# Advanced frost heave protection for cold storage area flooring

## Nelson™ Commercial Frost Heave Prevention Systems

Self-regulating electric heating cables and controls, specifically designed for freezers, refrigerated warehouses and cold rooms

EMERSON™

# Protect Against Costly Cold Room Floor Damage

Prevent frost heave by installing electrical heating cables in the substructure conduit to maintain soil temperatures above freezing

## OVERVIEW

Frost heave is the uplift of saturated soil due to expansion from freezing. Cold storage areas maintain continuous temperatures at or below freezing. Ice forms beneath the ground surface under refrigerated facilities, expanding as surrounding soil moisture flows through capillary action to expand that concentrated mass. As the ice formation grows, it vertically heaves the soil beneath the freezer floor and columns, resulting in significant structural damage.

### Frost heave results from three basic conditions:

- Frost-susceptible soil
- Sufficient water availability
- Cooling temperatures causing the soil and water to freeze

### Eliminating even one condition prevents frost heave

- Installing electrical heating cables in the conduit embedded in the substructure beneath the floor insulation maintains soil temperatures above freezing, preventing ice formation
- The substructure can be any suitable construction material, including concrete, compacted sand or (in some instances) compacted soil

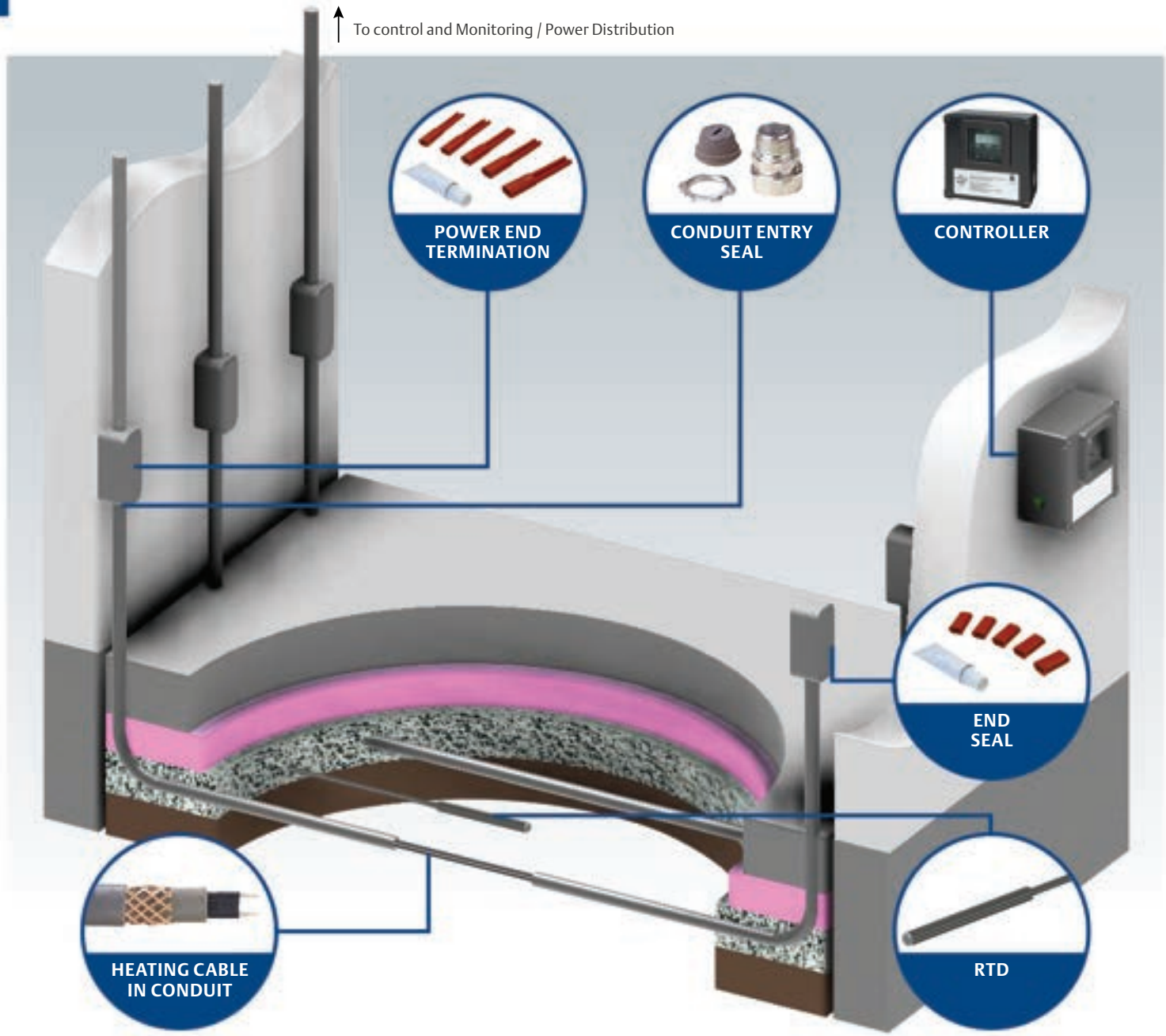
## BENEFITS

Nelson self-regulating frost heave prevention systems better monitor and control - with less maintenance - than Air or Glycol systems. The cable provides the correct wattage as temperatures fluctuate, providing an efficient, cost-effective and safe system that replaces the ground heat pulled by the freezer floor, preventing subsurface ice formation.

## SYSTEM DESIGN

- **The Heating Load**
  for a typical frost heave application is dependent on the thermal insulation barrier between the flooring and the substructure
- **Applications Above Grade Level**
  require thermal insulation installation around the perimeter of the heated area
- **Conduit Spacing**
  is typically 0.6 m - 1.2 m (2' - 4') on centers
- **Heater Cable Selection**
  depends largely on the minimum freezer design temperature; thermal resistance (R-Value) of the insulation barrier; and conduit spacing
- **The R-Value**
  is calculated by dividing the insulation thickness (in inches) by the insulation thermal conductivity (K factor)

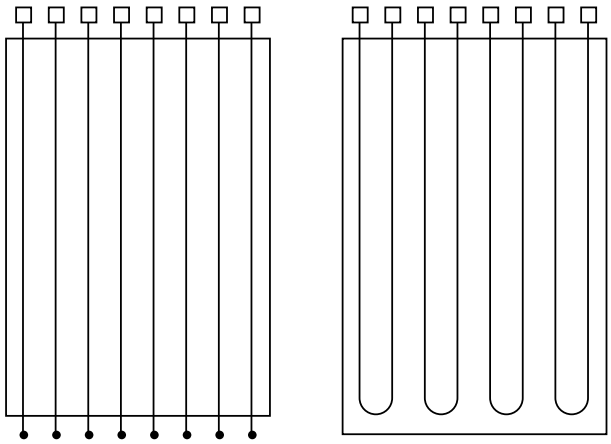
# System Installation




## TYPICAL CONDUIT LAYOUT

Configure conduit system based on power required and selected conduit spacing.

Let our Nelson Design Suites software help recommend the right cable for your application and provide the electrical installation details of each circuit.



Straight Run Layout



Hairpin Layout

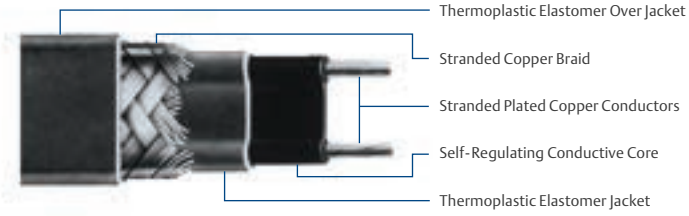
# Ideal for Commercial Applications

Nelson self-regulating heating cables are engineered to remediate the conditions that create ice heave, resulting in structural damage.

## SELF-REGULATING HEATING CABLES

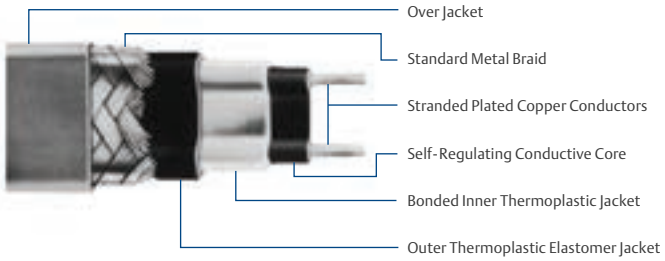
Nelson self-regulating electric heating cables are designed for efficient, cost-effective remediation of ice heave by maintaining above-freezing soil temperatures. Nelson offers high-quality cables and control options for virtually every commercial cold room, freezer or refrigerated storage application.

### Nelson CLT™ Cable




Designed for use in Ordinary (Unclassified) Locations

### Nelson LT™ Cable




Designed for use in Ordinary (Unclassified) Locations

A premium subsurface freezing prevention solution suitable for installation in the conduit embedded in the substructure. Ideal for freeze protection systems, the self-regulating cable automatically adjusts its heat output with temperature fluctuations for safe, efficient operation.

| Product Feature | Catalog No. | CLT Cable | | Catalog No. | LT Cable | |
|---|---|---|---|---|---|---|
| Power Output* @ 50°F | CLT-5JT | 120 VAC | 3.3 W/ft | LT-5JT | 120 VAC | 3 W/ft |
| | CLT-25JT | 240 VAC | | LT-25JT | 240 VAC | |
| | CLT-8JT | 120 VAC | 5.2 W/ft | LT-8JT | 120 VAC | 4.8 W/ft |
| | CLT-28JT | 240 VAC | | LT-28JT | 240 VAC | |
| Max. Voltage | 277 VAC | | | 277 VAC | | |
| Bus Wire Size | 18 Gauge | | | 16 Gauge | | |
| Max. Segment Cable Length | CLT-5JT | 225 ft | | LT-5JT | 280 ft | |
| | CLT-25JT | 450 ft | | LT-25JT | 560 ft | |
| | CLT-8JT | 180 ft | | LT-8JT | 225 ft | |
| | CLT-28JT | 360 ft | | LT-28JT | 450 ft | |

*Power output adjusted for installation in conduit.

# Optimize Self-Regulating Heater Cable Performance

Specifically designed for use with Nelson heating cables to regulate thermic variations and maintain above-freezing soil temperatures.

## CONTROL AND MONITOR

Nelson Heat Trace, microprocessor based, digital, general purpose controllers provide temperature regulation of an individual heater segment with sensor monitoring, remote alarm contacts and ground fault leakage protection. Recommended for use with frost heave prevention systems to reduce freezer loading and energy consumption during operation. Ground leakage and current monitoring are both advised for cables installed in electrically heated foundations, to detect dielectric integrity and changes in heater power outputs.

### Nelson™ CM-GP Controller

Microprocessor based digital electronic controller has been specifically designed for wall-mounted electric heat tracing applications. Provides temperature control of an individual heater segment with sensor monitoring, remote alarm contacts and ground fault leakage protection.

- NEMA 4X fiberglass reinforced, carbon impregnated, UV resistant polymer enclosure is designed for wall-mounted applications.
- System is provided with dual pole switching and is environmental hardened for use in various plant locations.
- Provided with common alarm contacts for remote monitoring of the control system.

### Nelson™ CM-1 Cable Monitoring System

Continually monitors the supply voltage and current flow to each heating device. Used with both series and parallel styles of electric heat tracing cables - with the addition of Continuity Monitoring Devices - monitors both bus wires in parallel styles of heating cable. Used with ground fault breakers, provides an automatic alarm system for any ground fault condition.

- For control function, use in conjunction with an electronic controller and / or mechanical thermostat.
- Mounted in a NEMA 4 or 4X enclosure that can be wall or rack mounted in close proximity to the breaker panel feeding the tracing system.
- Environmentally hardened for use in various locations and configurable up to 48 circuits.
- Connect individual CM-1 systems to a central PC running RS-485 communication software.

# Control Heat Tracing Systems

Designed for use with Nelson LT and CLT Heater Cables as part of a safe, efficient and cost-effective frost heave prevention system.

## HEAT TRACE THERMOSTAT

Nelson Heat Trace thermostats are approved for use in ordinary (unclassified) areas when used with Nelson Heat Trace field-fabricated heating cables.

### Nelson™ TH4X325 Thermostat

Ambient compensated, internal adjustment thermostat controls heat tracing systems in ordinary (unclassified) or corrosive locations. NEMA Type 4X, IP66, die cast aluminum enclosure with single pole, double throw switch.

- Temperature range: -4ºC to +163ºC (+25ºF to +325ºF).
- Exposure: -40ºC to +71ºC (-40ºF to +160ºF).
- Capillary Length: 3 m (10 ft).
- Capillary Material: Stainless Steel.
- Capillary Maximum Bulb Temperature: +215ºC (+420ºF).
- Electrical Data: 22 amp resistance 480 Vac (100 - 480 Vac).
- Calibration Accuracy: +1.6ºF (+3ºF).

# Ensure a Successful Installation, Every Time


## ACCESSORIES

Nelson self-regulating heating cables must be installed with appropriate entry and end seal kits, containing the accessories needed to execute a successful frost heave prevention system installation. Accessories are also available for purchase separately from inclusion with kits - delivering the hardware that's needed, in the quantities the project requires.

### Nelson™ SLT-ES Entry Seal Kit

Designed for use with Nelson CLT and LT heater cables, provides a watertight entry seal into a junction box (not included with this kit).

- It is recommended that a NEMA 3R, 4 or 4X junction box be used.
- One entry per kit.

### Nelson™ LT-MP Power End Termination Kit

Designed for use with Nelson CLT and LT heater cables and used for terminating field-fabricated heating cables inside the power connection box.

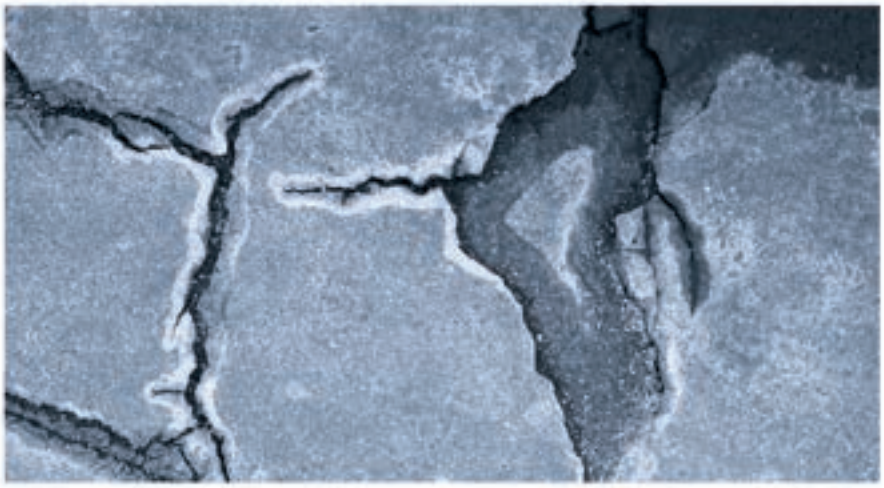
- Constructed of molded silicone material and silicone adhesive.
- Each kit contains materials to complete five terminations.

### Nelson™ LE-ME End Seal Kit

Designed for use with Nelson CLT and LT heater cables and used for terminating the ends of field-fabricated heating cables.

- Constructed of molded silicone material and silicone adhesive.
- Each kit contains materials to complete five terminations.

# Heating cable solutions protecting cold rooms against structurally compromising frost heave damage



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