

## Effective Heat Exchanger Tube Plugging for Highly Corrosive Environments & Processes



### Plant Types

- Fertilizer
  - Nitrogen
  - Phosphorus
  - Potassium
  - Ammonia
  - Urea
- Acid
  - Nitric
  - Sulfuric

### Key Personnel

- Maintenance Managers
- Reliability Engineers (Fixed Equipment)
- Turnaround Planners
- Inspection Supervisors

### Applications

- Waste Heat Boilers
- Shell & Tube Heat Exchangers
- Reboilers
- Condensers
- Air Cooled Heat Exchangers



### Protect Your Waste Heat Boiler Assets

In high pressure service, welded plugs are prone to leaking due to stress cracking. EST Group engineers and manufactures Pop-A-Plug® Tube Plugs, **a proven performer** in highly corrosive and severe service conditions existing in Ammonia, Urea, and Purified Terephthalic Acid (PTA) processes and in their associated acid plants.

In conventional ammonia production processes Waste Heat Boilers (WHB) are the key component. When Waste Heat Boilers are shut down for tube leaks, the entire plant is shut down directly impacting production and revenue. Due to WHB operating temperatures and pressures, welded tube plugs are widely used. The welding process is difficult and often requires re-work. Lengthy periods of pre-heat and post weld heat treatment (PWHT) can often push repair times into days. **Pop-A-Plug Tube Plugs eliminate welding** and the time consuming pre-heat and PWHT cycles associated with it. Pop-A-Plug Tube Plugs can have the plant back on line in hours – positively impacting the bottom line.

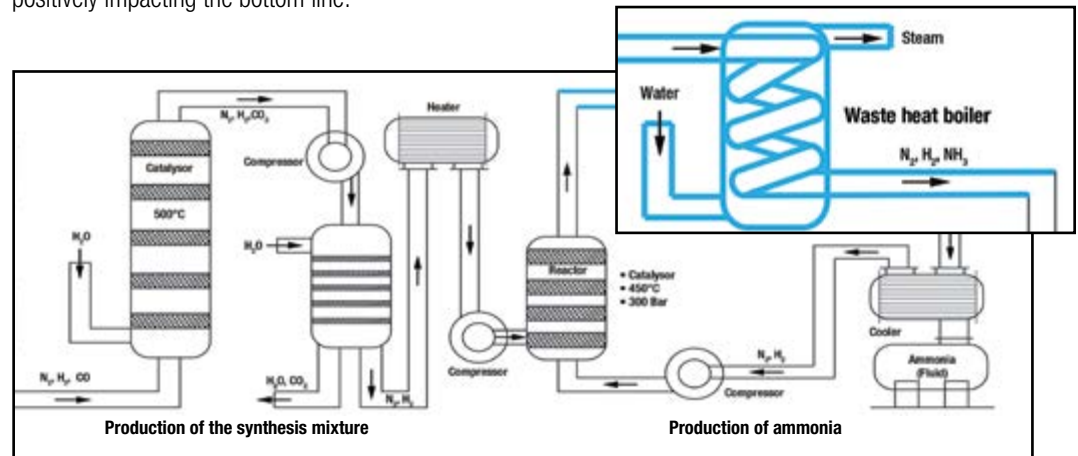


Figure 1 Haber - Bosch Ammonia Production Process

### Pop-A-Plug® Tube Plugging System - Stats & Features

**Pressure Rating** up to 7000 PsiG (483 BarG) - *higher pressures available upon request*

**Size Range** .400" to 1.460" (10.16mm - 37.08mm) Tube I.D. - P2 Plugs  
 .472" to 2.067" (11.99mm - 52.02mm) Tube I.D. - CPI/ Perma Plugs  
*Larger/smaller sizes available upon request*

**Available Materials** ASTM A-182 F9/F11/F22, Zirconium, Carbon Steel, Brass, Titanium, 316 / 316L Stainless Steel, Duplex Stainless Steel, Super Duplex Stainless Steel, Hastelloy Alloys, and Titanium; among other metal alloys commonly used in highly corrosive environments

### Features

- Eliminates need for welding and time consuming pre-heat and PWHT
- Plug material matches tube material - mitigates thermal expansion, contraction issues, and undesirable galvanic corrosion
- Helium leak tight seal
- Lowest life-cycle cost compared to alternative tube plugging methods
- Hydraulic installation significantly reduces turnaround/downtime
- Engineered solution - installed with controlled force eliminating tube, tubejoint, and ligament damage
- Each plug is marked with lot number making it fully traceable in regards to material of construction

## Why Choose Pop-A-Plug Tube Plugs for Critical Environments?

- EST Group has further developed its Pop-A-Plug Tube Plugging System to incorporate materials frequently used in the Fertilizer Industry (ASTM-A182-F11 and F2 graded used in Waste Heat Boilers).
- Reported downtimes of 12 hours or less, resulting in cost savings!
- Provides the reliability of welded plugs without the time consuming pre-heat, PWHT, and rework.

***A majority of our customers report a 2-3 day savings on their overall waste heat boiler, reboiler, and heat exchanger turnarounds when shifting from welded plugs to EST Group's Pop-A-Plug Tube Plugging System.***

EST Group has contacts with major licensor's in this industry and can provide relevant information and references upon request.

## Successful Tube Plugging In Fertilizer Plants

EST Group's Pop-A-Plug Tube Plugging system has established a proven record in the Fertilizer Industry. It has been successfully validated for plugging leaking or degraded tubes in highly critical, dangerous, and corrosive environments by many plants.

- **SKW Piesteritz** - The largest ammonia and urea producer in Germany, operating two Kellogg plants. Pop-A-Plug tube plugs were installed in just a few minutes enabling the life of the heat exchanger to be extended while reducing operating costs. *Complete case study available at International Fertilizer Magazine, December 2014.*
- **Fertilizer Manufacturing (Ammonia) in Mesaieed, Qatar** - Pop-A-Plug Tube Plugs were safely and efficiently installed into the WHB after the customer experienced delays and added costs with welded plugs. EST Group was able to engineer and test the plugs to meet the customers needs. No further tube and weld damage has occurred.

## EST Group Field Services

Expert Field Services and Technical Support, 24/7, 365 days a year

EST Group Field Services provides a complete range of on-site heat exchanger services for waste heat boilers, shell and tube heat exchangers, air cooled heat exchangers, condensers, and oil coolers. Our team also provides Hydrostatic testing services for pipe, piping systems, and flange connections. Our trained service technicians have the experience and know-how to handle the most demanding jobs, safely, competently, and on-time.

Join our growing list of satisfied customers in the *fertilizer, power generation, chemical, petrochemical, oil refining, pharmaceutical, industrial gas, shipbuilding, and boiler manufacturing industries.*

**For on-site training, please contact an EST Group Sales Office!**

## Quality Assurance / Product Approvals

- Manufactured in an ISO 9001:2015 registered facility
- Meets ASME PCC-2 (Article 312) requirements and ASME Boiler & Pressure Vessel Codes
- Compliant with several QA Systems, including; ANSI N45.2, NQA-1, 10 CFR 50 App. B, 10 CFR 21, and TÜV Rheinland

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