Condenser Tube Plugging with High Confidence (Patented Technology)

Presented by: Conco Services Corp.
The Significance of Condenser Tube Plugging

- Condenser reliability and availability
- The real cost of condenser tube failure
  - Damage to major plant components
  - Contamination of high purity steam
  - Loss of MW production and revenue
A Plug for Every Tube

When you need to seal off a leaking or damaged tube Conco is your one-stop source

- Multiple designs
- Variety of materials
- Configuration for any condenser specification
Determining the Correct Plug

From the condenser manufacturer’s data sheet determine the correct plug

• Tube size and tube/tubesheet materials
• Maximum operating pressure and temperature
• Purpose and location of plug
**Plug Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sized to specific Tube O.D., I.D. and BWG</td>
</tr>
<tr>
<td>Materials must not have galvanic reaction with Tube wall or Tubesheet</td>
</tr>
<tr>
<td>Certified to withstand maximum operating pressure and temperature</td>
</tr>
<tr>
<td>Designed to match application</td>
</tr>
<tr>
<td>• Tube and/or tubesheet plugging</td>
</tr>
<tr>
<td>• Temporary or permanent plugging</td>
</tr>
<tr>
<td>• Plugging coated tubes/tubesheets</td>
</tr>
<tr>
<td>• Placed flush with or recessed past tubesheet</td>
</tr>
<tr>
<td>• Placed deep inside tube</td>
</tr>
</tbody>
</table>
• High Confidence

• Expanding

• Fiber

• Pin and Pin and Collar
Common Characteristics

• Temporary or permanent plugging
• Compatible with coated tubes and tubesheets (except Fiber, Pin and Pin and Collar)
• Tested under pressure, temperature and vibration conditions common in the steam surface condenser
• Metal components available in titanium, 304 and 316 stainless steel, brass and bronze
High Confidence Tube Plugs

- For \(\frac{3}{4}\)” (19 mm) through 1\(\frac{1}{4}\)” (32 mm) O.D. tubes
- Separate gripping and sealing designs
- Wrench or socket torques plug into position
- Serrated adjustable cleats for positive gripping action
- Chloroprene cylinder expands to seal tube
- Tested to 1,000 PSI (69 BAR) and 200°F (93°C)
EX-3 Expanding Tube Plugs

- For $5/8''$ (16 mm) through $1^{1/4}''$ (32 mm) O.D. tubes
- Large outer washer holds plug flush with tubesheet
- Wrench or socket torques plug into position
- Chloroprene cylinders expand to seal tube
- Tested to 150 PSI (10 BAR) and 200° F (93° C)
EX-4 Expanding Tube Plugs

- For 5/8” (16 mm) through 1 1/4” (32 mm) O.D. tubes
- Can be recessed past tubesheet
- Wrench or socket torques plug into position
- Chloroprene cylinders expand to seal tube
- Tested to 150 PSI (10 BAR) and 200° F (93° C)
EX-F Expanding Tube Plugs

- For $\frac{5}{8}''$ (16 mm) through $1\frac{1}{4}''$ (32 mm) O.D. tubes
- Can be recessed past tubesheet
- Separate gripping and sealing designs
- Wrench or socket torques plug into position
- Vulcanized cloth fiber expands when wet for positive gripping action
- Chloroprene cylinder expands to seal tube
- Tested to 400 PSI (28 BAR) and 200° F (93° C)
Custom Expanding Tube Plugs
Produced for EDF

• For 3/4” (19 mm) O.D. tubes
• Large outer washer holds plug flush with tubesheet
• Lock nut provides secure installation
• Wrench or socket torques plug into position
• Chloroprene cylinder expands to seal tube
• Tested to 150 PSI (10 BAR) and 200° F (93° C)
Installation of EX-3, EX-4, EX-F and Custom Expanding Tube Plugs

• Clean and dry the last 3” of the tube
• Expand the Chloroprene cylinder(s) for a snug fit
• Insert the plug into the tube
  • Washer flush with tubesheet (EX-3 and Custom)
  • Plug recessed below tubesheet (EX-4 and EX-F)
• Tighten the nut firmly
• Use a torque wrench to verify torque is not above 150 inch pounds
Rapid Installation
Expanding Tube Plugs

- For 1” (25 mm) through 1 1/4” (32 mm) O.D. tubes
- Plug thread pin locks onto application tool for placement
- Can be recessed past tubesheet
- Application tool torques plug into position
- Chloroprene cylinder expands to seal tube
Reverse Thread
Expanding Tube Plugs

- For $\frac{5}{8}''$ (16 mm) through $1\frac{1}{4}''$ (32 mm) O.D. tubes
- Plug reverse threads onto application tool for placement
- Application tool torques plug into position
- Can be placed at any point within the tube
- Chloroprene cylinder expands to seal tube
- Tested to 150 PSI (10 BAR) and 200° F (93° C)
Fiber Tube Plugs

- For $\frac{5}{8}''$ (16 mm) through $1\frac{1}{4}''$ (32 mm)
- Made of vulcanized cloth fiber rod
- Hammered into position
- Vulcanized cloth fiber expands when wet for increased gripping and sealing action
- Tested to 400 PSI (28 BAR) and 230° F (110° C)
Pin Tube Plugs

- For \(5/8\)" (16 mm) through \(1\frac{1}{4}\)" (32 mm) O.D. tubes
- Hammered into position
- Can be welded into place
- Machined to exact specifications
- Tested at high pressures and temperatures

One Piece Tapered Design
Seals at High Temperatures
Pin and Collar Tube Plugs

- For $\frac{5}{8}''$ (16 mm) through $1\frac{1}{4}''$ (32 mm) O.D. tubes
- Hammered into position
- Can be welded into place
- Machined to exact specifications
- Tested at high pressures and temperatures
- Can be used to seal tubesheet holes
• Each tube requires two plugs (inlet and outlet)
• Tubesheet maps are useful for installation placement and record
• 2% of the total number of tubes is a basic recommendation for on-site inventory (25,000 tubes x 0.02 = 500 plugs)
• Assistance in reviewing current tube plugging program is available
Conco Services Corp.
530 Jones Street
Verona, PA 15147
Phone 1-412-828-1166
Toll-Free 1-800-345-3476
Fax 1-412-826-8255
info@conco.net
www.conco.net

- Condenser and Heat Exchanger Tube Cleaning
- Air Cooled Condenser and FinFan Cleaning
- Plate Heat Exchanger Cleaning
- Eddy Current Testing
- Leak Detection
- Tube Plugging
- Deposit Analysis