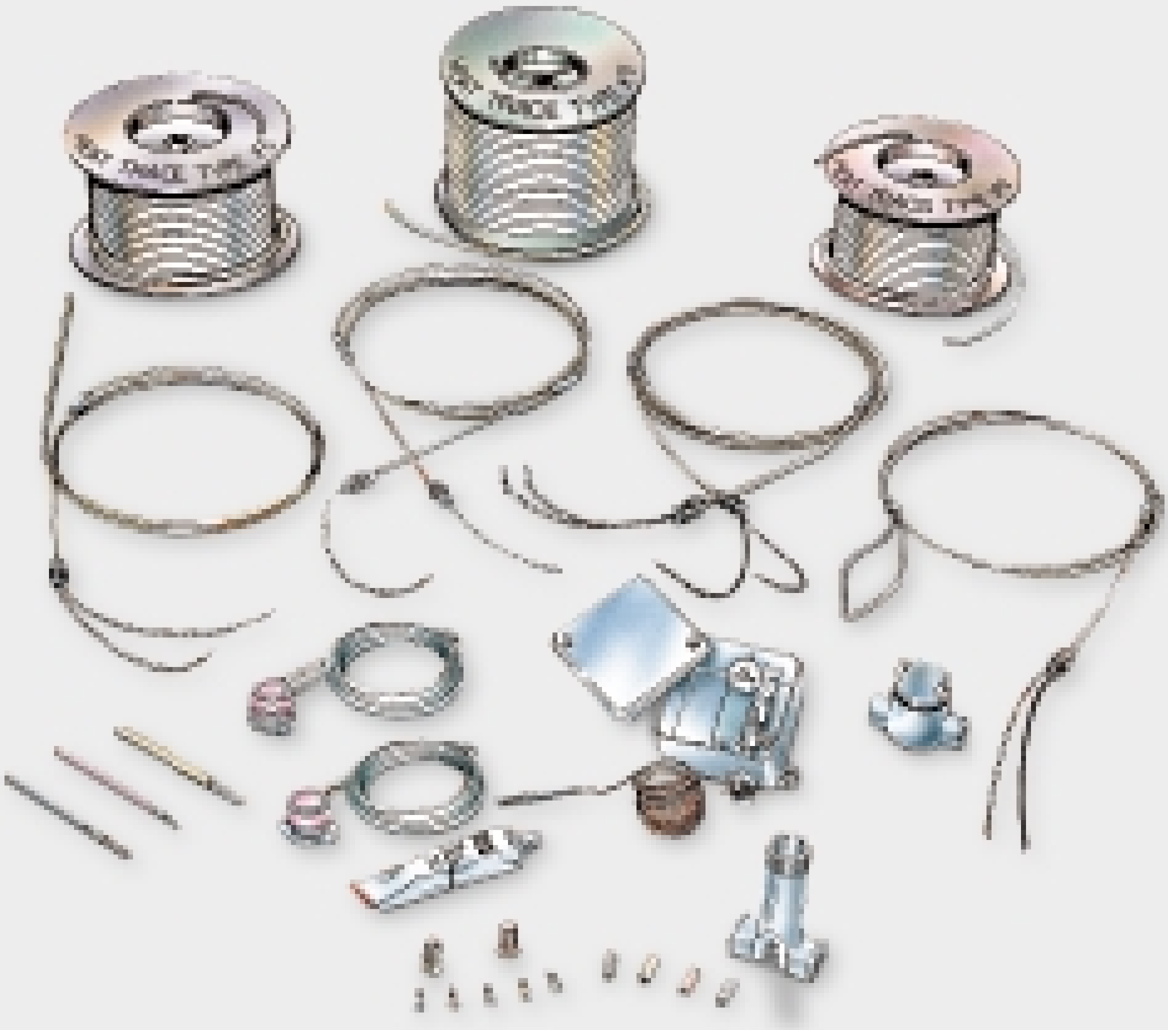


6 SECTION

Heat Trace Cable

Introduction to Heat Trace Cable Systems

Tempco's Heat Trace Cables are used to counteract the effects of heat dissipation from process pipe and equipment through its insulation (if any). This heat loss allows a drop in temperature, bringing about unacceptable consequences such as frozen pipes, reduced fluid viscosity, etc.

The use of heat trace cable replaces the heat lost, maintaining the desired temperature through the application of the required wattage.

There are two general categories of Electrical Heat Trace Cable:

Mineral Insulated Metal Sheath and

Non-Metallic Sheath heat trace cable

There are two types of Non-Metallic Sheath Heat Trace Cable:

Constant Wattage and

Self-Limiting or **Self-Regulating** cable.

Each style of heat trace cable serves different applications.

The Most Commonly Asked Questions About Heat Trace Cables

Which Cable do I need?

Selecting the proper cable depends on many different variables. The pipe size, exposure temperatures, ambient conditions, insulation type and thickness, maintenance temperatures, heat-up rate, flow rate, and type of material involved all play a part in determining which cable is best for your application.

Consult pages 6-2 to 6-19 and/or **Tempco** to assist you in making the correct choice.

Requirements for Metal Overbraid and Outer Jackets

Metal overbraid is required on all heat trace cabling to meet NEC code for grounding. The braid provides mechanical protection, as well as a low resistance grounding path.

On SL and SLE self limiting cables, in addition to the standard metal overbraid, an optional thermoplastic elastomer or fluoropolymer outer jacket is recommended when exposure to organic chemicals or corrosives is expected.

Field cutting ability without changing the resistance

Tempco's Constant Wattage and Self-Limiting style cable is designed to be a certain wattage per foot within a certain circuit length. All Constant Wattage cables have modules cut out of the bus wire jacket, exposing the bare wire at alternating points at predetermined lengths. The cable is designed to be a certain wattage within this circuit length. These circuits run the length of the spool, similar to short runs of cable run in series to make one long cable. If a circuit is interrupted (cut) the cable will be cold up until the next complete circuit.

Mineral Insulated Metal Sheath Heat Trace Cable

Mineral Insulated Metal Sheath Heating Cable is the *most rugged* and *durable* type of heating cable, due to its construction. It can have a very high watt output, which can be used for process heating applications. This type of cable is also noted for long life when properly installed, since it has no organic materials which can deteriorate with age.

Tempco's Mineral Insulated Heating Cable consists of one or two resistance wires surrounded by highly compacted magnesium oxide, enclosed in a metal sheath. The heating cable assembly is supplied complete with end cap, cold lead, and a threaded power connection fitting and is hermetically sealed.

Non-Metallic Sheath Heat Trace Cable

Constant Wattage Cable This style of heat trace cable is designed to put out a certain amount of wattage per linear foot at a particular voltage. It is always putting out the designed watts per foot, no matter what the surface or ambient temperature is.

This fact means that in most situations the heating cable is continually pumping heat into the vessel or pipe being maintained or heated. If the heat trace cable is not attached to some kind of control device, it has the potential to overheat itself and burn out. This would not only ruin the cable, but could cause damage to whatever it is being used on. Therefore, constant wattage cable must be controlled by some means.

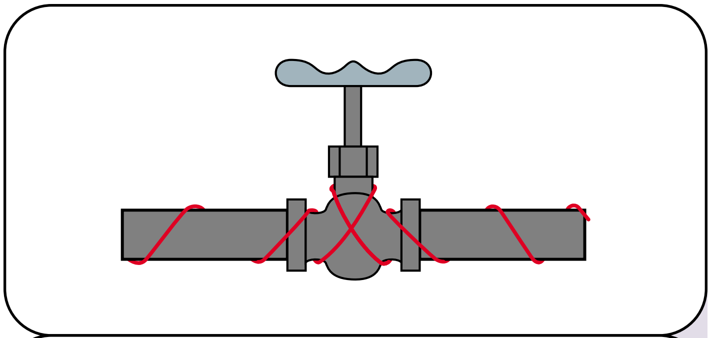
Self-Limiting or Self-Regulating Cable This cable will self-adjust its power output in relation to the surface temperature as well as ambient conditions. In other words, the hotter the conditions get, the lower the wattage output becomes. This characteristic allows this type of cable to be used without a control device. However, if a particular temperature is required, then a control device must be used.

Both cables are used by all types of industry. It is the user's requirements that dictate which design to use. Higher temperature maintenance applications will use the constant wattage cables due to the higher maximum exposure temperatures that they allow. Lower temperature maintenance applications, such as freeze protection, can use the self-limiting cable, although constant wattage cable can be used just as effectively as long as it is controlled properly.

Applications of Mineral Insulated Heat Trace Cable

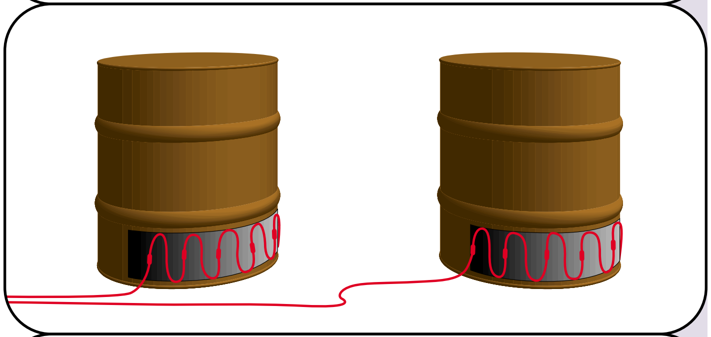
Pipe Tracing

The features of Tempco's Heat Trace heating cables are ideal for heating pipes and valves. A few of the many applications are: freeze protection of water lines: maintain viscosity of dense fuel oil: keep wax, pitch, asphalt, lead, etc. in liquid state; keep condensation in gas or steam lines from freezing; and protect gauges and instruments. Heat trace gives a uniform and controlled heat.



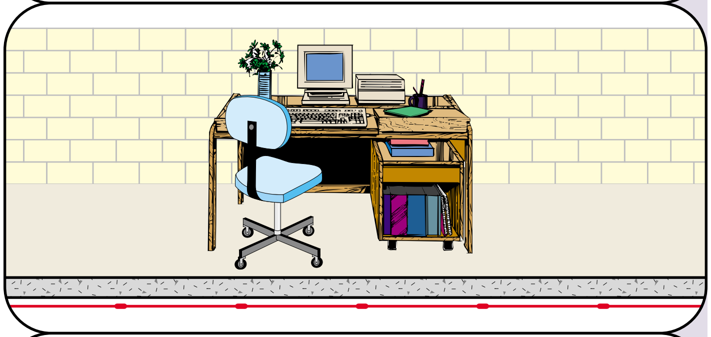
Vessel Heating

A vessel may be a barrel, tank, hopper or fly ash precipitator. They come in all shapes and sizes. Flexibility, mechanical ruggedness, easy installation and long life are the features that make Heat Trace heating cables a welcome tool for heating these vessels. Heat Trace cables are generally attached to the outside walls of vessels to prevent condensation or freezing, keep fluid parts from precipitating out, maintain liquids above pour point, and for melting wax or lard.



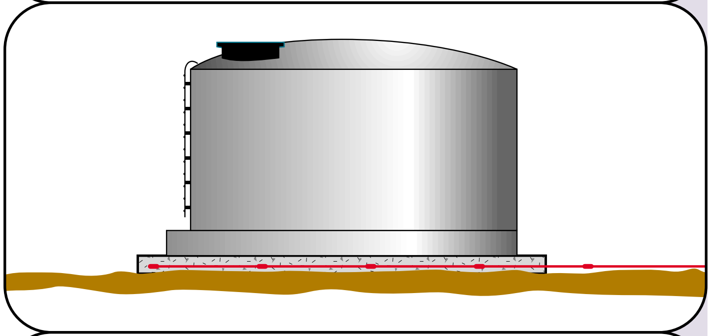
Comfort Heating

Electric comfort heating is growing at the same rapid rate as air conditioning. Heat Trace heating cables embedded in the floor slab give comfort and safety that is superior to other heating systems. Particularly applicable to children playing on the floor or mechanics working or standing for long periods on the floor. Installations include home basements, office, garage, warehouses, toll booths and hazardous areas such as paint or chemical spray booths and storage area.



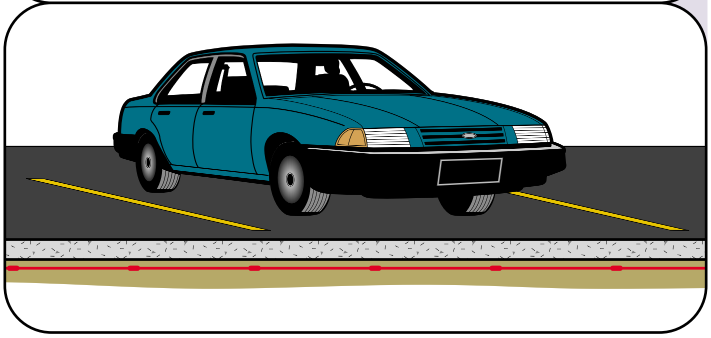
Frost Prevention

Frost Heaving can lift a brick building out of the ground, rupture a steel tank, or destroy a concrete foundation. Heat Trace heating cables, when installed in a conduit system in the sub-soil, can eliminate these forces. Applications include ice plants, freezer doors, aircraft hangar doors, and remote buildings exposed to frigid climate.



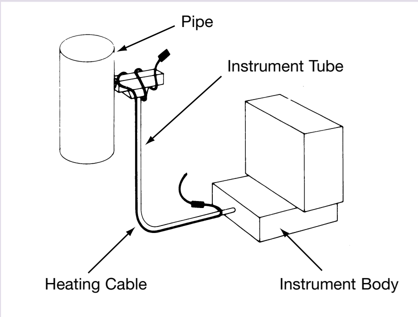
Snow Melting

Snow and ice removal for pedestrian and vehicle traffic has been an expensive and difficult problem. Heat Trace heating cables offer a simple, convenient and permanent method of melting snow and ice. The relatively small cost is easily justified to keep traffic moving, keep business flowing and prevent accidents. The more common installations include: roads, sidewalks, loading docks, ramps, parking garages, highway intersections; bridges, shopping malls, schools and hospitals.

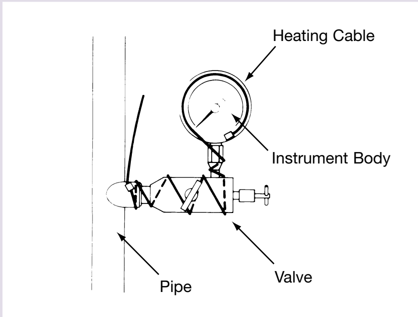


Heat Trace Cable Installation Details

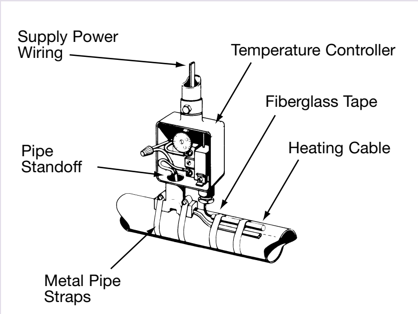
Installation of Heating Cable on a Pressure Transmitter.



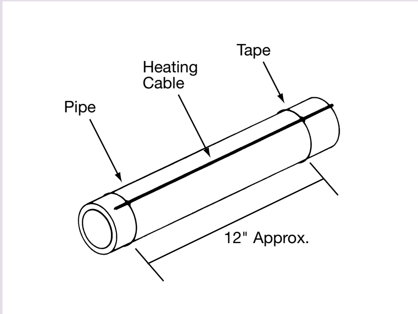
Installation of Heating Cable on a Pressure Indicator.



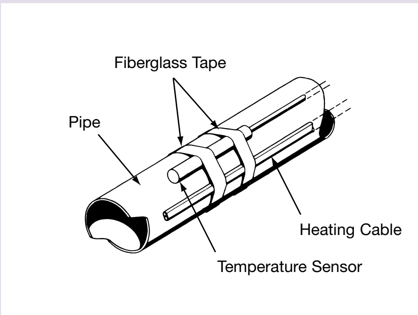
Installation of Heating Cable System in Non-Hazardous Area.



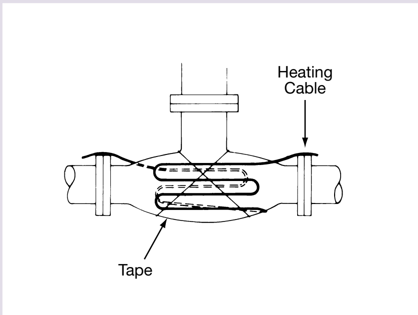
Installation of Heating Cable on a Straight Pipe Run.



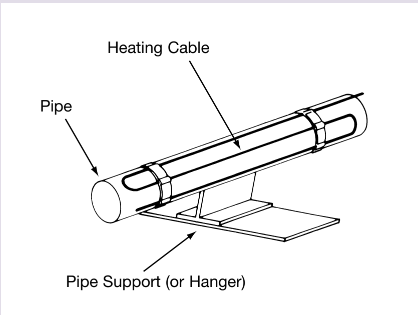
Installation of Temperature Sensor.



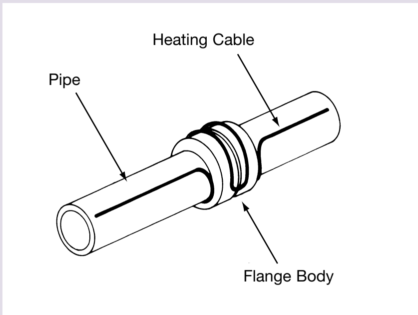
Installation of Heating Cable at a Blind Tee.



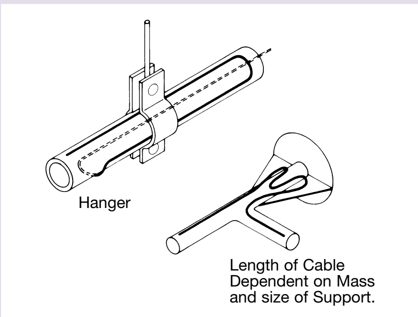
Installation of Heating Cable at a Pipe Support.



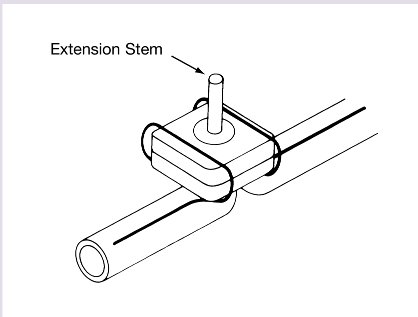
Installation of Heating Cable at a Flange Body.



Typical Installation of Heating Cable for Supports.



Installation of Heater on Diaphragm Valve (when surface area is sufficient).



Engineering Guide for Mineral Insulated Heat Trace Cable

Things You Need To Know

Heat required:
Watts/Foot— The heat required to maintain a pipe at any given temperature is a function of the size of the pipe, the type and thickness of the insulation and the difference in temperature between the minimum required operating temperature of the pipe and the minimum expected ambient temperature.

Length of the heating element hot section:
The hot section length is the length of pipe to be heated plus any additional length required to heat valves, fittings, supports or other pipe fittings.

Select a heating element cable style:
Things that must be considered when selecting a cable style is length of the run, power source location and cold section length.

STEP 1

Determine Watts per Foot

See page 6-6 for reference tables

A. Subtract the minimum expected ambient temperature from the minimum required operating temperature of the pipe. From **Table Mi-1**, determine the basic watts per foot for the pipe diameter.

B. Take the result from step A and multiply by the the Insulation Thickness correction factor from **Table Mi-2**. Then multiply this answer by the Insulation Type correction factor in **Table Mi-3**.

C. Multiply the figure obtained in step B above by the Wind Speed correction factor in **Table Mi-4**. The result is the watts per foot required to maintain the pipe at a minimum required operating temperature.

D. It is our recommendation that the "Watts per Foot" be increased by a safety factor of 20% (1.2 multiplier).

STEP 2

Determine Ohms per Foot and Current Draw

$$\text{Ohms/Ft} = \frac{(\text{Voltage})^2}{\text{Watts/Ft} \times (\text{Hot section length in feet})^2}$$

$$\text{Current (Amps)} = \frac{\text{Voltage}}{\text{Ohms/ft} \times (\text{Hot section length in feet})}$$

Design Example

System Specification:

Pipe Size: 6" Diameter
Pipe Length: 150 ft
Insulation Type: Cellular Glass **Thickness:** 2"
Desired Temperature: 300°F
Minimum Site Temperature: -10°F
Normal Wind Velocity: 20 MPH
Available Voltage: 380 VAC

Solution

A. $\Delta T = 300°F - (-10°F) = 310°F$
From Table Mi-1, the basic watts per foot requirement equals **53 watts/ft**

B. Correction Factors for 2" thickness of cellular glass insulation from Table Mi-2 and Mi-3
$= 53 \text{ watts/ft} \times .62 \times 1.45 =$ **47.7 watts/ft**

C. Correction Factor for wind velocity
$= 47.7 \times 1.06 =$ **50.5 watts/ft**

D. Using the recommended 20% Safety Factor gives
$50.6 \times 1.20 =$ **60.7 watts/ft**

$$\textbf{Ohms/Ft} = \frac{(380)^2}{(60.7) \times (150)^2} = \textbf{.11 Ohms/ft}$$

$$\textbf{Current (Amps)} = \frac{380}{.11 \times 150} = \textbf{23 Amps}$$

Table Mi-1 Basic Heat Loss From Pipe with 1" Fiberglass Insulation

Pipe Size	Temperature Difference (°F) Pipe to Ambient (Watts/ft.) 50	100	150	200	250	300	350	400	450	500
½	1.9	3.8	5.8	7.3	10	13	15	17	20	22
¾	2.2	4.5	7	9.6	12	15	18	21	24	27
1	2.3	4.7	7.3	9.6	13	16	19	22	25	28
1½	3	6.1	9.6	13	16	20	24	28	32	36
2	3.5	7	11	15	19	23	27	33	37	42
2½	3.9	8.1	13	17	22	27	32	37	43	48
3	4.7	9.6	15	20	26	32	38	44	50	57
4	5.6	11	17	24	30	38	44	53	60	68
6	7.4	14	24	33	42	53	62	73	83	95
8	9.6	18	30	41	53	66	77	92	104	118
10	11	21	36	50	64	78	94	110	125	143
12	14	24	42	58	75	93	110	128	147	167
14	16	32	49	67	86	106	126	147	168	191
16	18	36	56	75	97	119	142	167	191	216
18	19	40	61	84	108	133	158	186	212	241
20	22	44	68	93	118	147	175	205	235	266

Note: The data given is for 1" fiberglass insulation. When using thicker insulation, use the multipliers listed in **Table Mi-2**. When using insulation other than fiberglass, use the appropriate multiplier shown **Table Mi-3**.

Table Mi-2 Insulation Thickness Multipliers

Pipe Size	Insulation Thickness 1.5	2.0	3.0	4.0
½	.83	.73	.64	—
¾	.83	.72	.61	—
1	.83	.72	.60	—
1½	.81	.70	.59	—
2	.79	.67	.55	.47
2½	.79	.66	.55	.47
3	.77	.65	.51	.44
4	.77	.65	.50	.43
6	.76	.62	.47	.40
8	.76	.60	.45	.39
10	.72	.59	.44	.37
12	.72	.58	.43	.37
14	.72	.58	.43	.34
16	.72	.58	.42	.34
18	.72	.58	.42	.33
20	.72	.58	.42	.33

Table Mi-3 Insulation Type Multipliers

Insulation Type	Multiplier
Calcium Silicate	1.35
Fiberglass	1.00
Cellular Glass	1.45
Urethane	.74

Table Mi-4 Wind Speed Correction

Wind speed (MPH)	Correction Factor
0 – 8	1.00
9 – 18	1.03
19 – 30	1.06
31 – 50	1.15

EXAMPLE

An 8" pipe with 3" calcium silicate insulation and a temperature difference of 250°F would require 38.6 watts/ft.

From Table Mi-1, for an 8" pipe and a 250°F temperature difference, the basic heat loss = 53 W/ft.

Insulation Correction Factor from Table Mi-2 = .45.

Insulation Correction Factor from Table Mi-3 = 1.35.
Safety Factor = 1.20

Therefore: 53 × .45 × 1.35 × 1.2 = 38.6 watts/foot).

Specifications

Construction: Metal sheathed with compacted mineral insulation (MgO) that will not burn or support combustion with either single or dual conductors.

Hot Section Sheath Materials: Copper and nickel alloys are the most commonly used materials. Copper is very ductile and can be used to 500°F (260°C), while the nickel alloys are highly corrosion resistant and can be used to temperatures as high as 1800°F (982°C).

Size Range: ⅛"O.D. to ⅜"O.D.

Cold Section: The splice between the cold section and hot section is hermetically sealed. The cold section is of either copper or nickel alloys with compacted MgO insulation. Cold section to be 2 feet minimum in length.

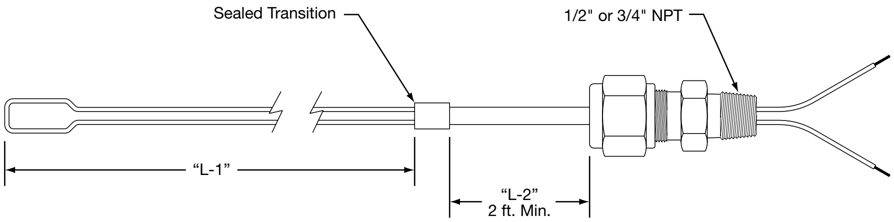
Pigtails: 12 inches of 12 gauge, stranded, Teflon® insulated copper conductors.

Power: 6 to 200 watts per foot

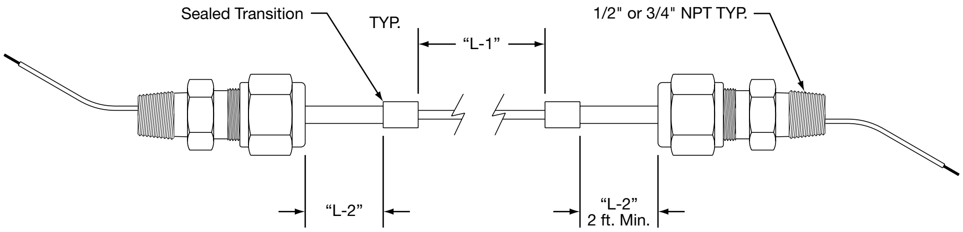
Voltage: 300 and 600 VAC maximum insulation ratings

Note: To insure the highest quality and long life it is suggested that the heat trace heating units be assembled at the factory.

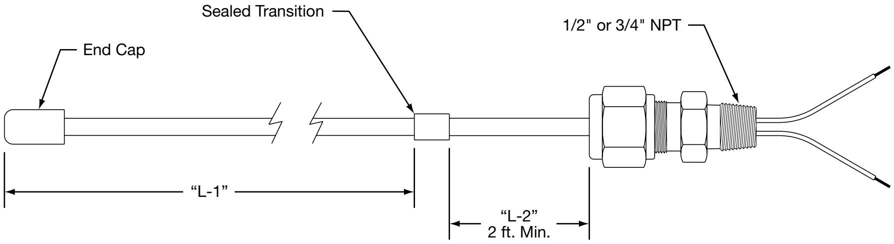
Product Types



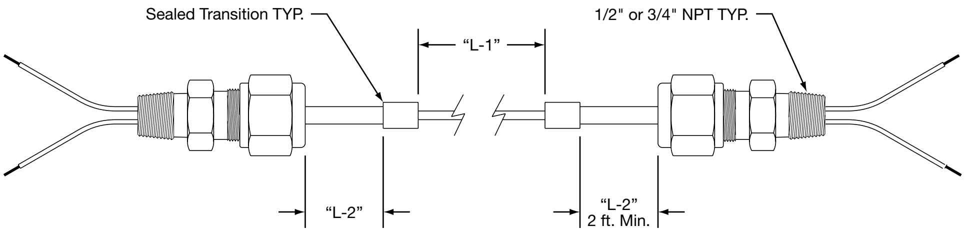
Style H1A Single Element (One Wire)



Style H1B Single Element (One Wire)



Style H2A Dual Element (Two Wire)



Style H2B Dual Element (Two Wire)

How to Order

Mineral Insulated Metal Sheath Heat Trace Cables

These cables are manufactured to specific application requirements.

Submit to **Tempco** your requirements for a quote.

Please Specify the following:

- ❑ Operating Temperature and Min. Ambient Temperature
- ❑ Pipe Size and Heated Length
- ❑ Insulation Type and Thickness
- ❑ Trace Type, Heated Length, Cold Section Length
- ❑ Sheath Material
- ❑ Watts per Foot and Operating Voltage

How to Determine Non-Metallic Heat Trace Cable Requirements

Heat Loss

Heat loss is the amount of heat given up to the surrounding atmosphere through a combination of conduction, convection, and radiation. The required parameters to determine total heat losses on a given pipe or vessel include several of the following:

- Temperature to be maintained
- Lowest expected ambient temperature
- Type, size, and run-length of pipe or tubing
- Type and thickness of thermal insulation to be used
- Heat loss from the surface of the material or vessel
- Losses through the vessel wall and the insulation
- Thermal properties (specific heat) of the materials being heated
- Flow rate
- Dimensions and weight of the material being heated
- Heat carried away by products being processed through the heated area
- Specified heat-up time
- Type and number of valves and supports

Calculating Heat Loss from Insulated Pipe

1. Calculate the ΔT or temperature difference. Subtract the lowest ambient temperature from the operating temperature.
2. Using the ΔT calculated in step 1, and the insulation thickness, refer to Table 1-A through 1-E—**Heat Loss for Pipes**, to determine the heat loss in watts per linear foot of pipe.
3. Depending on the type of insulation used in the application, multiply result from step 2 by the appropriate factor from Table 2—**Insulation Factor**. The resulting number is the heat loss expressed in watts per linear foot of pipe to be made up by the heat tracer.

Determine the Correct Heat Trace Cable

1. Determine the cable most appropriate for your system based on the temperature to be maintained, environment, length of the run, and the voltages available. There are **Tempco** heating cables available for most heat tracing applications.
2. If the watts per foot rating of the cable selected is more than the heat loss per foot, then a straight run may be used.

   If the watts per foot rating of the cable selected is less than the heat loss per foot, your options are:

   a. Use a higher wattage cable
   b. Use multiple straight runs
   c. Spiral wrap, the cable on the pipe
   d. Use insulation with a higher insulation factor or thickness.
3. Multiple or straight runs are preferred over spiraling in most applications because fewer power points along the pipe are required and installation is easier.
4. If spiraling is used, determine the wrapping factor by dividing the watts per linear foot of heat loss by the wattage rating of the selected heat tracer. A wrap factor of less than 1.0 indicates that a straight run of cable will provide adequate heat. For ease of installation, it is also recommended that multiple straight runs be used for wrapping factors of more than 2.0.
5. Determine the pitch distance for the pipe size being used by finding the wrapping factor in Table 3—**Spiral Pitch**, that is closest to the the one calculated.

Calculating the Heat Loss for Valves and Supports

1. To determine the heat loss multiplication factor for valves, refer to Table 4—**Heat Loss Multiplication Factors for Valves**. Multiply the watts per linear foot of heat loss of the pipe feeding to and from the valve by the multiplication factor for the corresponding pipe size from the table. This heat loss factor is based on a typical gate valve with insulation coverage to include the body, flange, and bonnet of the valve. If pipe supports are part of the system the heat loss calculation for each support should be made in the same manner as for a valve.

   To determine adjusted multiplication factor for other types of valves and supports, use the following conversion factors:

Gate valve	1.0
Ball valve	.7
Globe valve	.95
Butterfly valve	.60
Pipe supports	.50
2. Determine the length of cable required for each valve and/or support by dividing the heat loss in watts per foot by the wattage rating of the selected cable.

Determine the Total Amount of Heat Trace Required

1. Add the length of cable required for each valve and support to the length of cable required for the total pipe within your system.
2. Take the total length of cable and round it upward to the nearest figure divisible by the module length of 4 feet. Then add 4 feet for cold lead.
3. This final figure is the total amount required for the length of pipe, valves, and supports in the system.

Tables…
Please see the corresponding tables on pages 6-10 through 6-12.

Non-Metallic Heat Trace Cable Requirements

SAMPLE PROBLEM

System Specifications

Operating Temperature: 55°F
Low Ambient Temperature: -20°F
Pipe Size: 4" steel pipe
Pipe Length: 200 ft
Valve: 1 Gate Valve
Insulation Thickness and Type: 1" of Calcium Silicate
Voltage: 120 or 240 volts

PROCEDURE

1. Determine the heat loss.

a. Difference between low ambient and operating temperature:

55°F – (-20°F) = ΔT

ΔT = 75°F

b. Determine the heat loss by referring to Table 1-A—**Heat Loss for Pipes** for ΔT = 75°F, 4" diameter pipe, with 1" thick insulation. Heat loss factor using 1" thick fiberglass insulation = 7.6 W/ft.

2. Determine the adjusted heat loss for calcium silicate insulation (heat loss chart is based on fiberglass).

Refer to Table 2—**Insulation Factor**

Adjustment = 7.6 W × 1.47 adjustment factor = 11.17 W/ft

3. Select correct heating cable (by voltage and wattage) required to replace a heat loss of 11.17 W/ft. Use one straight run of 12 W/ft or three straight runs of 4 W/ft.

4. Determine the heat loss of the valve gate and supports.

Refer to Table 4—**Heat Loss Factor for Valves** for a 4" diameter pipe. The heat loss multiplication factor is 2.92.

Valve heat loss factor = 11.17 W/ft × 2.92 = 32.62 W

5. Determine the cable requirements for the valve.

Divide valve heat loss by W/ft of selected cable. Length of cable for valve:

32.62 W/ft. ÷ 12 W = 2.72 ft

6. Determine total cable requirements.

a. Cable required for pipe:

1 run × 200 ft = 200 ft

b. Cable required for valve = 2.72 ft

c. Total: 200 ft + 2.72 ft = 203 ft

Round this number (203) up to the nearest number evenly divisible by the module (module length = 4 ft), i.e. 204 ft.

d. Add module length (4 ft) for cold leads for termination:

204 ft + 4 ft = 208 ft

Total feet of cable required = 208 ft of 12 W/ft heating cable.

Table...

Please see the corresponding table on page 6-10 through 6-12

Table 1-A Heat Loss for Pipes — Insulation Thickness 1" *(Watts per foot)*

ΔT	NPS Pipe Size 0.25	0.5	0.75	1	1.5	2	2.5	3	4	6	8	10	12	14	16	18	20	24	30
25	0.6	0.7	0.8	1.0	1.2	1.5	1.7	2.0	2.4	3.3	4.2	5.2	6.0	6.6	7.5	8.4	9.2	11.0	13.6
50	1.2	1.5	1.7	2.0	2.5	3.0	3.4	4.0	4.9	7.0	8.7	10.6	12.4	13.5	15.3	17.1	18.9	22.5	28.0
75	1.8	2.3	2.6	3.0	3.9	4.6	5.3	6.2	7.6	10.6	13.3	16.3	19.1	20.8	23.6	26.3	29.1	34.7	43.0
100	2.5	3.2	3.6	4.2	5.3	6.3	7.2	8.4	10.4	14.4	18.2	22.2	26.0	28.4	32.2	36.0	39.8	47.3	58.7
125	3.2	4.0	4.6	5.3	6.8	8.0	9.3	10.8	13.3	18.5	23.3	28.5	33.3	36.4	41.2	46.0	50.9	60.6	75.1
150	3.9	5.0	5.7	6.5	8.4	9.8	11.4	13.3	16.3	22.7	28.6	35.0	40.9	44.6	50.6	56.5	62.5	74.4	92.2
175	4.7	5.9	6.8	7.8	10.0	11.7	13.6	15.8	19.4	27.0	34.2	41.7	48.8	53.3	60.4	67.5	74.6	88.7	110.0
200	5.5	6.9	7.9	9.1	11.7	13.7	15.9	18.5	22.7	31.6	39.9	48.7	57.0	62.2	70.5	78.8	87.1	103.7	128.5
225	6.3	8.0	9.1	10.5	13.4	15.8	18.2	21.2	26.1	36.3	45.9	56.0	65.5	71.5	81.0	90.6	100.1	119.1	147.7
250	7.1	9.0	10.3	11.9	15.2	17.9	20.7	24.1	29.6	41.2	52.0	63.5	74.3	81.1	91.9	102.7	113.5	135.2	167.6
275	8.0	10.1	11.6	13.3	17.1	20.1	23.2	27.1	33.2	46.2	58.4	71.3	83.5	91.1	103.2	115.3	127.5	151.7	188.1
300	8.9	11.3	12.9	14.9	19.0	22.4	25.8	30.1	37.0	51.5	65.0	79.4	92.9	101.3	114.8	128.4	141.9	168.9	209.4
325	9.8	12.5	14.2	16.4	21.0	24.7	28.6	33.3	40.8	56.8	71.8	87.7	102.6	111.9	126.9	141.8	156.7	186.5	231.3
350	10.8	13.7	15.6	18.0	23.1	27.1	31.3	36.5	44.8	62.4	78.8	96.2	112.6	122.9	139.3	155.7	172.0	204.8	253.9
375	11.8	15.0	17.1	19.7	25.2	29.6	34.2	39.9	48.9	68.1	86.1	105.1	123.0	134.2	152.0	169.9	187.8	223.5	277.1
400	12.8	16.3	18.5	21.4	27.4	32.2	37.2	43.3	53.2	74.0	93.5	114.2	133.6	145.8	165.2	184.6	204.0	242.9	301.1

Table 1-B Heat Loss for Pipes — Insulation Thickness 1.5" *(Watts per foot)*

ΔT	NPS Pipe Size 0.25	0.5	0.75	1	1.5	2	2.5	3	4	6	8	10	12	14	16	18	20	24	30
25	0.5	0.6	0.7	0.8	0.9	1.1	1.3	1.4	1.7	2.4	3.0	3.6	4.2	4.6	5.2	5.8	6.4	7.5	9.3
50	1.0	1.2	1.4	1.6	1.9	2.2	2.6	3.0	3.6	4.9	6.1	7.4	8.6	9.4	10.6	11.8	13.0	15.5	19.1
75	1.5	1.9	2.1	2.4	3.0	3.5	3.9	4.5	5.5	7.5	9.4	11.4	13.3	14.1	16.3	18.2	20.0	23.8	29.4
100	2.1	2.5	2.9	3.3	4.1	4.7	5.4	6.2	7.5	10.3	12.8	15.5	18.1	19.7	22.2	24.8	27.3	32.4	40.1
125	2.6	3.3	3.7	4.2	5.2	6.0	6.9	7.9	9.6	13.1	16.4	19.9	23.2	25.2	28.5	31.7	35.0	41.5	51.3
150	3.2	4.0	4.5	5.1	6.4	7.4	8.5	9.7	11.8	16.1	20.1	24.4	28.4	30.9	34.9	38.9	42.9	50.9	62.9
175	3.9	4.8	5.4	6.1	7.6	8.8	10.1	11.6	14.1	19.2	24.0	29.1	33.9	36.9	41.6	46.4	51.2	60.7	75.0
200	4.5	5.6	6.3	7.1	8.9	10.3	11.8	13.6	16.4	22.4	28.0	34.0	39.6	43.0	48.6	54.2	59.7	70.9	87.6
225	5.2	6.4	7.2	8.2	10.2	11.8	13.5	15.6	18.9	25.8	32.2	39.0	45.4	49.4	55.8	62.2	68.6	81.4	100.6
250	5.9	7.2	8.1	9.3	11.6	13.4	15.3	17.7	21.4	29.2	36.5	44.3	51.5	56.1	63.3	70.6	77.8	92.3	114.1
275	6.6	8.1	9.1	10.4	13.0	15.1	17.2	19.8	24.0	32.8	41.0	49.7	57.8	62.9	71.1	79.2	87.3	103.6	128.0
300	7.3	9.0	10.2	11.6	14.5	16.8	19.2	22.1	26.7	36.5	45.6	55.3	64.3	70.0	79.1	88.1	97.2	115.3	142.4
325	8.1	10.0	11.2	12.8	16.0	18.5	21.2	24.4	29.5	40.3	50.4	61.0	71.0	77.3	87.3	97.3	107.3	127.3	157.2
350	8.9	11.0	12.3	14.0	17.5	20.3	23.2	26.7	32.4	44.2	55.3	67.0	78.0	84.8	95.8	106.8	117.7	139.7	172.6
375	9.7	12.0	13.5	15.3	19.1	22.2	25.3	29.2	35.3	48.3	60.3	73.1	85.1	92.6	104.6	116.5	128.5	152.4	188.3
400	10.5	13.0	14.6	16.6	20.8	24.1	27.5	31.7	38.4	52.4	65.5	79.4	92.4	100.5	113.6	126.6	139.6	165.6	204.5

Table 1-C Heat Loss for Pipes — Insulation Thickness 2" *(Watts per foot)*

ΔT	NPS Pipe Size 0.25	0.5	0.75	1	1.5	2	2.5	3	4	6	8	10	12	14	16	18	20	24	30
25	0.4	0.5	0.6	0.6	0.8	0.9	1.0	1.2	1.4	1.9	2.4	2.8	3.3	3.6	4.0	4.5	4.9	5.8	7.1
50	0.9	1.1	1.2	1.3	1.6	1.9	2.1	2.4	2.9	3.9	4.8	5.8	6.7	7.3	8.2	9.1	10.1	11.9	14.6
75	1.3	1.6	1.8	2.0	2.5	2.9	3.3	3.7	4.4	6.0	7.4	8.9	10.3	11.2	12.6	14.0	15.5	18.3	22.5
100	1.8	2.2	2.5	2.8	3.4	3.9	4.4	5.1	6.1	8.2	10.1	12.2	14.1	15.3	17.2	19.2	21.1	24.9	30.7
125	2.3	2.8	3.2	3.6	4.4	5.0	5.7	6.5	7.8	10.4	12.9	15.6	18.0	19.6	22.1	24.5	27.0	31.9	39.3
150	2.9	3.5	3.9	4.4	5.4	6.2	7.0	8.0	9.5	12.8	15.9	19.1	22.1	24.0	27.1	30.1	33.1	39.2	48.2
175	3.4	4.1	4.6	5.2	6.4	7.3	8.3	9.5	11.4	15.3	18.9	22.8	26.4	28.7	32.3	35.9	39.5	46.7	57.5
200	4.0	4.8	5.4	6.1	7.5	8.6	9.7	11.1	13.3	17.9	22.1	26.6	30.8	33.5	37.7	41.9	46.1	54.5	67.1
225	4.6	5.6	6.2	7.0	8.6	9.9	11.2	12.7	15.2	20.5	25.4	30.6	35.4	38.5	43.3	48.1	53.0	62.6	77.1
250	5.2	6.3	7.0	7.9	9.7	11.2	12.6	14.4	17.3	23.3	28.8	34.7	40.2	43.6	49.1	54.6	60.1	71.1	87.5
275	5.8	7.1	7.9	8.9	10.9	12.5	14.2	16.2	19.4	26.1	32.3	38.9	45.1	49.0	55.1	61.3	67.4	79.7	98.2
300	6.5	7.9	8.8	9.9	12.2	14.0	15.8	18.0	21.6	29.1	36.0	43.3	50.2	54.5	61.3	68.2	75.0	88.7	109.2
325	7.2	8.7	9.7	10.9	13.4	15.4	17.5	19.9	23.9	32.1	39.8	47.8	55.4	60.2	67.7	75.3	82.9	98.0	120.7
350	7.9	9.6	10.7	12.0	14.7	16.9	19.2	21.9	26.2	35.2	43.6	52.5	60.8	66.0	74.4	82.7	91.0	107.6	132.4
375	8.6	10.4	11.6	13.1	16.1	18.5	20.9	23.9	28.6	38.5	47.6	57.3	66.4	72.1	81.2	90.2	99.3	117.4	144.5
400	9.3	11.3	12.6	14.2	17.5	20.1	22.7	25.9	31.0	41.8	51.7	62.2	72.1	78.3	88.2	98.0	107.8	127.5	157.0

Table 1-D Heat Loss for Pipes

Insulation Thickness 2.5" *(Watts per foot)*

ΔT	NPS Pipe Size 0.25	0.5	0.75	1	1.5	2	2.5	3	4	6	8	10	12	14	16	18	20	24	30
25	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.6	2.0	2.4	2.7	2.9	3.3	3.7	4.0	4.7	5.8
50	0.8	1.0	1.1	1.2	1.4	1.6	1.8	2.1	2.5	3.3	4.0	4.8	5.6	6.0	6.8	7.5	8.2	9.7	11.9
75	1.2	1.5	1.6	1.8	2.2	2.5	2.8	3.2	3.8	5.0	6.2	7.4	8.5	9.2	10.4	11.5	12.6	14.9	18.3
100	1.7	2.0	2.2	2.5	3.0	3.4	3.8	4.4	5.2	6.9	8.4	10.1	11.6	12.6	14.2	15.7	17.3	20.3	25.0
125	2.1	2.6	2.8	3.2	3.8	4.4	4.9	5.6	6.6	8.8	10.8	12.9	14.9	16.1	18.1	20.1	22.1	26.0	31.9
150	2.6	3.1	3.5	3.9	4.7	5.4	6.0	6.8	8.1	10.8	13.2	15.8	18.3	19.8	22.2	24.6	27.1	31.9	39.2
175	3.1	3.7	4.1	4.6	5.6	6.4	7.2	8.1	9.7	12.8	15.8	18.9	21.8	23.6	26.5	29.4	32.3	38.0	46.7
200	3.6	4.4	4.8	5.4	6.6	7.5	8.4	9.5	11.3	15.0	18.4	22.0	25.4	27.5	30.9	34.3	37.7	44.4	54.5
225	4.2	5.0	5.6	6.2	7.5	8.6	9.6	10.9	13.0	17.2	21.1	25.3	29.2	31.6	35.5	39.4	43.2	51.0	62.6
250	4.7	5.7	6.3	7.0	8.5	9.7	10.9	12.4	14.7	19.5	24.0	28.7	33.1	35.8	40.2	44.6	49.0	57.8	70.9
275	5.3	6.4	7.1	7.9	9.6	10.9	12.3	13.9	16.5	21.9	26.9	32.2	37.1	40.2	45.2	50.1	55.0	64.9	79.6
300	5.9	7.1	7.9	8.8	10.7	12.1	13.6	15.5	18.3	24.4	29.9	35.8	41.3	44.7	50.2	55.7	61.2	72.1	88.5
325	6.5	7.8	8.7	9.7	11.8	13.4	15.1	17.1	20.2	26.9	33.0	39.5	45.6	49.4	55.5	61.5	67.6	79.6	97.7
350	7.2	8.6	9.5	10.6	12.9	14.7	16.5	18.7	22.2	29.5	36.3	43.4	50.0	54.2	60.9	67.5	74.1	87.4	107.2
375	7.8	9.4	10.4	11.6	14.1	16.0	18.0	20.4	24.2	32.2	39.6	47.3	54.6	59.1	66.4	73.6	80.9	95.4	117.0
400	8.5	10.2	11.3	12.6	15.3	17.4	19.6	22.2	26.3	35.0	43.0	51.4	59.3	64.2	72.1	80.0	87.8	103.5	127.1

Table 1-E Heat Loss for Pipes

Insulation Thickness 3" *(Watts per foot)*

ΔT	NPS Pipe Size 0.25	0.5	0.75	1	1.5	2	2.5	3	4	6	8	10	12	14	16	18	20	24	30
25	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.1	1.4	1.7	2.0	2.3	2.5	2.8	3.1	3.4	4.0	4.9
50	0.7	0.9	1.0	1.1	1.3	1.5	1.6	1.9	2.2	2.9	3.5	4.2	4.8	5.2	5.8	6.4	7.0	8.3	10.1
75	1.1	1.4	1.5	1.7	2.0	2.3	2.5	2.8	3.3	4.4	5.4	6.4	7.3	7.9	8.9	9.8	10.8	12.7	15.5
100	1.6	1.9	2.0	2.3	2.7	3.1	3.4	3.9	4.6	6.0	7.3	8.7	10.0	10.8	12.1	13.4	14.7	17.3	21.2
125	2.0	2.4	2.6	2.9	3.5	3.9	4.4	5.0	5.8	7.7	9.4	11.1	12.8	13.8	15.5	17.2	18.8	22.1	27.1
150	2.4	2.9	3.2	3.6	4.3	4.8	5.4	6.1	7.2	9.4	11.5	13.7	15.7	17.0	19.0	21.1	23.1	27.1	33.2
175	2.9	3.5	3.8	4.2	5.1	5.8	6.4	7.3	8.5	11.2	13.7	16.3	18.7	20.2	22.7	25.1	27.5	32.3	39.6
200	3.4	4.0	4.5	4.9	5.9	6.7	7.5	8.5	10.0	13.1	16.0	19.0	21.9	23.6	26.5	29.3	32.1	37.8	46.2
225	3.9	4.6	5.1	5.7	6.8	7.7	8.6	9.7	11.5	15.0	18.4	21.8	25.1	27.1	30.4	33.6	36.9	43.4	53.1
250	4.4	5.3	5.8	6.4	7.7	8.8	9.8	11.0	13.0	17.1	20.8	24.8	28.5	30.8	34.5	38.1	41.8	49.2	60.2
275	5.0	5.9	6.5	7.2	8.7	9.8	11.0	12.4	14.6	19.1	23.4	27.8	31.9	34.5	38.7	42.8	46.9	55.2	67.5
300	5.5	6.6	7.2	8.0	9.7	10.9	12.2	13.8	16.2	21.3	26.0	30.9	35.5	38.4	43.0	47.6	52.2	61.4	75.1
325	6.1	7.3	8.0	8.9	10.7	12.1	13.5	15.2	17.9	23.5	28.7	34.1	39.2	42.4	47.5	52.6	57.6	67.7	82.9
350	6.7	8.0	8.8	9.7	11.7	13.2	14.8	16.7	19.6	25.8	31.5	37.5	43.1	46.5	52.1	57.7	63.2	74.3	91.0
375	7.3	8.7	9.6	10.6	12.8	14.5	16.2	18.2	21.4	28.2	34.4	40.9	47.0	50.8	56.9	62.9	69.0	81.1	99.3
400	7.9	9.4	10.4	11.6	13.9	15.7	17.5	19.8	23.3	30.6	37.3	44.4	51.0	55.2	61.8	68.4	74.9	88.1	107.8

Table 2 Insulation Factor

Insulation Material	Temperature (°F) to be Maintained 50	100	150	200	250	300	400	500	600
Fiberglass	1	1	1	1	1	1	1	1	1
Cellular Glass	1.53	1.50	1.48	1.44	1.42	1.40	1.36	1.34	1.32
Calcium Silicate	1.47	1.47	1.45	1.44	1.41	1.39	1.34	1.32	1.30
Polyurethane	0.60	0.60	0.58	0.57	✺	✺	✺	✺	✺

✺ Temperature (°F) exceeds the recommended values for foam.

Note: All insulation factors were determined based on leading insulation manufacturers' specifications.

Table 3 Spiral Pitch *(Feet of Heat Trace Cable Per Foot of Pipe)*

	NPS Pipe Size																	
Pitch	**0.50**	**0.75**	**1.00**	**1.50**	**2.00**	**2.5**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**	**30**
2"	1.98	2.27	2.66	3.52	4.25	5.01	5.97	7.52	10.85	13.98	17.30	20.43	22.39	25.53	28.67	31.81	38.09	47.50
3"	1.52	1.69	1.92	2.46	2.93	3.43	4.05	5.07	7.27	9.35	11.56	13.64	14.95	17.04	19.13	21.22	25.40	31.68
4"	1.32	1.43	1.59	1.96	2.29	2.65	3.11	3.86	5.49	7.04	8.69	10.25	11.23	12.80	14.36	15.93	19.06	23.77
5"	1.21	1.29	1.40	1.68	1.93	2.21	2.56	3.15	4.43	5.67	6.98	8.23	9.00	10.25	11.50	12.76	15.26	19.02
6"	1.15	1.21	1.29	1.51	1.70	1.92	2.20	2.68	3.74	4.75	5.84	6.88	7.52	8.56	9.60	10.64	12.73	15.86
7"	1.11	1.16	1.22	1.39	1.55	1.72	1.96	2.35	3.24	4.11	5.03	5.92	6.47	7.36	8.25	9.14	10.92	13.61
8"	1.09	1.12	1.17	1.31	1.44	1.58	1.78	2.12	2.88	3.63	4.43	5.20	5.68	6.46	7.23	8.01	9.57	11.92
9"	1.07	1.10	1.14	1.25	1.36	1.48	1.65	1.94	2.60	3.26	3.97	4.64	5.07	5.76	6.45	7.14	8.52	10.60
10"	1.06	1.08	1.11	1.21	1.30	1.40	1.54	1.80	2.38	2.96	3.60	4.20	4.58	5.20	5.82	6.44	7.68	9.55
11"	1.05	1.07	1.10	1.17	1.25	1.34	1.46	1.68	2.20	2.72	3.30	3.84	4.19	4.75	5.30	5.87	6.99	8.69
12"	SR	1.06	1.08	1.15	1.21	1.29	1.40	1.60	2.06	2.53	3.05	3.55	3.86	4.37	4.88	5.39	6.42	7.98
14"	SR	SR	1.06	1.11	1.16	1.22	1.31	1.46	1.84	2.23	2.66	3.08	3.35	3.78	4.21	4.65	5.53	6.86
16"	SR	SR	1.05	1.09	1.13	1.17	1.24	1.37	1.68	2.01	2.38	2.74	2.97	3.34	3.72	4.10	4.86	6.02
18"	SR	SR	SR	1.07	1.10	1.14	1.19	1.30	1.56	1.84	2.16	2.48	2.68	3.01	3.34	3.67	4.35	5.37
24"	SR	SR	SR	SR	1.06	1.08	1.11	1.18	1.35	1.53	1.75	1.97	2.12	2.35	2.59	2.83	3.33	4.08
30"	SR	SR	SR	SR	SR	1.05	1.07	1.12	1.23	1.37	1.52	1.69	1.80	1.97	2.16	2.34	2.73	3.32
36"	SR	SR	SR	SR	SR	SR	1.05	1.08	1.17	1.26	1.39	1.51	1.60	1.73	1.88	2.03	2.34	2.82
42"	SR	SR	SR	SR	SR	SR	SR	1.06	1.12	1.20	1.29	1.39	1.46	1.57	1.69	1.81	2.07	2.47
48"	SR	SR	SR	SR	SR	SR	SR	1.05	1.10	1.16	1.23	1.31	1.37	1.46	1.56	1.66	1.88	2.22
60"	SR	SR	SR	SR	SR	SR	SR	SR	1.05	1.10	1.15	1.21	1.25	1.31	1.38	1.46	1.62	1.87
72"	SR	SR	SR	SR	SR	SR	SR	SR	SR	1.07	1.11	1.15	1.18	1.23	1.28	1.33	1.46	1.66

SR = Straight Run

Table 4 Heat Loss Multiplication Factors for Valves

NPS Pipe Size	Multi. Factor	NPS Pipe Size	Multi. Factor	NPS Pipe Size	Multi. Factor	NPS Pipe Size	Multi. Factor
0.5	0.52	**2**	1.92	**6**	3.84	**16**	7.91
0.75	0.78	**2.5**	2.00	**8**	4.66	**18**	8.84
1	1.00	**3**	2.40	**10**	5.51	**20**	9.57
1.25	1.33	**3.5**	2.62	**12**	6.25	**24**	11.09
1.5	1.70	**4**	2.92	**14**	7.07		

Constant Wattage Heating Cable

Tempco's Constant Wattage Heating Cables are all parallel resistance, low watt density electrical heaters designed to be cut to the desired lengths in the field, eliminating the need for prefabrications and reducing or eliminating many design and installation costs. No special training is required.

All Tempco Heating Cables are parallel circuit designed. The multi-stranded bus wires are covered in a high dielectric insulation. Spirally wrapped resistance wire maintains circuit continuity by connecting short, alternately spaced sections of exposed conductor bus wire. They feature moisture and chemical resistance and are classed for hazardous locations when properly cut and spliced using the correct lead termination kit.

Metal Overbraid is provided on all heat tracing as standard to meet NEC code for grounding. The braid provides mechanical protection as well as a low resistance grounding path.

Tempco Constant Wattage heating cables are designed for a full range of applications. Whether your need is freeze protection or process temperature control of pipelines, water lines, oil lines or asphalt lines, Tempco has the cable for your special needs.

How to Order

Tempco's Constant Wattage Heat Trace Cable is sold by part number and length. The cable part number is put together as follows:

H T P 0 2 4 1 0

Cable Style
KE Style—01
FE Style—02

Wattage—Watts/ft.
3, 4, 5, 7, 8 = Same
12 W/ft = 2
Refer to individual cable style sections for availability

Voltage
120 VAC = 1
240 VAC = 2
480 VAC = 4

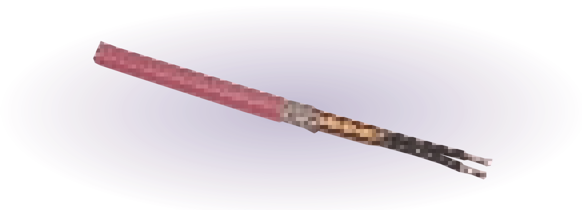
Options
None = 0

Note: Due to code requirements, KE and FE cable have metal overbraid.

KE Style Heating Cable

The KE Style cable heating element is tension wrapped and covered with two layers of Kapton film applied in reverse directions, then heat fused for moisture protection. A tinned copper overbraid is then added for additional abrasion protection and for a ground return path. The overbraid is further enclosed in a covering of 20 mil extruded Teflon® PFA for further chemical and abrasion resistance.

Maximum Temperature: 500°F (260°C)



Features

- Temperature Exposure Rating 500°F (260°C)
- Continuous electrical ground
- Excellent moisture and chemical resistance
- Hazardous location rating
- FM Approved

Applications

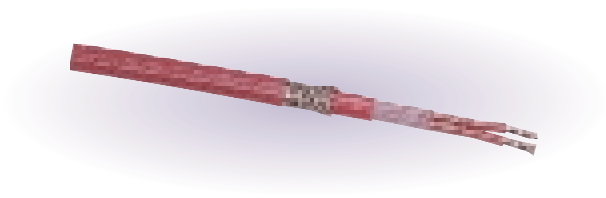
- Oil Refineries
- Asphalt Plants
- Severe Arctic Cold
- Mines
- Pulp and Paper Mills
- Corrosive Environments
- Explosive Environments

Specifications

Voltages Available: 120, 240, 480
Wattages: 4, 8, 12 (W/ft)
Outside Dimensions: Nom. .330" × .225"
Exposure Rating: 500°F (260°C)
De-Energized: 550°F (302°C)
Standard Metal Overbraid: Tinned Copper/Stainless Steel
Moisture and Chemical Resistance: Excellent
Flame Resistance: Outstanding
Radiation Resistance: Fair to Good

FE Style Heating Cable

The FE Style cable heating element is tension wrapped and covered with a fluorocarbon film and enclosed in a minimum 20 mil Teflon® FEP abrasion resistant extruded jacket. This tough outer cover provides moisture and dielectric protection as well as resistance to abrasion. A layer of tinned copper braid is then applied to meet NEC code and to provide mechanical protection as well as a low resistance to ground.



Maximum Temperature: 400°F (204°C)

Features

- Temperature Exposure Rating 400°F (204°C)
- Ease of installation—cut to length at the job site
- Moisture and chemical resistant
- Stands up to repeated handling and flexing
- Field proven industrial grade construction
- Single end power connection

Applications

- Mid-Temperature Control
- Food Processing Plants
- Freeze Protection
- Chemical Processing Plants
- Hazardous Locations
- Water Lines/Condensate Return Lines

Specifications

Wattages: 3, 5 (W/ft), 120 or 240V
8, 12 (W/ft), 120, 240 or 480V

Outside Dimensions: Nom. .300" × .200"

Exposure Rating: 400°F (204°C)

De-Energized: 450°F (232°C)

Standard Metal Overbraid: Tinned Copper

Moisture and Chemical Resistance: Excellent

Flame Resistance: Outstanding

Radiation Resistance: Fair to Good

Constant Wattage Heating Cable

Lead Termination and Cable Kits for Constant Wattage Cables

In order to maintain the integrity of the insulation, termination kits must be used to add leads or splice the heating cables. The termination kits are designed to fully seal using a general purpose silicone RTV sealant, such as GE RTV108, on the final connections.

Termination Kit Type	"KE" Cable	"FE" Cable
Universal Connection/ Termination Kit ❶	HTP90001	HTP90006
Lead and End Kit ❷	HTP90002	HTP90007
Single Lead Term.	HTP90003	HTP90008
Single End Term.	HTP90004	HTP90009
Cable Splice Kit ❸	HTP90005	HTP90010

❶ Each kit can be used to make one power input connection, or one power input splice and two end terminations. These assemblies are watertight and suitable for use in Division II hazardous locations.

❷ For 5 circuits

❸ For 1 in-line or 1 tee splice

Self-Limiting Heating Cable

Tempco's Self-Limiting Heating Cables are all parallel resistance, low watt density electrical heaters designed to be cut to the desired lengths in the field, eliminating the need for prefabrications and reducing or eliminating many design and installation costs. No special training is required.

Self-limiting heating cables are designed and built to regulate their output. As the process temperature drops, the cable's output increases; conversely, as the temperature rises, the cable's output decreases.

The self-limiting core is in essence an infinite number of parallel resistors which permit the cable to be cut to any length without creating cold sections. Because it is self-regulating and infinitely parallel, the output varies along the length of the cable, depending upon local process temperature.

Metal overbraid is provided on all heat trace cabling to meet NEC code for grounding. The braid provides mechanical protection, as well as a low resistance grounding path.

On SL and SLE self limiting cables, in addition to the standard metal overbraid, an optional thermoplastic elastomer or fluoropolymer outer jacket is recommended when exposure to organic chemicals or corrosives is expected.

Self-limiting cable heating cable provides safe, reliable heat tracing for process temperature maintenance and freeze protection of pipes, valves and similar applications.

How to Order

Tempco's Self-Limiting Heat Trace Cable is sold by part number and length. The cable part number is put together as follows:

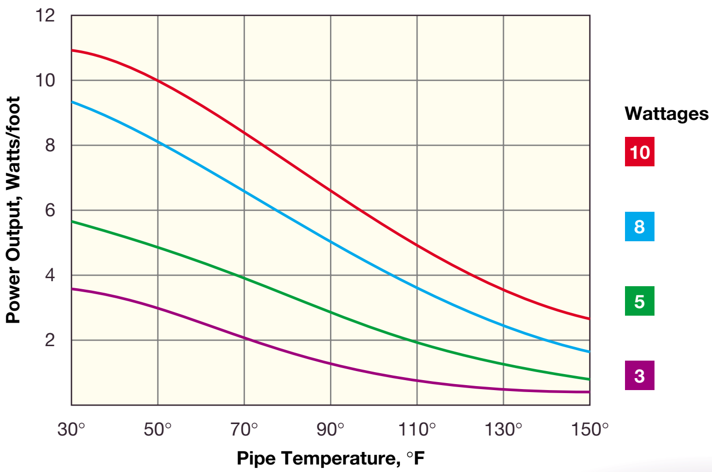
H T P __ _ _ _

Cable Style
SL Style—03
SLE Style—04

Wattage—Watts/ft.
3, 5, 6, 8 = Same
10 W/ft = 1
Refer to the individual sections for availability

Voltage
120 VAC = 1
240 VAC = 2

Options None: Code—0
For SL and SLE cable with metal braid and thermoplastic jacket: Code—1
For SL cable with metal braid and fluoropolymer jacket: Code—2

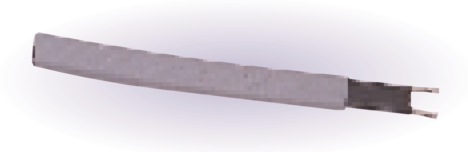


SL Style Heating Cable

The SL Style cable heating element is a low-watt density parallel circuit electrical heater. The multi-stranded bus wires are extruded in an irradiated self-regulating conductive polyolefin that increases and decreases its heat output with changes in the ambient temperature. A flame retardant thermoplastic elastomer jacket is added for abrasion and impact resistance.

A metal braided shield is then applied to meet NEC code for grounding. Metal overbraid heaters are FM approved for use in hazardous areas.

An optional fluoropolymer outer jacket is also available. This outer jacket should be specified when the metal braided cable is installed in corrosive environments.



Specifications

Voltages Available: 120, 240
Wattages: 3, 5, 8, 10 (W/ft)
Outside Dimensions: Nom. .450" × .130"
Exposure Rating: 150°F (65°C)
De-Energized: 185°F (85°C)
Standard Metal Overbraid: Tinned Copper or Stainless Steel
Moisture Resistance: Excellent
Chemical Resistance: Good
Flame Resistance: Good
Radiation Resistance: Fair

Features

- Efficient, Safe, Easy to Install
- Maintenance Temperatures up to 150°F (65°C)
- Can Be Overlapped
- Cut to Length at the Job Site

Applications

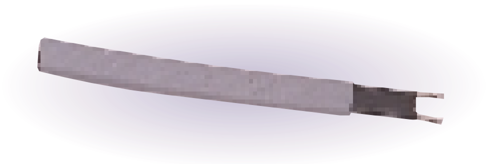
- Pipelines
- Drains
- Water Lines
- Safety Showers
- Sprinkler Systems

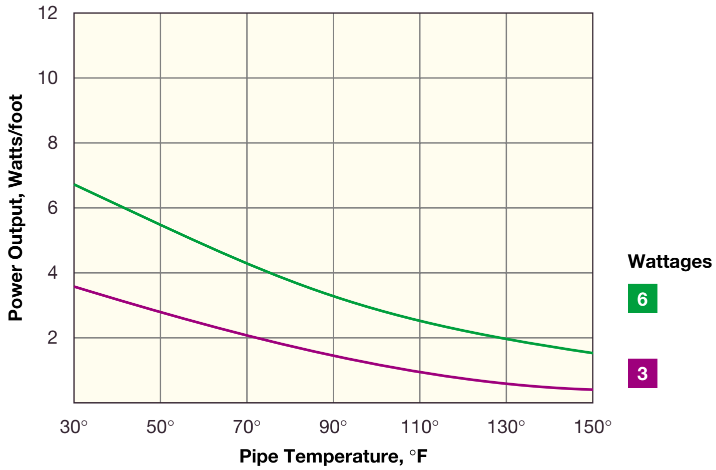
SLE Style Heating Cable

The SLE Style cable heating element is a commercial grade low-watt density parallel circuit electrical heater. The multi-stranded bus wires are extruded in an irradiated self-regulating conductive polyolefin that increases and decreases its heat output with changes in the ambient temperature. A flame retardant thermoplastic elastomer jacket is added for abrasion and impact resistance.

A metal braided shield is then applied to meet NEC code for grounding. Metal overbraid heaters are FM approved for use in hazardous areas.

An optional thermoplastic outer jacket is also available. This outer jacket should be specified when the metal braided cable is installed in corrosive environments.





Features

- Efficient, Safe, Easy to Install
- Maintenance Temperatures up to 150°F (65°C)
- Can Be Overlapped
- Cut to Length at the Job Site

Applications

- Water Lines
- Pipes and Valves
- Sprinkler Systems
- Drains

Specifications

Wattages: 3 (W/ft), 120V or 240V
6 (W/ft), 240V only

Outside Dimensions: Nom. .450" × .130"

Exposure Rating: 150°F (65°C)

De-Energized: 185°F (85°C)

Standard Metal Overbraid: Tinned Copper or Stainless Steel

Moisture Resistance: Excellent

Chemical Resistance: Good

Flame Resistance: Good

Radiation Resistance: Fair

Lead Termination and Cable Kits for Self-Limiting Cables

In order to maintain the integrity of the insulation, termination kits must be used to add leads or splice the heating cables. The termination kits are designed to fully seal using a general purpose silicone RTV sealant, such as GE RTV108, on the final connections.

Termination Kit Type	"SL" Cable	"SLE" 3W/ft Cable	"SLE" 6W/ft Cable
Universal Connection/ Termination Kit ❶	HTP90021	HTP90024	HTP90025
Termination Kit ❷	HTP90022	—	—
Splice Kit ❸	HTP90023	—	—

❶ Each kit can be used to make one power input connection, or one power input splice and two end terminations. These assemblies are watertight and suitable for use in Division II hazardous locations.

❷ For 10 terminations

❸ Sufficient material for 10 in-line splices or 10 tee splices.

Temperature Controls for Heat Trace Cables

Choosing the proper control depends first on the system requirements and second, on the features desired and cost. Since **Tempco's** heat trace products are used primarily for freeze protection and to offset system heat loss, PID controls are generally not required.

The most economical is the pipe mounted direct acting preset thermostat. **Tempco** offers two heavy duty models: a normally closed, open on the rise, two wire style, and a normally open/normally closed three wire model.

Where greater accuracy, faster response, and larger ranges with adjustment capability are required, a bulb and capillary style thermostat fills the need. **Tempco** offers two types with NEMA 3R for general purpose and NEMA 4X where a fully sealed housing is required.

If the heat trace is used for process control and very accurate control is needed along with additional features, a thermocouple-based electronic PID controller is required.

See Section 13—"Temperature Controls" for more information.

Action		Part No.
Closes	Opens	
35°F (2°C)	45°F (7°C)	HTP90104
45°F (7°C)	55°F (13°C)	HTP90105
60°F (16°C)	70°F (21°C)	HTP90106
90°F (32°C)	105°F (41°C)	HTP90107
185°F (85°C)	200°F (93°C)	HTP90108

The control is a pre-set, epoxy sealed thermostat containing a hermetically sealed single pole, double throw switch that allows the use of an alarm device.

Specifications

Voltage: Up to 277 VAC

Current: FM approved to 240 VAC at 25 amps

Leads: 36" long, 600 VAC 14 ga., 105° PVC insulation

Action		Part No.
Closes	Opens	
45°F (7°C)	55°F (13°C)	HTP90101
60°F (15°C)	70°F (21°C)	HTP90102
90°F (32°C)	105°F (40°C)	HTP90103

This control is a pre-set, epoxy sealed thermostat containing a hermetically sealed single pole switch that opens on the rise.

Specifications

Voltage: Up to 277 VAC

Current: FM approved to 240 VAC at 25 amps

Leads: 36" long, 600 VAC 14 ga., 105° PVC insulation

This control is an adjustable bulb and capillary thermostat. It is enclosed in a NEMA 4X enclosure with a clear cover.

Specifications

Voltage: 120 or 240 VAC
Contacts: 120V SPST, 240V DPST

Current: 50 amps at either voltage

Leads: Hard wired directly to terminals

Dimensions: 6"H × 6"L × 5.87"W

Range		Part No.	
°F	°C	120V	240V
0° - 150°	–18° - 66°	HTP90113	HTP90116
50° - 300°	10° - 149°	HTP90114	HTP90117
150° - 650°	66° - 343°	HTP90115	HTP90118

This control is an adjustable bulb and capillary thermostat with single pole double throw contacts. It is enclosed in a NEMA 3R general purpose enclosure.

Specifications

Voltage: Up to 277 VAC

Current: 277 VAC at 22 amps

Leads: Hard wired directly to terminals

Dimensions: 3.30"H × 4.08"L × 4.08"W

Range		Part No.
°F	°C	
0° - 150°	–18° - 66°	HTP90109
100° - 250°	38° - 121°	HTP90110
200° - 350°	93° - 177°	HTP90111