Controls: The system shall be controlled by an ambient sensing thermostat set at 40°F.
			1. HEAT TRACE CABLE (LIQUID GREASE FLOW MAINTENANCE)
				1. Acceptable Manufacturers: Raychem, or equal.

Part numbers listed below are for a complete system by Raychem. If a different manufacturer has been approved by the Port, use compatible components from that manufacturer.

* + - * 1. General:

Provide a complete UL listed heat tracing system to maintain insulated pipes at a fixed set point of 150ºF, including 120-volt, single phase heaters, ground fault protection, controls, single entry point connection, end seal, and accessories.

Heater selection and installation shall be based on a heater having a nominal power output on metal pipes equal to or greater than 5 W/ft at pipe temperature of 150ºF. Selection shall be in accordance with heat tracing manufacturer’s published specifications.

Size breaker based on a heater start up temperature of 50ºF, unless otherwise specified.

* + - * 1. Heat Trace Cable:

High temperature self-regulating heating cable shall be rated for process temperature maintenance to maximum exposure temperature of 185ºF. The heating cable shall be configured for use in non-hazardous and hazardous locations, including areas where corrosives may be present. The heating cable shall vary power output inversely with temperature so that power output decreases as pipe temperature increases. Cable construction shall consist of a pair of nickel-plated copper bus wires, spacer, self-regulating polymeric-fiber heating element, fluoropolymer inner jacket, tinned copper braid, and fluoropolymer outer jacket. Cable shall carry a 10-year warranty against factory defects. Raychem XL-Trace.

Service: Reclaimed liquid grease waste piping.

* + - * 1. Controls:

High temperature heating cable control shall be capable of controlling to a temperature maximum of 185ºF in an enclosure appropriate for area classification.

High temperature, self-regulating cable shall operate with the use of thermostats or transformers to control the heating cable.

* + - * 1. Single-Entry Power Connection with Junction Box: Kit complete with junction box with terminals, stand assembly, core sealer, braided wire termination tube, cable lubricant, and cable tie for use with specified heat trace cable, Raychem JBS-100-A.
				2. End Seal Kit: Cold applied low profile end seal for use with specified heat trace cable, suitable for maximum pipe temperature of 420ºF and hazardous locations. Raychem E-150.
				3. Accessories:

Glass Tape: Raychem GT-66.

Aluminum Tape: Raychem AT-180.

“Electric Traced” Label for Identifying Traced Pipes: Raychem ETL.

Universal Mounting Bracket for Mounting Thermostats on Pipe: Raychem UMB.

1. EXECUTION
	* + 1. INSTALLATION
				1. Strainer:

Provide valved blow off for each strainer of same size as plugs with maximum size of 1 1/2-inch. Pipe blow off full size and terminate over floor drains.

Applied Locations:

Bronze wye, in piping 2-inches and smaller, domestic water.

Cast iron, high pressure wye, in piping 2 1/2-inches and larger, domestic water.

* + - 1. HEAT TAPE (FREEZE PROTECTION)
				1. Provide heat trace on water, waste water piping, and vacuum piping in unheated spaces and where indicated on the drawings.
				2. Install cable in a straight run(s) and without heat transfer aids. Install in accordance with the manufacturer’s instructions and recommendations and with the NEC.
				3. Heating installation shall include allowances for valves, flanges and other heat sinks based on the manufacturer’s recommendations.
				4. All circuits shall be protected with 30mA ground fault interruption devices.
				5. Before and after installing thermal insulation, the heater shall be meggered at 500-2500 VDC. Minimum insulation resistance is 20 megohms regardless of heater length.
				6. Install heat trace cable on waste and water pipes indicated to maintain a minimum of 35ºF at pipe surface in an ambient temperature of 0ºF. Lay cable parallel on pipe or spiral wrap to maintain adequate temperature as required by pipe size and thermal properties of the pipe insulation to be applied.
				7. Attach heat trace cable to pipe with polyester tape at maximum 1‑foot increments.
				8. Install with temperature sensing element outside of the pipe insulation.
				9. Install thermostat at accessible location adjacent to pipe with a minimum of exposed capillary. Tape capillary to pipe run under insulation to bulb.
				10. Coordinate installation with work specified in Division 26 for adequate electrical service to each thermostat.
				11. Affix an “Electric Traced” label to the outside of the pipe’s thermal insulation on alternating sides at intervals of 5 to 15 feet immediately after the piping has been insulated.
			2. HEAT TAPE (LIQUID GREASE FLOW MAINTENANCE)
				1. Provide heat trace on reclaimed liquid grease piping where indicated on the drawings.
				2. Install cable in a straight run(s) and without heat transfer aids. Install in accordance with the manufacturer’s instructions and with the NEC.
				3. Heating installation shall include allowances for valves, flanges and other heat sinks based on the manufacturer’s recommendations.
				4. All circuits shall be protected with 30mA ground fault interruption devices.
				5. Before and after installing thermal insulation, the heater shall be meggered at 500-2500 VDC. Minimum insulation resistance is 20 megohms regardless of heater length.
				6. Install heat trace cable on reclaimed liquid grease piping to maintain a minimum of 170ºF at pipe surface in an ambient temperature of 50ºF. Lay cable parallel on pipe to maintain adequate temperature as required by pipe size and thermal properties of the pipe insulation to be applied.
				7. Install single-entry power connection and end seal in accordance with manufacturer’s installation instructions.
				8. Attach heat trace cable to pipe with glass tape at intervals recommended by the manufacturer.
				9. Install thermostat under insulation.
				10. Mount thermostat at accessible location on the pipe with a minimum of exposed capillary. Tape capillary to pipe run under insulation to bulb.
				11. Coordinate installation with work specified in Division 26 for adequate electrical service to each thermostat.
				12. Affix an “Electric Traced” label to the outside of the pipe’s thermal insulation on alternating sides at intervals of 5 to 15 feet immediately after the piping has been insulated.

Choose between Commissioning and Testing articles. Use Commissioning if Section 019100 is included in the project manual; otherwise use Testing.

* + - 1. COMMISSIONING
				1. Commission the following items:

Heat trace cables and accessories.

* + - 1. TESTING

A. Check out, start up, and test the following items:

1. Heat trace cables and accessories.

END OF SECTION 220520