

**CURTISS -
WRIGHT**

EST Group

Pop-A-Plug[®] Tube Plugs & GripTight[®] Isolation Plugs

Keeping Turnarounds on Track



Curtiss-Wright EST Group's proven solutions for heat exchanger repair and pipe/pressure vessel testing shorten turnaround time while increasing plant productivity and safety.

Turnarounds are critical for improving the safety, efficiency and throughput of refineries and petrochemical plants. And while most turnarounds are scheduled years in advance, plants still struggle to meet start-up dates. By some industry estimates, between 70% and 90% of turnaround projects extend beyond their scheduled time. Delays of even a few days can add millions of dollars to the cost of a turnaround, when one factors in the reduced productivity of the facility and the additional on-site contractor manpower required.

For more than 50 years, Curtiss-Wright EST Group has designed, manufactured and delivered an array of tools and systems to simplify maintenance and shorten turnaround times for operation-critical equipment, from shell-and-tube and air-cooled heat exchangers to pipelines, piping systems and pressure vessels. The high-pressure isolation and testing systems discussed below have saved petrochemical and refining operators millions of dollars in equipment maintenance and downtime.

Safe Isolation for Piping Repairs

During flange replacements and other pipeline repairs requiring welding, EST Group's range of high-performance plugs expedite the testing and isolation of piping, tubing and pressure vessels. This includes the GripTight Isolation Plug, which allows maintenance crews to safely isolate and monitor potentially explosive vapors during hot work, and hydrotest new weld connections—all with a single tool.

GripTight Isolation Plugs integrate EST Group's Double Block and Bleed plug with gripper technology, making each plug capable of withstanding test pressures up to 2250 PsiG (155.1 BarG) between the seals and upstream pressures up to 1500 PsiG (103 BarG). The plug's dual port design creates a positive pressure barrier between the seals, safely isolating welding from any residual upstream gases.

As upstream pressure increases, GripTight grippers use this pressure to grip against the ID of the pipe, ensuring greater operational safety by minimizing the risk of a blowout or expulsion from the line. The tool's lightweight aluminum/steel construction makes it easy to maneuver. In many cases, the plug can be positioned by field personnel without the added expense of a crane or other lifting devices.

In addition, GripTight Isolation Plugs allow for more targeted hydrotesting around the area where the repair was made, without the need to fill the entire system, often requiring less than a gallon (3.8L) of water to hydrotest, significantly reducing testing time and water treatment expenses.

For high-pressure hydrostatic testing, EST Group's GripTight MAX Test Plugs offer a safe and reliable solution. The test plugs operate by the same general principle as the isolation plugs, but at working pressures of up to 15,000 PsiG (1034 BarG).



Permanent and Cost-Effective Tube Plugging Solution

Shell-and-tube heat exchangers represent one of the most common, and critical, pieces of process equipment in any refinery or petrochemical plant. In most refinery and plant environments, heat exchanger tubes will eventually degrade or leak as a result of prolonged run lives, impurity-induced fouling/plugging and corrosive fluids that run through the system at high temperatures.

The traditional process for sealing the tubes calls for installing tube plugs with a thread. The plugs are then welded into the tubes with preheating and a post-heat treatments. This repair process is both time-consuming and unreliable. Welded plugs might suffer from circumferential cracks after the heat exchanger is brought back into service and is exposed to the wide temperature cycles that are common during normal operation.

Curtiss-Wright EST Group's heat exchanger tube testing and plugging systems are proven to minimize the delays in equipment maintenance during turnarounds, without welding and within a shorter time-frame. Solutions include the G-160 Tube Testing Tools for early leak detection in shell-and-tube heat exchangers, boilers and condensers. These tools rapidly pinpoint tube leaks while providing a safer environment for plant personnel.

Once leaks are identified, Pop-A-Plug Tube Plugs deliver a permanent and cost-effective plugging solution. Plugs are

hydraulically installed with a unique breakaway that eliminates welding, avoiding the labor costs and time associated with welding tapered plugs into place. Each plug maintains a helium leak-tight seal without damaging tubes, and can withstand extreme thermal and pressure cycling at working pressures up to 7000 PsiG (483 BarG).

Each plug is installed using a controlled force, protecting against damage to the tube sheet ligaments and adjacent tube sheet joints. Once installed, the plugs help bring the heat exchanger back online quickly, while extending its life and reducing operating costs.

Pop-A-Plug Tube Plugs are available in wide range of materials, including corrosion-resistant alloys, and can be matched to the metallurgy of the tube or tube sheet in which they are installed. Matching the material mitigates thermal expansion rates, ensuring leak tight seals during temperature cycles.

**Pop-A-Plug
Tube Plugs
saved
approximately
75 hours of
maintenance
work**



Proven Performance

Curtiss-Wright EST Group's turnaround expertise proved invaluable during a maintenance shutdown of a methanol refinery in Norway. Eddy current testing/inspection of the heat exchanger in the refinery's flare system found 58 tubes with significant (greater than 70%) wall loss.

The plant decided to plug these tubes to extend the cooler's operating life until the next maintenance shutdown. The refiner previously used tapered plugs and welded plugs for this application, neither of which proved fully effective. Tapered plugs leaked at the operating pressures and temperatures encountered in the system (10.8 BarG, 170°C). Welding plugs into the tubesheet was a labor-intensive and time-consuming exercise that could potentially weaken the metal's structure and increase the risk of leaks.

Curtiss-Wright EST Group's regional distributor, Jergo Group, proposed Pop-A-Plug Tube Plugs as an alternative. The weld-free plugging system provided a helium leak-tight seal to 1×10^{-10} cc/sec. The refiner preferred the Pop-A-Plug's "cold" installation method, which made it easier to work with than welding plugs and safer in explosion risk zones.



Pop-A-Plug Tube Plugs saved approximately 75 hours of maintenance work

In just four hours, Jergo Group completed tube puncturing, brushing and plugging with 116 Pop-A-Plugs. This installation saved approximately 75 hours of work compared to welding plugs, lowering labor costs while putting the maintenance program back on schedule. The refiner trusted the method and closed up the unit without pressure testing the repair first. This quick repair helped the refinery, which exports approximately 20% of all methanol consumed across Europe, come back online within the scheduled time.

Curtiss-Wright EST Group serves a global customer base with an extensive inventory ready to ship, and 24/7 emergency manufacturing is available. EST Group is always ready when they are needed most. For more information, visit www.cw-estgroup.com or call (215) 721-1100.

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