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## Upgrade your compressor antisurge control valves

Compressor “surge” is a low-flow phenomenon known to exist in “dynamic,” i.e., centrifugal and axial compressors found in petrochemical plants, liquefied natural gas (LNG) facilities and pipeline compressor stations. A simplified definition would describe surge as a series of rapidly occurring reversals of the pressurized gas flow.

Surging can cause serious damage to compressor internals. Thus, surge must be prevented by applying a suitable control strategy. In typical antisurge systems, a quick-acting valve recycles a portion of the compressor discharge flow back to the compressor suction. The compressor itself is thus always exposed to a gas volume sufficient to ensure forward flow of the gas.

While simple in terms of operation, this recycle application requires antisurge control valves to satisfy a multitude of factors. These include providing up to 40 decibels of noise abatement, high flow capacity and the ability to fully open the valve in less than two seconds. But, energy conservation also mandates operating large compressors close to their respective surge lines. This places strenuous control demands on valves with 24-in. (600-mm) strokes.

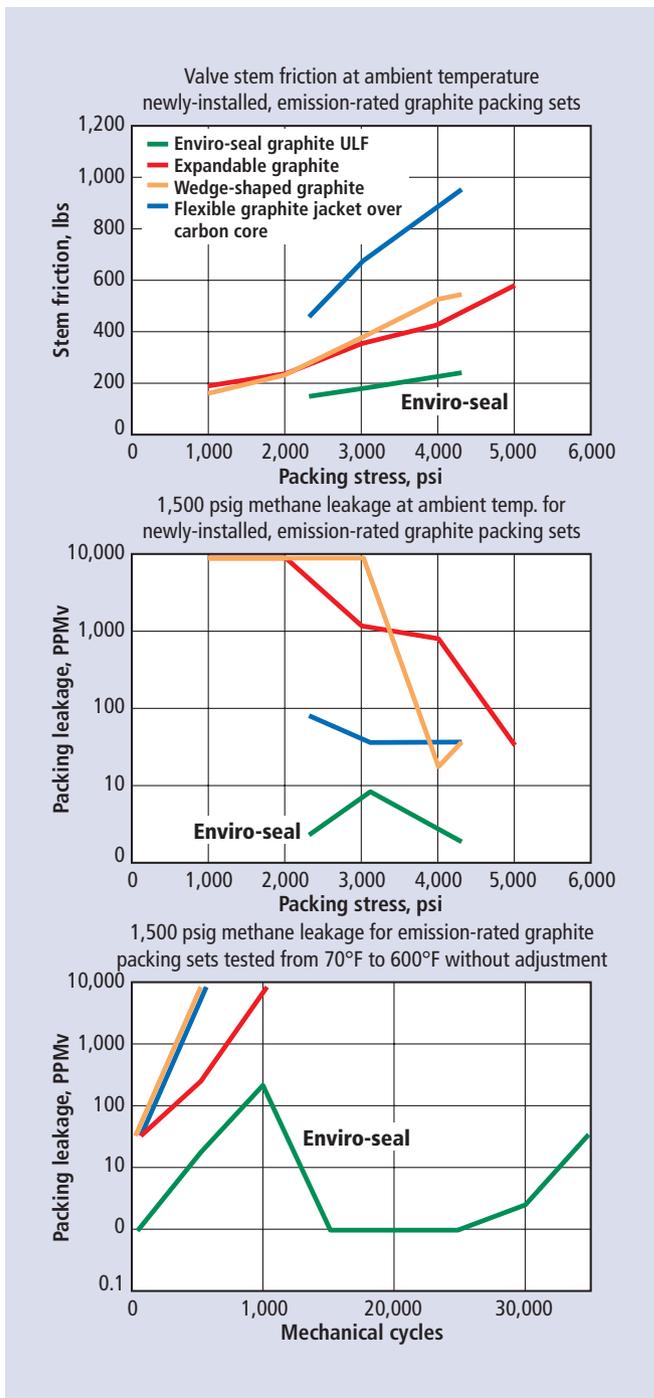
The importance of these valves is well understood by reliability-focused professionals. They not only pursue and implement the most up-to-date solution to protect the compression equipment, but also strive to maximize efficiency by safely operating compressors as close as possible to their surge limits.

**Improvements are possible.** While much advancement has been made in noise-attenuating technologies in recent years that address the potential for damaging noise and vibration, some of the most dramatic improvements can be traced to improved valve actuation and positioning technologies.

In many existing antisurge valves, old-style accessory configurations are used. Meeting the emergency stroking time requirements, old-style accessory designs often ignore how well the unit should, or could, be controlled when not in emergency conditions. Until recently, poor control strategies required dynamic process gas compressors to operate a safe and generous distance away from the surge line. In those installations, efficiency was not optimized and issues arose with valve stability during small step changes.

The picture brightens for facilities capitalizing on advancements in digital valve positioners and extensive dynamic testing by the Fisher Division of Emerson Process Management ([www.EmersonProcess.com/Fisher](http://www.EmersonProcess.com/Fisher)). New and existing antisurge valves can now be tuned to provide accurate response for fast, yet as needed small or large step changes, without impeding valve stroking speed.

Other benefits include ease of tuning during startup and commissioning. Older technology required accessories to provide the required stroking speed, which necessitated repeated tuning of bypasses and needle valves. This occasionally took as much as three days per valve.



**FIG. 1.** The graphite ULF system offers significant performance improvements.

With the latest implementation strategies, suitable adjustment of the pneumatics is all that is required during initial installation. This solution also eliminates the drawn-out process of tuning the accessories at least once a year as the equipment begins to degrade and drift.

### **Online monitoring and diagnostics.**

Using the latest technology, performance of recycle valves can also be monitored online, in real time. This allows the user to identify any potential issues without requiring a shutdown. With now seven- and eight-year turnaround intervals in modern ethylene plants, it often proves difficult to isolate potential valve performance issues. However, the latest software developments allow users to realize the expanded scope of predictive diagnostic software.

Valve-related software not only detects and identifies more than 200 fault conditions that can occur in control valves, but it can also spell out and recommend corrective action. This enables reliability professionals to actively preplan any necessary or available improvements or equipment upgrades well in advance of a shutdown, rather than reviewing each and every installation during a shutdown.

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**Improved valve packing systems.** Avoiding valve trouble also requires a packing system that has a managed stress level, ensures proper stem and shaft alignment, contains the correct amount of packing material and offers packing containment. As you link up with a competent surge control provider, be sure to consider the benefits of modern technology. Become familiar with the merits of Belleville washers to provide constant load over the life of the packing material, lined packing followers, an optimized amount of packing and antiextrusion rings that allow only a predetermined amount of packing deformation.

Fig. 1 shows potentially significant performance differences between modern graphite ULF and such traditional materials as expandable graphite, wedge-shaped graphite and flexible graphite over a carbon core. Get the right stuff when you upgrade. **HP**

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