



HeatTracer



Heating Cable Application Bulletin: Food and Beverage Plants.

Application Bulletin Food and Beverage



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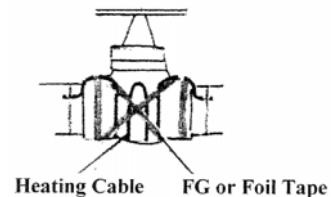
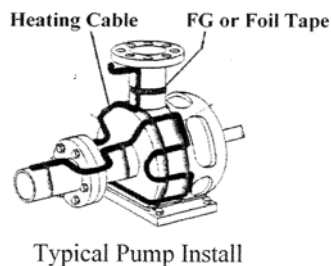
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Food and Beverage plants require heat tracing for a number of applications. These include but are not limited to process water (freeze protection); corn syrup, sugar syrup, chocolate, fats and oils (ingredients or cooking media); and caustic (cleaning agent).

These different fluids present some complexity to the heat tracing system design, since maintain temperature and chemical resistance varies for the different fluids. There are two approaches for the designer to take. One is to design the heat tracing system to the specific requirements of each line. This may result in a number of different cables being specified for the plant. The other is to specify the cable to meet the most stringent application. This approach allows cable quantities to be aggregated and ensures the wrong cable won't be incorrectly installed on the wrong line.

- Cable jacket exposure. Self regulating heating cables are available with polyolefin jackets and Fluoropolymer jackets. While polyolefin jackets are suitable for exposure to water, they are not suitable for exposure to fats and oils, chocolate, or caustic due to the chemical action of these fluids on the jacket material. Prolonged exposure of polyolefin jackets to these materials results in the degradation of the polymer which reduces the mechanical strength of the jackets and loss of dielectric insulation properties. Fluoropolymer jackets are designed to resist damage from exposure to these fluids. Since cables in food and beverage plants can be installed on either type of line, Fluoropolymer jackets should be specified throughout.
- Requirement for monitoring and control. Most food and beverage plants are highly automated and have streamlined work forces. Temperature maintain is particularly important where line temperatures must be kept in a band, e.g. chocolate lines. The heat tracing system should have appropriate monitoring and control to function automatically while providing immediate warnings and alarms in the event of system failure to provide adequate time for the appropriate action by the work force. Stand alone controllers with integral ground fault and alarm outputs should be specified throughout.
- Presence of heat tracing on both metallic and plastic piping systems. The heating cables and installation methods should be suitable for both metallic piping and plastic piping systems, recognizing that plastic pipes require that a heat-loss calculation factor be applied during the engineering design due to their lower thermal conductivity.
- Ensuring adequate heat generation while minimizing electric energy consumption. Many heating systems provide an excessive amount of power per unit pipe length. The heating cables should be designed to make up the heat lost at the minimum design ambient temperature, and no more. Any excess heat is merely wasted. The heating cables should be matched to heat loss calculations for the traced lines.
- Installation for ease of removal and replacement of sanitary components, valves and pump maintenance. In food and beverage, many components are regularly removed, cleaned and replaced. Also, pumps and valves must be maintained. The installation method of the cable can make maintenance easy or difficult. Incorrectly installed cable can not only increase the time to remove and replace components from piping systems, but may result in cable damage that can extend the system down-time and increase the cost of maintenance while damaged heating cables are repaired and replaced.



Generic Specification for Food and Beverage Plants

General:

Furnish, install and commission a complete CSA certified heat tracing system comprising self-regulating heating cables, connection components, and monitoring and control panels for the purposes of

- a. **Freeze protection** for any pipes containing water (or water mixture); or
- b. **Process temperature maintenance** for any other process line, tank or accessory requiring a safe, easily installed heat source.

Products:

1. Self Regulating Heating Cable.

a. Construction:

i. At a minimum self-regulating heating cable shall be:

1. A parallel circuit consisting of (or comprising) two (2) 16 AWG main bus wires nickel copper extruded within in a semi-conductive, self-regulating polymeric core.
2. The cable shall be capable of being cut to length and powered and terminated in the field by licensed qualified trades people.
3. The polymeric core shall be encased in a radiated cross-linked, modified polyolefin dielectric jacket. The dielectric jacket shall have a tinned copper wire shield (braided) encased in an outer jacket of fluoropolymer (SJ) which is specified for service where the cable jacket is exposed or could potentially be exposed to organic or inorganic chemicals. Jacket specification is Drexan HeatTracer –SJ.

b. Performance:

- i. Wattage output of self regulating cables shall vary along the linear length of the cable in response to, and in direct proportion to the temperature in immediate proximity (or in contact with) the cable.
- ii. **Tolerances:** Rated output (as certified by CSA) shall be -0% to +10% of published rated output as stated in catalogue and so marked on cable.
- iii. The cable shall be capable of operating at 120, 208, 220, 240, or 277 volts without use of a transformer.
- iv. The wattage output of the cable shall be matched to the heat loss of the pipe at minimum design ambient temperature as calculated by manufacturer's **ProTrace** heat tracing design software.

c. Warranty:

- i. Self Regulating Cable shall be furnished with a standard 3 year warranty against defects in workmanship and product quality.

d. Acceptable Products:

Drexan™ HeatTracer PipeGuard SJ.

2. Components

Drexan™ HeatTracer power connections, splices and end seals must be used, as per installation instructions, with the Drexan HeatTracer Cables to ensure product performance criteria and to comply with requirements of warranty, codes and approvals.

The connections components shall be one of the following varieties:

- i. heat shrinkable
- ii. metallic assemblies
- iii. **PowerPod™** polymeric quick connections

The connections shall be mounted on or above the insulation to allow access for inspection and troubleshooting.

A visible light indicator shall be provided at the end of the circuit to allow for visual confirmation of continuity when the heating cable is energized.

End seals shall be re-enterable for inspection and troubleshooting.

3. Monitoring and Control

a. Electronic Monitoring and Control Panel: **RECOMMENDED**

A programmable, solid-state Heat Tracing Monitoring and Control Panel shall be installed to provide the following System Fault Alarms:

- i. Breaker off or tripped.
- ii. Heater continuity or low current.
- iii. Ground fault trip.
- iv. Low temperature.
- v. High temperature.
- vi. Sensor fault.
- vii. The panel shall include
 1. DC or AC alarm output for PLC or remote alarm indication.
 2. A viewable LED Alarm indicator shall be on the door of the enclosure.
 3. The panel shall be a weatherproof, NEMA-4X enclosure.
 4. The panel shall exercise dormant heat tracing systems every 24 hours for early warning to prevent shut-downs.

Note: Alarm relays: where required by applicable law, alarm outputs may also be required.

Note: In all applications the heating cable circuit shall be protected with ground fault equipment in accordance with the National and Canadian Electrical Codes.

b. Where redundant systems are required to ensure uninterrupted freeze protection, two heating systems shall be installed on the lines and a two-circuit controller shall be installed, with one heating cable being operational and the other being available as a stand-by back-up.

Installation and Commissioning:

a. Heat tracing cable and cable connection components shall be installed in accordance with Manufacturer's Installation Instructions, including compliance with maximum circuit lengths for the selected breaker size and the design ambient start up conditions.

b. Heating cable shall be affixed to piping using fiberglass tape or nylon cable ties. Polyvinyl electrical tape and metallic pipe straps shall not be used.

b. Safety labels shall be affixed to the exterior of the insulated line.

c. The system shall be considered acceptable when all of the following conditions are met:

- i. Heating cable has been correctly installed;
- ii. connection components have been correctly installed;
- iii. the heat tracing lines are insulated;
- iv. the monitoring and control panel has been correctly installed;
- v. the monitoring and control panel has been correctly programmed;
- vi. power has been applied to the heat tracing control panel; and
- vii. The heat tracing control panel shows no alarms.
- viii. All of the above are certified by a representative of the manufacturer or an approved contractor.

Note: if thermostat and ground fault breaker are installed, then continuity must be confirmed after installation of insulation.