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HEUMANN ENVIRONMENTAL

DUAL TWO-STAGE CYCLONE ASSEMBLY IN AN OXYCHLORINATION REACTOR

HIGH TAPS IN ACTION: MASTERING HIGH ABRASION CHALLENGES

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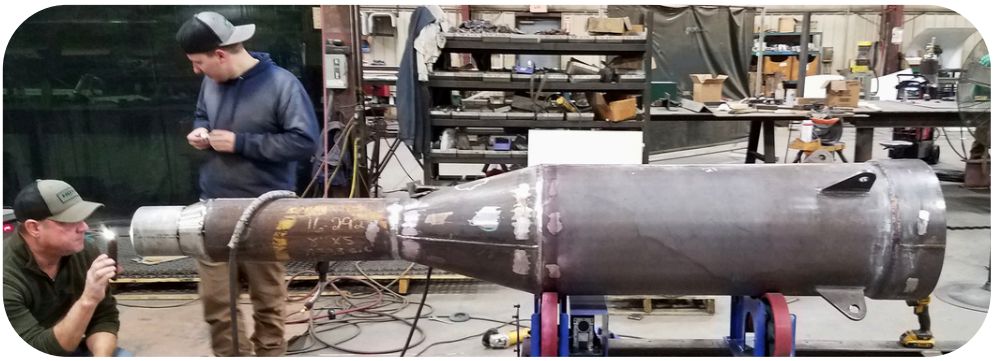

FLUID BED REACTORS

OXYCHLORINATION REACTOR CYCLONES

The abrasive nature of filtering particulate means that no cyclone can last indefinitely. Our goal is to delay the inevitable with clever engineering and superior materials while keeping operational costs in check. Nowhere is this more critical than in fluid bed reactors used for oxychlorination—where high temperatures, continuous operation, and aggressive catalyst flows demand exceptional resilience.

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THE CHALLENGE

In 2022, a leading U.S. supplier of PVC and VCM tasked Heumann Environmental with replacing a dual two-stage cyclone assembly nearing the end of its lifecycle in an oxychlorination reactor.

The challenge was to design a reliable replacement system that could endure the oxychlorination process, effectively remove catalysts, and operate continuously under high temperatures and pressures. The new reactor cyclones also needed to precisely match the existing components to ensure seamless integration without significant modifications, minimizing downtime.

SOLUTION PROVIDED

Using performance metrics and specifications from the current reactor cyclones as a starting point, Heumann Environmental designed and engineered new reactor cyclones with the goal of improving performance. Leveraging our experience with both refractory lining equipment and design for fluid bed reactors, our team focused on ensuring that the new cyclones met the rigorous demands of the oxychlorination process. Special attention was given coordinating with the end user to ensure seamless integration of the design into the current reactor, ensuring minimal downtime for installation.

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KEY CYCLONE SYSTEM FEATURES

SYSTEM SPECIFICATIONS

- DESIGN PRESSURE: +/- 5 PSIG
- DESIGN TEMPERATURE: 550 °F
- INLET FLOW RATE: 10,170 ACFM

MATERIAL OF CONSTRUCTION:

Known for its reliability in moderate to low-temperature settings, carbon steel SA516 Grade 70 is a staple in refineries, chemical plants, and power generation facilities. This material is revered in the pressure vessel industry for its durability and widespread use, making it the logical choice as the base material for the cyclone system.

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AT-A-GLANCE: BALANCING STRENGTH AND COST

- **Tailored Fit**

  Precision engineered to match existing reactor setup, minimize downtime, and reuse existing components.

- **SA516 Grade 70 Steel**

  The optimal balance of strength, thermal resilience, and value.

- **¾" Rescobond AA-22S Refractory Lining**

  Heat and abrasion-resistant lining to extend system life and avoid the need for specialty alloys.

- **Maximize Catalyst Return**

  The dual two-stage cyclone configuration with diplegs, splash plates, and trickle valves is designed to maximize catalyst separation and recovery while minimizing gas flow up the diplegs.

REFRACTORY LINING:

The reactor cyclones and diplegs were lined at strategic locations inside the equipment using 3/4" Rescobond AA-22S refractory, anchored by 3/4" x 14 ga. carbon steel hex mesh. This Rescobond refractory lining plays a crucial role in protecting the base metal from abrasion. By utilizing this lining, we optimized the use of cost-effective base steel materials, reducing the need for more expensive specialty metals and significantly enhancing overall cost efficiency.

DUAL TWO-STAGE CYCLONE CONFIGURATION

This dual two-stage cyclone configuration is engineered for optimal catalyst recovery. It includes two first-stage and two second-stage cyclones, each equipped with dipleg stubs, allowing for seamless integration with the customer-supplied diplegs and bracings. The first-stage cyclone is outfitted with a splash plate, while the second-stage cyclone features a partially shrouded trickle valve. This design enables in-bed discharge while preventing gas from flowing back up the diplegs. The configuration ensures superior particle separation and maximizes the return of catalysts to the fluid bed reactor, achieving peak performance in the oxychlorination process.

SMART DESIGN FOR CLEVER COST-SAVING MEASURES

Strategic Material Choices
Instead of opting for expensive specialty alloys, our combination of carbon steel reinforced with a refractory lining delivers durability and heat resistance with reduced material costs.

Installation Savings
Matched to the original reactor dimensions, the design integrated seamlessly with existing diplegs, bracings, and hangars—eliminating structural modifications, reducing waste, and accelerating installation.

RESULTS AND OUTCOMES

After a successful installation, the new reactor cyclone system is fully operational—enhancing catalyst removal and reliability while meeting the client's performance and cost expectations.

RELIABLE PERFORMANCE:

The system is designed to operate efficiently at high temperatures and pressures, maintaining optimal performance round the clock.

IMPROVED DURABILITY:

The combination of SA516 Grade 70 material and Rescobond Refractory lining will extend the system's lifespan, reducing the frequency of replacements.

COST-EFFECTIVENESS:

Minimized new fabrication by reusing equipment and leveraging efficient materials—maintaining quality while reducing cost.

SEAMLESS INTEGRATION:

Engineered for an exact fit, the cyclone system was installed without issue—supporting streamlined maintenance and long-term operational stability.

- TEMPERATURE – ABRASION
  PRESSURE – SURFACE FINISH

HIGH TAPS SOLUTIONS

High TAPS isn't just a category—it's a commitment to solving your toughest process challenges. When faced with abrasive flows, aggressive chemical exposure, and the need for seamless integration, standard solutions fall short. By combining advanced materials with expert design and fabrication, our High TAPS approach delivered rapid transition, robust performance, and long-term reliability. It's proof that when the stakes are high, precision-built, custom-engineered solutions aren't optional—they're essential.

WHY HEUMANN ENVIRONMENTAL?

At Heumann Environmental, we take a collaborative, tailored approach to ensure each solution aligns with your unique operational goals. With decades of combined experience, we anticipate challenges and deliver high-performance, cost-effective systems built for compliance, reliability, and durability.

Our custom-engineered designs reduce emissions, improve product recovery, and enhance sustainability, all while meeting regulatory requirements and optimizing efficiency.

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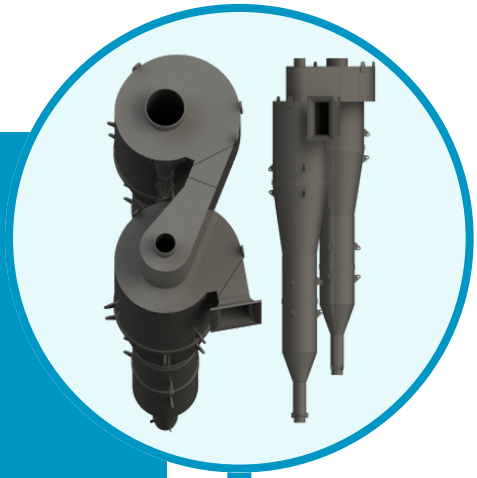

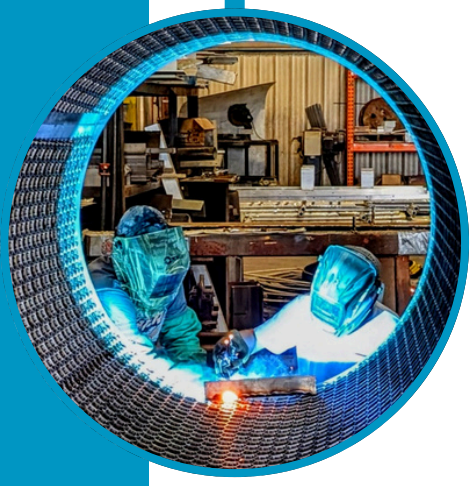

BEYOND OFF-THE-SHELF

EXPLORE MORE HIGH TAPS SOLUTIONS FOR EXTREME INDUSTRIAL CHALLENGES

Our ASME-certified fabrication facility adheres to AWS, IBC, and AISC standards with the ability to provide ASME or CE certifications as needed. We deliver solutions that meet the highest industry benchmarks across industries such as:

- OIL & GAS
- CHEMICAL PROCESSING
- PHARMACEUTICALS
- WOOD PROCESSING

DISCOVER HOW HIGH TAPS SOLUTIONS ARE ENGINEERED TO PERFORM.

LEARN MORE ABOUT HIGH TAPS →