Tubular Heaters Types HX and IX

CCI Thermal Technologies Inc. has one factory dedicated to the production of the highest quality tubular heating elements. We use only the best commercially available materials and we use design parameters proven to maximize element life expectancy.

Operating Principles

Refer to Fig. 1 page A5 for typical heating element construction. The coil and terminal pins are electrically isolated from the outer metal sheath with highly compacted magnesium oxide which also serves as a conductor for the heat generated by the coil.

When voltage is applied to the heating element terminals, an electric current passes through the heating element resistance coil. Heat is produced as wattage in accordance with Ohm's law where the wattage equals I^2R (current squared x coil resistance).

Watt Density

Watt density is defined as the watts per unit of surface area of the heated section of the heating element. The selection of the ideal watt density for a particular application is the most important parameter affecting heating element service life.

All heat generated by the element resistance coil must be transferred from its sheath so that a balance is maintained. If the transferring medium is poor, the element may reach a high temperature before a sufficient temperature gradient is developed to reach thermal balance.

Since watt density also determines the temperature gradient between the sheath and the resistance coil, it is essentially the watt density that sets the resistance coil temperature.

Life Expectancy

Normal life expectancy depends mainly on the resistance coil operating temperature (see Fig. 1) which is a function of the sheath operating temperature and the wattage per unit heated length of element.

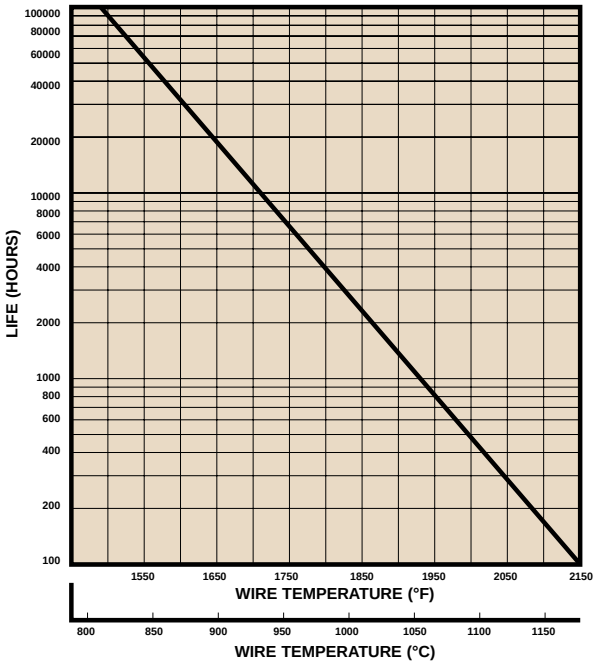
Factors such as cycling frequency will also affect life.

Sheath Materials

Sheath material selection ranks next to watt density in importance. The sheath must withstand the corrosive and temperature effects of its environment. For instance, elements designed for operation in water will generally fail if operated in air.

Fortunately, many different sheath materials are available, making the tubular heater suitable for the vast majority of heating applications.

FIG. 1 - Life vs. Coil Temperature (Typical)



Sizes and Shapes

We offer a broad selection of element sizes and shapes to suit most any requirement. Larger diameter elements must be used for high voltage applications. Although practical considerations limit length, we can splice selected diameter elements to achieve continuous lengths in excess of 50 meters (2000 ins.).

In most applications, the elements are formed at the factory in a series of loops or coils. Elements require furnace annealing prior to bending.

Insulation Resistance

If an unsealed element is to be installed in a damp area, the element insulation resistance to ground may decrease and, in severe cases, approach zero ohms. Elements with low insulation resistance have high leakage currents which, under certain circumstances, could be hazardous. Factory installed seals which prevent moisture from entering at the terminal ends of the element are available.

Dielectric Strength Tests

One hundred percent (100%) of the elements we manufacture are dielectric strength tested before they are released for shipment. This test, conducted at many times the intended operating voltage of the element, insures that the heater will not "short-out" during normal life.

Application

Tubular elements of proper rating, material and shape can be used in most heating applications requiring process temperatures to 750°C (1382°F).

Many of the heaters listed in this catalog utilize tubular elements as the heat source.

Tubular elements may be clamped, immersed, cast into metal or spaced away from the work as radiant heaters. Elements can also be positioned in ducts or vessels for heating air or other gases.

Features

- Easy to install
- Available in a wide variety of sheaths, diameters and ratings
- Heat can be located exactly where required
- Can be formed to practically any shape
- Compact
- Easy to control to provide heat only when required
- Low maintenance and long life
- Excellent internal electrical insulation and heat conduction
- Electrically isolated sheath

Catalog Numbers

We assign a unique catalog number to all elements we manufacture (where practical). One of three prefixes is used to designate which type of element has been supplied as follows:

PREFIX	TYPE
HX	straight, unfinned
IX	formed unfinned
KX	any finned element

Construction

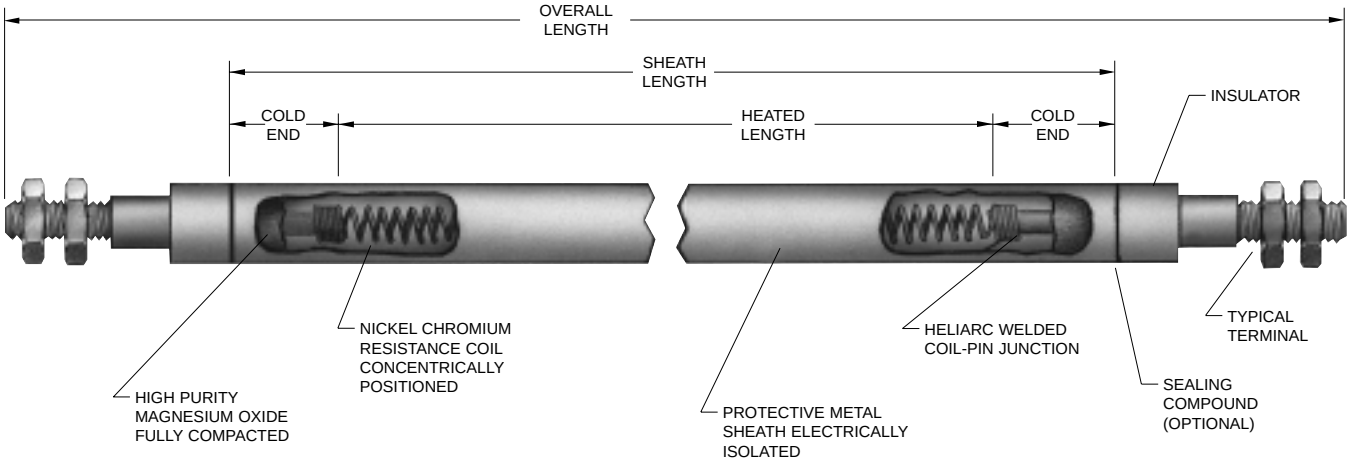


FIG. 1 - Tubular Element Features and Components

Factory Bending

Tubular heaters can be factory formed to virtually any shape. Inside bending diameters as small as one element diameter are sometimes possible. Figures 1 to 11 illustrate some of the most commonly used element shapes. If your application can be satisfied with one of these shapes, you may wish to refer to these figures when ordering or requesting pricing information.

FIG. 1

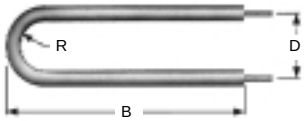


FIG. 2

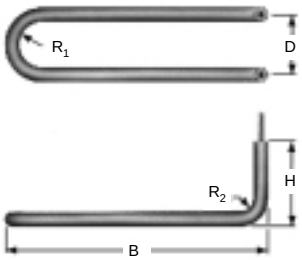


FIG. 3

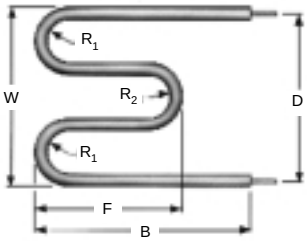


FIG. 4

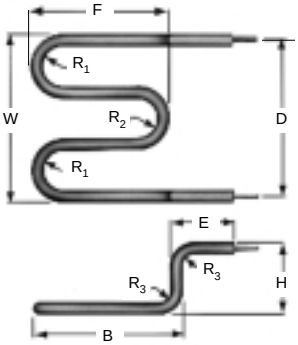


FIG. 5

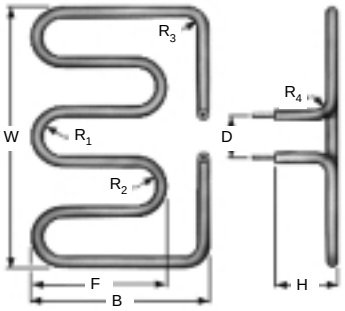


FIG. 6

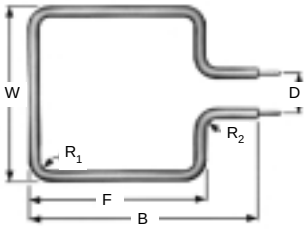


FIG. 7

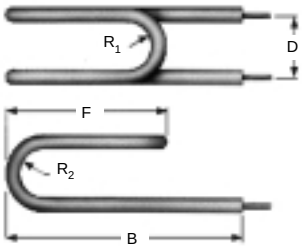


FIG. 8

FIG. 9

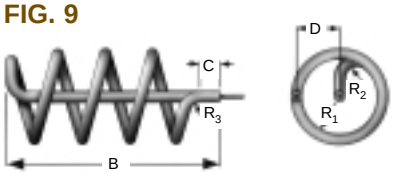


FIG. 10

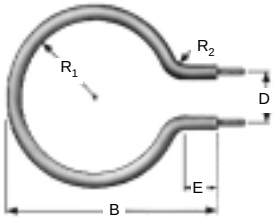
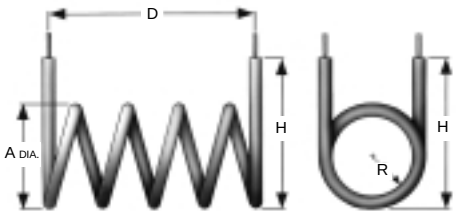


FIG. 11



N = Number of turns

FIG. 12 - In ovens or cabinets

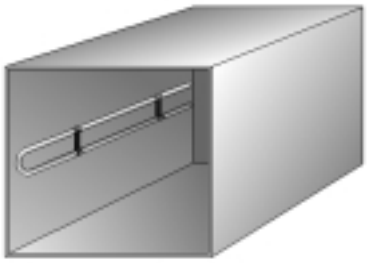


FIG. 13 - In ducts

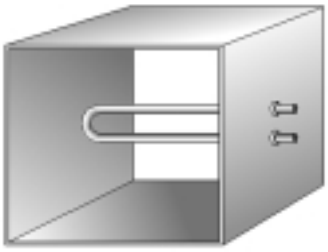


FIG. 14 - In pipe wells

FIG. 15 - High wattage resistors or load banks

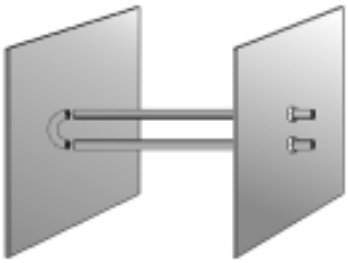


FIG. 16 - To radiate heat

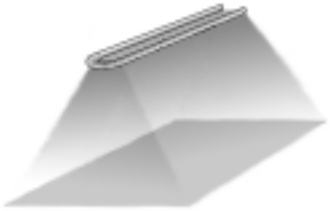


FIG. 17 - Immersed in liquids

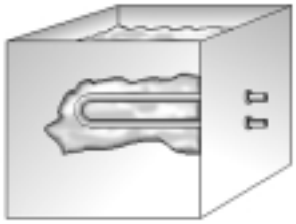


FIG. 18 - Clamped to walls, hoppers and pipes

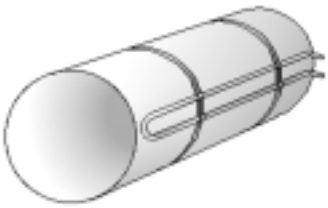


FIG. 19 - In drilled holes in plates or cylinders

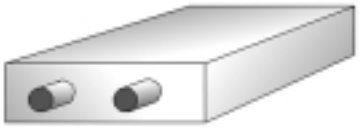


FIG. 20 - Sandwiched between plates

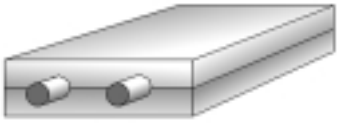


FIG. 21 - Cast-in to iron, aluminum or copper

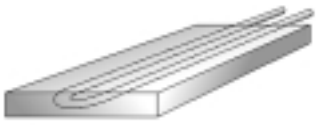


FIG. 22 - Bent to conform to system geometry

FIG. 23 - In finned heater assemblies

Selection

Most tubular elements are made-to-order. The following procedure (Step 1 to Step 9) will simplify the selection of the element best suited to your needs. If you need assistance we will, without obligation, determine your kW requirements and provide design sketches.

STEP 1 - Determination of wattage requirements.

Refer to Section D of the Caloritech™ catalog for technical data and sample calculations.

STEP 2 - Selection of voltage rating and phase.

Remember that, for any fixed voltage, the higher the wattage rating, the higher will be the current. If you have a choice of available voltages try to specify the higher voltage, especially if the required wattage is above 6 kW.

STEP 3 - Selection of sheath material.

Sheath material selection is based on the highest expected sheath temperature and also the ability of the metal to withstand corrosion.

COPPER - For immersion heating of water and noncorrosive aqueous solutions.

STEEL - For immersion heating of oil or paraffin or casting into iron.

INCOLOY® - For heating air and other gases; clamping-on to tanks and platens; immersion into salt solutions, soft metals, oils, most mildly corrosive chemical solutions; for radiant heating.

OTHER MATERIALS - Refer to the Corrosion Guide recommendations in Section D of the Caloritech™ catalog.

See Table 1 for common sheath materials and maximum allowable sheath temperatures.

TABLE 1 - Sheath Materials vs. Temperature

STANDARD SHEATHS	MAX. ALLOWABLE TEMP. °C	°F
Copper	185	365
Bundy®	400	750
Incoloy®	815	1500
Stainless 304, 321	760	1400
Steel	400	750
SPECIAL SHEATHS	**MAX. ALLOWABLE TEMP. °C**	**°F**
Inconel®	870	1600
Monel	540	1000
Stainless 316	760	1400
Titanium	540	1000

STEP 4 - Selection of sheath diameter.

Select sheath diameter from Table 2. Remember that smaller diameter sheaths are the most economical, but their use is restricted at the higher voltages.

TABLE 2 - Sheath Diam. vs. Max. Allowable Voltage

STANDARD DIA. mm	(in.)	MAX. VOLTS	SPECIAL DIA. mm	(in.)	MAX. VOLTS
6.6	(.260)	250	2.8	(.112)	120
8.0	(.315)	600*	4.1	(.160)	250
10.9	(.430)	600	5.2	(.205)	250
12.1	(.475)	600	9.5	(.375)	600
			13.7	(.540)	600

***NOTE:** .315 dia. elements above 300V require special terminals.

STEP 5 - Determination of allowable watt density.

Below is a partial listing of maximum recommended watt densities. Refer to Section D for a more complete listing encompassing most applications.

MAXIMUM WATT DENSITY RATINGS

These are suggested ratings only and will differ when flow velocity, heat transfer rate, or operating temperature vary.

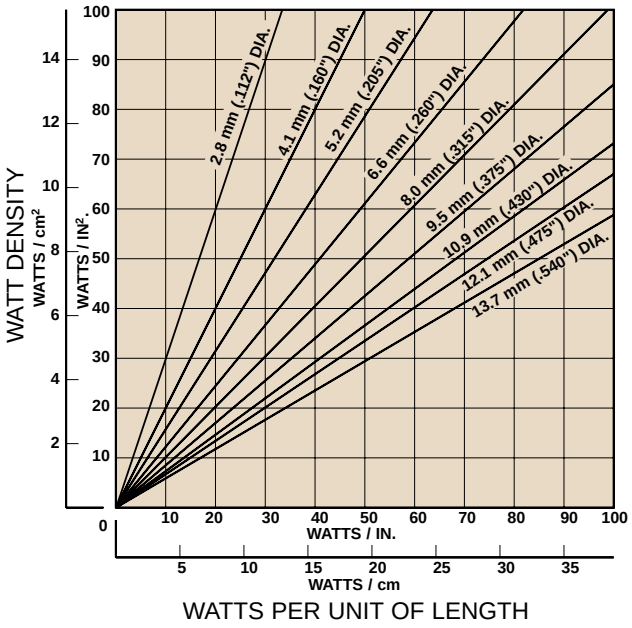
TABLE 3 - Maximum Watt Density Ratings

MATERIAL BEING HEATED		MAXIMUM WATTS PER SQUARE INCH	OPERATING TEMP. (°F)
Acid Solution		40	180
Alkaline Solution		40	212
Ammonia Plating Solution		25	50
Degreasing Solution, Vapor		20	275
Electroplating Solution		40	180
Fatty Acids		20	150
Freon		3	300
Gasoline		25	300
Glycerine		40	50
Lead-Stereotype Pot		35	600
Linseed Oil		50	150
Molasses		4-5	100
Oils	Bunker C Fuel	8	160
	Dowtherm A	20	600
	Dowtherm E	12	400
	Fuel Preheating	9-14	180
	Machine (SAE 30)	18-24	250
	Mineral	20-26	200
		16-18	400
	Vegetable	30-50	400
Paraffin or Wax		16-22	150
Potassium Hydroxide		25	160
Water		55-80	212

STEP 6 - Determination of total required heated length.

Using the maximum allowable watt density from Step 5 and the selected diameter from Step 4 refer to Figure 1 below to determine the wattage per unit of length.

FIGURE 1 - SURFACE WATTS vs. LINEAR WATTS



Next divide this number into the required wattage as determined in Step 1. This gives you the total heated length required.

STEP 7 - Determination of the cold end length

Ideally, the cold end should not be less than 40 mm (1-1/2") for sheath lengths up to 2000 mm (80") and 65 mm (2-1/2") for sheath lengths over 2000 mm. It shall not terminate within a bent section of the element. For immersion, the cold end must always terminate below the minimum liquid level. For higher temperature, "clamp-on", or air heating applications, increasing the cold length will result in lower terminal temperatures.

STEP 8 - Determination of element configuration and total sheath length.

Refer to page A6 for some of the more common shapes for elements. For other shapes, forward to us a hand sketch showing all critical dimensions. In selecting an element shape you may have to use more than one element to meet the following conditions:

(a) to distribute heat over a large surface or tank;

(b) if required sheath length is greater than maximum available length shown in Table 4;

(c) if element heated length, voltage and wattage selected are outside of minimum and maximum ohms per unit of length as shown in Table 4.

$$\text{OHMS/UNIT LENGTH} = \frac{\text{VOLTS}^2}{\text{WATTS x HEATED LENGTH}}$$

TABLE 4 - SHEATH DIAMETER VS. MAXIMUM LENGTH AND OHMS/UNIT LENGTH

SHEATH DIAMETER mm (in.)	MAXIMUM LENGTH mm (in.)	OHMS PER HEATED LENGTH MINIMUM OHMS/mm (in.)	MAXIMUM OHMS/mm (in.)
2.8 (.112)	1400 (55)	.0118 (.300)	.126 (3.2)
4.1 (.160)	3050 (120)	.0090 (.230)	.354 (9.0)
5.2 (.205)	3940 (155)	.0066 (.170)	.472 (12.0)
6.6 (.260)	2590 (102)	.0022 (.056)	.395 (10.0)
8.0 (.315)	3835 (151)	.0014 (.035)	.512 (13.0)
9.5 (.375)	3710 (146)	.0016 (.040)	.512 (13.0)
10.9 (.430)	7240 (285)	.0010 (.025)	.551 (14.0)
12.1 (.475)	7240 (285)	.0010 (.025)	.551 (14.0)
13.7 (.540)	2700 (106)	.0010 (.025)	.551 (14.0)

NOTES: (1) .260 & .315 Diam. elements are available in lengths up to 7240 mm (285") in low volume runs (check factory).
(2) Lengths beyond maximums shown above can be increased by splicing. Check factory for limitations.

STEP 9 - Selection of element terminal and optional hardware.

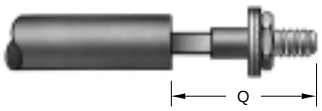
Refer to page A10 for standard element terminal types and to page A14 for optional hardware.

Types AA and AB terminals can be supplied with 1" length on request.

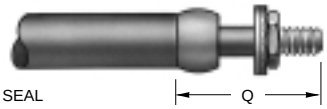
WHEN ORDERING SPECIFY:

- number of elements
- element voltage
- element wattage
- sheath diameter
- sheath length
- sheath material
- length of cold ends
- terminal type
- optional hardware
- forming dimensions (send sketch)

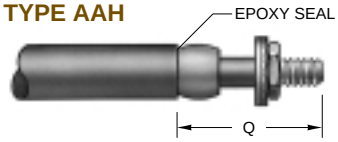
TYPE A



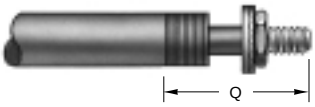
TYPE AA



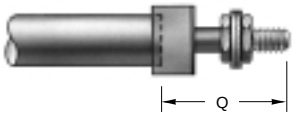
TYPE AAH



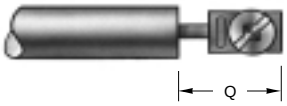
TYPE AB



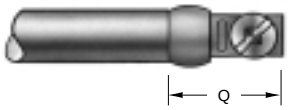
TYPE AC



TYPE D

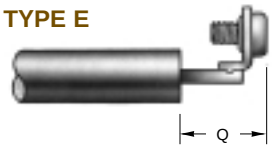


TYPE DA

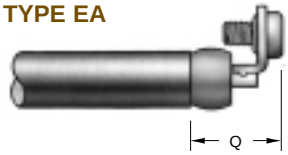


TYPE DB

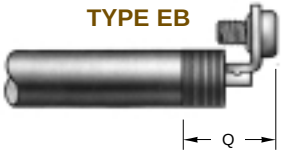
TYPE E



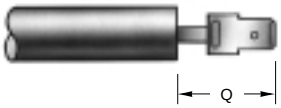
TYPE EA



TYPE EB



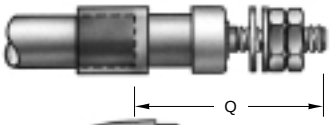
TYPE F



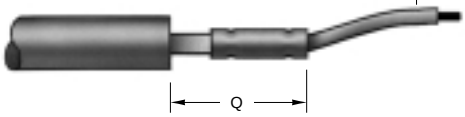
TYPE FA

TYPE FB

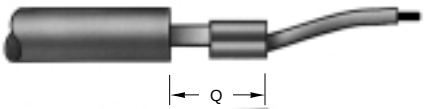
TYPE G



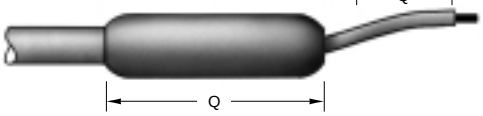
TYPE J1



TYPE J2



TYPE JF



NOTE: ALLOWABLE CURRENT FOR EACH TERMINAL TYPE DEPENDS, IN PART, ON THE APPLICATION - CHECK FACTORY FOR DETAILS

TABLE 1 - TERMINAL TYPE SPECIFICATIONS

TERM. TYPE	DIM. 'Q'	THD. SIZE	MAX. VOLTS	MAX. TEMP.	SUITABLE FOR ELEMENT DIAMETERS (in.) 0.112	0.160	0.205	0.260	0.315	0.375	0.430	0.475	0.540
A	1 1/8"*	#10-32*	600	400°C	✔	✔	✔	✔	✔	✔	✔	✔	—
AA	1 1/8"*	#10-32*	600	200°C	—	—	—	✔	✔	✔	✔	✔	—
AAH	1 1/8"*	#10-32*	600	150°C	—	—	—	✔	✔	✔	✔	✔	—
AB	1 1/8"*	#10-32*	600	400°C	—	✔	✔	✔	✔	✔	✔	✔	—
AC	1 1/8"*	#10-32*	600	400°C	—	—	—	—	—	—	✔	—	✔
D	13/16"	#10-32*	250	400°C	✔	✔	✔	✔	✔	✔	✔	✔	—
DA	13/16"	#10-32*	250	200°C	—	✔	✔	✔	✔	✔	✔	✔	—
DB	13/16"	#10-32*	250	400°C	—	✔	✔	✔	✔	✔	✔	✔	—
E	11/16"	#10-32*	250	400°C	✔	✔	✔	✔	✔	✔	✔	✔	—
EA	11/16"	#10-32*	250	200°C	—	✔	✔	✔	✔	✔	✔	✔	—
EB	11/16"	#10-32*	250	400°C	—	✔	✔	✔	✔	✔	✔	✔	—
F	15/16"	N/A	250	250°C	✔	✔	✔	✔	✔	✔	✔	✔	—
FA	15/16"	N/A	250	200°C	—	✔	✔	✔	✔	✔	✔	✔	—
FB	15/16"	N/A	250	250°C	—	—	—	✔	✔	✔	✔	✔	—
G	1 1/8"	#8-32	250	400°C	—	—	—	✔	—	—	—	—	—
G	1 3/8"	#10-32	250	400°C	—	—	—	—	✔	—	—	—	—
G	1 3/8"	#10-32	250	400°C	—	—	—	—	—	✔	—	—	—
G	1 5/8"	1/4"-28	250	400°C	—	—	—	—	—	—	✔	—	—
J1	1	N/A	300	200°C	✔	✔	✔	✔	✔	✔	✔	✔	—
J2	1/2"	N/A	300	200°C	✔	✔	✔	✔	✔	✔	✔	✔	—
JF*	1 5/8"	N/A	300	90°C	—	—	—	✔	✔	✔	✔	—	—

* 1 1/8" available as 1"; #10-32 available in #8-32; type JF, Q = 2 1/4" for 0.375 and 2 3/4" for 0.430.

FIG. 1 - Watt density vs. sheath temperature of tubular elements in 70°F air.

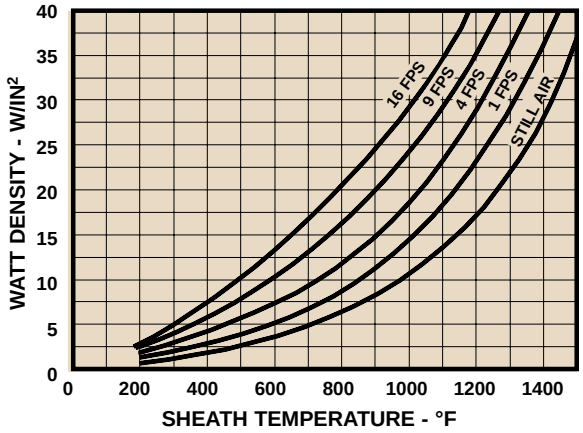


FIG. 2 - Allowable watt density on tubular elements in distributed air velocity of 1 ft. / sec.

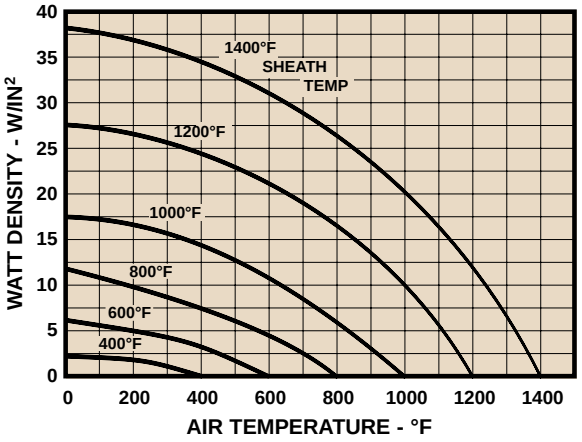


FIG. 3 - Allowable watt density on tubular elements in distributed air velocity of 4 ft. / sec.

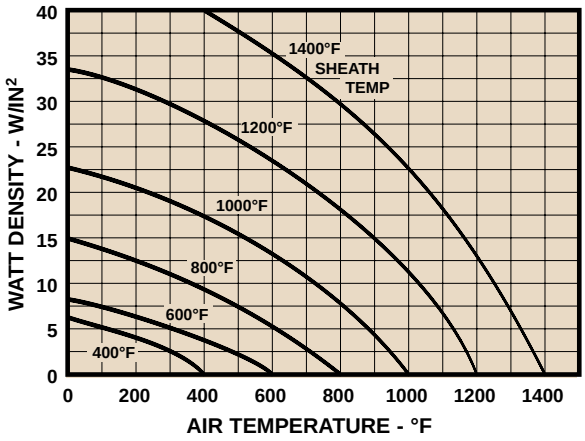


FIG. 4 - Allowable watt density on tubular elements in distributed air velocity of 9 ft. / sec.

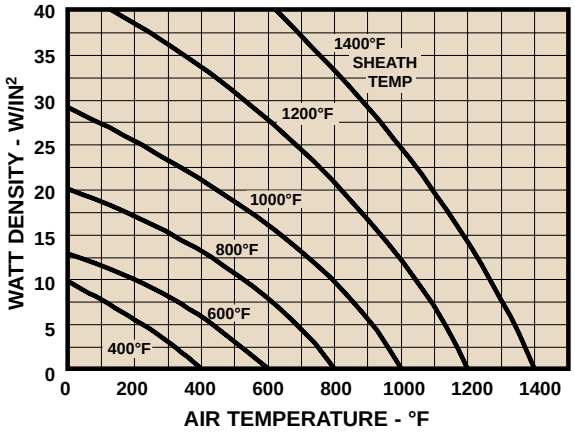


FIG. 5 - Allowable watt density on tubular elements in distributed air velocity of 16 ft. / sec.

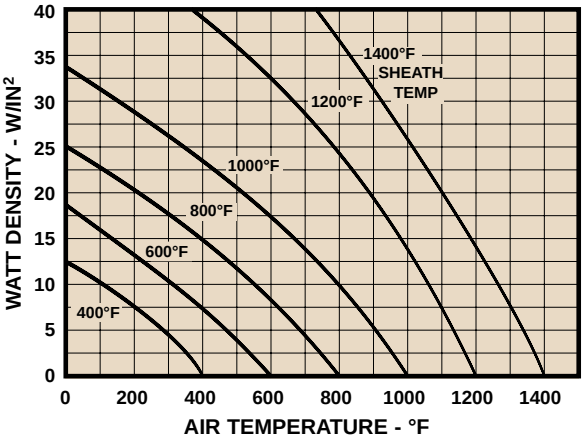
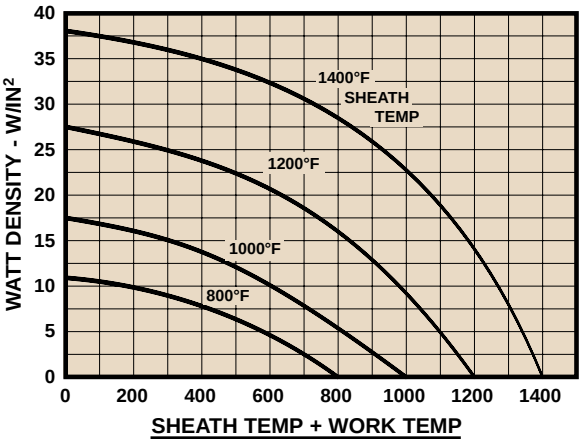
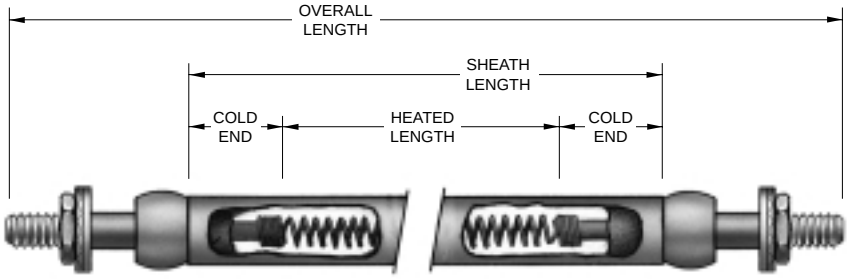


FIG. 6 - Allowable watt density for clamped-on tubular elements based on work temperature.



Listed Elements - .315 (8.0 mm) and .430 (10.9 mm) Diameters

Tables 1 and 2 list typical incoloy sheathed elements. The .315 diameter elements are generally for use at supply voltages of 240V and less. The .430 diameter elements listed in Table 2 can be used at up to 600V. An unlimited number of combinations of length, wattage, voltage rating and heated length are available in a wide selection of sheath materials (check factory).



continued on next page ...

Table 1 - .315" (8.0 mm) Diameter Incoloy Sheathed Elements

HEATED LENGTH		RESISTANCE	WATTAGE AND WATT DENSITY AT VARIOUS VOLTAGES									CATALOG
			120V			208V			240V			
mm	in.	(ohms)	WATTS	W/cm^2	W/in.^{2}	WATTS	W/cm^2	W/in.^{2}	WATTS	W/cm^2	W/in.^{2}	NUMBER
400	15.7	90.0	160	1.6	10	470	4.7	30	620	6.2	40	HXI10480-01
400	15.7	46.5	310	3.1	20	940	9.3	60	1250	12.4	80	HXI10480-02
400	15.7	23.2	620	6.2	40	—	—	—	—	—	—	HXI10480-03
600	23.6	120.0	120	0.8	5	350	2.3	15	470	3.1	20	HXI10480-04
600	23.6	62.6	230	1.6	10	700	4.7	30	940	6.2	40	HXI10480-05
600	23.6	30.6	470	3.1	20	1400	9.3	60	1870	12.4	80	HXI10480-06
600	23.6	15.3	940	6.2	40	—	—	—	—	—	—	HXI10480-07
800	31.5	90.0	160	0.8	5	470	2.3	15	620	3.1	20	HXI10480-08
800	31.5	46.5	310	1.6	10	940	4.7	30	1250	6.2	40	HXI10480-09
800	31.5	23.2	620	3.1	20	1870	9.3	60	2490	12.4	80	HXI10480-10
800	31.5	11.5	1250	6.2	40	—	—	—	—	—	—	HXI10480-11
1000	39.4	75.8	190	0.8	5	580	2.3	15	780	3.1	20	HXI10480-12
1000	39.4	36.9	390	1.6	10	1170	4.7	30	1560	6.2	40	HXI10480-13
1000	39.4	18.5	780	3.1	20	2340	9.3	60	3120	12.4	80	HXI10480-14
1000	39.4	9.2	1560	6.2	40	—	—	—	—	—	—	HXI10480-15
1200	47.2	62.6	230	0.8	5	700	2.3	15	940	3.1	20	HXI10480-16
1200	47.2	30.6	470	1.6	10	1400	4.7	30	1870	6.2	40	HXI10480-17
1200	47.2	15.3	940	3.1	20	2810	9.3	60	3740	12.4	80	HXI10480-18
1200	47.2	7.7	1870	6.2	40	—	—	—	—	—	—	HXI10480-19
1500	59.1	49.7	290	0.8	5	880	2.3	15	1170	3.1	20	HXI10480-20
1500	59.1	24.8	580	1.6	10	1750	4.7	30	2340	6.2	40	HXI10480-21
1500	59.1	12.3	1170	3.1	20	3510	9.3	60	4680	12.4	80	HXI10480-22
1500	59.1	6.2	2340	6.2	40	—	—	—	—	—	—	HXI10480-23
1800	70.9	41.1	350	0.8	5	1050	2.3	15	1400	3.1	20	HXI10480-24
1800	70.9	20.6	700	1.6	10	2100	4.7	30	2810	6.2	40	HXI10480-25
1800	70.9	10.3	1400	3.1	20	4210	9.3	60	5610	12.4	80	HXI10480-26
1800	70.9	5.1	2810	6.2	40	—	—	—	—	—	—	HXI10480-27
2100	82.7	35.1	410	0.8	5	1230	2.3	15	1640	3.1	20	HXI10480-28
2100	82.7	17.6	820	1.6	10	2450	4.7	30	3270	6.2	40	HXI10480-29
2100	82.7	8.8	1640	3.1	20	4910	9.3	60	6550	12.4	80	HXI10480-30
2100	82.7	4.4	3270	6.2	40	—	—	—	—	—	—	HXI10480-31
2400	94.5	30.6	470	0.8	5	1400	2.3	15	1870	3.1	20	HXI10480-32
2400	94.5	15.3	940	1.6	10	2810	4.7	30	3740	6.2	40	HXI10480-33
2400	94.5	7.7	1870	3.1	20	5610	9.3	60	7480	12.4	80	HXI10480-34
2700	106.3	27.2	530	0.8	5	1580	2.3	15	2100	3.1	20	HXI10480-35
2700	106.3	13.7	1050	1.6	10	3160	4.7	30	4210	6.2	40	HXI10480-36
2700	106.3	6.9	2100	3.1	20	6310	9.3	60	8420	12.4	80	HXI10480-37
3000	118.1	24.8	580	0.8	5	1750	2.3	15	2340	3.1	20	HXI10480-38
3000	118.1	12.3	1170	1.6	10	3510	4.7	30	4680	6.2	40	HXI10480-39
3000	118.1	6.2	2340	3.1	20	7010	9.3	60	9350	12.4	80	HXI10480-40

... continued from previous page

These elements are stocked in limited quantities (181.1 and shorter). We can add the terminal type you require, adjust the cold end length anywhere from 40 - 150 mm (1.6" - 5.9") and ship within three or four working days. Multiple elements can be field wired in series or parallel to meet your application requirements.

If a lead time of three or four weeks is available, it is always best to order a custom element to meet your specific needs. A word of caution... regardless of the element you choose, since it can get very hot, it may prove hazardous to people or property if it is improperly selected and applied. Pages A8 and A9 discuss the selection process. If you are even the least bit uncertain of your choice or if you require any type of assistance, contact our agent or nearest sales office.

TO ORDER SPECIFY:

- quantity
- catalog no.
- voltage
- wattage
- cold end length; 40 mm (1.6") to 150 mm (5.9")
- terminal type (see page A10)

Table 2 - .430" (10.9 mm) Diameter Incoloy Sheathed Elements

HEATED LENGTH		RESISTANCE	WATTAGE AND WATT DENSITY AT VARIOUS VOLTAGES									CATALOG
			240V			480V			600V			
mm	in.	(ohms)	WATTS	W/cm²	W/in.²	WATTS	W/cm²	W/in.²	WATTS	W/cm²	W/in.²	NUMBER
600	23.6	180.0	320	1.6	10	1280	6.2	40	1980	9.6	62	HXI10481-01
600	23.6	120.0	480	2.3	15	1910	9.3	60	2970	14.4	93	HXI10481-02
600	23.6	60.0	960	4.7	30	—	—	—	—	—	—	HXI10481-03
900	35.4	240.0	240	0.8	5	960	3.1	20	1480	4.8	31	HXI10481-04
900	35.4	120.0	480	1.6	10	1910	6.2	40	2970	9.6	62	HXI10481-05
900	35.4	80.0	720	2.3	15	2870	9.3	60	4450	14.4	93	HXI10481-06
900	35.4	40.0	1440	4.7	30	—	—	—	—	—	—	HXI10481-07
1200	47.2	180.0	320	0.8	5	1280	3.1	20	1980	4.8	31	HXI10481-08
1200	47.2	90.0	640	1.6	10	2550	6.2	40	3960	9.6	62	HXI10481-09
1200	47.2	60.0	960	2.3	15	3830	9.3	60	5940	14.4	93	HXI10481-10
1200	47.2	30.2	1910	4.7	30	—	—	—	—	—	—	HXI10481-11
1600	63.0	134.0	430	0.8	5	1700	3.1	20	2640	4.8	31	HXI10481-12
1600	63.0	67.8	850	1.6	10	3400	6.2	40	5280	9.6	62	HXI10481-13
1600	63.0	45.0	1280	2.3	15	5110	9.3	60	7910	14.4	93	HXI10481-14
1600	63.0	22.6	2550	4.7	30	—	—	—	—	—	—	HXI10481-15
2000	78.7	108.7	530	0.8	5	2130	3.1	20	3300	4.8	31	HXI10481-16
2000	78.7	54.3	1060	1.6	10	4250	6.2	40	6590	9.6	62	HXI10481-17
2000	78.7	36.0	1600	2.3	15	6380	9.3	60	9890	14.4	93	HXI10481-18
2000	78.7	18.1	3190	4.7	30	—	—	—	—	—	—	HXI10481-19
2400	94.5	90.0	640	0.8	5	2550	3.1	20	3960	4.8	31	HXI10481-20
2400	94.5	45.0	1280	1.6	10	5110	6.2	40	7910	9.6	62	HXI10481-21
2400	94.5	30.2	1910	2.3	15	7660	9.3	60	11870	14.4	93	HXI10481-22
2400	94.5	15.0	3830	4.7	30	—	—	—	—	—	—	HXI10481-23
2800	110.2	77.8	740	0.8	5	2980	3.1	20	4620	4.8	31	HXI10481-24
2800	110.2	38.7	1490	1.6	10	5960	6.2	40	9230	9.6	62	HXI10481-25
2800	110.2	25.8	2230	2.3	15	8930	9.3	60	13850	14.4	93	HXI10481-26
2800	110.2	12.9	4470	4.7	30	—	—	—	—	—	—	HXI10481-27
3400	133.9	64.0	900	0.8	5	3620	3.1	20	5610	4.8	31	HXI10481-28
3400	133.9	31.8	1810	1.6	10	7230	6.2	40	11210	9.6	62	HXI10481-29
3400	133.9	21.3	2710	2.3	15	10850	9.3	60	16820	14.4	93	HXI10481-30
3400	133.9	10.6	5420	4.7	30	—	—	—	—	—	—	HXI10481-31
4000	157.5	54.3	1060	0.8	5	4250	3.1	20	6590	4.8	31	HXI10481-32
4000	157.5	27.0	2130	1.6	10	8510	6.2	40	13190	9.6	62	HXI10481-33
4000	157.5	18.1	3190	2.3	15	12760	9.3	60	19780	14.4	93	HXI10481-34
4000	157.5	9.0	6380	4.7	30	—	—	—	—	—	—	HXI10481-35
4600	181.1	47.2	1220	0.8	5	4890	3.1	20	7580	4.8	31	HXI10481-36
4600	181.1	23.5	2450	1.6	10	9790	6.2	40	15170	9.6	62	HXI10481-37
4600	181.1	15.7	3670	2.3	15	14680	9.3	60	22750	14.4	93	HXI10481-38
4600	181.1	7.8	7340	4.7	30	—	—	—	—	—	—	HXI10481-39

THREADED FITTING (FIG. 1)

Threaded fittings can be factory brazed or welded to the element cold section. These fittings provide a leak tight joint in applications where the heater is installed in open tanks or vessels. Fittings are available in brass, steel or stainless. (Check factory.)

FIG. 1

COMPRESSION FITTING (FIG. 2)

Compression fittings (in nickel plated brass) can be provided for field installation on .430 diam. elements only.

FIG. 2

TERMINAL BOX (FIG. 3)

Moisture resistant terminal boxes can be supplied loose or factory installed.

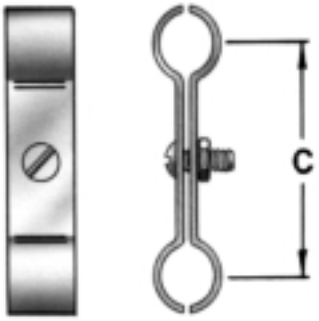
Boxes supplied for field installation can be provided with predrilled holes to accept the element. Note that the element will require fittings for connection to the box.

FIG. 3

ELEMENT CLAMP (FIG. 4)

These two piece stainless steel clamps can be used as element standoffs in ovens or tanks. One half of the clamp is ideal for clamp-on applications when used with a stud welded to the tank or plate. "C" dim. is available at 1 1/4", 1 7/16", 1 5/8" or 1 15/16".

FIG.4



MOUNTING BRACKETS (FIGS. 5-7)

Standard mounting brackets can be factory crimped to elements to facilitate installation. Special brackets are available for high volume orders.

FIG. 5

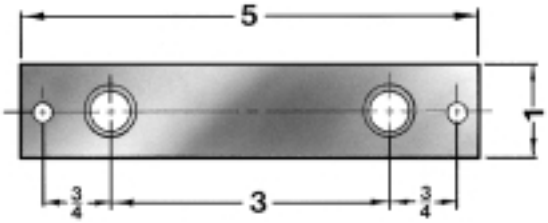


FIG. 6

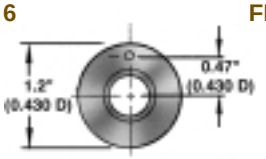
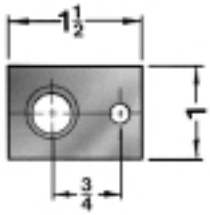


FIG. 7



PART NUMBERS

Refer to these part numbers when ordering special features.

FIG.	DESCRIPTION	PART NO.
1	Threaded Fitting	Check Factory
2	Compression Fitting	A11300
3	Terminal Box (small diam.)	XH1B2M
3	Terminal Box (large diam.)	XH2B1M
4	Element Clamp	A10619
5	Bracket	A10783
6	Bracket	A50100
7	Bracket	A10860