

**Freezer Floor Freeze Protection
Heat Cable Design:**

Application

Freezers and other refrigerated storage areas are maintained at temperatures below freezing. Therefore, moisture in the soil under the floor could also freeze. Expansion of the soil caused by the freezing temperatures can result in damage to the above surface. Some floors depending on size and temperature of the freezer have been observed to raise 12", 24" or more. In many cases this causes the floor to crack, costing thousand of dollars in removal and replacement cost. Heat cable installed under the floor and in the substrate will prevent the soil from freezing.

Standards

IEEE Std. 515.1 Recommended Practice for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Commercial Applications

Code Considerations

- National Electric Code (NEC) Article 426
- National Electric Code (NEC) Article 427
- National Fire Protection Association (NFPA)
- Local Codes

Design Considerations

- A typical substrate design includes the concrete slab, a layer of rigid foam insulation and a heater cable imbedded in sand or concrete. The heater cable is generally installed on 2 to 4 foot (.6 to 1.2 meters) centers.
- The heat load requirement is calculated based on the amount of insulation between the concrete floor and the heated substrate and the refrigerated area temperature. For elevated applications, insulation around the perimeter should be considered.
- The following tables show the heater load requirements based on insulation thickness, cable spacing and freezer temperature. Although constant wattage / zone heaters and MI cable can be used in this application the cable generally used is low temperature self-regulating cables with a copper braid and over jacket.

Design Conditions:

Floor Size _____
 Facility Operating Temperatures _____
 Substrate Material _____
 Type of Insulation _____

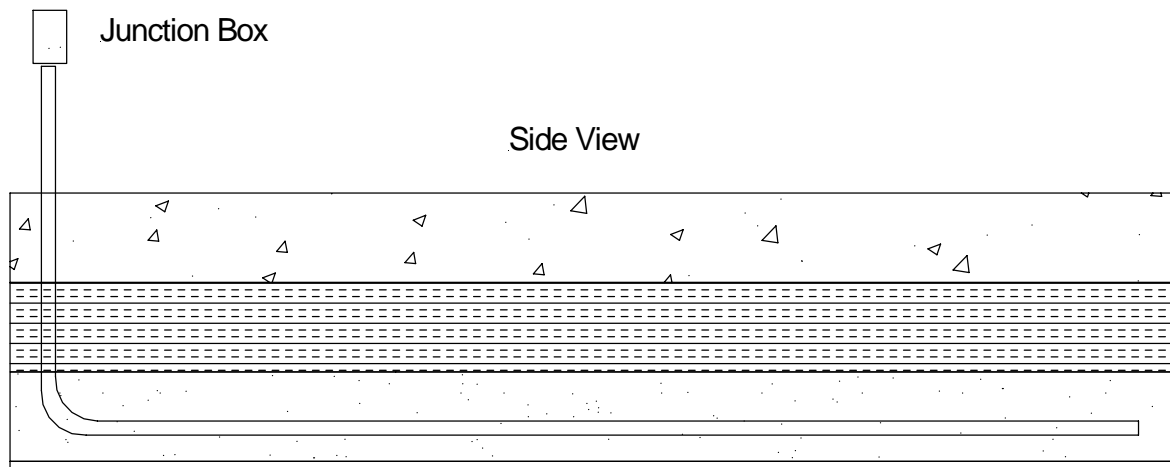
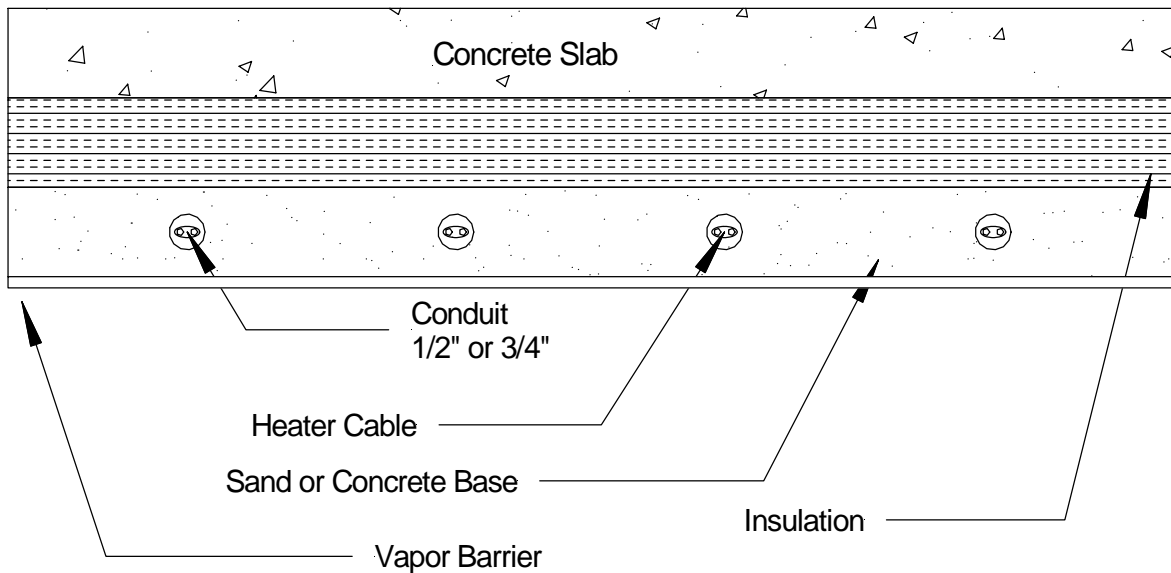
Freezer Temperature	Watts @2.00 Ft	Watts @ 3.00 Ft	Watts @ 4.00 Ft
-40° F	6.4	7.3	9.1
-20° F	4.1	5.1	7.0
-10° F	3.6	4.3	5.5
-0° F	3.2	4.0	4.8
10° F	2.7	3.0	3.4

4" Insulation

Freezer Temperature	Watts @2.00 Ft	Watts @ 3.00 Ft	Watts @ 4.00 Ft
-40° F	3.9	5.2	7.0
-20° F	3.2	3.7	4.9
-10° F	2.7	3.0	4.0
-0° F	2.3	2.7	3.2
10° F	1.8	2.1	2.4

6" Insulation

- Although not required, it is recommended that polymer based heaters be installed in conduit for ease of access and / or replacement. If non-metallic conduit is being used however, care should be taken that the cables sheath temperature does not damage the pipe. This can occur if high temperature self-regulating cable or constant wattage / zone heaters are being used. Self-regulating cable also requires de-rating when installed in conduit. (De-rate LT and CLT products by 40% when installed in metallic conduit and HLT product by 10%)
- Power connection kits and end seals should be mounted in an accessible junction box. Branch breakers feeding the cables shall be 30mA GFEPD.
- Thermostatic control is recommended for this application. The sensor should be located in conduit halfway between two runs of heater cable toward the center of the heated area.



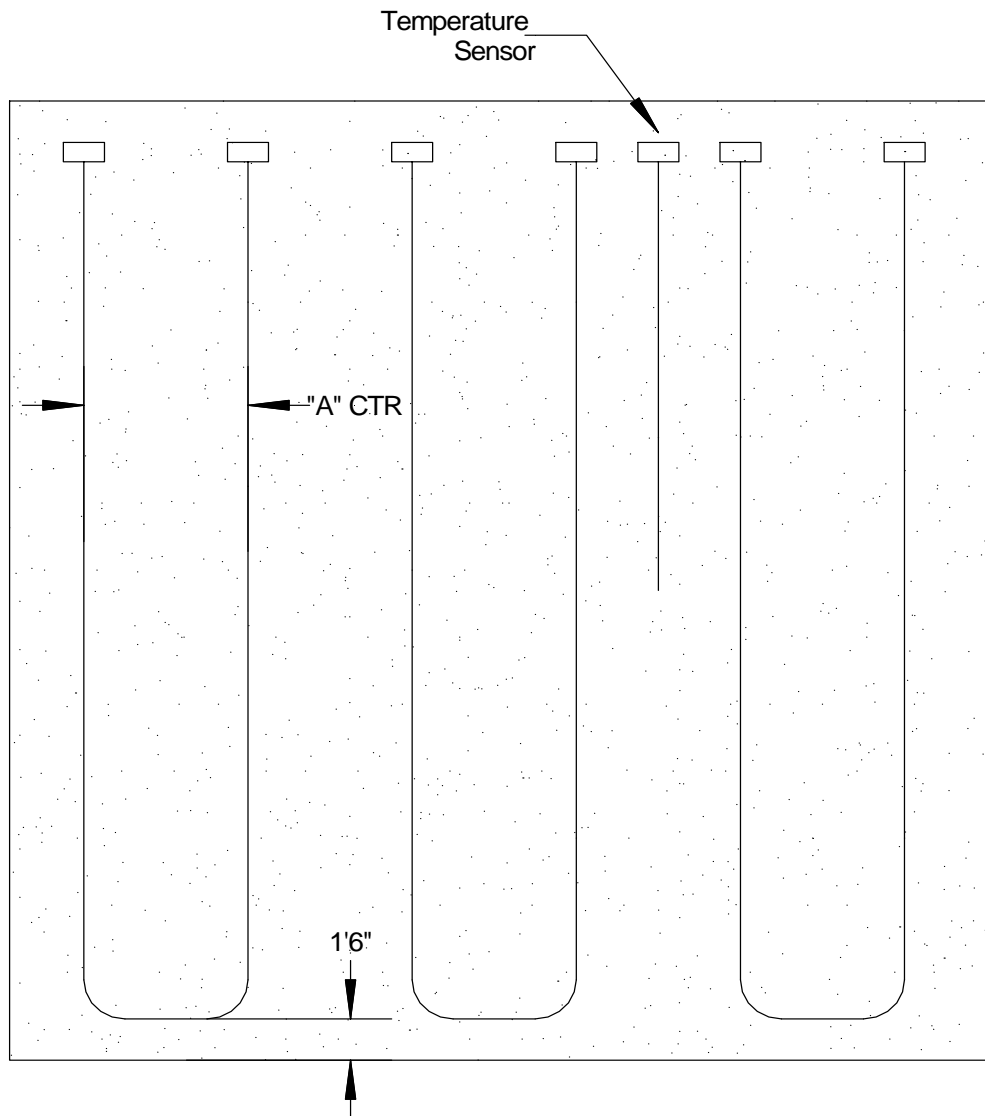
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LAYOUT

Heater Cable Conduit Shall be mounted in the sand or Concrete base and run no closer to the outside wall that 1'6". Each conduit shall be located at "A" Centers and be a minimum of 1/2", 3/4" where allowed. A Weather proof junction box shall be mounted at each end of the Heater Cable Conduit. The junction box shall be located for easy access to both the Power Termination End and End Run connection.

The Junction box will include molded Silicone End Seal and Power Termination kit with Silicone Adhesive.

Temperature Sensor mounted in a separate conduit centered between two Heater Cable Conduit runs. Sensor shall be Type J with weather proof 30' leads. Sensor wire to Control cabinet shall be made with Type J PVC insulated Thermocouple wire and connections made with minimum 90% Silver solder. Wire nuts are not permissible.



Freezer Floor Freeze Protection

Controls

Control Panel shall be designed with Digital temperature Controller, GFI Ground Fault protection, Control transformer, Low temperature alarm, Rotating Alarm light and Alarm reset push button to make up a monitoring and controlling System.

Our control panels are pre-wired, and labeled for easy confident, installation and shipped complete with easy to setup Fuji Digital Temperature Controllers, wiring diagrams and manuals.

All wiring is brought to Clearly Labeled terminal strips that make wiring easy. Attach your heater wire, incoming power wiring, and thermocouple wiring and your ready to run.

Systems come complete with the following:

- NEMA 4X enclosure
- Fuji Temperature Controllers
- GFI Ground Fault Protection
- Fused Control voltage
- Magnetic Contactors
- Control Transformer (size as req.)
- Red Pilot Light (Alarm)
- Flashing Alarm Light
- Re-set Alarm Push Button



Inputs:

- Thermocouple
- Terminals for external stop / Heater shutdown.
(Remote contact closure Emergency stop PB.)



Fuji, 1/16th DIN Size Digital Temperature Controller, complete with 4X gasketed case, PID control, Autotune – selftune feature, Digital Display of both Setpoint and Process Temperatures. We can substitute your controller of choice for no extra charge.

Cost differences do apply!

All Fuji controllers have a 3-year warranty!

