

# ENGINEERED SOLUTIONS

## CASE STUDY

Enhancing Reliability in Chlor-Alkali  
Corrosive Service Valve Applications



FAMILY OF BRANDS







# INTRODUCTION, BACKGROUND & CHALLENGE

A prominent Chlor-alkali manufacturer encountered persistent issues of liner failures with the lined butterfly valves supplied by their current supplier in their cell effluent process piping.

## BACKGROUND

When working with chlorine production and corrosive chemicals, chemical resistant fluoropolymer lined valves are a critical part of process isolation and control applications.

## CHALLENGE

Over time, permeation of the liners will cause the valve to lose functionality. The impact of this failure often results in unplanned outages or environmental risks.

# BACKGROUND

One of our customers, a major Chlor-alkali producer, was experiencing continuous liner failures with their existing supplier's lined butterfly valves within their cell effluent process piping. It was revealed that the valve's lifespan was typically just eight months from installation date. The resulting cost of maintenance hours, valve replacement and production downtime were an ongoing concern for their Reliability Team.

When working with chlorine production and corrosive chemicals, chemical resistant fluoropolymer lined valves (often called "t-lined" or "Teflon-lined" valves) are a critical part of process isolation and control applications. In such a corrosive environment as wet chlorine, lined valves are often pushed to the limits of possibility, frequently resulting in premature failure which comes at an even greater cost - production loss. A valve's reliability and longevity play a critical role in the efficient and safe operation of any Chlor-alkali production facility.

# CHALLENGE

Fluoropolymer lined valves in wet chlorine or chlorinated brine services will experience permeation of the liners causing corrosion of valve bodies and internal components. The rate of permeation (and resulting corrosion) is affected by process conditions, with higher temperatures and concentrations of chlorine being the most demanding services. Over time, permeation of the liners will cause the valve to lose functionality. The impact of this failure often results in unplanned outages due to the inability to isolate critical process equipment, or worse, environmental exposure.





# SOLUTION

**1**

We enlisted the expertise of professionals from UNP Polyvalves, a leading manufacturer specializing in valves designed for corrosive environments, to lead our Engineered Solutions Team.

**2**

Soon after learning the application parameters and root cause analysis of the incumbent valve's failure mode, UNP developed a custom solution in the CBR Series Lined Butterfly Valve.

# SOLUTION

As an industry leader in Hazardous Chemical and Corrosive Service Valves, and with specific expertise in valves for the Chlor-alkali process, our CHEMFLOW Products team went to work on a solution to extend the lined butterfly valve life cycle in their cell effluent application. While collaborating with our client, it was determined that the current butterfly valve liner was failing due to elevated temperatures combined with electrolysis, causing rapid and excessive permeation of the disc liner. In the most extreme failures, the valve “trim inserts” were completely corroded away resulting in what the lined valve community calls an “empty lollipop”. Valves in this condition are rendered completely inoperable and incapable of isolating the process fluid.

To help address the issue, we brought in experts from UNP Polyvalves, a premier manufacturer of valves for corrosive applications, to spearhead our Engineered Solutions Team. The team’s focus quickly shifted to providing an improved life cycle in the harsh cell effluent process conditions that resulted in the rapid permeation of the existing valves. Soon after learning the application parameters and root cause analysis of the incumbent valve’s failure mode, UNP developed a custom solution in the CBR Series Lined Butterfly Valve.

The valve trim inserts are true to UNP’s already robust design, including Duplex SS trim inserts and ultra-thick PFA disc linings. The valve body itself remained as investment cast carbon steel, which is a significant upgrade to the industry standard ductile iron. The body liner was upgraded from the industry standard 3.5 mm thick to a full 8 mm thick and made from 3M Dyneon TFM-1600 isostatically molded material. While the standard butterfly valve product line could have provided a complete solution, the customer saw real value in our CBR design as a lifecycle extending feature.

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# RESULTS & CONCLUSION

## RESULTS

**1**

UNP developed and engineered the CBR Series valve to withstand the most demanding corrosive chemical applications.

**2**

The newly designed solution has delivered zero permeation related failures.

## CONCLUSION

**1**

Dramatically improved the customers' operational efficiency and overall life cycle.

**2**

CHEMFLOW Products stands out as a dependable partner, providing solutions with integrity.

# RESULTS

With no other solution available, UNP developed and engineered the CBR Series valve to withstand the most demanding corrosive chemical applications. Effectively solving the customer's previous issues with traditional lined-butterfly valve failures.

After more than 30 months in service, the customers' experience has been outstanding. Where the traditional valve technologies struggled to deliver 8 months of service between failures, the newly designed solution has delivered zero permeation related failures. This success has now been duplicated in over ten (10) additional installations proving the combination of increased liner thickness and upgraded trim insert materials has provided a consistent solution.

# CONCLUSION

Transitioning routine failures from 8 months to over two and half years (and still going), this approach of problem solving, technical expertise, and manufacturing capabilities has demonstrated a consistent commitment to building trust, addressing unique challenges, and offering reliable tailored solutions customers can depend on to dramatically improve the customers' operational efficiency and overall life cycle. As the industry grapples with similar issues, CHEMFLOW Products stands out as a dependable partner, providing not just valves but providing solutions with integrity.







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