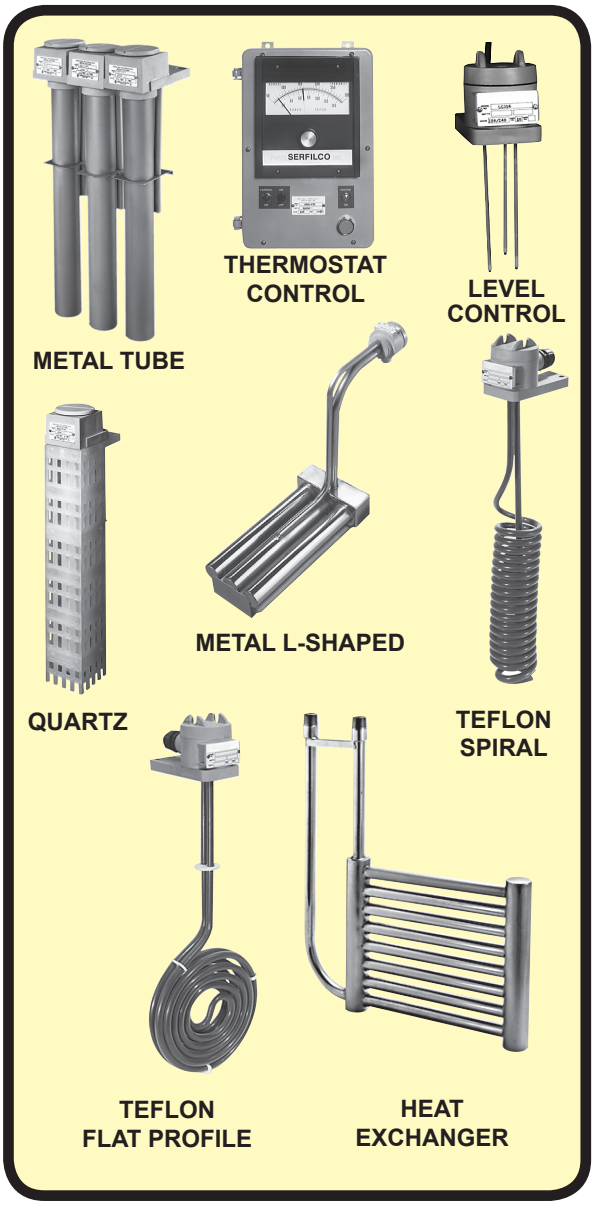
# SERFILCO®

# HEATERS and HEAT EXCHANGER COILS

2900 MacArthur Blvd. Northbrook, IL. USA 60062 **www.serfilco.com** (800) 323 - 5431

BULLETIN
A-102_N
JAN 2011




## HEATERS WITH "SAFEGUARD" CONTROLS PROVIDE SAFE, EFFICIENT AND ECONOMICAL HEATING FOR:

***PLATING / PICKLING / RINSING***
***ANODIZING / D.I. WATER / DYES***
***ACIDS / ALKALIES / CLEANERS***
***and OTHER AQUEOUS SOLUTIONS***

UL LISTED CSA CERTIFIED

- **Heaters**
  Available in a variety of configurations in steel, 304 SS, 316 SS, titanium, quartz, and Teflon®
- **Thermostat controls and liquid level sensors for safe operation**
- **Heat exchanger coils**
  Metal coils in 316 SS and titanium; fluoropolymer tube coils

# THERMAL OVERLOAD PROTECTION

## Protector I, II and III-Series

**PROTECTOR I SERIES (Standard on all electric immersion heaters)**
The Protector I over-temperature control system utilizes a heat sensitive fuse to detect overheating conditions. The fuse, placed inside a thermowell, positioned in contact with the heater sheath, will cut power to the heater in the event of a low liquid level.

**PROTECTOR II AND PROTECTOR III SERIES (Optional - Consult Sales Dept.)**
The Protector II and Protector III systems provide the same reliable over-temperature protection as the Protector I; however, the control systems feature a heat sensing thermostat. Should the tank's liquid level drop to a preset overheat point, the thermostat will trip and an audible alarm will sound, as well as cutting power to the heater. This eliminates dangerous operating conditions. After filling the tank, the immersion heater can be quickly made operational by pushing the reset button on the control to restore power.

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## TO DETERMINE THE HEATING REQUIREMENT OF A TANK

**Obtain the following information:**

1. TOTAL CUBIC FEET OF TANK. - Multiply the inside dimensions of the tank (depth x width x length). If the solution is normally 6" below the top of the tank, allow for this when calculating.
2. TOTAL GALLONS OF SOLUTION - Multiply by 7.48 the cubic feet of the tank occupied by solution.
3. AVERAGE AMBIENT (ROOM) TEMPERATURE WHERE TANK IS LOCATED.
4. TEMPERATURE LEVEL AT WHICH SOLUTION IS TO BE HELD.
5. HEAT-UP TIME DESIRED (HOURS).

**After this information is known, use the legend at right to make the calculations.**

$$\frac{A \times 1.0^{*} \times 8.35^{**} \times B}{3412 \times C} = \_\_\_\_\_$$

$$D \times E = \_\_\_\_\_$$

**Add the results of both calculations. The total is the Kilowatt requirement of the tank.**

### LEGEND

* Specific heat of water. Insert specific heat of your solution here. If unavailable, use water value.

** Weight of water. Insert specific weight of your solution here. If unavailable, use water value.

**A** = Total gallons of solution

**B** = Difference between ambient temperature and desired-solution temperature.

**C** = Desired heat-up time (hours).

**D** = Heat loss of tank. Refer to "Surface Losses" chart below.

**E** = Square feet of top of tank (multiply length x width)

## SURFACE LOSSES IN KW from open hot water tank

| | | | | | |
|---|---|---|---|---|---|
| 80° | -- | 130° | .16 | 180° | .50 |
| 85° | .01 | 135° | .18 | 185° | .55 |
| 90° | .02 | 140° | .21 | 190° | .60 |
| 95° | .04 | 145° | .24 | 195° | .66 |
| 100° | .05 | 150° | .27 | 200° | .72 |
| 105° | .065 | 155° | .30 | 205° | .80 |
| 110° | .09 | 160° | .34 | 210° | .87 |
| 115° | .10 | 165° | .37 | 215° | .95 |
| 120° | .12 | 170° | .41 | 220° | 1.04 |
| 125° | .14 | 175° | .45 | | |

## TYPICAL HEATER INSTALLATION

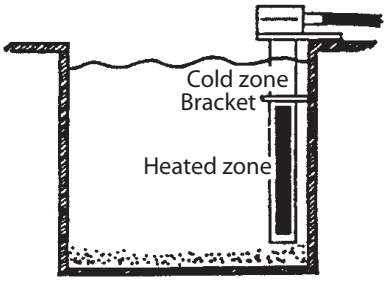
Be certain heater is properly connected in compliance with all codes and per instructions which accompany heater.

Solution level must always remain above heated zone of heater.

Heater should remain at least 2" above sludge at bottom of tank.

***CAUTION:*** All heated tanks should be equipped with an emergency automatic shut-off device.

Solution level must be at least one inch below junction box. Junction box must not be submerged.



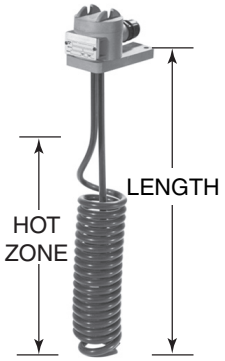

## AMPS FOR SELECTION OF CONTROLS

| HEATER WATTS | AMPS FOR HEATING LOAD | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SINGLE PHASE | | | | | | THREE PHASE (BALANCED) | | | | |
| | 120V | 208V | 230V | 240V | 460V | 480V | 208V | 230V | 240V | 460V | 480V |
| 1,000 | 8.4 | 4.8 | 4.4 | 4.2 | 2.2 | 2.1 | 2.8 | 2.6 | 2.5 | 1.3 | 1.2 |
| 2,000 | 16.7 | 9.7 | 8.7 | 8.4 | 4.4 | 4.2 | 5.6 | 5.1 | 4.9 | 2.6 | 2.5 |
| 3,000 | 25.0 | 14.5 | 13.1 | 12.5 | 6.6 | 6.3 | 8.4 | 7.6 | 7.3 | 3.8 | 3.7 |
| 4,000 | 33.4 | 19.3 | 17.4 | 16.7 | 8.7 | 8.4 | 11.2 | 10.1 | 9.7 | 5.9 | 4.9 |
| 6,000 | 50.0 | 28.9 | 26.1 | 25.0 | 13.1 | 12.5 | 16.7 | 15.1 | 14.5 | 7.6 | 7.3 |
| 8,000 | 66.7 | 38.5 | 34.8 | 33.4 | 17.4 | 16.7 | 22.3 | 20.2 | 19.3 | 10.1 | 9.7 |
| 9,000 | 75.0 | 43.3 | 39.2 | 37.5 | 19.6 | 18.8 | 25.1 | 22.7 | 21.7 | 11.4 | 10.9 |
| 12,000 | 100.0 | 57.7 | 52.2 | 50.0 | 26.1 | 25.0 | 33.4 | 30.2 | 29.0 | 15.1 | 14.5 |
| 18,000 | 150.0 | 86.6 | 78.3 | 75.0 | 39.2 | 37.5 | 50.1 | 45.3 | 43.4 | 22.7 | 21.7 |
| 27,000 | 225.0 | 129.9 | 117.4 | 112.5 | 58.7 | 56.3 | 75.1 | 67.9 | 65.1 | 34.0 | 32.6 |
| 36,000 | 300.0 | 173.1 | 156.6 | 150.0 | 78.3 | 75.0 | 100.1 | 90.5 | 86.8 | 45.3 | 43.4 |

# OVER-THE-SIDE HEATERS (OTS) *SPIRAL* TEFLON®

2900 MacArthur Blvd. Northbrook, IL. USA 60062 **www.serfilco.com** (800) 323 - 5431

## SINGLE ELEMENT SPIRAL OVER - THE - SIDE TEFLON IMMERSION HEATERS



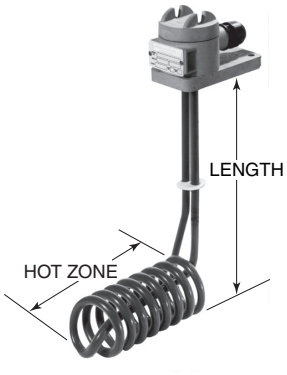

10 watts/square inch nominal.
240 volts standard as listed - other voltages available.

Compatible with most plating tank solutions, inert to acids, anodizing and pickling solutions up to 212°F. temperature. Check Chemical Resistance Chart or with chemical supplier for proper material selection.
Replaces alumina or graphite heaters.

### FEATURES:

- Low watt density for long service life.
- Non-contaminating Teflon covered stainless steel elements.
- PTI or PTLI thermal protection standard.
- Grounded internal metal element for safety.
- U.L. listed, CSA certified.
- Lightweight, non-floating construction.
- Standard 3' flexible PVC liquid-tight conduit.
- Polypropylene or Teflon guards optional. Consult Sales Dept.
- Single phase only
- Longer lengths available.
- Vapor-tight polypropylene terminal enclosure.

## SINGLE ELEMENT SPIRAL L-SHAPED TEFLON IMMERSION HEATERS




Bottom design for even heating and varying liquid levels.

| WATTS | VOLTS* | HOT ZONE Inches | VERT.* LENGTH Inches | PRICE CODE NUMBER | SHIP WT. lbs. |
|---|---|---|---|---|---|
| 500 | 240 | 5 | 11 | 79-1000XAA1 | 6 |
| 1,000 | 240 | 7 | 11 | 79-1001XAA1 | 7 |
| 2,000 | 240 | 12 | 17 | 79-1002XAA1 | 8 |
| 3,000 | 240 | 16 | 23 | 79-1003XAA1 | 13 |
| 4,000 | 240 | 20 | 29 | 79-1004XAA1 | 15 |
| 5,000 | 240 | 25 | 35 | 79-1005XAA1 | 18 |
| 6,000 | 240 | 29 | 40 | 79-1006XAA1 | 21 |
| 8,000 | 240 | 37 | 47 | 79-1007XAA1 | 25 |
| 9,000 | 240 | 44 | 54 | 79-1008XAA1 | 28 |

| WATTS | VOLTS* | HOT ZONE Inches | VERT.* LENGTH Inches | PRICE CODE NUMBER | SHIP WT. lbs. |
|---|---|---|---|---|---|
| 500 | 240 | 6 | 12 | 79-1009XAA1 | 6 |
| 1,000 | 240 | 8 | 12 | 79-1010XAA1 | 7 |
| 2,000 | 240 | 12 | 18 | 79-1011XAA1 | 8 |
| 3,000 | 240 | 17 | 18 | 79-1012XAA1 | 13 |
| 4,000 | 240 | 20 | 18 | 79-1013XAA1 | 15 |
| 5,000 | 240 | 24 | 18 | 79-1014XAA1 | 18 |
| 6,000 | 240 | 29 | 18 | 79-1015XAA1 | 21 |
| 8,000 | 240 | 37 | 18 | 79-1016XAA1 | 26 |
| 9,000 | 240 | 44 | 18 | 79-1017XAA1 | 29 |

* Consult Sales Dept. for other choices.

## PRICE CODE IDENTIFICATION

**Price Code Number: 79- _ _ _ _ #1 #2 #3 #4 #5_**

| #1 HEATER MATERIAL | #2 VOLTAGE | #3 PROTECTOR Consult Sales Dept. | #4 PHASE |
|---|---|---|---|
| X = PTFE (Teflon)<br>Q = Quarts<br>P = Plain steel<br>F = 304 stainless steel<br>S = 316 stainless steel<br>T = Titanium | A = 240V<br>B = 480V<br>C = 120V<br>D = 208V<br>E = 415V<br>G = 600V<br>H = 380V | Replaceable PI: A = to 180°F; B = 180-230°F; C = 230-300°F<br>Resettable PII or PIII: D = to 180°F; E = 180-230°F; F = 230-300°F | 1 = 1φ<br>3 = 3φ<br>**#5 OPTIONS**<br>Blank = No guard<br>C = w/guard<br>G = Guard only<br>J = Tube only<br>E = Element only |

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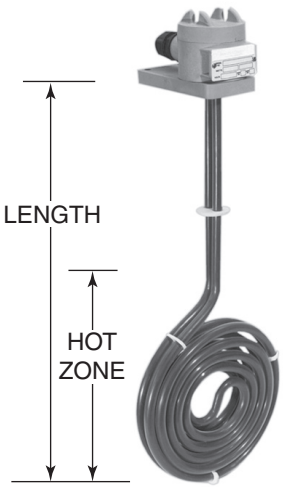
## SINGLE ELEMENT FLAT OVER-THE-SIDE TEFLON




Flat, low profile design.

Compatible with most plating tank solutions, inert to acids, anodizing and pickling solutions up to 212°F. temperature. Check Chemical Resistance Chart or with chemical supplier for proper material selection.Replaces alumina or graphite heaters.

**FEATURES:**

- Low watt density for long service life.
- Non-contaminating Teflon covered stainless steel element.
- PTI or PTLI thermal protection standard
- U.L. listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure.
- Standard 3' flexible PVC liquid-tight conduit.
- Polypropylene or Teflon guards optional. Consult Sales Dept.
- Single phase only
- Grounded internal metal element for safety.
- Longer vertical lengths available.

## SINGLE ELEMENT FLAT L-SHAPED TEFLON IMMERSION HEATERS


10 watts/square inch nominal
240 volts standard as listed - other voltages available.
Low profile bottom design for even heating and varying liquid levels.

| WATTS | VOLTS* | HOT ZONE Inches | VERT.* LENGTH Inches | DIA.* inches | PRICE CODE NUMBER | SHIP WT. lbs. |
|---|---|---|---|---|---|---|
| 500 | 240 | 6 | 14 | 5 | 79-1018XAA1 | 6 |
| 1,000 | 240 | 7 | 14 | 6 | 79-1019XAA1 | 7 |
| 2,000 | 240 | 9 | 17 | 8 | 79-1020XAA1 | 8 |
| 3,000 | 240 | 10 | 23 | 9 | 79-1021XAA1 | 13 |
| 4,000 | 240 | 12 | 29 | 11 | 79-1022XAA1 | 15 |
| 5,000 | 240 | 13 | 35 | 12 | 79-1023XAA1 | 18 |
| 6,000 | 240 | 14 | 40 | 13 | 79-1024XAA1 | 22 |

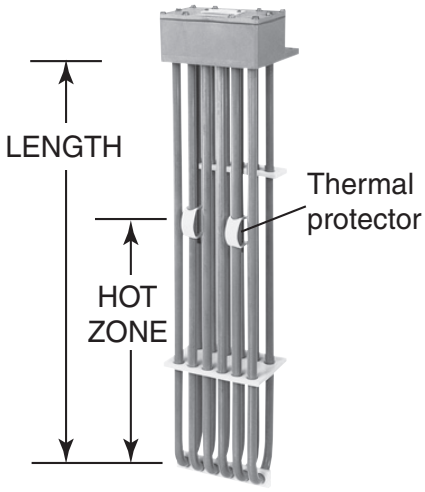
| WATTS | VOLTS* | HOT ZONE Inches | VERT.* LENGTH Inches | DIA.* inches | PRICE CODE NUMBER | SHIP WT. lbs. |
|---|---|---|---|---|---|---|
| 500 | 240 | 5 | 12 | 5 | 79-1027XAA1 | 6 |
| 1,000 | 240 | 6 | 12 | 6 | 79-1028XAA1 | 7 |
| 2,000 | 240 | 8 | 18 | 8 | 79-1029XAA1 | 8 |
| 3,000 | 240 | 9 | 18 | 9 | 79-1030XAA1 | 13 |
| 4,000 | 240 | 11 | 18 | 11 | 79-1031XAA1 | 15 |
| 5,000 | 240 | 12 | 18 | 12 | 79-1032XAA1 | 18 |
| 6,000 | 240 | 13 | 18 | 13 | 79-1033XAA1 | 22 |

* Consult Sales Dept. for other choices.

# OVER-THE-SIDE HEATERS (OTS) *LOOP* TEFLON®

2900 MacArthur Blvd. Northbrook, IL. USA 60062 **www.serfilco.com** (800) 323 - 5431

## SIX ELEMENT OVER - THE - SIDE TEFLON IMMERSION HEATERS



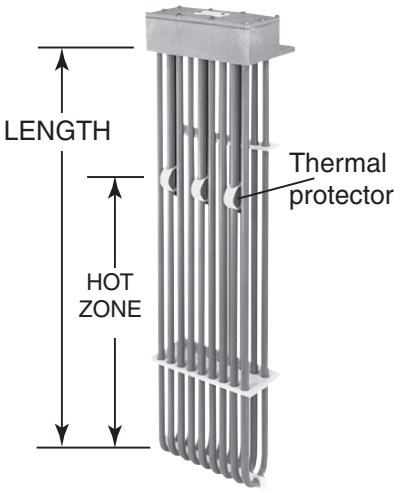

10 watts/square inch nominal 240 volts standard as listed - other voltages available.

Compatible with most plating tank solutions, inert to acids, anodizing and pickling olutions up to 212°F. temperature. Check Chemical Resistance Chart or with chemical supplier for proper material selection. Replaces alumina or graphite heaters.

### FEATURES:

- U.L. listed, CSA certified.
- Low watt density for long service life.
- Non-contaminating Teflon covered stainless steel elements.
- PTI thermal protection standard.
- Grounded internal metal element for safty.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure.
- Standard 3' flexible PVC liquid-tight conduit.
- Polypropylene or Teflon guards optional. Consult Sales Dept.
- Standard 3-phase wiring. Consult Sales Dept. for optional single phase.

## NINE ELEMENT OVER - THE - SIDE TEFLON IMMERSION HEATERS




3 to 18 kw, 10 watts/square inch nominal 240 volts standard as listed - other voltages available.

| WATTS | VOLTS* | HOT ZONE inches | LENGTH* inches | PRICE CODE NUMBER | SHIP WT. lbs |
|---|---|---|---|---|---|
| 2,000 | 240 | 9 | 17 | 79-1069XAA3 | 19 |
| 3,000 | 240 | 15 | 23 | 79-1070XAA3 | 22 |
| 4,000 | 240 | 21 | 29 | 79-1071XAA3 | 24 |
| 6,000 | 240 | 28 | 35 | 79-1072XAA3 | 27 |
| 8,000 | 240 | 38 | 47 | 79-1073XAA3 | 33 |
| 10,000 | 240 | 47 | 59 | 79-1074XAA3 | 40 |
| 12,000 | 240 | 55 | 68 | 79-1075XAA3 | 45 |

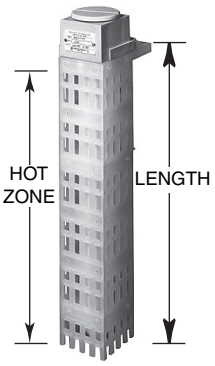
| WATTS | VOLTS* | HOT ZONE inches | LENGTH* inches | PRICE CODE NUMBER | SHIP WT. lbs |
|---|---|---|---|---|---|
| 3,000 | 240 | 9 | 17 | 79-1076XAA3 | 28 |
| 4,500 | 240 | 15 | 23 | 79-1077XAA3 | 33 |
| 6,000 | 240 | 21 | 29 | 79-1078XAA3 | 36 |
| 9,000 | 240 | 28 | 35 | 79-1079XAA3 | 40 |
| 12,000 | 240 | 38 | 47 | 79-1080XAA3 | 49 |
| 15,000 | 240 | 47 | 59 | 79-1081XAA3 | 60 |
| 18,000 | 240 | 55 | 68 | 79-1082XAA3 | 67 |

* Consult Sales Dept. for other choices.

# OVER-THE-SIDE HEATERS (OTS) *TUBULAR*

2900 MacArthur Blvd. Northbrook, IL. USA 60062 **www.serfilco.com** (800) 323 - 5431

## SINGLE TUBE




26 watts/square inch nominal.
240 volts standard as listed, other voltages available.

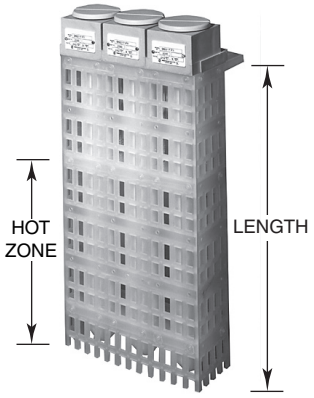
For plating tanks, pickling and other acidic aqueous solutions. Check Chemical Resistance Chart or with chemical supplier for proper material selection.

**Not for use in hydrofluoric acid or alkaline solutions.**

### FEATURES:

- Heavy duty, long lasting construction.
- PQI thermal protection standard
- Grounded for safety.
- U.L. listed, CSA certified.
- Vapor-tight polypropylene terminal enclosure.
- Standard 3' flexible PVC liquid-tight conduit.
- Replaceable elements and quartz tube.
- Complete standard heater provided with polypropylene guard, optional Teflon guard available for solutions over 200°F. and chromic acid.

## TRIPLE TUBE




26 watts/square inch nominal.
240 volts standard as listed, other voltages available.

| WATTS | VOLTS* | HOT ZONE inches | LENGTH* inches | PRICE CODE NUMBER | SHIP WT. lbs. |
|---|---|---|---|---|---|
| 500 | 240 | 6 | 10 | 79-1136QAA1C | 9 |
| 1,000 | 240 | 7 | 11 | 79-1137QAA1C | 10 |
| 1,000 | 240 | 7 | 17 | 79-1138QAA1C | 11 |
| 2,000 | 240 | 12 | 17 | 79-1139QAA1C | 11 |
| 2,000 | 240 | 12 | 23 | 79-1140QAA1C | 14 |
| 3,000 | 240 | 18 | 23 | 79-1141QAA1C | 14 |
| 3,000 | 240 | 18 | 29 | 79-1142QAA1C | 17 |
| 3,500 | 240 | 21 | 29 | 79-1143QAA1C | 17 |
| 4,000 | 240 | 28 | 35 | 79-1144QAA1C | 20 |
| 4,000 | 240 | 28 | 41 | 79-1145QAA1C | 23 |
| 5,000 | 240 | 33 | 41 | 79-1146QAA1C | 23 |
| 5,000 | 240 | 33 | 47 | 79-1147QAA1C | 26 |
| 6,000 | 240 | 39 | 47 | 79-1148QAA1C | 26 |
| 6,000 | 240 | 39 | 52 | 79-1149QAA1C | 29 |
| 8,000 | 240 | 49 | 59 | 79-1150QAA1C | 31 |
| 10,000 | 240 | 62 | 71 | 79-1151QAA1C | 34 |

| WATTS | VOLTS* | HOT ZONE inches | LENGTH* inches | PRICE CODE NUMBER | SHIP WT. lbs. |
|---|---|---|---|---|---|
| 1,500 | 240 | 6 | 10 | 79-1152QAA1C | 21 |
| 3,000 | 240 | 7 | 11 | 79-1153QAA1C | 22 |
| 3,000 | 240 | 7 | 17 | 79-1154QAA1C | 26 |
| 6,000 | 240 | 12 | 17 | 79-1155QAA1C | 26 |
| 6,000 | 240 | 12 | 23 | 79-1156QAA1C | 30 |
| 9,000 | 240 | 18 | 23 | 79-1157QAA1C | 30 |
| 9,000 | 240 | 18 | 29 | 79-1158QAA1C | 34 |
| 10,500 | 240 | 21 | 29 | 79-1159QAA1C | 34 |
| 12,000 | 240 | 28 | 35 | 79-1160QAA1C | 38 |
| 12,000 | 240 | 28 | 41 | 79-1161QAA1C | 44 |
| 15,000 | 240 | 33 | 41 | 79-1162QAA1C | 44 |
| 15,000 | 240 | 33 | 47 | 79-1163QAA1C | 48 |
| 18,000 | 240 | 39 | 47 | 79-1164QAA1C | 48 |
| 18,000 | 240 | 39 | 52 | 79-1165QAA1C | 52 |
| 24,000 | 240 | 49 | 59 | 79-1166QAA1C | 55 |
| 30,000 | 240 | 62 | 71 | 79-1167QAA1C | 65 |

Single phase standard. Consult Sales Dept. for optional 3 phase.

* Consult Sales Dept. for other choices.

Standard design consists of three individual single phase heaters, which can be wired delta in the field to achieve a three phase balanced operating system. Individual elements are field replaceable.

# OVER-THE-SIDE HEATERS (OTS) *TUBULAR*

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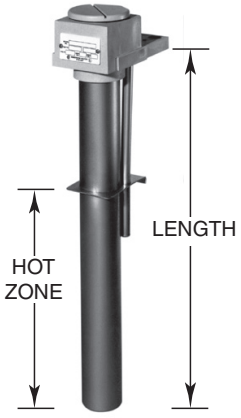
## SINGLE TUBE METAL OVER - THE - SIDE IMMERSION HEATERS




35 watts/square inch nominal

240 volts standard as listed - other voltages available.

Single phase standard. Consult Sales Dept. for optional 3 phase.

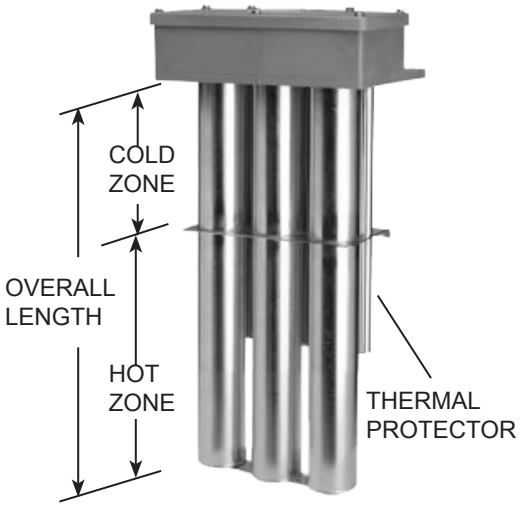
Standard 3' flexible PVC liquid-tight conduit.

For plating tanks, rinse tanks and other aqueous solutions. Check Chemical Resistance Chart or with chemical supplier for proper material selection.

### FEATURES:

- Heavy duty, long lasting construction.
- PI thermal protection standard
- U.L. listed except plain steel, all CSA certified.
- Grounded for safety.
- Vapor tight polypropylene terminal enclosure.

## TRIPLE TUBE METAL OVER - THE - SIDE IMMERSION HEATERS




35 watts/square inch nominal

240 volts standard as listed - other voltages available.

Standard units consist of a single head with 3' flexible PVC liquid tight conduit.

Single phase standard. Consult Sales Dept. for optional 3 phase.

| WATTS | VOLTS[1] | HOT ZONE inches | LENGTH[1] inches | 316 STAINLESS STEEL[2] | SHIP WT. lbs. |
|---|---|---|---|---|---|
| 1,000 | 240 | 6 | 11 | 79-1168SAA1 | 7 |
| 2,000 | 240 | 10 | 17 | 79-1169SAA1 | 10 |
| 3,000 | 240 | 16 | 23 | 79-1170SAA1 | 11 |
| 4,000 | 240 | 20 | 29 | 79-1171SAA1 | 13 |
| 5,000 | 240 | 25 | 35 | 79-1172SAA1 | 15 |
| 6,000 | 240 | 30 | 40 | 79-1173SAA1 | 17 |
| 8,000 | 240 | 37 | 47 | 79-1174SAA1 | 23 |
| 9,000 | 240 | 44 | 54 | 79-1175SAA1 | 24 |
| 10,000 | 240 | 49 | 59 | 79-1176SAA1 | 25 |
| 12,000 | 240 | 58 | 68 | 79-1177SAA1 | 28 |

| WATTS | VOLTS[1] | HOT ZONE inches | LENGTH[1] inches | 316 STAINLESS STEEL[2] | SHIP WT. lbs. |
|---|---|---|---|---|---|
| 3,000 | 240 | 6 | 11 | 79-1178SAA1 | 21 |
| 6,000 | 240 | 10 | 17 | 79-1179SAA1 | 30 |
| 9,000 | 240 | 16 | 23 | 79-1180SAA1 | 33 |
| 12,000 | 240 | 20 | 29 | 79-1181SAA1 | 39 |
| 15,000 | 240 | 25 | 35 | 79-1182SAA1 | 45 |
| 18,000 | 240 | 30 | 40 | 79-1183SAA1 | 51 |
| 24,000 | 240 | 37 | 47 | 79-1184SAA1 | 63 |
| 27,000 | 240 | 44 | 54 | 79-1185SAA1 | 69 |
| 30,000 | 240 | 49 | 59 | 79-1186SAA1 | 75 |
| 36,000 | 240 | 58 | 68 | 79-1187SAA1 | 84 |

[1] Consult Sales Dept. for other choices.

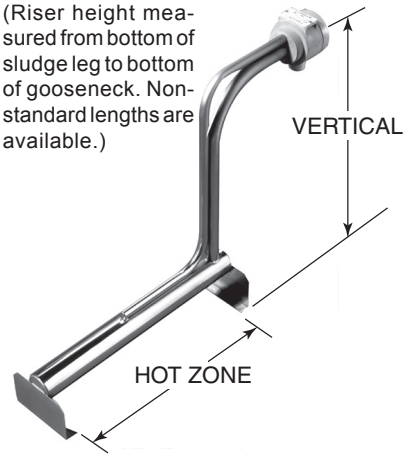
[2] For 304SS heater, change **S** to **F** in Price Code Number.
For titanium heater, change **S** to **T** in Price Code Number.
For plain steel, change **S** to **P** in Price Code Number.

# OVER-THE-SIDE HEATERS (OTS) *TUBULAR*

2900 MacArthur Blvd. Northbrook, IL. USA 60062 **www.serfilco.com** (800) 323 - 5431

## SINGLE TUBE METAL L-SHAPED IMMERSION HEATERS

(Riser height measured from bottom of sludge leg to bottom of gooseneck. Non-standard lengths are available.)




For plating tanks, rinse tanks and other non-sludging aqueous solutions. Check Chemical Resistance Chart or with chemical supplier for proper material selection.

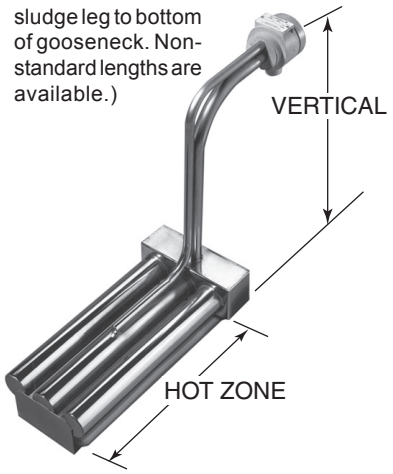
**FEATURES:**

- Bottom mount design for even heating and varying solution levels.
- Standard 2" sludge legs (longer available).
- Heavy duty, long lasting construction.
- PLI thermal protection standard
- U.L. listed except plain steel, all CSA certified.
- Grounded for safety.
- Vapor- tight polypropylene terminal enclosure.
- Standard 3' flexible PVC liquid-tight conduit.
- Optional Teflon flexible riser or straight vertical configuration available.(Consult Sales Dept).

35 watts/square inch nominal
240 volts standard as listed - other voltages available.
Single phase standard. Consult Sales Dept. for optional three phase.

## TRIPLE TUBE METAL L-SHAPED IMMERSION HEATERS

(Riser height measured from bottom of sludge leg to bottom of gooseneck. Non-standard lengths are available.)




35 watts/square inch nominal
240 volts standard as listed - other voltages available.
Three phase standard. Consult Sales Dept. for optional single phase.

| WATTS | VOLTS[2] | HORIZ.[2] inches | VERT.[2] inches | 316 STAINLESS STEEL[1] | SHIP WT. lbs. |
|---|---|---|---|---|---|
| 1,000 | 240 | 13 | 15 | 79-1208SAA1 | 10 |
| 2,000 | 240 | 17 | 19 | 79-1209SAA1 | 11 |
| 3,000 | 240 | 22 | 25 | 79-1210SAA1 | 12 |
| 4,000 | 240 | 26 | 25 | 79-1211SAA1 | 13 |
| 5,000 | 240 | 31 | 37 | 79-1212SAA1 | 14 |
| 6,000 | 240 | 36 | 50 | 79-1213SAA1 | 15 |
| 8,000 | 240 | 44 | 50 | 79-1214SAA1 | 18 |
| 9,000 | 240 | 50 | 50 | 79-1215SAA1 | 20 |
| 10,000 | 240 | 55 | 50 | 79-1216SAA1 | 22 |
| 12,000 | 240 | 64 | 50 | 79-1217SAA1 | 25 |

| WATTS | VOLTS[2] | HORIZ.2 inches | VERT.2 inches | 316 STAINLESS STEEL1 | SHIP WT. lbs. |
|---|---|---|---|---|---|
| 3,000 | 240 | 13 | 15 | 79-1218SAA3 | 30 |
| 6,000 | 240 | 17 | 37 | 79-1219SAA3 | 33 |
| 9,000 | 240 | 22 | 37 | 79-1220SAA3 | 36 |
| 12,000 | 240 | 26 | 37 | 79-1221SAA3 | 39 |
| 15,000 | 240 | 31 | 37 | 79-1222SAA3 | 42 |
| 18,000 | 240 | 36 | 50 | 79-1223SAA3 | 45 |
| 24,000 | 240 | 44 | 50 | 79-1224SAA3 | 54 |
| 27,000 | 240 | 50 | 50 | 79-1225SAA3 | 60 |
| 30,000 | 240 | 55 | 50 | 79-1226SAA3 | 66 |
| 36,000 | 240 | 64 | 50 | 79-1227SAA3 | 75 |

[1] For 304SS heater, change **S** to **F** in Price Code Number.
For titanium heater, change **S** to **T** in Price Code Number.
For plain steel, change **S** to **P** in Price Code Number.

[2] Consult Sales Dept. for other choices.

**WARNING**

**ELECTRIC IMMERSION HEATERS WILL IGNITE MANY PLASTIC TANKS SUCH AS POLYPROPYLENE AND POLYETHYLENE AND SUBJECT PERSONNEL TO SHOCK HAZARD IF NOT PROPERLY INSTALLED AND MAINTAINED.**

**IGNITION SOURCE**

**SHOCK HAZARD**

2900 MacArthur Blvd. Northbrook, IL. USA 60062 **www.serfilco.com** (800) 323 - 5431

## DIGITAL COMBINATION CONTROLS WITH STEPDOWN TRANSFORMER

*Provides digital indication of setpoint and control point temperature.*

- SIngle setpoint
- 1 or 3 phase controls with 5 ft. FEP sleeved sensor.
- -58°F to 302°F temperature range. (-50° to 150°C).
- cULus listed.
- ±1°F accuracy.
- Optional 10 ft. sensor
- Large LED readout.

| ORDERING INFORMATION | | | | | |
|---|---|---|---|---|---|
| PRICE CODE NO. | MODEL NUMBER | VOLTS | MAX. AMPS | SHIP/ WT. lbs/(Kg.) | OPTIONS* |
| 79-1660 A<br>79-1660 B | DLC 302<br>DLC 304 | 240<br>480 | 30 | 16<br>(7.5) | Add -**LT** to Price Code Number and Model Number for "less transformer". |
| 79-1661 A<br>79-1661 B | DLC 502<br>DLC 504 | 240<br>480 | 50 | 17<br>(8) | Transformer must be used at 480 volts. |
| 79-1662 A<br>79-1662 B | DLC 752<br>DLC 754 | 240<br>480 | 75 | 23<br>(10.5) | PII or PIII resettable systems (Consult Sales Dept.) |
| 79-1663 A<br>79-1663 B | DLC 902<br>DLC 904 | 240<br>480 | 90 | 25<br>(11.5) | *Consult Sales Dept. for other choices |
| 79-1664 A<br>79-1664 B | DLC 1202<br>DLC 1204 | 240<br>480 | 120 | 27<br>(12.5) | |
| 79-1665 A<br>79-1665 B | DLC 1502<br>DLC 1504 | 240<br>480 | 150 | 33<br>(15) | |

## DIGITAL COMBINATION CONTROLS WITH STEPDOWN TRANSFORMER

*Provides digital indication of setpoints and control point temperatures.*

- Dual setpoints for heat / cool applications.
- 1 or 3 phase controls with 10 ft. FEP sleeved sensor.
- 0-500°F temperature range (Field selectable 0 - 260°C).
- cULus listed
- ±.25% accuracy (full span).
- Large LED readout.


| ORDERING INFORMATION | | | | | |
|---|---|---|---|---|---|
| PRICE CODE NO. | MODEL NUMBER | VOLTS | MAX. AMPS | SHIP/ WT. lbs/(Kg.) | OPTIONS* |
| 79-1670 A<br>79-1670 B | DQ 302<br>DQ 304 | 240<br>480 | 30 | 19<br>(8.5) | Add -**LT** to Price Code Number and Model Number for "less transformer". |
| 79-1671 A<br>79-1671 B | DQ 502<br>DQ 504 | 240<br>480 | 50 | 20<br>(9) | Transformer must be used at 480 volts. |
| 79-1672 A<br>79-1672 B | DQ 752<br>DQ 754 | 240<br>480 | 75 | 26<br>(12) | PII or PIII resettable systems (Consult Sales Dept.) |
| 79-1673 A<br>79-1673 B | DQ 902<br>DQ 904 | 240<br>480 | 90 | 28<br>(13) | *Consult Sales Dept. for other choices |
| 79-1674 A<br>79-1674 B | DQ 1202<br>DQ 1204 | 240<br>480 | 120 | 30<br>(13.5) | |
| 79-1675 A<br>79-1675 B | DQ 1502<br>DQ 1504 | 240<br>480 | 150 | 36<br>(16.5) | |

## NON-INDICATING COMBINATION CONTROLS WITH STEPDOWN TRANSFORMER

*For temperature control of heated aqueous solutions.*

- Single setpoint
- 30°F to 220°F temperature range.
- 1 or 3 phase controls with 5 ft. FEP sleeved sensor.
- cULus listed.
- ±5°F accuracy.


FEP is fluorinated ethylene propylene fluoro polymer.

| ORDERING INFORMATION | | | | | |
|---|---|---|---|---|---|
| PRICE CODE NO. | MODEL NUMBER | VOLTS | MAX. AMPS | SHIP/ WT. lbs/(Kg.) | OPTIONS* |
| 79-1534A<br>79-1534B | NR302<br>NR304 | 240<br>480 | 30 | 15<br>(7) | Add -LT to Price Code No. and Model No. for "less transformer". |
| 79-1535A<br>79-1535B | NR502<br>NR504 | 240<br>480 | 50 | 16<br>(7.5) | Transformer must be used at 480 volts. |
| 79-1536A<br>79-1536B | NR752<br>NR754 | 240<br>480 | 75 | 22<br>(10) | Add -H to Price Code No. and Model No. for high temp. model (150°F to 550°F) |
| 79-1537A<br>79-1537B | NR902<br>NR904 | 240<br>480 | 90 | 24<br>(11) | PII or PIII resettable systems (Consult Sales Dept.) |
| 79-1538A<br>79-1538B | NR1202<br>NR1204 | 240<br>480 | 120 | 26<br>(12) | *Consult Sales Dept. for other choices |
| 79-1539A<br>79-1539B | NR1502<br>NR1504 | 240<br>480 | 150 | 32<br>(14.5) | |

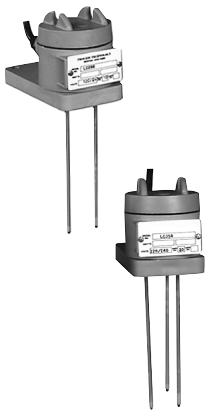
## LIQUID LEVEL SENSOR - SINGLE AND DUAL FUNCTION

*For fluid processing and leak detection*

SERIES LC2 Single function probe Designed to control power to immersion heater should process solution drop below upper probe.

SERIES LC3 Dual function probe Style same as above and also controls power to pump, solenoid valve or other equipment. 10 amp maximum.

- Prevents heater burn out from low liquid level.
- Designed for use in conductive solutions up to 70K OHMS resistance.
- PTFE covered stainless steel, titanium, Hastelloy® C or graphite probes available.



| ORDERING INFORMATION | | | | | |
|---|---|---|---|---|---|
| LC SERIES — 2 PROBES | | | LC SERIES — 3 PROBES | | |
| PRICE CODE NO. | MODEL NUMBER | PROBE LENGTH (FIELD TRIM) in. | PRICE CODE NO. | MODEL NUMBER | PROBE LENGTH (FIELD TRIM) in. |
| 79-1510_* | LC2( * )6 | 6 | 79-1517_* | LC3( * )6 | 6 |
| 79-1511_* | LC2( * )12 | 12 | 79-1518_* | LC3( * )12 | 12 |
| 79-1512_* | LC2( * )18 | 18 | 79-1519_* | LC3( * )18 | 18 |
| 79-1513_* | LC2( * )24 | 24 | 79-1520_* | LC3( * )24 | 24 |
| 79-1514_* | LC2( * )30 | 30 | 79-1521_* | LC3( * )30 | 30 |
| 79-1515_* | LC2( * )36 | 36 | 79-1522_* | LC3( * )36 | 36 |
| 79-1516_* | LC2( * )48 | 48 | 79-1523_* | LC3( * )48 | 48 |

* Designate material selection in Price Code Number and Model Number.
S = 316 Stainless steel T = Titanium
H = Hastelloy G = Graphite (Not field trimmable)

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# *TEFLON and METAL*

## QUICK ESTIMATION (BASED ON STEAM) HEAT-UP

***STEP 1*** Determine gallons in tank.
(U.S. Gal. = Tank Width ___" x Length ___" x Depth ___" ÷ 231.)
Enter this amount at (**A**) in Formula 1.

***STEP 2*** Subtract temperature of media to be heated from the temperature to which it must be heated.
(Δ Temperature = Desired Temp. ___°F - Initial Temp.___ °F)
Enter this amount at (**B**).

***STEP 3*** Locate your useable steam pressure in Steam Pressure Factor chart and find the factor number. Enter this at (C).

***STEP 4*** Multiply (A) times (B) times (C). Divide the product by 1000. This is the square foot area you require for a one hour heat-up. If more time is available, coil surface area may be reduced by dividing the square foot area by the heat-up time available, up to 4 hours maximum.

### *Formula 1*

(**A**) _____ x (**B**) _____ x (**C**) _____ ÷ 1,000 = FT²
(GALLONS) (Δ T) (STEAM FACT.)

## FORMULA FOR HOT WATER HEATING MEDIA

***STEP 1*** Determine gallons in tank. Enter at (A) in Formula 2.

***STEP 2*** Subtract temperature of media to be heated from the temperature to which it must be heated. Enter at (B).

***STEP 3*** Multiply (A) times (B) times 8.33. Enter answer at (C).

***STEP 4*** Subtract the required tank temperature from the temperature of your hot water supply. Enter this figure at (D).

***STEP 5*** Multiply (D) by 100 for all metals or 30 for Teflon and enter answer at (E).

***STEP 6*** Divide (C) by (E) to determine square feet of area required. If more time is available, coil surface area may be reduced by dividing the square foot area by the heat-up time available, up to 4 hours maximum.

### *Formula 2*

(**A**)_____ x (**B**)_____ x 8.33 = ——
(gallons) (ΔT)

_____ = (**C**) = FT² OF AREA
100 (all metals) (**E**) REQ'D FOR ONE HOUR HEAT-UP

or x (**D**)_____
30 (Teflon) (Temp. rise required)

### *STEAM PRESSURE FACTORS*

| **Steam Pressure Available PSI** | 5 | 10 | 15 | 20 | 25 | 50 |
|---|---|---|---|---|---|---|
| Steam Factor for Metal | .55 | .50 | .42 | .37 | .30 | .25 |
| Steam Factor for Teflon | 2.75 | 2.50 | 2.10 | 1.85 | 1.50 | __ |

*Consult Sales Dept. for pressures above 50 lb. for metal and 30 lb. for Teflon.*

## FORMULA FOR COOLING WITH ANY MEDIUM

This formula assumes that all electrical energy is dissipated in the tank as heat. In more efficient electrochemical conversions, the energy dissipated as heat may be less.

***STEP 1*** Determine watts by multiplying voltage times amperage delivered by the tank rectifier. Multiply this product times 3.412 to determine BTU's. Enter answer at (A) in Formula 3.

***STEP 2*** Subtract cooling liquid temperature from required tank temperature. Enter at (B). CAUTION: If this number is less than 15, consult Sales Dept. for assistance in determining proper coil size.

***STEP 3*** Multiply (B) times 100 for all metals or 30 for Teflon and enter answer at (C).

***STEP 4*** Divide (A) by (C) to determine square feet of surface area required.

### *Formula 3*

(**A**)_____
(volts x amps x 3.412)

_____ = (**A**)/(**C**) = FT.² OF SURFACE AREA REQUIRED
(**B**) _____ x **100** (all metals) or **30** (Teflon)
(Req'd. tank temp. minus cooling liquid temp.)

**For a more in-depth analysis of your specific heat requirements, provide the following information and we will gladly size your heat exchanger.**

Initial temperature_____

Desired temperature_____

Tank size: Length _____ Width _____ Height _____

Solution depth _____

Type of solution to be heated or cooled _____

Production load: Lbs./hr. _____ & load temp. _____

Agitation (type) _____

Rectifiers: Number _____ Voltage _____ Amp _____

Covered or uncovered tank _____

Insulated tank & tank material _____

Steam pressure at coil hook-up point _____

Cooling media _____ Inlet temp. _____ Flow rate _____

***Maximum flow rates, performance curves and pressure drops are determined at the factory for optimum design efficiency. Contact us for performance data.***

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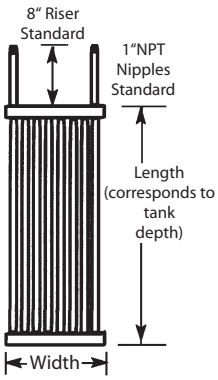
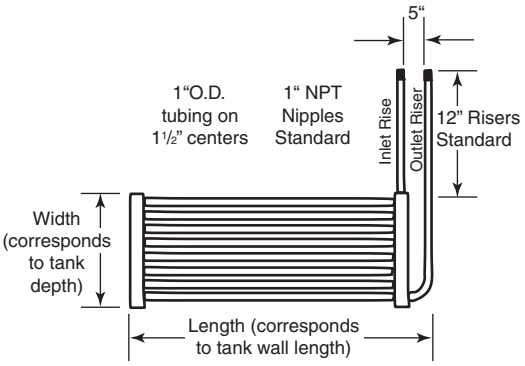
## GRID COILS

### VERTICAL GRID




### HORIZONTAL GRID

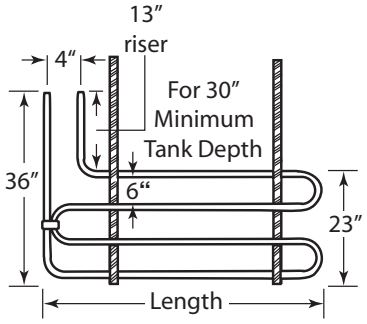



Where tank space is at a premium, the gridcoil is only 2" thick. The gridcoil permits full flow-through of solution for efficient heat transfer. Every square inch of surface is an active heat transfer area. Gridcoils can be banked or stacked for greater heat transfer.

Standard connections are 1" NPT nipples on 4" centers for serpentine and 5" centers for grids. 1" NPT nipples on variable centers for vertical models.

Gridcoils are offered in two styles - horizontal and vertical. However, the horizontal gridcoil is more commonly specified. Also, gridcoils can be operated in shallow solutions - as low as 12". The vertical style is ideal for deep, narrow tanks or wells.

## SERPENTINE COILS (4-pass)




| SURFACE AREA Sq. ft. | LENGTH in. | PRICE CODE NO. ** | |
|---|---|---|---|
| | | 316 SS | TITANIUM |
| 2.75 | 24 | 79-1432SA | 79-1432TA |
| 3.75 | 36 | 79-1432SB | 79-1432TB |
| 4.75 | 48 | 79-1432SC | 79-1432TC |
| 5.75 | 60 | 79-1432SD | 79-1432TD |
| 7.25 | 78 | 79-1432SE | 79-1432TE |
| 8.75 | 96 | 79-1432SF | 79-1432TF |

Serpentine coils offer lower cost per heating surface area. The design allows them to be installed in tanks with limited space.

## GRIDCOIL SPECIFICATIONS

| SURFACE AREA Sq. ft. | COIL DIMENSIONS (inches) | | NUMBER OF TUBES | PRICE CODE NUMBER [1,2,3] 316 SS |
|---|---|---|---|---|
| | WIDTH | LENGTH | | |
| 5.6 | 12-1/2 | 30 | 8 | 79-1442SB |
| 6.7 | 12-1/2 | 36 | 8 | 79-1442SC |
| 6.8 | 18-1/2 | 24 | 12 | 79-1443SA |
| 8.4 | 18-1/2 | 30 | 12 | 79-1443SB |
| 8.8 | 12-1/2 | 48 | 8 | 79-1442SD |
| 9.4 | 24-1/2 | 24 | 16 | 79-1444SA |
| 10.0 | 18-1/2 | 36 | 12 | 79-1443SC |
| 11.5 | 24-1/2 | 30 | 16 | 79-1444SB |
| 13.2 | 18-1/2 | 48 | 12 | 79-1443SD |
| 13.6 | 24-1/2 | 36 | 16 | 79-1444SC |
| 13.7 | 12-1/2 | 72 | 8 | 79-1442SF |
| 13.7 | 36-1/2 | 24 | 24 | 79-1446SA |
| 15.1 | 12-1/2 | 84 | 8 | 79-1442SG |
| 15.8 | 42-1/2 | 24 | 28 | 79-1447SA |
| 16.3 | 18-1/2 | 60 | 12 | 79-1443SE |
| 16.8 | 36-1/2 | 30 | 24 | 79-1446SB |
| 17.2 | 12-1/2 | 96 | 8 | 79-1442SH |
| 17.8 | 24-1/2 | 48 | 16 | 79-1444SD |
| 19.2 | 12-1/2 | 108 | 8 | 79-1442SJ |
| 19.5 | 18-1/2 | 72 | 12 | 79-1443SF |
| 19.5 | 42-1/2 | 30 | 28 | 79-1447SB |
| 20.0 | 36-1/2 | 36 | 24 | 79-1446SC |
| 22.0 | 24-1/2 | 60 | 16 | 79-1444SE |
| 22.6 | 18-1/2 | 84 | 12 | 79-1443SG |
| 23.2 | 42-1/2 | 36 | 28 | 79-1447SC |
| 23.4 | 12-1/2 | 132 | 8 | 79-1442SL |
| 25.7 | 18-1/2 | 96 | 12 | 79-1443SH |
| 26.1 | 24-1/2 | 72 | 16 | 79-1444SF |
| 26.3 | 36-1/2 | 48 | 24 | 79-1446SD |
| 28.9 | 18-1/2 | 108 | 12 | 79-1443SJ |
| 30.3 | 24-1/2 | 84 | 16 | 79-1444SG |
| 30.6 | 42-1/2 | 48 | 28 | 79-1447SD |

| SURFACE AREA Sq. ft. | COIL DIMENSIONS (inches) | | NUMBER OF TUBES | PRICE CODE NUMBER [1,2,3] 316 SS |
|---|---|---|---|---|
| | WIDTH | LENGTH | | |
| 32.0 | 18-1/2 | 120 | 12 | 79-1443SK |
| 32.5 | 36-1/2 | 60 | 24 | 79-1446SE |
| 34.5 | 24-1/2 | 96 | 16 | 79-1444SH |
| 35.2 | 18-1/2 | 132 | 12 | 79-1443SL |
| 38.0 | 42-1/2 | 60 | 28 | 79-1447SE |
| 38.3 | 18-1/2 | 144 | 12 | 79-1443SM |
| 38.7 | 24-1/2 | 108 | 16 | 79-1444SJ |
| 38.8 | 36-1/2 | 72 | 24 | 79-1446SF |
| 42.9 | 24-1/2 | 120 | 16 | 79-1444SK |
| 45.1 | 36-1/2 | 84 | 24 | 79-1446SG |
| 45.4 | 42-1/2 | 72 | 28 | 79-1447SF |
| 47.1 | 24-1/2 | 132 | 16 | 79-1444SL |
| 51.3 | 24-1/2 | 144 | 16 | 79-1444SM |
| 51.4 | 36-1/2 | 96 | 24 | 79-1446SH |
| 52.8 | 42-1/2 | 84 | 28 | 79-1447SG |
| 57.7 | 36-1/2 | 108 | 24 | 79-1446SJ |
| 60.2 | 42-1/2 | 96 | 28 | 79-1447SH |
| 64.0 | 36-1/2 | 20 | 24 | 79-1446SK |
| 67.6 | 42-1/2 | 108 | 28 | 79-1447SJ |
| 70.3 | 36-1/2 | 132 | 24 | 79-1446SL |
| 75.0 | 42-1/2 | 120 | 28 | 79-1447SK |
| 76.6 | 36-1/2 | 144 | 24 | 79-1446SM |
| 82.4 | 42-1/2 | 132 | 28 | 79-1447SL |
| 89.8 | 42-1/2 | 144 | 28 | 79-1447SM |

[1] For titanium grid coil change 'S' to 'T' in price code no.

[2] Add 'V' to end of price code no. for vertical style.
Add 'H' to end of price code for horizontal style.

[3] Add 'S' to end of price code number for steam.
Add 'W' to end of price code number for water

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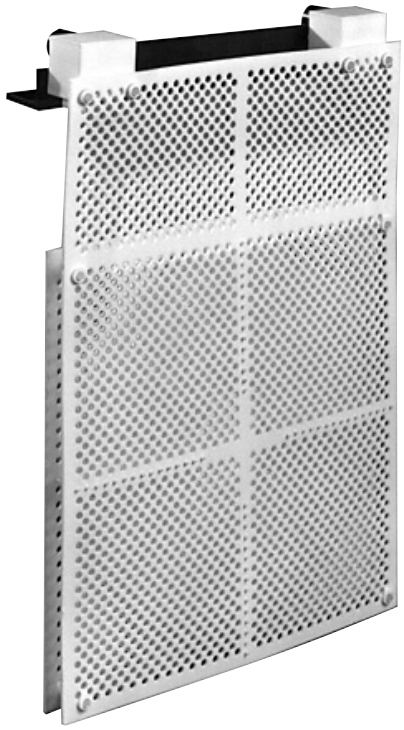
## HEAT EXCHANGERS



**TO ORDER - Select Price Code Number**

| 1/4 TUBE COIL - Rectangular | | | |
|---|---|---|---|
| SURFACE AREA sq. ft. | CONNECTIONS in. | SIZE in | PRICE CODE NUMBER |
| 2.25 | ½" FNPT | 11½ x 11½ x 1½ | 79-1478X |
| 4.5 | ½" FNPT | 11½ x 11½ x 2 | 79-1479X |
| 4.5 | ½" FNPT | 15½ x 15½ x 1½ | 79-1480X |
| 9.25 | ½" FNPT | 15½ x 15½ x 2 | 79-1481X |

| 1/2 TUBE COIL - Round | | | |
|---|---|---|---|
| SURFACE AREA sq. ft. | CONNECTIONS in. | PRICE CODE SIZE in. | PRICE CODE NUMBER |
| 6 | 1" FNPT | 17½ x 17½ x 2 | 79-1482X |
| 12 | 1" FNPT | 17½ x 17½ x 3¼ | 79-1483X |
| 18 | 1½" FNPT | 17½ x 17½ x 4½ | 79-1484X |
| 24 | 1½" FNPT | 17½ x 17½ x 5¾ | 79-1485X |
| 11.5 | 1" FNPT | 23½ x 23½ x2 | 79-1486X |
| 23 | 1" FNPT | 23½ x 23½ x 3¼ | 79-1487X |
| 34.5 | 1½" FNPT | 23½ x 23½ x 4½ | 79-1488X |
| 46.5 | 1½" FNPT | 23½ x 23½ x 5¾ | 79-1489X |

## FLUOROPOLYMER TUBE COILS

### *STATE-OF-THE-ART IN HEAT*

Unmatched for operating performance, installation ease and quality construction, tube coils are produced from high grade FEP with PTFE guard construction.

Compact tube coil exchangers maximize heating/cooling efficiency through a design that not only creates extremely high surface area, but also ensures outstanding flow-through circulation of the process bath by creating uniform spacing between the tubing. No other heat exchanger is faster or cheaper to install/service thanks to a unique design that incorporates a manifold into the heat exchanger package.

Only the highest quality components and craftsmanship go into the manufacture of these tube coils . . . so that you can expect outstanding performance and dependability over a long service life.

- **CONSTRUCTION FROM HIGH GRADE MATERIALS**
  **Frame -** high strength mechanical grade Teflon
  **Guard and fittings -** mechanical grade Teflon
  **Coil -** FEP ( virgin fluorinated ethylene propylene) to 30 PSI steam or water *(For up to 60 PSI steam or water, consult Sales Dept.)*
- **NON-CONTAMINATING**
- **OUTSTANDING RESISTANCE TO VIRTUALLY ALL ACIDS AND ALKALIES**
- **SIZES FROM 2.25 FT.$^2$ OF EXCHANGE AREA TO 46.5 FT.$^2$**
- **OTHER SIZES AVAILABLE**

### CUSTOM COIL CAPABILITIES

We offer many standard model heat exchangers in a wide range of materials such as stainless steel, titanium and FEP. Custom configurations, high density exchange areas, special fittings on connections, and consideration for heating and/or cooling media (as in using a coil for an evaporator for a refrigeration system) are just a few. Consult Sales Dept.

### MAINTENANCE

Due to the well known anti-stick properties of FEP, very little maintenance is required. However, when excessive build-up does occur, either chemically clean or pressure spray to clean.

DO NOT ATTEMPT TO CLEAN BY SCRAPING.

Manifold fittings may require slight re-tightening after the first 24 hours of use due to the cold flow properties of FEP. However, once re-tightened, no further tightening should be required.