

Condenser Plug Change Out - Plug Leaking Tubes with Pop-A-Plug® Tube Plugs



Target Plant Type

- Power
- Nuclear
- Conventional
- Large
- Older (>10 years old)

Target Personnel

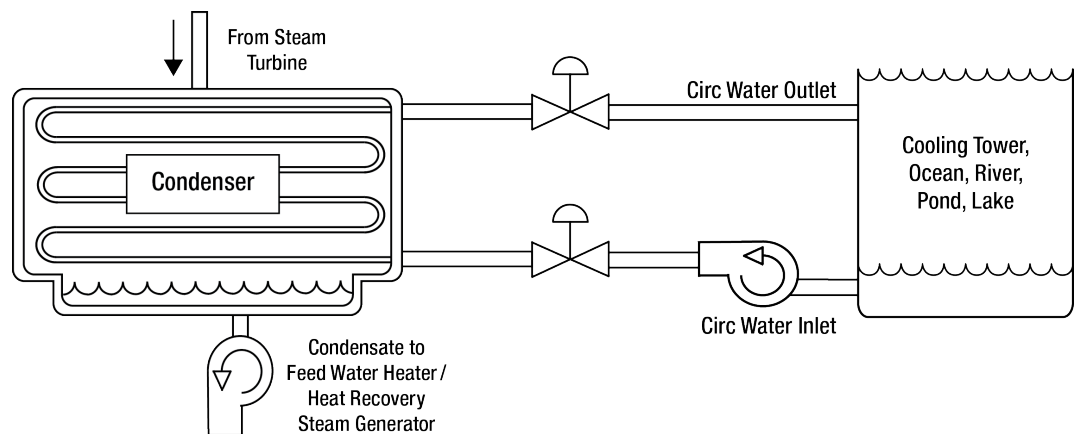
- Maintenance Managers
- System Engineers
 - Feedwater
 - Condensate
 - Circulating Water
- Outage Planners
- Plant Chemists

Target Equipment

- Condensers
- Surface Condensers

Main Condensers are used in conventional, nuclear and combined cycle power stations. Their primary function is to collect waste steam and reintroduce condensate back into the feedwater system. When tube leaks occur (through corrosion or leaking plugs), raw cooling water mixes with steam plant clean water leading to premature failure of critical and extremely expensive equipment.

Many plants use elastomer/polymer plugs as a quick fix for leaking tubes, however elastomer/polymer tube plugs have been shown to deteriorate over time leading to lost and leaking plugs¹. The Pop-A-Plug® Tube Plugging System offers a perfect solution to plants looking for a reliable permanent, yet removable engineered solution for repairing leaking or degraded condenser tubes.



Equipment Specification Range for Most Condensers

Tube Size	3/4" through 1 1/4" (19.05mm to 31.75mm)
Tube Length	20 to 150 ft. (6.1 to 45.7m)
Tube Quantity	8,000 to 40,000 tubes
Tube Material	Copper based alloys, Austenitic and Super Austenitic Stainless Steels, Ferritic Stainless Steels, Titanium

Pop-A-Plug® CPI/Perma - Stats & Features

Pressure Rating 1000 PsiG (68.9 BarG) - *higher pressures available upon request*

Size Range 0.472" to 2.067" (11.99mm - 52.5mm) Tube I.D. - *larger/smaller sizes available upon request*

Available Materials Brass, Carbon Steel, 316 Stainless Steel, 304 Stainless Steel, 4142 Alloy, 70/30 CuNi, 90/10 CuNi, Monel, Duplex 2205, Chromoly Grade 11, Chromoly Grade 22, Titanium

Features

- Metal to metal seal will not leak or degrade like elastomer plugs
- Plug material matches tube material - preventing thermal expansion and contraction issues and undesirable galvanic interaction
- Helium leak tight seal to 1×10^{-6} cc/sec
- Engineered solution - installed with controlled force eliminating ligament and/or roll joint damage
- Lowest lifecycle cost compared to alternative tube plugging methods
- Hydraulic installation significantly reduces turnaround/down time
- Eliminates need for welding or explosives



Top 5 Reasons to Replace Elastomer/Polymer Plugs with Pop-A-Plug® Tube Plugs

- You have leaking condenser plugs and resulting cooling water inleakage, causing increased forced outage hours
- You've experienced increased water chemistry costs attributed to inleakage
- You've had secondary equipment failures caused by inleakage
- You've incurred increased costs to identify leaking or compromised tube plugs
- You've had LOOP events (Nuclear Power Plants) and the elastomer plugs you're using are degrading and expelling

What Makes Pop-A-Plug® Tube Plugs Uniquely Suited for Power Plant Applications?

1. Reliable, Engineered Tube Plugging Solution

- Metal-to-metal seal, eliminates welding
- Will not degrade like elastomer/polymer plugs
- Helium leak tight seal to 1×10^{-6} cc/sec
- Will not damage tube or tubesheet joints like hammer in plugs
- Controlled, repeatable installation
- Safe to use in application with epoxy coated tubes and / or tubesheets

2. **Maximizes Plant Uptime** – by combining speed of installation and long term performance, Pop-A-Plug® Tube Plugs minimize downtime due to lengthy repairs, rework and chasing lost or leaking plugs.

3. **Provides Lowest Lifecycle Cost** – compared to alternative plugging methods

4. **Eliminates Corrosion & Thermal Concerns** – matching plug to tube material eliminates corrosion and differences in thermal coefficients of expansion.

5. **Readily Available** – we maintain a large inventory; 24/7 emergency manufacturing capability; Outage Job Box Program.

6. **Industry Reputation** – used at 99% of US Nuclear Power Plants (NPPs), 100% of Canadian NPPs, 100% of French NPPs, and US Navy Carriers and Submarines.

7. **LOOP Tolerant** – pressure rating safety factors in excess of 10 X – easily handles pressure upset occurring during nuclear power plant Loss of Offsite Power (LOOP) or Station Black Out (SBO) events.

Quality Assurance / Product Approvals

- Material Traceability - full material traceability on each individual plug
- QA Program - Manufactured in an ISO 9001:2008 registered facility
- Third party evaluation and approval by TUV and others
- Meets or exceeds **EPRI Condenser Plug Selection Criteria**²
- **NUPIC Audited and Approved** - Quality Program audited by NUPIC under 10 CFR 50 Appx. B and ASME NQA-1
- **US Navy Approved** - Quality Program to Navy Level 1
- **Canadian CRN approvals**
- **Recognized in ASME PCC-2** as a qualified repair method



1. Main Condenser Cooling Water Inleakage, Institute of Nuclear Power Operations (INPO), 2013, INPO Event Report L4-13-17
2. Condenser In-Leakage Guideline, Electric Power Research Institute (EPRI), Palo Alto, CA, 2000, TR-112819 Page 7-2.