COPPER & STEEL CONSTRUCTION

Performance Notes

- Super high flow
- Largest flow rates & heat transfer available
- Rugged steel construction
- Custom designs available
- Competitively priced
- 3/8” and 5/8” tubes available
- Maximum 10” diameter, 12’ long
- 150# ANSI/ASME flanged shell connections (metric available)
- End bonnets removable for servicing
- Saddle brackets for incremental mounting
- Special ASME/TEMA C/CRN ratings available

Materials

- Tubes Copper
- Headers Steel
- Shell Connections Steel
- Baffles Brass
- End Bonnets Cast Iron
- Mounting Brackets Steel/cast iron
- Gaskets Nitrile rubber/cellulose fiber
- Nameplate Aluminum foil

Maximum Flow Rates

<table>
<thead>
<tr>
<th></th>
<th>Shell Side (GPM)</th>
<th>Tube Side (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6” Baffle</td>
<td>9” Baffle</td>
</tr>
<tr>
<td>6” Baffle</td>
<td>210</td>
<td>320</td>
</tr>
<tr>
<td>9” Baffle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How to Order

- Model Series
- Model Size Selected
- Baffle Spacing
- Tube Diameter Code
  - 6 - 3/8”
  - 10 - 5/8”
- Tubeside Passes
  - Blank - Copper
  - CN - CuNi
  - SS - Stainless Steel
  - AD - Admiralty Brass
- Cooling Tube Material
- Blank - Cast Iron
- Blank - Electroless Nickel Plate
- End Bonnet Material
- Blank - Cast Iron
- Blank - CuNi
- Blank - Stainless Steel
- Zinc Anodes
- Blank - None
- Blank - Z - Zinc

CA = ANSI/ASME shell side flanges; NPT tubeside bottom connections (two & four pass); ANSI/ASME flanges on tube side (one pass).
CAM = ANSI/ASME shell side metric flanges; BSPP tubeside connections (two & four pass); ANSI/ASME metric flanges on tube side (one pass).
**Dimensions**

### One Pass

**Model:** CA-2036 49.64 11.82 15.92
CA-2048 61.64 11.82 15.92
CA-2060 73.64 11.82 15.92
CA-2072 85.64 11.82 15.92
CA-2084 97.64 11.82 15.92
CA-2096 109.64 11.82 15.92
CA-20108 121.64 11.82 15.92
CA-20120 133.64 11.82 15.92
CA-20132 145.64 11.82 15.92
CA-20144 157.64 11.82 15.92

### Two Pass

**Model:** CA-2036 45.55 9.90 14.38
CA-2048 57.55 9.90 14.38
CA-2060 69.55 9.90 14.38
CA-2072 81.55 9.90 14.38
CA-2084 93.55 9.90 14.38
CA-2096 105.55 9.90 14.38
CA-20108 117.55 9.90 14.38
CA-20120 129.55 9.90 14.38
CA-20132 141.55 9.90 14.38
CA-20144 153.55 9.90 14.38

### Four Pass

**Model:** CA-2036 45.34 9.78 13.78
CA-2048 57.34 9.78 13.78
CA-2060 69.34 9.78 13.78
CA-2072 81.34 9.78 13.78
CA-2084 93.34 9.78 13.78
CA-2096 105.34 9.78 13.78
CA-20108 117.34 9.78 13.78
CA-20120 129.34 9.78 13.78
CA-20132 141.34 9.78 13.78
CA-20144 153.34 9.78 13.78

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**NOTE:** We reserve the right to make reasonable design changes without notice. Dimensions are in inches.

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Performance Curves

3/8" Tubes

![Graph showing Performance Curves for 3/8" Tubes]

<table>
<thead>
<tr>
<th>Curve Number</th>
<th>Model</th>
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<tbody>
<tr>
<td>1</td>
<td>CA-2036-6-6-F</td>
</tr>
<tr>
<td>2</td>
<td>CA-2036-9-6-F</td>
</tr>
<tr>
<td>3</td>
<td>CA-2048-6-6-F</td>
</tr>
<tr>
<td>4</td>
<td>CA-2048-9-6-F</td>
</tr>
<tr>
<td>5</td>
<td>CA-2072-9-6-F</td>
</tr>
<tr>
<td>6</td>
<td>CA-2084-9-6-F</td>
</tr>
<tr>
<td>7</td>
<td>CA-20108-9-6-F</td>
</tr>
<tr>
<td>8</td>
<td>CA-20132-9-6-F</td>
</tr>
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<table>
<thead>
<tr>
<th>Oil Flow (GPM @ 2:1 O/W Ratio)</th>
<th>Pressure Drop</th>
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<tbody>
<tr>
<td>40</td>
<td>5 PSI</td>
</tr>
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</tr>
<tr>
<td>60</td>
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<tr>
<td>70</td>
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5/8" Tubes

![Graph showing Performance Curves for 5/8" Tubes]

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<tbody>
<tr>
<td>1</td>
<td>CA-2036-6-10-F</td>
</tr>
<tr>
<td>2</td>
<td>CA-2036-9-10-F</td>
</tr>
<tr>
<td>3</td>
<td>CA-2048-6-10-F</td>
</tr>
<tr>
<td>4</td>
<td>CA-2048-9-10-F</td>
</tr>
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<td>5</td>
<td>CA-2060-6-10-F</td>
</tr>
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<td>CA-2084-6-10-F</td>
</tr>
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<td>CA-2084-9-10-F</td>
</tr>
<tr>
<td>8</td>
<td>CA-2096-6-10-F</td>
</tr>
<tr>
<td>9</td>
<td>CA-20120-6-10-F</td>
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Selection Procedure

Performance Curves are based on 100SSU oil leaving the cooler 40°F higher than the incoming water temperature (40°F approach temperature). Curves are based on a 2:1 oil to water ratio.

**STEP 1** Determine the Heat Load. This will vary with different systems, but typically coolers are sized to remove 25 to 50% of the input nameplate horsepower. (Example: 100 HP Power Unit x .33 = 33 HP Heat load.)

If BTU/HR is known: \( HP = \frac{BTU/HR}{2545} \)

**STEP 2** Determine Approach Temperature.
Desired oil leaving cooler °F – Water Inlet temp. °F = Actual Approach

**STEP 3** Determine Curve Horsepower Heat Load. Enter the information from above:

\( \text{HP heat load} \times \frac{40}{\text{Actual Approach}} \times \text{Viscosity} \) = Curve Horsepower

**STEP 4** Enter curves at oil flow through cooler and curve horsepower. Any curve above the intersecting point will work.

**STEP 5** Determine Oil Pressure Drop from Curves. Multiply pressure drop from curve by correction factor B found on oil viscosity correction curve.

- ● = 5 PSI
- ■ = 10 PSI
- ▲ = 20 PSI
- ● = 40 PSI

**Oil Temperature**

Oil coolers can be selected by using entering or leaving oil temperatures.

Typical operating temperature ranges are:
- Hydraulic Motor Oil 110°F - 130°F
- Hydrostatic Drive Oil 130°F - 180°F
- Lube Oil Circuits 110°F - 130°F
- Automatic Transmission Fluid 200°F - 300°F

**Desired Reservoir Temperature**

**Return Line Cooling:** Desired temperature is the oil temperature leaving the cooler. This will be the same temperature that will be found in the reservoir.

**Off-Line Recirculation Cooling Loop:** Desired temperature is the temperature entering the cooler. In this case, the oil temperature change must be determined so that the actual oil leaving temperature can be found. Calculate the oil temperature change (Oil \( \Delta T \)) with this formula:

\( \text{Oil} \ \Delta T = \frac{\text{BTUs/HR}}{\text{GPM Oil Flow}} \times 210 \).

To calculate the oil leaving temperature from the cooler, use this formula:

\( \text{Oil Leaving Temperature} = \text{Oil Entering Temperature} - \text{Oil} \ \Delta T \).

This formula may also be used in any application where the only temperature available is the entering oil temperature.

**Oil Pressure Drop:** Most systems can tolerate a pressure drop through the heat exchanger of 20 to 30 PSI. Excessive pressure drop should be avoided. Care should be taken to limit pressure drop to 5 PSI or less for case drain applications where high back pressure may damage the pump shaft seals.