How to Safely Seal HF Acid: Echelon™-HF

Hydrogen fluoride (HF) is one of the most aggressive and hazardous chemicals used in industrial applications today. Upon contact with moisture, it forms hydrofluoric extremely corrosive and toxic substance that presents significant risks to personnel safety and plant equipment. Despite these challenges, HF remains integral to the production of refrigerants, plastics, pharmaceuticals, and high-octane gasoline via alkylation units in petroleum refineries. Given the severity of its hazards, ensuring the safe and reliable containment of HF is not just a priority; it is a necessity.

BY ROBBIE RIGGS

The Challenges of Sealing HF Alky Units

Refinery alkylation units utilize either sulfuric acid or hydrofluoric acid as catalysts in the production of high-octane gasoline blend-stock. While HF alkylation is highly effective, it introduces substantial maintenance, reliability, and safety concerns due to its extreme corrosiveness. Even minimal exposure to moisture can result in the formation of HF acid and rapid flange corrosion.

To mitigate these risks, refineries have traditionally employed semi-metallic gaskets such as spiral wound or camprofile gaskets. However, conventional designs often leave small gaps between the inner ring and the flange face, creating potential sites for HF acid pooling and subsequent corrosion. The result? Severe flange face degradation, costly repairs, and heightened operational hazards.

Ensuring Effective Sealing with The Echelon™-HF

Recognizing the limitations of traditional sealing solutions, Teadit developed the Echelon™--HF gasket—an innovative solution specifically designed for HF acid service. This gasket features a dual-seal design that provides both exceptional primary sealing and comprehensive flange corrosion protection. Follow these steps to ensure effective sealing:

Step 1: Understand the Primary Seal Function

The Echelon™-HF gasket features a fire safe high-density winding with alternating wraps of flexible graphite and Monel® 400. This combination ensures:

- Compliance with strict low-emission requirements.
- Consistent sealing integrity over time.
- Extended service life with minimal maintenance.

Step 2: Use Advanced Secondary Sealing

To prevent HF acid pooling at the inside diameter of the flange, the Echelon™-HF incorporates a secondary sealing element. This Monel® 400 camprofile inner ring is faced with high-performance expanded PTFE (ePTFE). This is engineered to:

- Compress effectively, forming a complete barrier at the flange's inner diameter while conforming to surface irregularities.
- Provide superior creep resistance and uniform density, ensuring long-term reliability through a proprietary ePTFE formulation.

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Step 3. Optimize Gasket Stress Distribution

Achieving an optimal balance between the primary and secondary sealing elements in a single-gasket design is complex. If the secondary seal is too thin, it may not provide adequate corrosion protection; if too thick, it can prevent the primary seal from achieving the required gasket load. The Echelon™-HF is engineered to optimize both sealing surfaces, ensuring each component functions effectively without compromising the other.

Step 4. Implement a Comprehensive Sealing Program

Even the most advanced gasket design must be part of a comprehensive sealing program. To ensure a successful sealing solution for HF alkylation units, refinery and chemical processing personnel should be trained on:

- Installation Training & Verification
- Flange Inspection & Maintenance
- Torque Specifications & Guidelines
- Inventory & Specification Management
- Retorque Procedures & Performance Monitoring

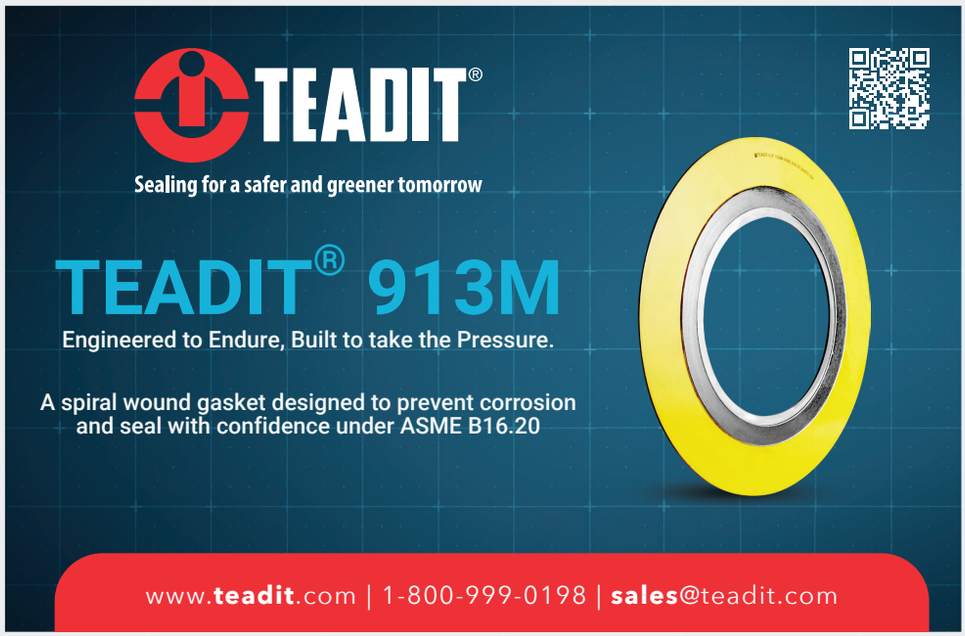
The Standard for HF Sealing

Given the extreme demands of HF alkylation applications, refineries require a gasket solution that delivers not only a secure, fire-safe seal but also long-term flange protection. The Teadit Echelon™-HF, with its advanced dual-seal technology, superior material selection, and optimized stress distribution, sets a new benchmark for safety, reliability, and cost-effectiveness in HF acid containment.

For more information on how the Teadit Echelon™-HF can enhance the safety and performance of your HF alkylation unit, visit https://teadit.com/us/produto/echelon-hf/ or contact Teadit today at **sales@teadit.com**

ABOUT THE EXPERT

Robbie Riggs is the President & CEO of TEADIT® North America. With extensive experience in the oil & gas, petrochemical, and chemical processing sectors, he is a degreed mechanical engineer from VCU in Richmond, VA. Robbie holds several patents on innovative sealing solutions in the oil & gas and chemical processing industries and drives the company's mission to deliver innovative, low-emission gasketing and packing solutions that improve safety, reliability, and environmental performance.



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