Immersion Coils

**TITAN** supplies Titanium Immersion Coils in many different configurations to meet the specific needs of the industry. Grid coils are used to achieve the maximum heat transfer area in the least amount of dimensional space, while Serpentine and “U” coils are used in situations where smaller heat transfer requirements are needed.

### Sizing Heating Coils

Calculate the BTUs required to heat up a plating tank. Once the BTUs are established, calculate the amount of square footage of coil to put into the tank.

**Required Input:**
- Tank size
- Operating temperature
- Ambient temperature
- Solution density (1 gallon of water = 8.33 lbs)
- Total gallons (length in feet × width in feet × depth in feet × 7.5)
- Heat-up time (hours)
- Heating source (steam pressure or hot water temperature)

**STEP 1:** \( \text{ABTUs/Hr:} \)

\[
\frac{\text{gallons} \times \text{solution density} \times \Delta T \ (\text{Oper. temp} - \text{Amb. temp})}{\text{Heat-up time}}
\]

**STEP 2:** \( \text{AMTD (average mean temperature difference) for Steam:} \)

\[
\frac{(\text{Steam temp} - \text{Amb. temp}) + (\text{Steam temp} - \text{Oper. temp})}{2}
\]

or \( \text{AMTD for Hot Water:} \)

\[
\frac{(\text{Hot Water temp} - \text{Amb. temp}) + ((\text{Hot Water temp} - 10^\circ F) - \text{Oper. temp})}{2}
\]

**STEP 3:** \( \text{Total Square Footage Required:} \)

\[
\frac{\text{ABTUs/Hr}}{150 \text{ U-factor for hot water (or 200 U-factor for steam)} \times \text{AMTD}}
\]

**STEP 4:** \( \text{Square Footage per Coil:} \)

\[
\frac{\text{Total square footage required}}{\text{Number of coils per tank}}
\]

### Sizing Cooling Coils

Calculate the BTUs required to be removed from the plating tank. Then calculate the amount of square footage of coil to put into the tank.

**Required Input:**
- Tank size
- Total AMPs
- Operating temperature
- Total Volts
- Temperature of Cooling Source (1 gallon of water = 8.33 lbs)

**BTUs/Hr:** \( \text{AMPs} \times \text{Volts} \times 3.412 \)

**Square Footage Required:** \( \frac{150 \times \text{U-factor} \times (\text{Oper. temp} - \text{temp of Cooling Source})^*}{\text{BTUs/Hr}} \)

*Must have at least 15° ΔT between Oper. temp and Cooling Source

**BTUs/Hr Without AMPs & Volts Input:**

**STEP 1:** \( \text{Gallons} \times \text{solution density} \)

\[
\text{Time it takes to build to maximum temperature}
\]

**STEP 2:** \( \text{Max. temp} - \text{Oper. temp} = \text{Temperature Difference} \)

**STEP 3:** \( (\text{Step 1}) \times (\text{Step 2}) = \text{BTU/Hr to be removed} \)

**STEP 4:** Complete above formula to obtain square footage needed for cooling

**EXAMPLE:** Input = 2000 gallons, 8.33 lbs/gal  Oper. Temp = 170°F  Max. Temp = 200°F 4 hours to reach Max. Temp.  Cooling Water Temp = 60°F

**FORMULA:** 2000 × 8.33 = 16,600 / 4 hours = 4165; 4165 × 30°F (Temp. Difference) = 124,950 BTUs/Hr / 124,950 BTU = 7.6 sq. ft.
Determining Your **TITAN** Coil Model Number

1. Match the square footage calculated from the formulas in this Reference Guide to the coils shown in the following charts.
2. Select the coil with the height and length to fit in your tank.
3. Add customer supplied information (*) for columns A, C and D.

**TITAN** Coil Model Numbers contain eight fields of information:
- **A**. Material Type: Ti, Zr, Nb, Ta or SS
- **B**. Coil Style: G = Grid; S = Serpentine; H = Helical; U = “U”
- **C**. Orientation: H = Horizontal; V = Vertical; B = Bottom Mount
- **D**. Heat/Cool Source: S = Steam; W = Water; F = Freon
- **E**. Number of Passes (as below)
- **F**. Length of Coil (as required)
- **G**. Riser Length (as below) can be special ordered
- **H**. Square Footage Per Coil (as below)

**EXAMPLE:**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ti G H S</td>
<td>22 36</td>
<td>5.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Model #TIGHS-22-36-5.5

Larger and custom coils available upon request.

**TITAN** Serpentine Coil Model Numbers

- **4 Pass** (Body Height = 19”)
  - Customer supplied information (*) for columns A, C and D.
  - Material Type: Ti, Zr, Nb, Ta or SS
  - Heat/Cool Source: S = Steam; W = Water; F = Freon
  - Number of Passes: 4
  - Length of Coil: 12 Pass
  - Wall mounting (bottom mounts available)

- **6 Pass** (Body Height = 21”)
  - Customer supplied information (*) for columns A, C and D.
  - Material Type: Ti, Zr, Nb, Ta or SS
  - Heat/Cool Source: S = Steam; W = Water; F = Freon
  - Number of Passes: 6
  - Length of Coil: 12 Pass
  - Wall mounting (bottom mounts available)

- **8 Pass** (Body Height = 23”)
  - Customer supplied information (*) for columns A, C and D.
  - Material Type: Ti, Zr, Nb, Ta or SS
  - Heat/Cool Source: S = Steam; W = Water; F = Freon
  - Number of Passes: 8
  - Length of Coil: 12 Pass
  - Wall mounting (bottom mounts available)

**TITAN** Grid Coil Model Numbers

- **8 Pass** (Body Height = 12”)
  - Customer supplied information (*) for columns A, C and D.
  - Material Type: Ti, Zr, Nb, Ta or SS
  - Heat/Cool Source: S = Steam; W = Water; F = Freon
  - Number of Passes: 8
  - Length of Coil: 12 Pass
  - Wall mounting (bottom mounts available)

- **12 Pass** (Body Height = 18”)
  - Customer supplied information (*) for columns A, C and D.
  - Material Type: Ti, Zr, Nb, Ta or SS
  - Heat/Cool Source: S = Steam; W = Water; F = Freon
  - Number of Passes: 12
  - Length of Coil: 12 Pass
  - Wall mounting (bottom mounts available)

- **14 Pass** (Body Height = 21”)
  - Customer supplied information (*) for columns A, C and D.
  - Material Type: Ti, Zr, Nb, Ta or SS
  - Heat/Cool Source: S = Steam; W = Water; F = Freon
  - Number of Passes: 14
  - Length of Coil: 12 Pass
  - Wall mounting (bottom mounts available)

- **16 Pass** (Body Height = 24”)
  - Customer supplied information (*) for columns A, C and D.
  - Material Type: Ti, Zr, Nb, Ta or SS
  - Heat/Cool Source: S = Steam; W = Water; F = Freon
  - Number of Passes: 16
  - Length of Coil: 12 Pass
  - Wall mounting (bottom mounts available)

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**Standard Coil Features**
- 1” O.D. titanium tubing
- 3/8” to 2” NPT Nipples
- Horizontal or Vertical orientation for side wall mounting (bottom mounts available)
- Support braces between riser tubes for coil strength
- All styles equipped for water or steam
- Grid coils incorporate D-shaped tube vertical manifold design
- Pressure tested at 150 psi
- 100% inert gas purged welds
- 5-year warranty on workmanship

**Coil Options:**
- Hanger straps
- Anti-flotation Arms
- Solution Level Jackets
- Material: Titanium, Stainless Steel, Zirconium, Tantalum, Niobium

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*Please supply the following information upon submitting an inquiry to TITAN via phone, fax or e-mail:*

1. **Quantity**
2. **Material Type**
3. **Style**
4. **Accessories Required**
5. **Model Number**
6. **For Heating or Cooling**
7. **Heating/Cooling Source**
8. **Heating/Cooling Source Temperature**
9. **Tank Size & Solution Level**
10. **Operating Temperature**
11. **Ambient Temperature**
12. **Weight of Solution (if not water)**
13. **Desired Heat-up Time**
14. **Amps & Volts**
15. **Contact & Phone**

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