

Emerson Extends Molecular Sieve Throughput in Ethanol Production Process

With the competitive environment in the ethanol industry constantly increasing, now is the time to focus on improving overall plant efficiency and reliability. Regardless of plant scale, the molecular sieve application presents a significant opportunity for such improvements.

Described by many as the bottleneck within the plant, this process presents a significant reliability concern. In surveying over twenty ethanol producers from around the world, some of the most commonly reported maintenance problems related to the molecular sieve process include:

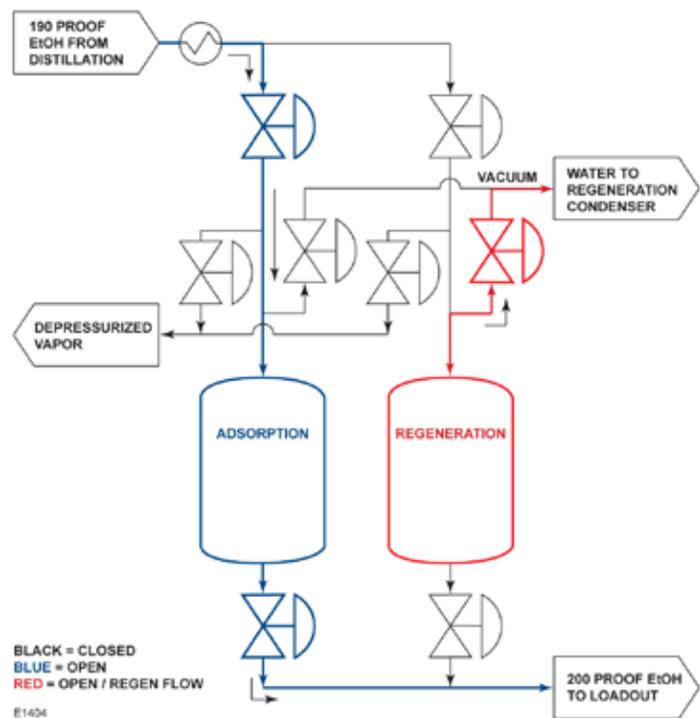
- Selection of oversized butterfly valves leading to poor control and reduced cycle life.
- Accelerated bearing wear, often seen after only a few months.
- Poor valve-actuator-positioner linkages leading to multiple mechanical failures in a high-cycle environment.
- Poor performance from low-quality valve positioners in both the adsorption and regeneration cycles.

Improper selection of control valve equipment can lead to large amounts of unscheduled downtime. During this downtime, a typical 50 million gallon per year ethanol facility can suffer over \$10,000 per hour in lost production.

Continued enhancement of this essential component of the ethanol process is critical to achieving plant output and revenue targets. The Fisher® digital control valve from Emerson brings these performance enhancements to the molecular sieve operation:

■ **Enhanced Process Availability** – The long-term reliability of the Fisher digital valve is demonstrated by rigorous testing, maintaining control valve performance in excess of 1 million cycles. This rigorous laboratory testing has been validated through multiple in-service replacements, leading customers to begin measuring valve cycle life in years, rather than months. The molecular sieve valve is equipped with the Fisher FIELDVUE™ digital valve controller that provides advanced diagnostics as a key factor in preventing costly downtime.

During a recent shutdown, one of the largest ethanol producers in the world removed four Fisher valves which were showing initial signs of mechanical wear. When asked about the performance, the customer claimed, “I’m looking forward to another ten years of service.”



■ **Increased Process Throughput** – The Fisher high performance butterfly valve uses an elastomer-based disc seal, which provides tight shutoff against the medium-pressure, superheated ethanol vapor, purified through the adsorption process. By eliminating lost motion in the valve drive train, process variability is reduced. Both attributes allow for increased throughput and higher quantities of on-spec product. The Fisher digital valve also utilizes a proprietary servo algorithm and adjustable tuning set to precisely control ethanol throughput. A large ethanol producer, after recently installing the appropriate Fisher solution, reported an immediate capacity improvement of over 2%.





Installed Fisher Solutions



High-cycle testing station



Improving Molecular Sieve Efficiency

The Fisher digital valve utilizes the industry-leading FIELDVUE digital valve controller to help increase ethanol throughput. The FIELDVUE instrument extends the amount of time spent at set point during the adsorption cycle and improves regeneration efficiency by:

- Optimizing tight shutoff seal integrity throughout the lifetime of the valve to ensure optimum ethanol purity exiting the beds.
- Increasing the response to set point at the beginning of the adsorption and regeneration cycle without overshoot.
- Controlling, precisely, the rate of opening to eliminate bead bed disturbance.
- Decreasing the deviation from set point during the pressure swing that's typically caused by bead swelling, bed compaction and release during regeneration.
- Enabling complete resin bead stripping during regeneration to ensure that beads do not saturate during adsorption and regeneration cycles.

Improving Molecular Sieve Reliability

The Fisher digital valve is state-of-the-art designed using Finite Element Analysis and proven with rugged and exhaustive testing. The high-cycle lab station, located in the Emerson Innovation Center in Marshalltown, Iowa, U.S., was developed to demonstrate product reliability against the most rigorous cycle requirements. The reliability of the Fisher digital valve for molecular sieve service was verified by over 1 million test cycles. Both the valve and actuator demonstrated remarkable seal and bearing integrity, which are key indicators of an extended service life capability.

Fisher Molecular Sieve Valve Construction

- NPS 2 to NPS 24 high performance butterfly valve
- 316SST chrome-plated disc for extended cycle life
- UHMWPE or reinforced PTFE seal technology
- PTFE-lined PEEK bearings for low friction operation and optimal cycle life
- Improved shaft pinning system ensuring easy disassembly and reassembly for maintenance
- Patented spring-loaded shaft design allowing horizontal or vertical actuator mounting flexibility
- Emission control PTFE live-loaded packing
- FIELDVUE DVC2000 HART® or DVC6200f (FOUNDATION™ fieldbus) digital valve controller
- FieldQ™ actuator for optimal cycle life and performance

Learn More

Improve molecular sieve reliability, ethanol quality and capacity. Contact the Emerson Process Management sales office in your area. Also, visit www.EmersonProcess.com/Fisher for additional information on control valves and instrumentation for the processing industries.

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