

## Effective Heat Exchanger Tube Plugging in Ammonia / Urea Services

### Safe Solution for Fertilizer Production

In high pressure service, welded tube plugs are prone to leaking due to stress cracking since proper quality of welds is difficult to assure. Welded plugs require time consuming pre-heat / post weld heat treatment and the installation process can present significant safety concerns when units contain highly toxic, explosive, and/or corrosive residual contaminants.

### Safe Tube Plugging Solution

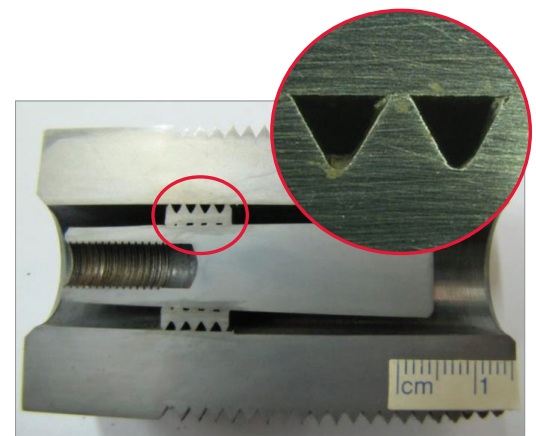
EST Group engineers and manufactures Pop-A-Plug® Heat Exchanger Tube Plugs to serve as the safe and reliable tube plugging solution for these critical processes. It provides a safe, controlled, and repeatable method for sealing heat exchanger tubes with installed stability better than a welded plug. The installation method only takes minutes and protects against damage to tube sheet ligaments and the adjacent tube sheet joints. Plug material is always matched to the host tube to prevent any undesirable galvanic interaction and maintain a leak-tight seal under extreme thermal and pressure cycling.

### Pop-A-Plug Tube Plug Features and Benefits

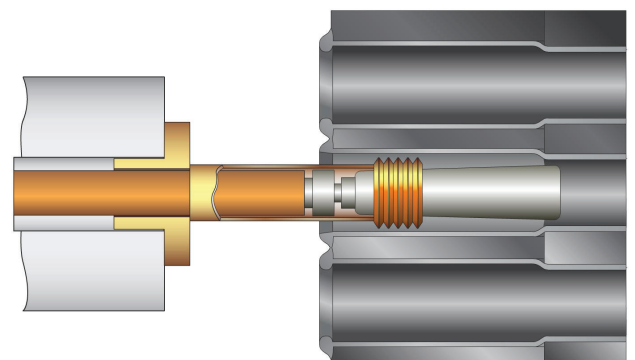
- Pressure Ratings up to 7000 PsiG (483 BarG)
- No welding required
- Reduce downtime from days to hours
- Controlled and repeatable installation
- Unique breakaway prevents damage to tube and tube joint
- Offers the lowest life cycle cost when compared to alternative tube plugging methods
- Helium leak tight seal to  $1 \times 10^{-10}$  cc/sec
- Meets ASME PCC-2 Article 3.12 requirements
- Suitability and type tested by TUV



Pop-A-Plug P2 Tube Plugging System



Pop-A-Plug Sectioned Serration Detail



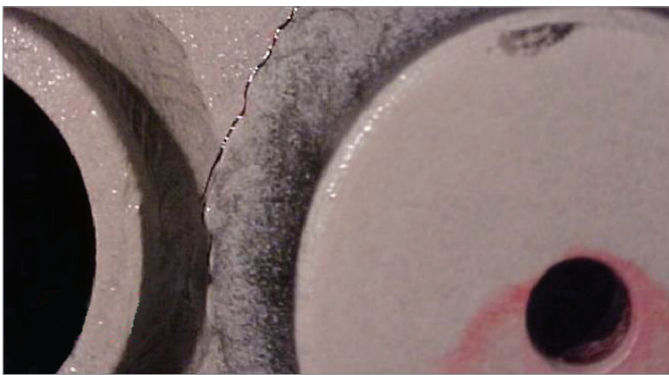
Pop-A-Plug P2 Tube Plug Installation

## Successful Tube Plugging in Fertilizer Plant with Pop-A-Plug Tube Plugs

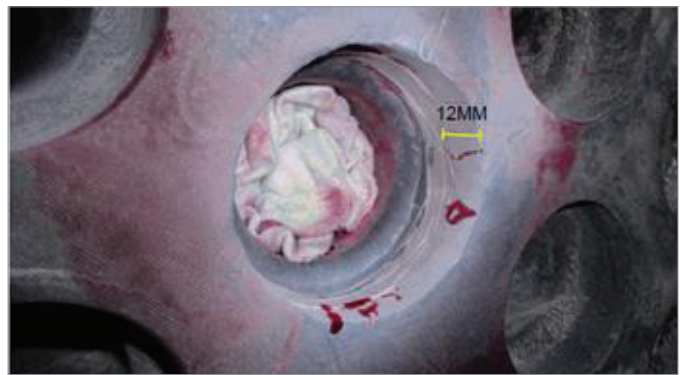
SKW Piesteritz is the largest ammonia and urea producer in Germany, operating two Kellogg plants. After problems with leaking and cracking tubes, a welding repair was made. However, the repair process was lengthy and welded plugs suffered from circumferential cracks after the units returned to service.

SKW approached EST Group and requested a safe and reliable solution to plug the heat exchanger without welding and within a shorter time-frame. The Pop-A-Plug Tube Plugging System was installed using a controlled force, protecting against damage to the tube sheet ligaments, and the adjacent tube sheet joints. The system took just a few minutes to install and enabled the life of the heat exchanger to be extended while reducing operating costs. *(Available at International Fertilizer Magazine, December 2014)*

The same tube plugging effectiveness occurred at a Fertilizer Manufacturer (Ammonia) in Mesaieed, Qatar. After a short time welding plugs, the customer noticed cracking around the heat affected zone. EST Group engineered and manufactured a special Pop-A-Plug Tube Plug allowing the customer to safely and efficiently install it into the tubesheet. Subsequently, there were no more issues with heat affected zones – no further tube and weld damage has occurred.



SKW Piesteritz Waste Heat Boiler Crack after Welding



Qatar Waste Heat Boiler Crack after Welding

### Pop-A-Plug Tube Plug Materials

#### Most Popular Materials:

- ASTM A-182 F9/F11/F22
- Zirconium
- Carbon Steel
- Brass
- Titanium
- 316 SS

### Over 35 Alloys Available Including:

- SS-316/316L
- SS-317L/321/347
- SS-400 Series Alloys
- SS-904L
- SS-254SMO
- SS-20CB3/ Alloy20
- Duplex SS /Super Duplex SS
- Inconel /Incoloy Alloys
- Hastelloy Alloys
- Monel
- Nickel 200/201
- AL6XN
- CuNi 70/30 - 90/10
- Carbon Steel A350 LF2
- Chrome Moly 4142
- Chrome Moly F5/F9/F11/F22

**Other materials and grades available,  
please contact EST Group for details**

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