Plugging HX tubes in HP Urea Equipment
EST Group (Curtiss Wright) POP-A-Plug® has revolutionized plugging of HP Heat Exchangers

POP-A-Plug® eliminates Welding, reduces Downtime and increases Safety and Reliability
Patented internally and externally serrated rings designed to maintain a leak-tight seal under extreme thermal and pressure cycling

- Installed using a controlled force (no risk for any damage)
- Takes only minutes to install

POPA-Plug® features

- POP-A-Plug® Pin
- POP-A-Plug Ring
- Installation Tool
- Breakaway Element
- Controlling Installation

note: ammonia application

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Plugging so far:

Extremely difficult to guarantee weld quality

- Difficult weld position
- Risk for damaging surrounding tube ends
- Very high risk for porosities & worm holes due to moisture
- How to avoid moisture coming down during welding at bottom tube sheet?
- Repeated heat input
- A leaking plug weld is the main cause for an unexpected plant shut down when looking at HP heat exchanger failure modes
- Replacing a welded plug requires min. 10 hours while pressure to restart production again asap is very high
Plugging so far:

Time consuming procedure

Purchase certified material, machine to right dimensions, qualify welders, do preparation work, make positive leak, weld layer 1, do quality tests, weld layer 2, do quality tests

Only one barrier between Process side and steam side

In case of a leak of a plug weld
One cannot see easily if there is any damage to the carbon steel part of the tube sheet (NDT techniques are required)

Note: carbamate corrosion rate of carbon steel is 900 mm/year
EST Group has agreement for special UREA grade material for the development of POP-A-PLUG® for UREA service.

Design incorporates a virgin Teflon® O-ring for proper sealing characteristics between POP-A-PLUG® and tubesheet. This is a proven and reliable due to the special design and the high thermal expansion coefficient of Teflon®.

EST Group has taken in advise from experts in the UREA industry with regards to requirements for such plugs.

Design eliminates welding risks.
Proven seal ring design in overlay weld area

POP-A-PLUG® for HP Urea Equipment

POP-A-PLUG® is installed in tubesheet by pulling plug pin through ring

- BC.05 overlay weld, 10-mm thk
- Urea Grade Pin
- Urea Grade serrated ring
- O-ring virgin Teflon®

- O-ring virgin Teflon® is filling the chamber already before assembly.
- After assembly O-ring is compressed already completely locked up.
- During operation O-ring is further compressed due to higher temperatures.
No risk for corrosion due to Urea Grade Material & proven seal ring
POP-A-PLUG® is widely applied in Nuclear and Fossil Power generation plants and in many chemical plants and refineries.

POP-A-PLUG® is fully developed for Ammonia plants (ASTM A 182 F22 Class 3 Material) and now also available for Urea plants (Urea Grade material).


Tests on Urea Plugs (July 2012)

100 Pcs POP-A-PLUG® will be installed in waste heat boiler of HT NH₃ plant of GPIC in Bahrain (November 2012, installed by maintenance GPIC trained by EST Group).

Very Successful Track Record
EST Group (Curtiss Wright) POP-A-Plug® has revolutionized plugging of HP Heat Exchangers.

POP-A-Plug® eliminates Welding, reduces Downtime and increases Safety and Reliability.

POP-A-Plug® is available in Urea Grade Material for HP Heat Exchangers in Urea Plants.

Proven virgin Teflon® O-ring is applied for sealing. O-ring is compressed after installation and more compressed during operation creating an additional barrier.

Totally six barriers between process side and steam side.

Urea plugs tests are performed in SBN Austria supplied coupons of actual tube sheet on which the recommended preparation work has been performed.

POP-A-PLUG® are manufactured in USA, short delivery times are possible.

Preparation and Installation work can be done by local services companies.

In case of a leak one can easily check if there is any damage of tube sheet as corrosion would start from the inside the tube sheet hole.

Replacing a new POP-A-PLUG takes max 15 minutes and can be done with a protection mask when ammonia are present.