



# Chemraz®

## The Material of Choice for Oil Refinery Applications



### Customer

To meet its production targets, a large oil refinery in the U.S. Gulf Coast region (production capacity approximately 250,000 barrels per day) could not tolerate leakage in any of its pumps. The refinery had two goals for its HP (high-pressure) stripper bottom pumps:

- Extend MTBR (mean time between repair) from a few weeks to more than one year
- Reduce maintenance, operation, and life-cycle cost

### Application

The customer was experiencing sealing problems with tandem mechanical seals in its HP stripper bottom pumps. Tandem mechanical seals play a key role in the oil refinery process. Designed for balance and low-face deformation, they are primarily used in high-speed, high-pressure applications (e.g., cooling-processes). HP stripper bottom pumps separate the gas and oil components of waxy, gas-oil media; therefore, their seals must withstand challenging process conditions.

Technical Data	
<b>Pump Type</b>	David Brown Union Pump, type HTS
<b>Seal Design</b>	Tandem mechanical seal design
<b>Former Product</b>	EPDM dynamic face o-ring, sleeve o-ring, Dovetail® o-rings
<b>New Product</b>	Chemraz® 600
<b>Media</b>	Waxy, gas-oil media with H <sub>2</sub> S
<b>Viscosity</b>	0.32 cP
<b>Temperature</b>	Around 500°F (260°C)
<b>Pressure</b>	Exceeding 1,100 psi (76 bar)

### Challenge

Lack of movement in HP stripper bottom pumps can cause circulation difficulties. During standby operations, the heat exchanger in this particular pump often became plugged with waxy, gas-oil. When the pump started again after idling, the primary seal was running without flush, and heat had built up in the seal chamber. As a result, the static sleeve, Dovetail® o-ring and the dynamic face o-ring that formed the primary seal exploded and split along the molding lines.



## Solution

Initially, the customer did not know the exact temperature effecting each o-ring, making it difficult to determine the right elastomeric requirements. The Greene Tweed engineering design team needed to work out temperature estimations. To support this analysis, the customer changed the piping plan to API 21, discharge cooling through a heat exchanger. The service temperature was then determined to be 500°F (260°C) maximum.

Armed with this initial data from the customer, Greene Tweed engineers recommended that all three o-rings be tested with Chemraz® 615, which has a Shore A durometer of 80 and excellent heat resistance (up to 615°F). After a three-month test with Chemraz® 615, the static sleeve and Dovetail® o-ring were still in perfect condition, but the dynamic face seal was showing signs of distress. The customer also noted that the Dovetail® o-ring was nestled into a machined groove that could not be redesigned, making the thermal expansion issues even more critical.

Greene Tweed engineers suggested that all three o-rings be fitted with Chemraz® 600. Not only does Chemraz® 600 have the same high-temperature and high-pressure resistance of 615, but it provides a 90 Shore A durometer, making it harder than 615. This higher durometer meant greater anti-extrusion resistance, no thermal growth, and improved heating capabilities. When the HP stripper pumps stood idle, the Chemraz® 600 seals would not expand, preventing the heat and flush problems that earlier caused seal splits along the molding lines.

## Results

- In 2006 (four years later) when the pump came down due to non-o-ring issues, all tandem mechanical seals in the HP stripper bottom pumps were still running uninterrupted.
- Chemraz® 600 components were inspected and found to be in great shape. MTBR had been extended from a few weeks to four years.

## Advantages

- **Increased Reliability and Lifetime** — Pump lifetime has increased from a few weeks to more than four years, significantly exceeding customer expectations.
- **Custom-Engineered Seal Design** — Greene Tweed design engineers worked closely with the customer in evaluating the operating conditions and tailoring the seal design to match the conditions. The custom seal design leads to lower maintenance and operating costs.



HP Stripper Bottom Equipment



Heat Exchanger

## Greene Tweed

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