Chemical : High Corrosion

The Objective

Design a corrosion-resistant heat exchanger to cool a hot, high-pressure gas stream containing Ethylene Dichloride (EDC) and trace amounts of Hydrogen Chloride (HCl). The system needed to safely reduce gas temperature from 160°C to 20°C using chilled water at 10°C and a flow rate of 10 GPM, while maintaining long-term durability under corrosive and high-pressure conditions.

The Challenge

The customer's process involved highly corrosive gases and elevated pressure (20.69 bar), both of which posed risks of material degradation and system failure.
The exchanger also had to fit within tight geometric constraints without sacrificing performance or mechanical strength.
Typical stainless steel materials were unsuitable due to corrosion vulnerability, necessitating a specialized alloy solution that could withstand harsh chemical exposure and maintain cleanliness and efficiency.

The Solution

Exergy engineered a custom shell-and-tube heat exchanger (Model #00540-03, 23 Series) specifically designed for corrosive gas service.
Key design features included:

- Construction: All titanium for exceptional corrosion resistance
- Heat Transfer Area: 1.19 ft^2
- Shell Diameter: 1”
- Tube Length: 16”
- Connections: NPT fittings for secure integration
- Certifications: Full material certification package included

This configuration provided both high pressure and temperature tolerance, along with a compact, low-maintenance design.

The Results / Benefits

The Exergy solution successfully cooled the gas stream from 160°C to 20°C, maintaining consistent thermal performance while completely eliminating corrosion-related concerns.
The titanium construction ensured long service life, reliability, and compliance with demanding process requirements.
Its compact footprint allowed for easy installation in constrained environments without compromising heat transfer efficiency.
This project demonstrates Exergy's ability to engineer durable, corrosion-proof heat exchangers for aggressive chemical and high-pressure applications—delivering safety, reliability, and performance where conventional materials fall short.