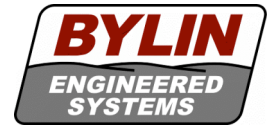


## **Bylin Engineered Systems**

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# General Specification

## Pipe Freeze Protection

### Part 1 . . . General

Design, furnish and install a complete system of heaters and components approved by Underwriters Laboratories Inc. (UL), the Canadian Standards Association (CSA) or Factory Mutual (FM) specifically for pipe heat tracing. The heat tracing system shall conform to the applicable requirements in the latest editions of the following codes and standards:

- National Electrical Code (NEC/NFPA 70)
- National Fire Protection Association (NFPA)
- Occupational Safety and Health Act (OSHA)
- National Electrical Manufacturers Association (NEMA)
- American National Standards Institute (ANSI)
- Institute of Electrical and Electronic Engineers (IEEE)
- All applicable local codes and standards

### Part 2 . . . Design

1. The equipment, materials and installation shall be suited for the electrical classification of the area involved.
2. A minimum safety factor of 10% shall be used to determine heat loss.
3. Heat loss calculations shall consider that the thermal insulation may be oversized to allow space for the heating cable(s).
4. Heater cable lengths for piping shall include cable on all in-line components including but not limited to: flanges, pumps, valves, pipe supports/hangers, vents/drains and instruments.

### Part 3 . . . Products

Heating cables used on this project shall be self-regulating, such that they vary their output in response to temperature variations along the length of a traced pipe. Heating cable to be used for a given application shall be based on the design and operating environment requirements. The following self-regulating heating cables are approved for use on this project.

1. Self-regulating heating cable design shall be capable of maintaining process temperatures up to 150°F (65°C) and continuous exposure to temperatures of 185°F (85°C) while de-energized.
2. Cable must be capable of being cut to a desired length to suit the installation conditions and must form a continuous heating circuit.
3. The heating cable shall consist of two parallel 16 AWG (minimum) nickel-plated copper bus wires embedded in a semi-conductive polymer core that forms a continuous matrix heating element. A polyethylene dielectric insulating jacket is extruded over the heating element core.
4. A metallic braid of tinned copper shall cover the basic cable. The braid shall provide a nominal coverage of 80%.
5. The cable shall be further covered with a polyolefin overjacket.
6. Long-term stability shall be established by the service life performance test per IEEE Std 515.1
7. The supplier shall have a minimum of 10 years experience in the design and supply of pipe heat tracing systems and shall have an experienced engineering department who can provide engineering and design assistance when required. The supplier shall be Bylin Engineered Systems (1-888-313-5666) or engineer / architect approved equal.

#### **Part 4 . . . Installation**

1. Refer to the manufacturer's installation instructions and design guide for proper installation and layout methods. Deviations from these instructions could result in performance characteristics different than intended.
2. All installations and terminations must conform to the NEC and any other applicable national or local code requirements.
3. All heat tracing circuits shall be equipped with ground-fault equipment protection in accordance with applicable codes and standards.
4. Heating cable shall be attached to pipes on maximum one-foot intervals.
5. Heating cable shall be installed such that all in-line devices and equipment may be easily removed and reinstalled without cutting the heating cable.
6. Heating cable shall be installed on the lower quadrant of horizontal pipe whenever possible to avoid mechanical damage. Cable shall be located on the outside radius of all 45° and 90° pipe elbows.

#### **Part 5 . . . Testing**

1. Heating cable shall be tested with a megohmmeter (megger) between the heating cable bus wires and the heating cable metallic braid. While a 2,500 Vdc megger test is recommended, the minimum acceptable level for testing is 500 Vdc. This test should be performed a minimum of three times:
  - a. Prior to installation while the cable is still on reel(s).
  - b. After installation of heating cable and completion of circuit fabrication kits (including any splice kits) but prior to installation of thermal insulation.
  - c. After installation of thermal insulation, but prior to connecting cable to power.
2. The minimum acceptable level for the megger readings is 20 megohms, regardless of the circuit length.
3. Results of the megger readings shall be recorded and submitted on the Heating Cable Installation and Inspection Form.