Tubular Heaters - 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 Figure 1 page A8 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 I2R (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.

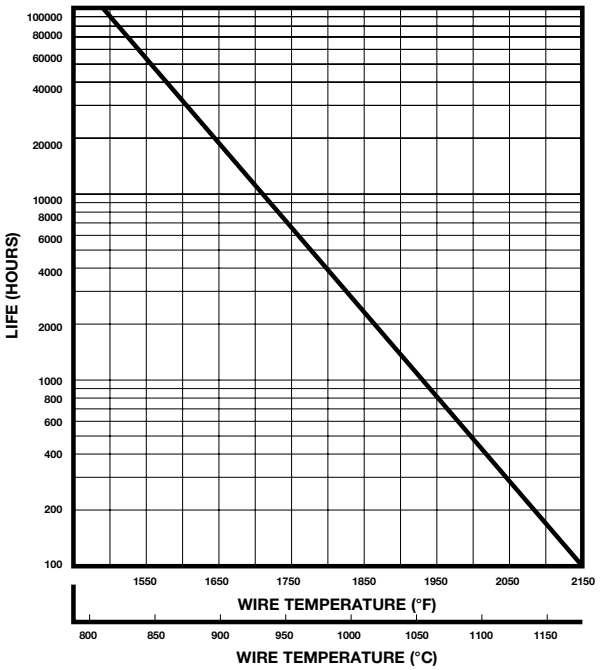
Since watt density also determines the temperature gradient between the sheath and the resistance coil, it is essentially the watt density that sets the resistance coil temperature.

Life Expectancy

Normal life expectancy depends mainly on the resistance coil operating temperature (see Figure 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.

Figure 1 Life vs. Coil Temperature (Typical)



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.

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").

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

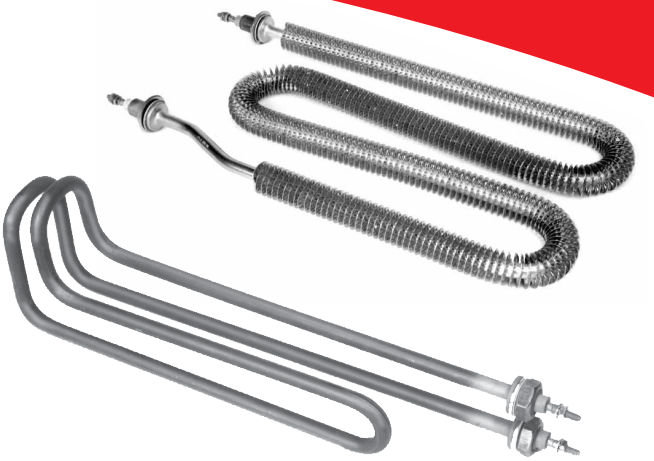
One hundred percent (100%) of the elements we manufacture are dielectric strength tested before they are released for shipment. This test, conducted at many times the intended operating voltage of the element, insures that the heater will not “short-out” during normal life.

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

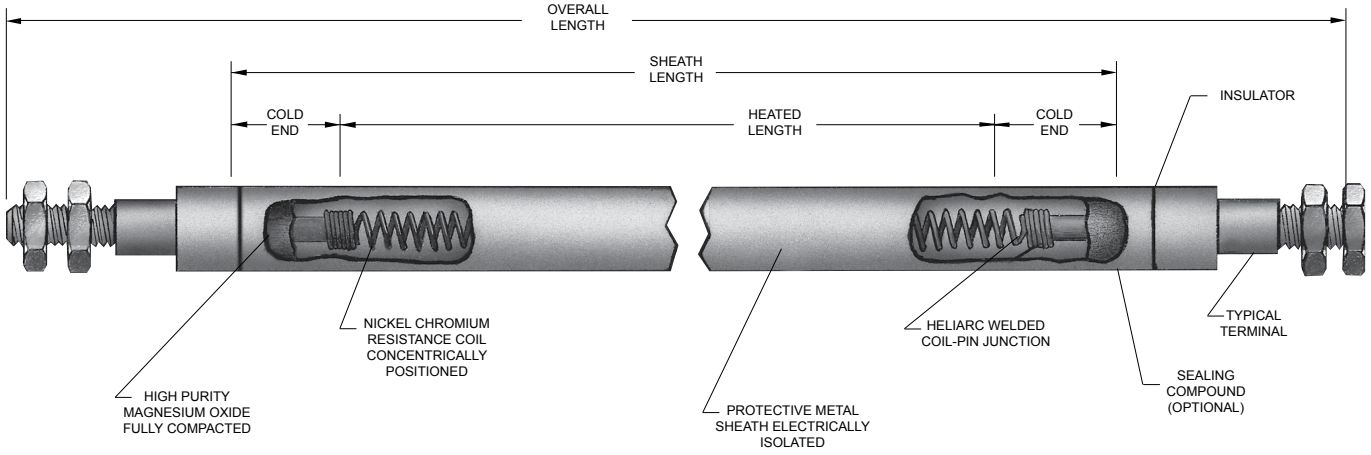
- Easy to install
- Available in a wide variety of sheaths, diameters and ratings
- Heat can be located exactly where required
- Can be formed to practically any shape
- Compact
- Easy to control to provide heat only when required
- Low maintenance and long life
- Excellent internal electrical insulation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

Figure 1 Construction - Tubular Element Features and Components



Typical Shapes

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.

Figure 1

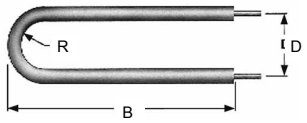


Figure 2

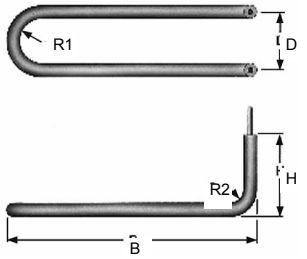


Figure 3

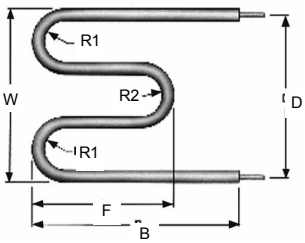


Figure 4

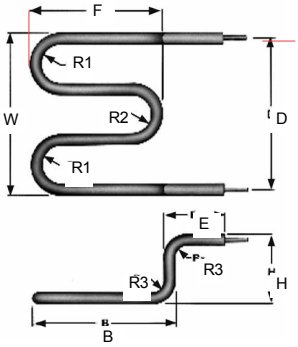


Figure 5

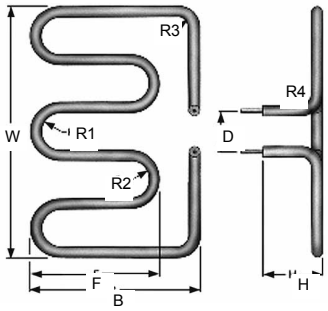


Figure 6

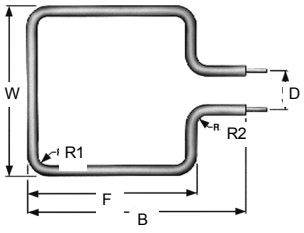


Figure 7

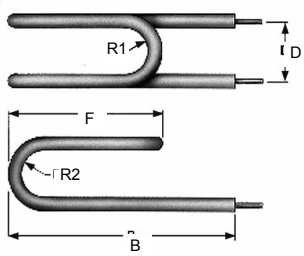


Figure 8

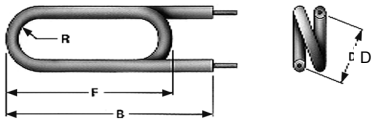


Figure 9

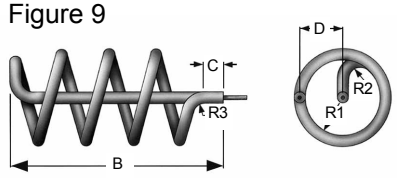


Figure 10

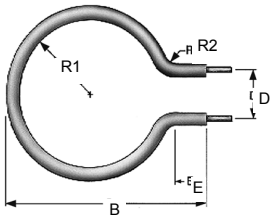
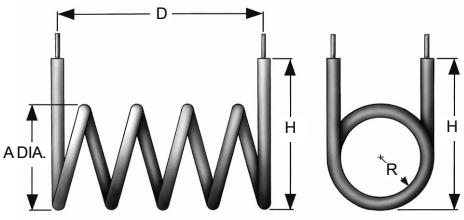


Figure 11



N = Number of turns

Typical Installations

Figure 12 In ovens or cabinets

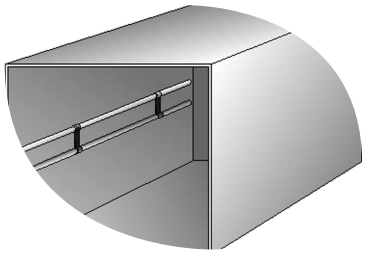


Figure 13 In ducts

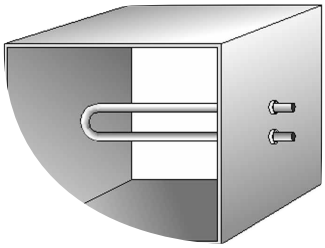


Figure 14 In pipe wells

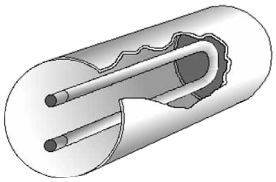


Figure 15 High wattage resistors or load banks

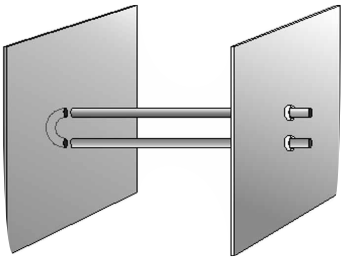


Figure 16 To radiate heat

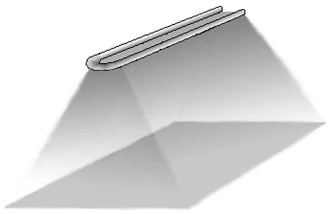


Figure 17 Immersed in liquids

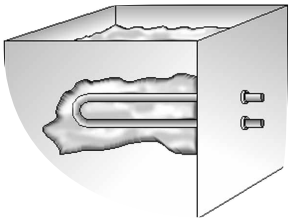


Figure 18 Clamped to walls, hoppers and pipes

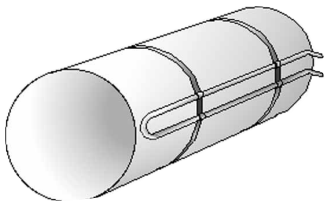


Figure 19 In drilled holes in plates or cylinders

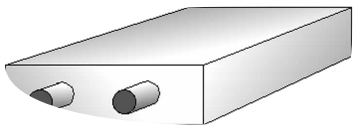


Figure 20 Sandwiched between plates

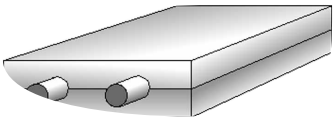


Figure 21 Cast-in to iron, aluminum or copper

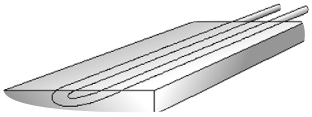


Figure 22 Bent to conform to system geometry

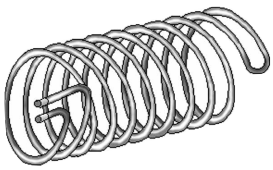
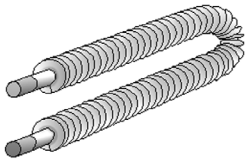


Figure 23 In finned heater assemblies



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	177	350
Bundy®	400	750
Incoloy®	815	1500
Stainless 304, 321	760	1400
Steel	400	750
SPECIAL SHEATHS	**MAX ALLOWABLE TEMP. °C**	**°F**
Incoloy®	870	1600
Monel	450	900
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. in	mm	MAX. VOLTS	SPECIAL DIA. in	mm	MAX VOLTS
.260	6.6	250	.112	2.8	120
.315	8.0	600*	.160	4.1	250
.430	10.9	600	.205	5.2	250
.475	12.1	600	.375	9.5	600
			.540	13.7	600

***Note:**
.315 (8 mm) diameter 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.

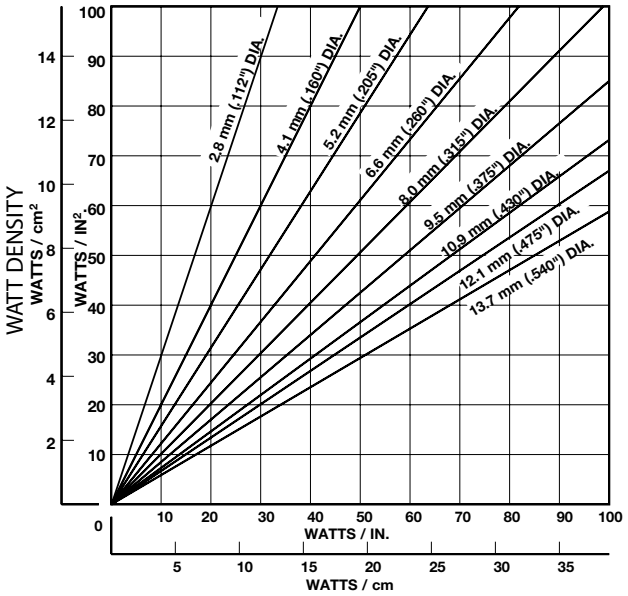
TABLE 3 Maximum Watt Density Ratings

MATERIAL BEING HEATED		MAXIMUM WATTS PER SQUARE INCH	OPERATING TEMPERATURE °C (°F)
Acid Solution		40	82 (180)
Alkaline Solution		40	100 (212)
Ammonia Plating Solution		25	10 (50)
Degreasing Solution, Vapor20		275	
Electroplaing Solution		40	82 (180)
Fatty Acids		20	66 (150)
Freon		3	149 (300)
Gasoline		25	149 (300)
Glycerine		40	10 (50)
Lead-Stereotype Pot		35	316 (600)
Linseed Oil		50	66 (150)
Molasses		4-5	38 (100)
Oils	Bunker C Fuel	8	71 (160)
	Dowtherm A	20	316 (600)
	Dowtherm E	12	204 (400)
	Fuel Preheating	9-14	82 (180)
	Machine (SAE 30)	18-24	121 (250)
	Mineral	20-26	93 (200)
		16-18	204 (400)
	Vegetable	30-50	204 (400)
Paraffin or Wax		16-22	66 (150)
Potassium Hydroxide		25	71 (160)
Water		55-80	100 (212)

HX and IK

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 1-1/2" (40 mm) for sheath lengths up to 80" (2000 mm) and 2-1/2" (65 mm) for sheath lengths over 80" (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 A8 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 in (mm)	MAXIMUM LENGTH in (mm)	OHMS PER MINIMUM OHMS/in (mm)	HEATED LENGTH MAXIMUM OHMS/in (mm)
.112 (2.8)	55 (1400)	.300 (.0118)	3.2 (.126)
.160 (4.1)	120 (3050)	.230 (0090)	9.0 (.354)
.205 (5.2)	155 (3940)	.170 (.0066)	12.0 (.472)
.260 (6.6)	102 (2590)	.056 (.0022)	10.0 (.395)
.315 (8.0)	106 (2700)	.035 (.0014)	13.0 (.512)
.375 (9.5)	146 (3710)	.040 (.0016)	13.0 (.512)
.430 (10.9)	285 (7240)	.025 (.0010)	14.0 (.551)
.475 (12.1)	285 (7240)	.025 (.0010)	14.0 (.551)
.540 (13.7)	106 (2700)	.025 (.0010)	14.0 (.551)

NOTES:
(1) .260" (0.66 mm) & .315" (0.80 mm) Diam. elements are available in lengths up to 285" (7240 mm) 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 A12 for standard element terminal types and to page A16 for optional hardware.

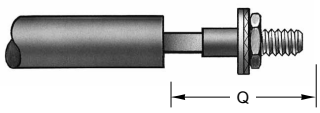
Types AA and AB terminals can be supplied with 1" (25 mm) length on request.

When Ordering Specify

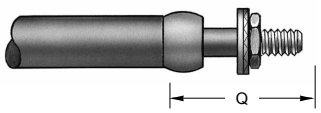
- number of elements
- element voltage
- element wattage
- sheath diameter
- sheath length
- sheath material
- length of cold ends
- terminal type
- optional hardware
- forming dimensions (send sketch)

Standard Terminal Types

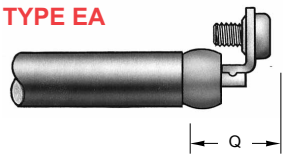
TYPE A



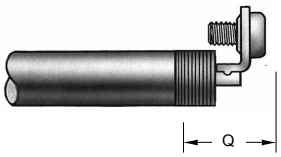
TYPE AA



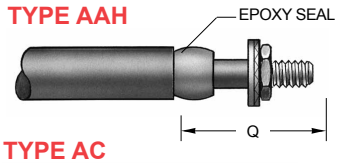
TYPE EA



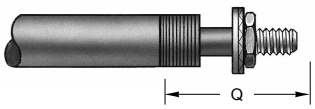
TYPE EB



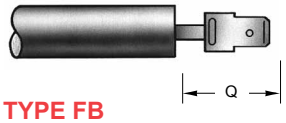
TYPE AAH



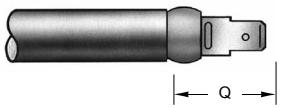
TYPE AB



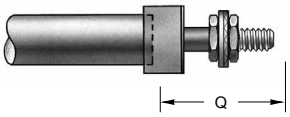
TYPE F



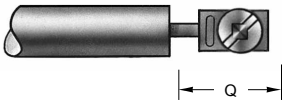
TYPE FA



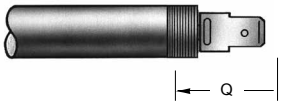
TYPE AC



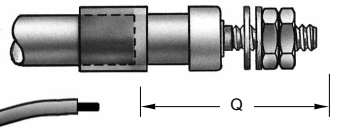
TYPE D



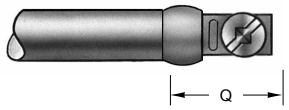
TYPE FB



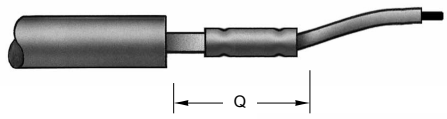
TYPE G



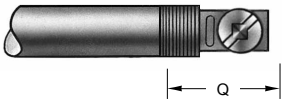
TYPE DA



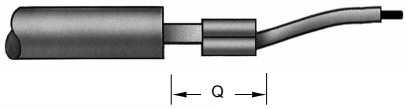
TYPE J1



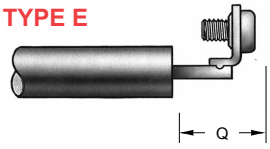
TYPE DB



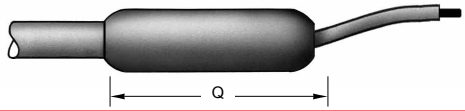
TYPE J2



TYPE E



TYPE JF



NOTE:
Allowable current for each terminal type depends, in part, on the application - check fac tory for details.

TABLE 1 - Terminal Type Specifications

TERM.	DIM. 'Q'	THD.	MAX.	MAX. TEMP.	SUITABLE FOR ELEMENT DIAMETERS - inches (mm)								
TYPE	inches (mm)	SIZE	VOLTS	°C (°F)	0.112 (2.84)	0.160 (4.06)	0.205 (5.21)	0.260 (6.60)	0.315 (8.00)	0.375 (9.53)	0.430 (10.9)	0.475 (12.1)	0.540 (13.7)
A	1 1/8 (28.6)*	#10-32*	600	400 (752)	✓	✓	✓	✓	✓	✓	✓	✓	–
AA	1 1/8 (28.6)*	#10-32*	600	200 (392)	–	–	–	✓	✓	✓	✓	✓	–
AAH	1 1/8 (28.6)*	#10-32*	600	150 (302)	–	–	–	✓	✓	✓	✓	✓	–
AB	1 1/8 (28.6)*	#10-32*	600	400 (752)	–	✓	✓	✓	✓	✓	✓	✓	–
AC	1 1/8 (28.6)*	#10-32*	600	400 (752)	–	–	–	–	–	–	✓	–	✓
D	13/16 (20.6)	#10-32*	250	400 (752)	✓	✓	✓	✓	✓	✓	✓	✓	–
DA	13/16 (20.6)	#10-32*	250	200 (392)	–	✓	✓	✓	✓	✓	✓	✓	–
DB	13/16 (20.6)	#10-32*	250	400 (752)	–	✓	✓	✓	✓	✓	✓	✓	–
E	11/16 (17.5)	#10-32*	250	400 (752)	✓	✓	✓	✓	✓	✓	✓	✓	–
EA	11/16 (17.5)	#10-32*	250	200 (392)	–	✓	✓	✓	✓	✓	✓	✓	–
EB	11/16 (17.5)	#10-32*	250	400 (752)	–	✓	✓	✓	✓	✓	✓	✓	–
F	15/16 (23.8)	N/A	250	250 (482)	✓	✓	✓	✓	✓	✓	✓	✓	–
FA	15/16 (23.8)	N/A	250	200 (392)	–	✓	✓	✓	✓	✓	✓	✓	–
FB	15/16 (23.8)	N/A	250	250 (482)	–	–	–	✓	✓	✓	✓	✓	–
G	1 1/8 (28.6)*	#8-32	250	400 (752)	–	–	–	✓	–	–	–	–	–
G	1 3/8 (34.9)	#10-32*	250	400 (752)	–	–	–	–	✓	–	–	–	–
G	1 3/8 (34.9)	#10-32*	250	400 (752)	–	–	–	–	–	✓	–	–	–
G	1 5/8 (41.3)	1/4"-28	250	400 (752)	–	–	–	–	–	–	✓	–	–
J1	1 (25.4)	N/A	300	200 (392)	✓	✓	✓	✓	✓	✓	✓	✓	–
J2	1/2 (12.7)	N/A	300	200 (392)	✓	✓	✓	✓	✓	✓	✓	✓	–
JF*	1 5/8 (41.3)	N/A	300	90 (194)	–	–	–	✓	✓	✓	✓	–	–

NOTE:
*1 1/8" (28.6 mm) available as 1" (25.4 mm); #10-32 available in #8-32; type JF, Q = 2 1/4" (57.2 mm) for .375" (9.53 mm) and 2 3/4" (69.9 mm) for 0.430" (10.9 mm)

HX and IK

Watt Density - Temperature Data

Figure 1 Watt density vs. sheath temperature of tubular elements in 21°C (70°F) air.

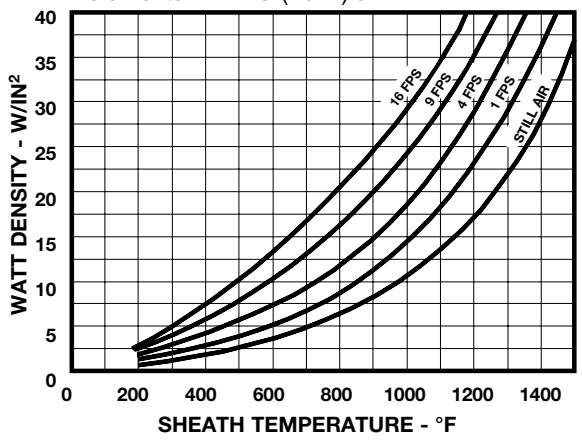


Figure 2 Allowable watt density on tubular elements in distributed air velocity of 1 ft. / sec.

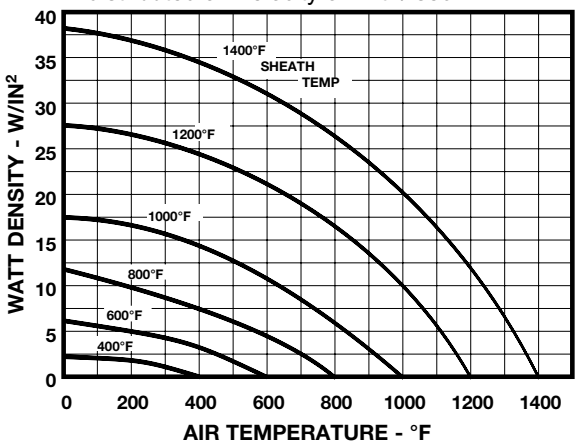


Figure 3 Allowable watt density on tubular elements in distributed air velocity of 4 ft. / sec.

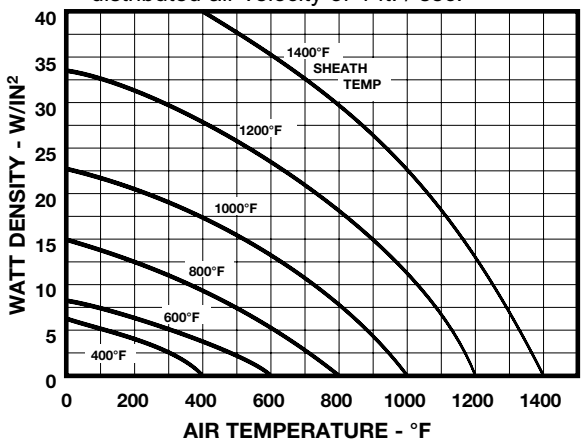


Figure 4 Allowable watt density on tubular elements in distributed air velocity of 9 ft. / sec.

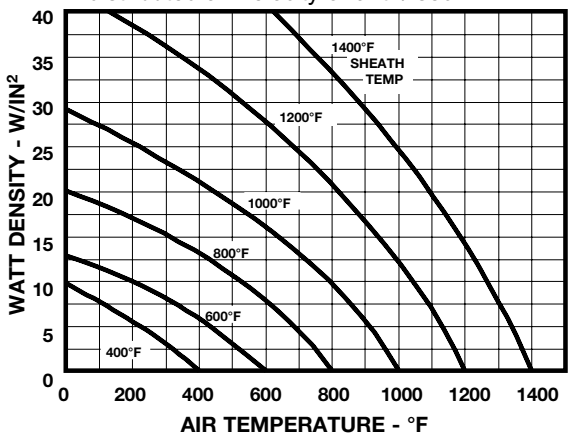


Figure 5 Allowable watt density on tubular elements in distributed air velocity of 16 ft. / sec.

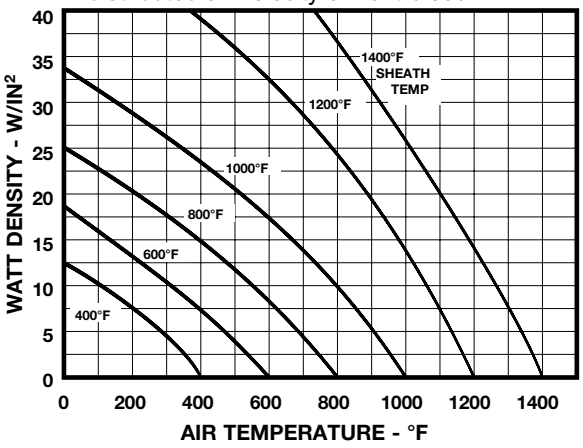
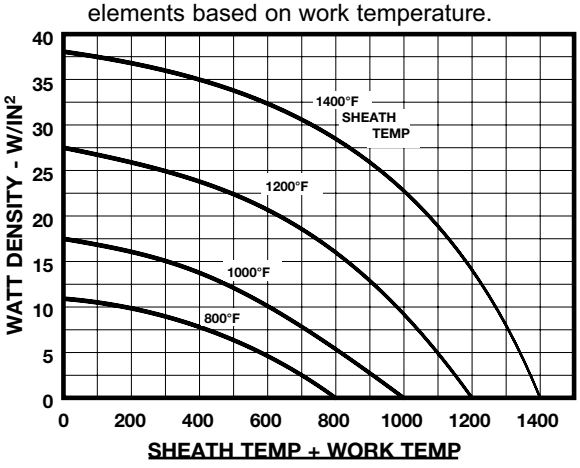


Figure 6 Allowable watt density for clamped-on tubular elements based on work temperature.



HX and IX

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

Tables 1 and 2 list typical incoloy® sheathed elements. The .315 (8.0 mm) diameter elements are generally for use at supply voltages of 240V and less. The .430 (10.9 mm) 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...

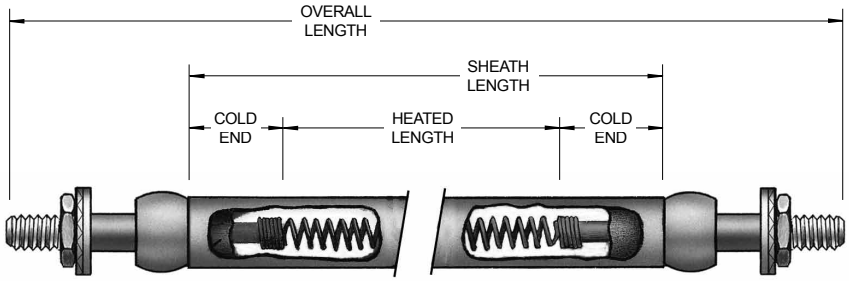


TABLE 1 Diameter Incoloy® Sheathed Elements - .315” (8.0 mm)

HEATED LENGTH			WATTAGE AND WATT DENSITY AT VARIOUS VOLTAGES									CATALOGUE
		RESISTANCE		120V			208V			240V		
in	mm	(ohms)	WATTS	W/in²	W/cm²	WATTS	W/in²	W/cm²	WATTS	W/in²	W/cm²	NUMBER
15.7	400	90.0	160	10	1.6	470	30	4.7	620	40	6.2	HXI10480-01
15.7	400	46.5	310	20	3.1	940	60	9.3	1250	80	12.4	HXI10480-02
15.7	400	23.2	620	40	6.2	–	–	–	–	–	–	HXI10480-03
23.6	600	120.0	120	5	0.8	350	15	2.3	470	20	3.1	HXI10480-04
23.6	600	62.6	230	10	1.6	700	30	4.7	940	40	6.2	HXI10480-05
23.6	600	30.6	470	20	3.1	1400	60	9.3	1870	80	12.4	HXI10480-06
23.6	600	15.3	940	40	6.2	–	–	–	–	–	–	HXI10480-07
31.5	800	90.0	160	5	0.8	470	15	2.3	620	20	3.1	HXI10480-08
31.5	800	46.5	310	10	1.6	940	30	4.7	1250	40	6.2	HXI10480-09
31.5	800	23.2	620	20	3.1	1870	60	9.3	2490	80	12.4	HXI10480-10
31.5	800	11.5	1250	40	6.2	–	–	–	–	–	–	HXI10480-11
39.4	1000	75.8	190	5	0.8	580	15	2.3	780	20	3.1	HXI10480-12
39.4	1000	36.9	390	10	1.6	1170	30	4.7	1560	40	6.2	HXI10480-13
39.4	1000	18.5	780	20	3.1	2340	60	9.3	3120	80	12.4	HXI10480-14
39.4	1000	9.2	1560	40	6.2	–	–	–	–	–	–	HXI10480-15
47.2	1200	62.6	230	5	0.8	700	15	2.3	940	20	3.1	HXI10480-16
47.2	1200	30.6	470	10	1.6	1400	30	4.7	1870	40	6.2	HXI10480-17
47.2	1200	15.3	940	20	3.1	2810	60	9.3	3740	80	12.4	HXI10480-18
47.2	1200	7.7	1870	40	6.2	–	–	–	–	–	–	HXI10480-19
59.1	1500	49.7	290	5	0.8	880	15	2.3	1170	20	3.1	HXI10480-20
59.1	1500	24.8	580	10	1.6	1750	30	4.7	2340	40	6.2	HXI10480-21
59.1	1500	12.3	1170	20	3.1	3510	60	9.3	2680	80	12.4	HXI10480-22
59.1	1500	6.2	2340	40	6.2	–	–	–	–	–	–	HXI10480-23
70.9	1800	41.1	350	5	0.8	1050	15	2.3	1400	20	3.1	HXI10480-24
70.9	1800	20.6	700	10	1.6	2100	30	4.7	2810	40	6.2	HXI10480-25
70.9	1800	10.3	1400	20	3.1	4210	60	9.3	5610	80	12.4	HXI10480-26
70.9	1800	5.1	2810	40	6.2	–	–	–	–	–	–	HXI10480-27
82.7	2100	35.1	410	5	0.8	1230	15	2.3	1640	20	3.1	HXI10480-28
82.7	2100	17.6	820	10	1.6	2450	30	4.7	3270	40	6.2	HXI10480-29
82.7	2100	8.8	1640	20	3.1	4910	60	9.3	6550	80	12.4	HXI10480-30
82.7	2100	4.4	3270	40	6.2	–	–	–	–	–	–	HXI10480-31
94.5	2400	30.6	470	5	0.8	1400	15	2.3	1870	20	3.1	HXI10480-32
94.5	2400	15.3	940	10	1.6	2810	30	4.7	3740	40	6.2	HXI10480-33
94.5	2400	7.7	1870	20	3.1	5610	60	9.3	7480	80	12.4	HXI10480-34
106.3	2700	27.2	530	5	0.8	1580	15	2.3	2100	20	3.1	HXI10480-35
106.3	2700	13.7	1050	10	1.6	3160	30	4.7	4210	40	6.2	HXI10480-36
106.3	2700	6.9	2100	20	3.1	6310	60	9.3	8420	80	12.4	HXI10480-37
118.1	3000	24.8	580	5	0.8	1750	15	2.3	2340	20	3.1	HXI10480-38
118.1	3000	12.3	1170	10	1.6	3510	30	4.7	4680	40	6.2	HXI10480-39
118.1	3000	6.2	2340	20	3.1	7010	60	9.3	9350	80	12.4	HXI10480-40

...continued from previous page

These elements are stocked in limited quantities (7.1”/181.1 mm and shorter). We can add the terminal type you require, adjust the cold end length anywhere from 1.6” to 5.9” (40 to 150 mm) 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 A10 and A11 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; 1.6” to 5.9” (40 mm to 150 mm)
- terminal type (see page A12)

TABLE 2 Diameter Incoloy® Sheathed Elements - .430” (10.9 mm)

HEATED LENGTH		RESISTANCE	WATTAGE AND WATT DENSITY AT VARIOUS VOLTAGES									CATALOGUE
			120V			208V			240V			
in	mm	(ohms)	WATTS	W/in²	W/cm²	WATTS	W/in²	W/cm²	WATTS	W/in²	W/cm²	NUMBER
23.6	600	180.0	320	10	1.6	1280	40	6.2	1980	62	9.6	HXI10481-01
23.6	600	120.0	480	15	2.3	1910	60	9.3	2970	93	14.4	HXI10481-02
23.6	600	60.0	960	30	4.7	–	–	–	–	–	–	HXI10481-03
35.4	900	240.0	240	5	0.8	960	20	3.1	1480	31	4.8	HXI10481-04
35.4	900	120.0	480	10	1.6	1910	40	6.2	2970	62	9.6	HXI10481-05
35.4	900	80.0	720	15	2.3	2870	60	9.3	4450	93	14.4	HXI10481-06
35.4	900	40.0	1440	30	4.7	–	–	–	–	–	–	HXI10481-07
47.2	1200	180.0	320	5	0.8	1280	20	3.1	1980	31	4.8	HXI10481-08
47.2	1200	90.0	640	10	1.6	2550	40	6.2	3960	62	9.6	HXI10481-09
47.2	1200	60.0	960	15	2.3	3830	60	9.3	5940	93	14.4	HXI10481-10
47.2	1200	30.2	1910	30	4.7	–	–	–	–	–	–	HXI10481-11
63.0	1600	134.0	430	5	0.8	1700	20	3.1	2640	31	4.8	HXI10481-12
63.0	1600	67.8	850	10	1.6	3400	40	6.2	5280	62	9.6	HXI10481-13
63.0	1600	45.0	1280	15	2.3	5110	60	9.3	7910	93	14.4	HXI10481-14
63.0	1600	22.6	2550	30	4.7	–	–	–	–	–	–	HXI10481-15
78.7	2000	108.7	530	5	0.8	2130	20	3.1	3300	31	4.8	HXI10481-16
78.7	2000	54.3	1060	10	1.6	4250	40	6.2	6590	62	9.6	HXI10481-17
78.7	2000	36.0	1600	15	2.3	6380	60	9.3	9890	93	14.4	HXI10481-18
78.7	2000	18.1	3190	30	4.7	–	–	–	–	–	–	HXI10481-19
94.5	2400	90.0	640	5	0.8	2550	20	3.1	3960	31	4.8	HXI10481-20
94.5	2400	45.0	1280	10	1.6	5110	40	6.2	7910	62	9.6	HXI10481-21
94.5	2400	30.2	1910	15	2.3	7660	60	9.3	11870	93	14.4	HXI10481-22
94.5	2400	15.0	3830	30	4.7	–	–	–	–	–	–	HXI10481-23
110.2	2800	77.8	740	5	0.8	2980	20	3.1	4620	31	4.8	HXI10481-24
110.2	2800	38.7	1490	10	1.6	5960	40	6.2	9230	62	9.6	HXI10481-25
110.2	2800	25.8	2230	15	2.3	8930	60	9.3	13850	93	14.4	HXI10481-26
110.2	2800	12.9	4470	30	4.7	–	–	–	–	–	–	HXI10481-27
133.9	3400	64.0	900	5	0.8	3620	20	3.1	5610	31	4.8	HXI10481-28
133.9	3400	31.8	1810	10	1.6	7230	40	6.2	11210	62	9.6	HXI10481-29
133.9	3400	21.3	2710	15	2.3	10850	60	9.3	16820	93	14.4	HXI10481-30
133.9	3400	10.6	5420	30	4.7	–	–	–	–	–	–	HXI10481-31
157.5	4000	54.3	1060	5	0.8	4250	20	3.1	6590	31	4.8	HXI10481-32
157.5	4000	27.0	2130	10	1.6	8510	40	6.2	13190	62	9.6	HXI10481-33
157.5	4000	18.1	3190	15	2.3	12760	60	9.3	19780	93	14.4	HXI10481-34
157.5	4000	9.0	6380	30	4.7	–	–	–	–	–	–	HXI10481-35
181.1	4600	47.2	1220	5	0.8	4890	20	3.1	7580	31	4.8	HXI10481-36
181.1	4600	23.5	2450	10	1.6	9790	40	6.2	15170	62	9.6	HXI10481-37
181.1	4600	15.7	3670	15	2.3	14680	60	9.3	22750	93	14.4	HXI10481-38
181.1	4600	7.8	7340	30	4.7	–	–	–	–	–	–	HXI10481-39

Special Features

Threaded Fitting (Figure1)
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.)

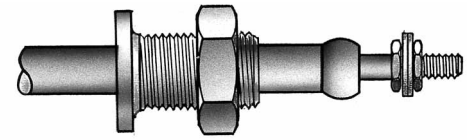


Figure 1

Compression Fitting (Figure 2)
Compression fittings (in nickel plated brass) can be provided for field installation on .430" (10.9 mm) diameter elements only.

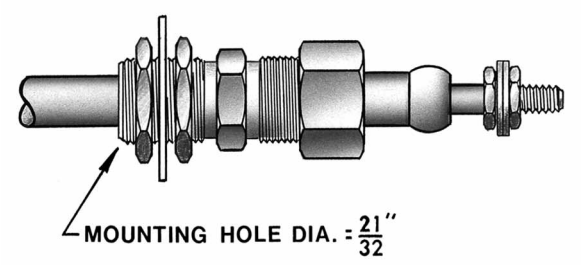


Figure 2

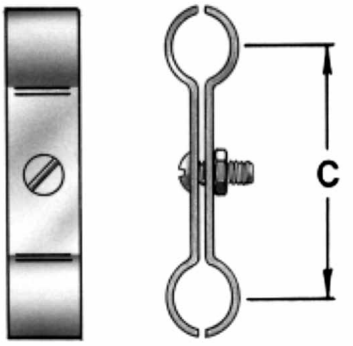
Terminal Box (Figure 3)
Moisture resistant terminal boxes can be supplied loose or factory installed.

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.

Figure 3

Element Clamp (Figure 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" (32 mm), 1 7/16" (36.5 mm), 1 5/8" (41 mm) or 1 15/16"(49 mm).

Figure4



Mounting Brackets (Figures 5-7)
Standard mounting brackets can be factory crimped to elements to facilitate installation. Special brackets are available for high volume orders.

Figure 5

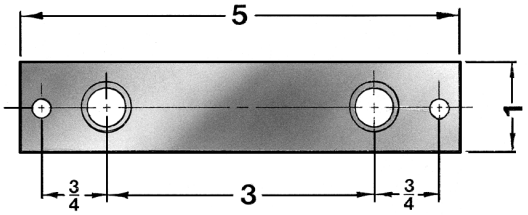


Figure 6

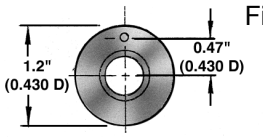
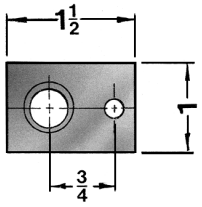


Figure 7



Part Numbers
Refer to these part numbers when ordering special features.

Figure	DESCRIPTION	PART NO.
1	Threading 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

HX and IK