

EasyHeat™ HSR Cable

Pipe Freeze Protection and Pipe Temperature Maintenance, Self-Regulating, Cut-to-Length. For Commercial Applications.

Product Overview

- HSR self-regulating heating cables are used in high temperature commercial and industrial applications.
- The self-regulating heating cable automatically varies its heat output as the surrounding temperature changes.

Applications

- Pipe freeze protection or temperature maintenance applications, in either ordinary or hazardous locations.
- Maintains the temperature and viscosity of piped liquids in high temperature commercial applications, as may be required on large pipes which are periodically cleaned with high pressure steam.
- Suitable for refrigeration/HVAC condensation lines that are subject to freezing temperatures.

Features

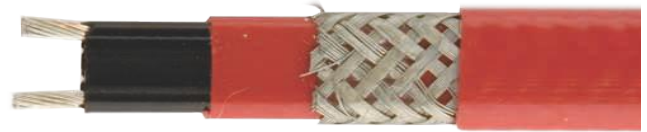
- Maintains liquids in pipes at temperatures exceeding +150°F (+66°C) up to 420°F (+216°C) maximum intermittent exposure temperatures
- Available for 120, 208, 240, and 277 Vac applications.
- Available in circuit lengths up to 785 ft (239.27 m) with output up to 20 Watts per foot (0.30 m) at +50°F (+10°C).
- Parallel resistance, cut-to-length cable is provided on bulk spools.
- Fluoropolymer over jacket for enhanced chemical resistance.
- Can be wrapped over itself (overlapped), if necessary, when installed on pipes, valves or flanges.
- One year limited warranty.

Accessories

- HSR cables use TSR accessories for power/end connections, splicing and end-of-circuit termination. See *EasyHeat™ TSR Accessories*.

Related Products

- It is recommended that heating cables for freeze protection and temperature maintenance be controlled by a thermostat to optimize energy consumption. See *EasyHeat™ Pipe Tracing*



Controls. Control options are as follows:

- Ordinary areas
 - C4XC Thermostat
 - T4XC Thermostat
 - T4XA Thermostat
- Hazardous locations areas
 - T9EC Thermostat
 - T9EA Thermostat

Certifications

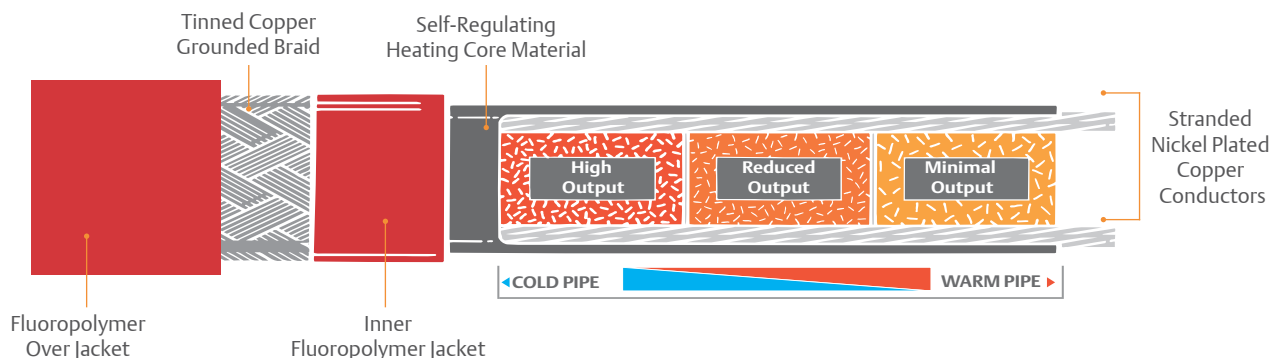
- CSA Certified, Factory Mutual Approved, and UL Listed for ordinary locations when used with EasyHeat™ accessories.
- UL Listed for use in Class I, Division 2 Hazardous locations with a T3 Temperature rating, when used with approved termination accessories.

Notes

- Per NEC and CEC requirements ALWAYS use a ground fault protection device (GFEP) to reduce the danger of fire from a damaged or improperly installed heating cable. Electrical fault currents caused by damaged or improperly installed cable MAY NOT BE LARGE ENOUGH to trip a conventional circuit breaker.
- Heating cables must be installed in compliance with all national, state/provincial and local codes. Check with your local electrical inspector for specific details.
- Do not twist the bus wires together at either end of the cable.
- Maximum maintenance temperature of all cables is +250°F (+121°C) with +375°F (+191°C) maximum intermittent exposure temperature.
- It is recommended that all heat traced pipes have a minimum of 1/2 inch (12.7 mm) of fiberglass insulation or equivalent.
- All electrical connections in the system must be sealed against moisture.
- Do not expose heating cables to temperatures above their maximum ratings.
- Immediately replace any damaged heating cable or components.
- Classified areas (explosive dust or gas) require the use of special electrical components.

Illustrated Features

A special self-regulating core is at the center of the HSR cable. This core is conductive and adjusts according to the surrounding temperatures. When it is cold, the cable's core has many conductive paths that generate enough heat to keep the water flowing in the pipe. As the surrounding temperature warms, there are fewer conductive paths and less heat is generated.



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How To Determine The Length of Cable You Need

Design Procedure

The following procedure can be used to select a heating cable system for your application. To determine the heat loss that must be replaced by the heating cable, the following should be determined:

- T_F Fluid temperature to be maintained
- T_A Minimum ambient temperature
- Size and material of pipe to be heated
- Thermal insulation – type and thickness
- Pipe supports and valves, etc.

1. Temperature Differential

Determine the temperature differential (ΔT) to be maintained by subtracting the ambient temperature (T_A) from the fluid temperature (T_F) to be maintained ($\Delta T = T_F - T_A$). Typically, for pipe freeze protection applications, the pipe temperature should be maintained at +40°F (+4°C). Pipe temperatures should be maintained at +110°F (+43°C) for grease disposal lines and +40°F (+4°C) for fuel lines.

2. Heat Loss

Use Table 1. Pipe Heat Loss (W/ft), to look up the heat loss associated with the pipe diameter and thickness of insulation. If a rigid insulation such as calcium silicate is used, the pipe heat loss should be increased to that associated with the next larger size. Insulation should also be oversized when using any cable other than the standard self-regulating HSR, without over jacket.

As an example, you would use 2 in (50 mm) pipe diameter heat losses for 1-1/2 in (38 mm) pipe heating application if rigid insulation were used. Heat loss figures from Table 1, include a 10% safety factor.

3. Adjustments to Heat Loss Values

The heat loss values in Table 1 are based on glass fiber insulation. If other insulations are used, multiply the heat loss value by the correction factor for your insulation shown in Table 2: Insulation Factors.

Heat losses are based on outdoor applications with 20 mph wind. If piping is used indoors, multiply heat loss values by 0.9.

4. Determine Cable Power

For example, for heat loss of 30 W/ft, use two 15 W/ft cables. Cable power may exceed heat loss by up to 50%. It is also possible to spiral cable on pipe such that the power applied to the pipe exactly matches the pipe heat loss.

For example, for heat loss of 13 W/ft, a 10 W/ft cable can be spiraled on the pipe such that 1.3 ft (0.4 m) of cable are wound on every foot of pipe, resulting in exactly 13 W/ft being applied to the pipe.

However, spiraling requires significant extra labor to install and significant clearance around the pipe. For this reason, we do not recommend spiraling. For further information on spiraling, contact your local EasyHeat™ sales representative.

5. Adjustments For Heat Sinks

Any thermally conductive item that protrudes through the insulation will require extra heat to be applied to the pipe. The footage shown in Table 3 should be added to the required heating cable length to compensate for these extra heat losses. When multiple-tracing or spiraling cable, increase the cable adders proportionately.

6. Determine Cable Length

Cable length = (pipe length × N) + (heat sink adjustments × N) + (slack × N)

Slack = (2 ft for power supply) + (2 ft per tee) + (2 ft per tail)

N = number of traces

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Performance and Rating Table

Catalog Number	Power Rating Voltage	Maximum Watts/ft (Watts/m) @ 50°F (10°C)	Maximum Single Run Length ft (m)	Temperature Rating
HSR51F	120	5 (16)	310 (94)	T3
HSR52F	240	5 (16)	620 (189)	T3
HSR101F	120	10 (33)	190 (58)	T3
HSR102F	240	10 (33)	375 (114)	T3
HSR151F	120	15 (49)	135 (41)	T3
HSR152F	240	15 (49)	270 (82)	T3
HSR201F	120	20 (66)	105 (32)	T3
HSR202F	240	20 (66)	210 (64)	T3

Maximum maintenance temperature of all cables is +250°F (+121°C) with +375°F (+191°C) maximum intermittent exposure temperatures.

Circuit Breaker Selection

Watts/ft	Maximum Length vs Circuit Breaker Size ft (m)					
	120 Volt			240 Volt		
	15A	20A	30A	15A	20A	30A
5	185 (56)	245 (75)	370 (113)	385 (117)	500 (152)	770 (235)
10	115 (35)	150 (46)	230 (70)	225 (69)	300 (91)	450 (137)
15	80 (24)	110 (34)	160 (49)	160 (49)	215 (66)	320 (98)
20	65 (20)	85 (26)	130 (40)	125 (38)	170 (52)	250 (76)

Example

- Straight water line (105 ft) to be maintained at +50°F.
- Minimum ambient temperature is -10°F.
- Pipe is three-inch diameter steel.
- Insulation is one inch thick mineral fiber.
- Three valves

1. Calculate Temperature Differential

$$\Delta T = T_F - T_A$$

$$\Delta T = 50 - (-10)^\circ\text{F}$$

$$\Delta T = 60^\circ\text{F}$$

2. Heat Loss

Use Table 1 to find the heat loss in W/ft. Where the desired temperature differential falls between two values, use interpolation:

From Table 1: @ 50°F, Q = 4.4 W/ft
 @ 100°F Q = 9.2 W/ft

Therefore:

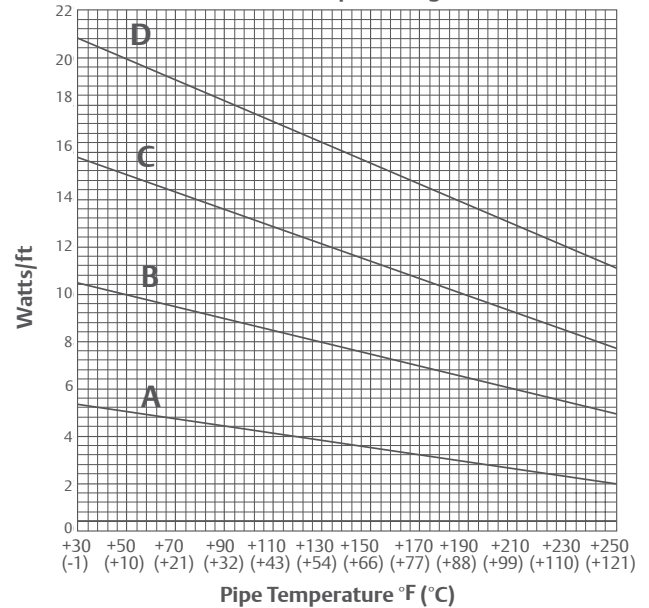
$$Q_F = 4.4 \text{ W/ft} + 10/50 \times (9.2 - 4.4 \text{ W/ft})$$

$$Q_F = 4.4 + .96 = 5.4 \text{ W/ft}$$

Voltage Adjustment Table

Cable	Power Rating Multiplier		
	208 Vac	220 Vac	277 Vac
HSR52	0.76	0.85	1.29
HSR102	0.80	0.88	1.23
HSR152	0.83	0.89	1.19
HSR202	0.88	0.93	1.15

Power Output Rating



A HSR51F HSR52F B HSR101F HSR102F C HSR151F HSR152F D HSR201F HSR202F

3. Adjustment to Heat Loss

Adjust the heat loss for mineral fiber. From Table 2, the adjustment factor is 1.84.

$$Q_M = Q_F \times 1.84$$

$$Q_M = 5.4 \text{ W/ft} \times 1.84$$

$$Q_M = 9.93 \text{ W/ft}$$

Since the piping is outdoors, no adjustment is necessary for the absence of wind.

4. Determine Cable Power

Select 10 W/ft cable. Apply single cable straight along the pipe.

5. Determine Cable Length

$$\text{Length} = 105 \times 1 + 3 \times 3 + \text{Slack}$$

$$\text{Slack} = 2 + 0 \times 2 + 1 \times 2 = 4$$

$$\text{Total Length} = 114 + 4 = 116 \text{ ft}$$

6. Adjustment For Heat Sinks

From Table 3, an additional 3 feet of cable is required at each valve.

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Table 1: Pipe Heat Loss, W/ft

Insulation Thickness in (mm)	ΔT °F (°C)	Pipe Diameter (in)													
		1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	8	10	12	
		3/4	1	1-1/4	1-1/2	2									
1.0 (25)	+10 (-12)	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9	1.1	1.5	1.9	2.4	2.7	
	+50 (+10)	1.7	1.9	2.2	2.5	2.8	3.3	3.8	4.4	5.4	7.5	9.5	11.5	13.5	
	+100 (+38)	3.5	3.9	4.5	5.3	5.8	6.8	7.9	9.2	11.3	15.7	19.8	24.5	28.2	
	+150 (+66)	5.4	6.2	7.1	8.3	9.1	10.7	12.4	14.4	17.5	24.6	31.0	37.8	44.2	
	+200 (+93)	7.5	8.6	9.9	11.5	12.6	14.9	17.2	20.0	24.5	34.2	43.2	52.6	61.5	
	+250 (+121)	9.8	11.2	12.8	15.0	16.5	19.4	22.4	26.0	31.9	44.6	56.1	68.4	80.0	
1.5 (38)	+10 (-12)	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.7	0.8	1.1	1.4	1.6	1.9	
	+50 (+10)	1.3	1.5	1.7	1.9	2.1	2.5	2.8	3.2	3.9	5.3	6.7	8.1	9.4	
	+100 (+38)	2.8	3.1	3.5	4.1	4.4	5.1	5.9	6.8	8.2	11.2	14.0	16.9	19.7	
	+150 (+66)	4.4	4.9	5.5	6.4	6.9	8.1	9.2	10.6	12.8	17.6	21.9	26.5	30.8	
	+200 (+93)	6.1	6.8	7.7	8.9	9.7	11.2	12.8	14.7	17.8	24.4	30.5	36.9	42.9	
	+250 (+121)	7.9	8.9	10.0	11.6	12.6	14.6	16.7	19.2	23.2	31.8	39.6	48.0	55.8	
2.0 (50)	+10 (-12)	0.2	0.3	0.3	0.4	0.4	0.4	0.65	0.5	0.6	0.9	1.1	1.3	1.5	
	+50 (+10)	1.2	1.3	1.4	1.6	1.7	2.0	2.3	2.6	3.1	4.2	5.2	6.3	7.3	
	+100 (+38)	2.4	2.7	3.0	3.4	3.7	4.3	4.8	5.5	6.6	8.9	11.0	13.2	15.3	
	+150 (+66)	3.8	4.2	4.7	5.4	5.8	6.7	7.6	8.6	10.3	13.9	17.2	20.7	24.0	
	+200 (+93)	5.3	5.9	6.6	7.5	8.1	9.3	10.5	12.0	14.4	19.4	24.0	28.8	33.4	
	+250 (+121)	6.9	7.7	8.6	9.8	10.7	12.1	13.7	15.6	18.7	25.3	31.2	37.5	43.5	
2.5 (63)	+10 (-12)	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.7	0.9	1.1	1.2	
	+50 (+10)	1.0	1.2	1.3	1.4	1.6	1.8	2.0	2.3	2.7	3.6	4.4	5.2	6.0	
	+100 (+38)	2.2	2.4	2.7	3.0	3.3	3.7	4.2	4.7	5.6	7.5	9.2	11.0	12.7	
	+150 (+66)	3.4	3.8	4.2	4.8	5.1	5.8	6.6	7.4	8.8	11.7	14.4	17.2	19.9	
	+200 (+93)	4.8	5.3	5.9	6.6	7.1	9.1	9.1	10.3	12.3	16.3	20.0	24.0	27.6	
	+250 (+121)	6.2	6.9	7.6	8.6	9.3	10.6	11.9	13.5	16.0	21.3	26.1	31.2	36.0	
3.0 (75)	+10 (-12)	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.8	0.9	1.1	
	+50 (+10)	1.0	1.1	1.2	1.3	1.4	1.6	1.8	2.0	2.4	3.1	3.8	4.5	5.2	
	+100 (+38)	2.0	2.2	2.5	2.8	3.0	3.4	3.7	4.2	5.0	6.5	8.0	9.5	10.9	
	+150 (+66)	3.2	3.5	3.9	4.3	4.6	5.3	5.9	6.6	7.8	10.3	12.5	14.9	17.1	
	+200 (+93)	4.4	4.9	5.4	6.0	6.5	6.7	8.2	9.2	10.8	14.3	17.4	20.7	23.8	
	+250 (+121)	5.8	6.3	7.0	7.8	8.4	9.5	10.6	12.0	14.1	18.6	22.6	26.9	30.9	

Note: Please contact your local EasyHeat™ sales representative for larger sizes.

Table 2: Insulation Factors

Insulation Type	Correction Factor
Glass Fiber	1.00
Calcium Silicate	1.72
Cellular Glass	1.84
Rigid Urethane	0.76
Foamed Elastomer	1.16
Mineral Fiber	1.20
Expanded Perlite	1.42
Mineral Wool	1.04
Polystyrene	1.04
Flexible Elastomer	1.16
Polyisocyanurate	0.68

Table 3: Heat Loss Adder

Pipe Size in (mm)	Flange	Pipe Support	Valve
0.50 (12.7)	0.5	1.0	1.0
0.75 (19.1)	0.5	1.5	1.5
1.00 (25.4)	0.5	1.5	2.0
1.50 (38.1)	0.5	1.5	2.5
2.00 (50.8)	0.5	2.0	2.5
3.00 (76.2)	0.75	2.0	3.0
4.00 (101.6)	0.75	2.5	4.0
6.00 (152.4)	1.0	2.5	5.0
8.00 (203.2)	1.0	2.5	7.0

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Product Selection

Catalog Number	Description	Carton Quantity	Carton Weight lb (kg)	UPC
HSR51F	5 Watts per foot (0.30 m), 120 Vac, cut-to-order, fluoropolymer jacket	1	0.057 (0.026) per foot	01362700167
HSR52F	5 Watts per foot (0.30 m), 240 Vac, cut-to-order, fluoropolymer jacket	1	0.057 (0.026) per foot	01362700312
HSR101F	10 Watts per foot (0.30 m), 120 Vac, cut-to-order, fluoropolymer jacket	1	0.057 (0.026) per foot	01362700162
HSR102F	10 Watts per foot (0.30 m), 240 Vac, cut-to-order, fluoropolymer jacket	1	0.057 (0.026) per foot	01362700190
HSR151F	15 Watts per foot (0.30 m), 120 Vac, cut-to-order, fluoropolymer jacket	1	0.137 (0.062) per foot	01362700315
HSR152F	15 Watts per foot (0.30 m), 240 Vac, cut-to-order, fluoropolymer jacket	1	0.125 (0.057) per foot	01362700316
HSR201F	20 Watts per foot (0.30 m), 120 Vac, cut-to-order, fluoropolymer jacket	1	0.137 (0.062) per foot	01362700319
HSR202F	20 Watts per foot (0.30 m), 240 Vac, cut-to-order, fluoropolymer jacket	1	0.137 (0.062) per foot	01362700176