



# Heat Exchanger Tube Plugging & Testing Equipment



Pop-A-Plug® Tube Plugs  
Installation & Removal Equipment  
G-Series Tube Testing Tools  
Pop-A-Plug® Tube Stabilizers



## EST GROUP

Established in 1968 and headquartered in Hatfield Pennsylvania USA, Curtiss-Wright EST Group specializes in the development, and manufacture of highly-engineered products and repair services for shell and tube heat exchangers, condensers, coolers and chillers. Our flagship product, Pop-A-Plug® Tube Plugs are the industry's leading technology for plugging leaking and/or degraded heat exchanger tubes.

### Core products include:

- **Pop-A-Plug® Tube Plugging System** – for preparing and plugging leaking and/or degraded heat exchanger tubes. Suitable for service in operating pressures to 7000 PsiG (480 BarG) without welding or explosives. Identified in ASME PCC-2 (*Article 312*)\* as a recommended mechanical tube plugging method
- **G-Series Tube Testing Tools** – for identifying and locating leaking heat exchanger tubes and tube-to-tubesheet joints
- **Pop-A-Plug® Tube Stabilizers** – for stabilizing weakened, fractured or severed heat exchanger tubes

EST Group Field Services provides a full range of turnkey field services, including heat exchanger tube testing, tube inspection, mechanical tube cleaning, tube sleeving or lining, tube plugging, tube pulling and partial retubing operations, as well as on-site training for all EST Group products.

EST Group serves the power generation; petrochemical and refining; fine chemical and pharmaceutical; shipbuilding; oil and gas production; and engineering and construction industries worldwide.

*Curtiss-Wright has a long history of solving tough problems that begins with a passion for understanding customer needs. Add to that unparalleled technical expertise, the highest standards of quality and a long heritage of innovative thinking. For nearly a century Curtiss-Wright's Industrial Division has been doing things the Wright way.*

\*Inspection and Repair of Shell and Tube Heat Exchangers, The American Society of Mechanical Engineers (ASME) PCC-2 Article 312.



# Heat Exchanger Tube Plugging & Testing Equipment



## Pop-A-Plug® CPI/Perma Tube Plugs

Resistant to thermal cycling and able to provide a seal that's helium-leak tight, Pop-A-Plug CPI/Perma Tube Plugs are the safe, effective, and reliable solution for heat exchanger tube leaks. Rated to 1000 PsiG (68.9 BarG), Pop-A-Plug CPI/Perma Tube Plugs install in minutes, and their broad expansion range fits multiple gauges reducing inventory and costs. Controlled and repeatable installation minimizes installer fatigue and protects against damage to tubesheet ligaments and adjacent tubesheet joints, extending the life of heat exchangers and reducing costs for retubing. Kits include ten (10) plugs and one (1) Go/No-Go Gage.

### Pressure Rating

1000 PsiG (68.9 BarG)  
Higher pressures available upon request

### Size Range

0.472" to 2.067" (11.99mm to 52.5mm) Tube ID  
*Larger/smaller sizes available upon request*

### Standard Materials\*

Brass, Carbon Steel, 304/316 Stainless Steel, 70/30 CuNi

### Features

- Helium leak tight seal to  $1 \times 10^{-6}$  cc/sec
- Plug material matches tube material preventing thermal expansion and contraction issues and/or undesirable galvanic interaction
- Metal to metal seal will not leak or degrade like elastomer plugs
- Accommodates through the tube plugging applications
- Lowest lifecycle cost compared to alternative tube plugging methods
- Readily available from stock with 24/7 emergency manufacturing capability



## Pop-A-Plug® P2 High Pressure Tube Plugs

When pressures reach supercritical levels, there's nothing like the Pop-A-Plug P2 Tube Plugging System. A proven long-term performer in fossil and nuclear stations, Pop-A-Plug P2 Tube Plugs feature internally serrated rings designed to maintain a leak-tight seal under extreme thermal and pressure cycling. The Pop-A-Plug P2 Tube Plugging System reduces downtime, eliminates welding and explosives, and will not damage your tubes, tube joints or tubesheets. Kits include ten (10) plugs, one (1) tube preparation brush, and one (1) Go/No-Go Gage.

### Pressure Rating

Up to 7000 PsiG (483 BarG)  
Higher pressures available upon request

### Size Range

0.400" to 1.460" (10.16mm to 37.08mm) Tube ID  
*Larger/smaller sizes available upon request*

### Standard Materials\*

Brass, Carbon Steel, 304/316 Stainless Steel, 70/30 CuNi, Titanium

### Features

- Helium leak tight seal to  $1 \times 10^{-10}$  cc/sec
- Unique engineered breakaway controls the installation force preventing damage to the tube, tubesheet, and surrounding tubes
- Ideal for use in applications with coated tubes and tubesheet
- Lowest lifecycle cost compared to alternative tube plugging methods
- Readily available from stock with 24/7 emergency manufacturing capability

\* Additional materials available: Chromoly F9 & F11, AL6XN, SS 317L/321/347, SS 400 Series Alloys, SS 904L, SS 254 SMO, SS 20CB3/Alloy 20, Super Duplex SS, Inconel Alloys, Incoloy Alloys, Hastelloy Alloys, Nickel 200/201, Zirconium, Carbon Steel A350 LF2 - contact Customer Service for full list.

# Heat Exchanger Tube Plugging & Testing Equipment



## Ram Packages

### 6600 Ram

Hydraulically install Pop-A-Plug Tube Plugs in seconds. Our Small Ram is compact, lightweight and easy to use. Install Pop-A-Plug Tube Plugs safely and easily in tubes from 0.400" to 1.212" (10.16mm to 30.78mm). Electric & Battery operated versions available.

### Required for Tube Plug Installation

#### Size Range

0.400" to 1.212" (10.16mm to 30.78mm)

#### Components

Air Activated Hydraulic Pump, 10ft. (3m) of Hydraulic Hose with Quick Connects, Pressure Gauge, Cable Assembly, Small Ram Head, and Metal Case

#### Features

- No welding required for installation
- Controlled, repeatable installation reduces operator fatigue
- Operates on shop air supply - 40 to 125 PsiG (2.7 to 8.6 BarG)

### 1750 Ram

Hydraulically install Pop-A-Plug Tube Plugs in seconds. Our Large Ram features rugged steel construction for maximum reliability. Install Pop-A-Plug Tube Plugs safely and easily in tubes from 1.180" to 2.000" (29.97mm to 50.80mm).

### Required for Tube Plug Installation

#### Size Range

1.180" to 2.000" (29.97mm to 50.80mm)

#### Components

Air Activated Hydraulic Pump, 10ft. (3m) of Hydraulic Hose with Quick Connects, Pressure Gauge, Cable Assembly, Large Ram Head, and Metal Case

#### Features

- No welding required for installation
- Controlled, repeatable installation reduces operator fatigue
- Operates on shop air supply - 40 to 125 PsiG (2.7 to 8.6 BarG)

### Close Quarters Ram

Install Pop-A-Plug Tube Plugs even when there is minimal clearance around the tube end. Ideal for tubes in the outermost row of closed head feedwater heaters or tubes adjacent to a pass partition or divider plate.

### Required for Tube Plug Installation

#### Size Range

0.400" to 0.860" (10.16mm to 21.84mm)

#### Components

Air Activated Hydraulic Pump, 10ft. (3m) of Hydraulic Hose with Quick Connects, Pressure Gauge, Cable Assembly, Close Quarters Ram Head, and Metal Case

#### Features

- Compact, lightweight design
- Ideal for limited clearance applications
- Operates on shop air supply - 40 to 125 PsiG (2.7 to 8.6 BarG)



## Manual Installation Tool

Provides reliable installation in situations where air or electricity are not available. Each Manual Installation Tool comes complete with a Pull Rod and Positioner to install the size and style Pop-A-Plug Tube Plug identified in the tool's model number. The Manual Installation Tool can be used with manual wrenches or sockets, as well as with electric or pneumatic impact wrenches.

### Required for Tube Plug Installation when Air or Electricity are not Available

#### Size Range

CPI/Perma: .471" to 1.149" (11.96 to 29.18 mm)  
P2: .400" to 1.160" (10.16 to 29.46 mm)

#### Standard Material

Zinc Plated Carbon Steel

#### Features

- Provides fast, reliable installation where air or electricity are not available
- The standard body accepts all MIT pull rods and positioners
- The locating pin acts as a reaction arm to prevent the body from spinning as the Hex Nut is being tightened



## Pull Rod Assemblies

Used in combination with Pop-A-Plug Tube Plugging System Ram Packages to install Pop-A-Plug Heat Exchanger Tube Plugs. EST Group maintains a significant inventory of Pull Rod assemblies, Channel Head assemblies and extensions for both near end and through the tube plugging in shell and tube heat exchangers.

### Required for Tube Plug Installation

#### Size Range

Pull Rod and Channel Head Pull Rod Assemblies available for all Tube Plug sizes.

Extensions available in 1ft (30cm), 2ft (60cm), 4ft (120cm), and 6ft (180cm) lengths.

#### Standard Material

Zinc Plated Carbon Steel

#### Features

- Assembly consists of a size specific Plug Positioner, Pull Rod, Rod and Tube Positioner, Knurled Nut, and Safety Hex Nut
- Hydraulic Ram Safety Cable designed to be installed between the Knurled Nut and Safety Hex Nut



## Tube Preparation Brushes

Tube preparation is vital to successful tube plugging. EST Group's full complement of unique heat exchanger tube brushes deliver fast, consistent tube preparation. Tube brushes size the tube ID, make it round, quickly remove surface defects that can cause leaks and provide a roughened surface. This improves the Pop-A-Plug Tube Plug pressure holding capability and leak tight integrity.

### Required for Tube Plug Installation

#### Size Range

Available for tube sizes from 0.400" to 2.067" (10.16mm to 52.5mm) in increments of 0.020" (0.508mm).

Brush Kits are available for CPI/Perma Tube Plugs that contain multiple brushes to cover the size range of the Tube Plug.

#### Standard Material

Zinc Plated Carbon Steel. Nylon Coated Bristles on sizes above 1" (25.4mm)

#### Features

- High and Low Tensile Brushes available based on tube material
- Modified threaded brushes are compatible with Channel Head Pull Rod Assemblies
- Channel Head extensions available in 1ft (30cm), 2ft (60cm), 4ft (120cm), and 6ft (180cm) lengths



## Tapered Reamers

A critical step when weld droop obstructs a tube opening and prevents proper measurement of tube ID. Tapered design allows for precise removal of weld droop or other obstructions when fitted into a hand-held power drill. Offered in various sizes for use with both Pop-A-Plug CPI/Perma and P2 Tube Plugs.

### Required for Removing Weld Obstruction

#### Size Range

Available for tube plug sizes from 0.400" to 0.979" (10.16mm to 24.86mm).

Extensions available in 1ft (30cm), 2ft (60cm), 4ft (120cm), and 6ft (180cm) lengths.

#### Standard Material

Hardened Alloy Steel

#### Features

- Removes weld droop to prevent incorrect sizing for Pop-A-Plug Tube Plugs
- Compatible with a standard hand-held power drill
- In most cases, weld droop can be removed in 15-30 seconds



## Plug Removal Tool

Quickly remove installed Pop-A-Plug Tube Plugs with the dual functioning Removal Tool. Features a nose piece that threads into the pin of an installed plug, enabling the pin to be separated from the ring. The tool retains the pin while a serrated spear grabs the ring's ID. An integral slide hammer pulls out the ring and pin in one operation. Also available in extended models.

### Required for Tube Plug Removal / Retubing

#### Size Range

Available for tube plug sizes from 0.400" to 1.180" (10.16mm to 29.97mm).

Extensions available in 1ft (30cm), 2ft (60cm), 4ft (120cm), and 6ft (180cm) lengths.

#### Standard Material

Zinc Plated Carbon Steel Slide Hammer and Pull Rod, Hardened Alloy Steel Tapered Spear

#### Features

- Can be operated manually with the slide hammer or hydraulically with the Small Ram Kit
- Plugs can quickly and easily be removed for retubing or to bring heat exchanger tubes back into service



## Tube Stabilizers

Effectively stabilizes weakened or fractured heat exchanger and condenser tubes. Ideal for any type of shell and tube heat exchanger from high pressure feedwater heaters to surface condensers. Available in either rod or cable type configuration. Available in any length. Unique Pop-A-Plug Anchoring System eliminates cable or rod migration, ensuring fractured/deteriorated tubes are securely supported until retubing or sleeving can be performed.

### Required to Support Deteriorated / Fractured Tubes

#### Size Range

Sizes to fit tubes ranging from 0.501" to 0.960" (12.73mm to 24.38mm)

#### Standard Material

Stainless Steel

#### Features

- Bullet or wedge style tip configurations
- Stepped anchor diameter allows it to fit in unrolled section of tubes
- Installs using standard Pop-A-Plug Ram packages
- Anchors are easily removable for retubing or repair





## G-160 Tube Testing Tool

Rapidly detect tube leaks while providing a safer working environment for plant personnel. Innovative patented gripper design provides increased operator safety. Durable cast aluminum housing fully protects gauges. Analog & digital gauge versions available.

### Operating Pressure

Standard compressed air supply  
40 to 125 PsiG (2.7 to 8.5 BarG)

### Size Range

0.49" to 1.11" (12.4mm to 28.2mm)

*Optional Tube Support Assemblies available for tube sizes from 0.28" to 1.81" (7.1mm to 46.0mm)*

### Standard Seal Material\*

Neoprene

### Features

- Patented gripper design
- Requires less operator force
- Ergonomic design with push button activated air injection valve
- Corrosion resistant powder coated finish
- Lightweight aluminum construction
- Fully protected gauges



## G-250 Vacuum Tube Testing Tool

Quickly seal off and evacuate individual heat exchanger tubes to test for leakage. Machined from high strength aluminum alloy reducing fatigue associated with using heavier testing equipment. Optional seal sets are available to test tubes to 2.50" (63.5mm). Analog & digital gauge versions available.

### Operating Pressure

Standard compressed air supply  
40 to 125 PsiG (2.7 to 8.5 BarG)

### Size Range

0.28" to 1.45" (7.1mm to 36.8mm)

*Optional Seal Sets are available to 2.50" (63.5mm)*

### Standard Seal Material\*

Neoprene

### Features

- Each G-250 set weighs less than 2.5 lbs. (1.1kg)
- Replacement Seal and Washer Sets, Channel Head Extensions and Digital Pressure Gauges are available



## G-650 Joint Testing Tool

Quickly test expanded tube-to-tubesheet joints for leakage. Ideal for heat exchanger manufacturers or companies performing retubing operations. The G-650 gun seals the tube ID and the tubesheet face, then evacuates the tube end at the joint. A loss of vacuum indicates a leaky tube joint. Analog & digital gauge versions available.

### Operating Pressure

Standard compressed air supply  
40 to 125 PsiG (2.7 to 8.5 BarG)

### Size Range

G-650 - 3/8" to 1 1/4" (9.5mm to 31.75mm)

G-650A - 1 1/2" to 2 1/2" (38.1mm to 63.5mm)

### Standard Seal Material\*

Neoprene

### Features

- A highly efficient venturi typically creates 21 to 24 in-Hg (707 to 808 mBar) vacuum on an inlet air supply of 100 PsiG (6.8 BarG) and 10 SCFM (283 l/min)

# Contact Information

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Product animations, instructions, and detailed technical information are available on our website: [www.cw-estgroup.com](http://www.cw-estgroup.com)

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