

Part 1 General

1.1 SUMMARY

- .1 This Contractor is responsible for:
 - .1 All related calculations.
 - .2 Supplying, installing and testing required materials, equipment and quantities.
 - .3 Provide and install and modify existing equipment to incorporate the new addition of heat tracing cables, control and controller for water system pipes.
- .2 Submit the following information with shop drawings: Calculations, layouts, cables spacing, installation details, wattage, maximum density and accessories.
- .3 All equipment shall be from the same manufacturer.
- .4 All components shall be CSA certified.
- .5 Related Requirements
 - .1 Section 01 91 13 – General Commissioning (Cx) Requirements.
 - .2 Section 26 05 00 – Common Work Results – For Electrical.
 - .3 Section 26 05 31 – Splitters, Junction, Pull Boxes and Cabinets.
 - .4 Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings.
 - .5 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-12, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .3 CSA Group
 - .1 CAN/CSA-C22.2 No. 130-03(R2013), Requirements for Electrical Resistance Heating Cables and Heating Device Sets.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
 - .1 Submit [two] copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.
 - .1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 GENERAL

- .1 Heating cables: to CAN/CSA-C22.2 No.130.

2.2 SELF-REGULATED HEATING CABLES

- .1 Self-Regulating heating cable to be used for water pipes systems freeze protection and temperature maintenance application.
- .2 Self-limiting heating cable with copper ground wire, polyolefin jackets and overall jackets. Heating capacity: 5 W/m; for use with 208V power supply.
- .3 CSA approved.
- .4 Suitable for use in corrosive locations.
- .5 Outer jacket colour: orange.
- .6 Cable shall meet the requirement for Canadian Electrical Code (Latest Edition).
- .7 Heating cable maximum circuit length shall be at least 427 ft under the following conditions:

- .1 Start-up temperature: -29 °C
- .2 Maintain Temperature: 4 °C
- .3 Circuit breaker size: 30A, 2P, 208V.
- .4 Heating cable length as shown on drawings.
- .8 Acceptable Materials: Pentair, Thermon or equal.

2.3 HEAT TRACE ACCESSORIES

- .1 Provide power connection kit, lighted end seal, aluminum tape, glass tape, cable ties, cable lubricant, label, pipes mounting bracket and strap, conduit fitting, junction boxes and others as required for a complete heat tracing system.
- .2 All required accessories shall be from the same manufacture as the heating cable and designed specifically to be used for the selected heat trace cable.
- .3 Rated voltage 208V.
- .4 CSA approved.
- .5 Rated NEMA 4X.
- .6 Power connection kit and lighted end seal shall be installed above insulation.

2.4 HEAT TRACING CONTROLLER

- .1 Multi circuit microprocessor-based controller able to provide temperature control and monitoring capabilities for existing and new heat trace system.
- .2 Control and monitoring up to 18 circuits, 208V and up to 30A each.
- .3 Ground Leakage alarm/trip 30mA to 150 mA.
- .4 Include copper ground bus bar and isolated ground bus bar.
- .5 The controller shall:
 - .1 Include general alarm relay to indicate to the DDC system (BAS) a general alarm condition.
 - .2 Include operational status relay to indicate to the DDC system (BAS) if the heat trace system is working or not.
 - .3 Communicate with remote monitoring / control software through Ethernet.
- .6 Temperature control range -40 °C to 500 °C.
- .7 The unit shall be able to be configured for either process sensing control or ambient sensing control. The ambient sensing control is provided from a wall mounted outdoor RTD in ambient temperature.
- .8 Relay interface module.
- .9 Modbus compatible and shall include Ethernet communication card and Serial-to-Ethernet converter.

- .10 Digital display and manual bypass.
- .11 Heat trace systems communication software for remote monitoring and control. Provide minimum of two licences valid for a minimum of 3 years. The software shall be able to continuously monitor and manage all heat traced circuits and indicates all alarms remotely.
- .12 Power output module (On-off control with soft start, proportional and self-adjust).
- .13 The control modules and all related components shall be located in a CSA type 4X enclosure (size as required). The enclosure shall be wall mounted and include, mounting brackets, isolated ground bar, terminal blocks and external door with window and suitable for wall mounted application.
- .14 Submit the controller panel wiring diagram show drawing for review.
- .15 Upgrade the existing panel "HTCP1" to meet all items listed in this section.
- .16 Acceptable Material: THERMON TC1818a c/w enclosure.

2.5 AMBIENT SENSING RTD TEMPERATURE SENSOR

- .1 Ambient sensing RTD shall be mounted outside and able to provide one single point control input to all the heat trace controller circuits (18 circuits).
- .2 Provide control input for freeze protection and temperature maintenance application.
- .3 Maximum exposure to Bulb is 500 °F.
- .4 Include 15m cable lead.
- .5 Provided c/w wall mounted bracket and all required connections.
- .6 Acceptable Material: THERMON RTD-500-3-AMB-KIT.

2.6 ALTERNATE MANUFACTURER'S

- .1 If this Contractor proposes to use alternate manufacturer's:
 - .1 Alternate products shall comply with the contracts document.
 - .2 Self-regulated cables, heat trace accessories and heat tracing control panels shall be from the same manufacturer.
 - .3 In addition, the Contractor shall be responsible for: remove existing panel HTCP1, provide, install and commission new heat tracing control panel "HTCP1".

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Install heating cables in accordance with manufacturer's instructions. Co-ordinate installation with pipe insulation application.
- .2 Install heating cables in accordance with manufacturer's instructions. Distribute and fasten cable evenly on pipe using pipe strap or tape at maximum spacing 0.5 m. Ensure that heating cables do not touch or cross each other. Run only cold leads in conduit and ensure sensing bulb does not touch cable. Ground shield to building ground. Co-ordinate cable installation with insulation application. Loop additional cable at fittings, valves, flanges, dead end pipes, water supply and others as shown on the drawing.
- .3 Make power and control connections.
- .4 Install all power and control cables in conduit.

3.3 FIELD QUALITY CONTROL

- .1 Tests:
 - .1 Perform tests in accordance with Section 26 05 01 - Common Work Results for Electrical.
 - .2 Use 500V Megger to test cables for continuity and insulation value and record readings before, during and after installation.
 - .3 Where resistance of 50 megohms or less is measured, stop work and advise Departmental Representative.

3.4 TRAINING

- .1 Provide three (3) days on-site training and demonstration by heat trace manufacturer to train on site personnel in maintenance / use of heat tracing system.

3.5 SPARE PARTS

- .1 Provide the following spare parts:
 - .1 5 RTD.
 - .2 7 Power connection kit.
 - .3 7 end seal.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.

- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION