



Sealing Kit for Valves

Patented

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CyberSeal's Sealing Kit for Valves Patented

Why use CyberSeal's sealing kit for valves?

No stem leakage –

- For specifying valves where the toxic nature of the process fluid requires a zero leakage stem seal.
- For preventing valve stem leakage and keeping a processing plant EPA compliant.
- For replacing or upgrading a valve that has been historically difficult to keep from leaking.
- For specifying a valve that is costly to fix or maintain because of its location. For example, a control valve in a pipeline or a valve that is difficult to access in a chemical plant.

No maintenance –

- CyberSeal's valve sealing kit does not need periodic adjustment, eliminating costly valve maintenance and maintenance training.
- There is no need to tighten packing with CyberSeal's valve stem seal. Over-tightening standard packing causes operational problems with the valve and wears out the packing sooner than normal. Under-tightening standard packing causes the packing to leak in a relatively short period of time, requiring further adjustment.

Long life –

- Lasts up to ten times longer than stem packing.
- If the stem seal begins to leak, it will be the barrier grease and not the process fluid that leaks. Barrier grease can be added, preventing unplanned shutdowns and extending seal life.
- Reduces valve packing repair cost and plant downtime.

Low friction –

- Reduces valve stem friction by more than 80%.
- Reduces seal and stem wear.
- Improves control valve stability by lowering static seal friction and therefore improves product quality, keeping processes in control and reducing product waste.

Predictive replacement (proactive seal failure notification) –

- The status of barrier grease stem seal leakage can be monitored at any time visually and/or electronically.
- Indication of barrier fluid leakage gives maintenance personnel time to plan for valve repair, avoiding unscheduled processing shutdowns.

Lower cost –

- Total cost (total cost = purchase cost + ownership cost) is lower for valves that have high-cycle rates, like control valves, because seal maintenance is not required and the seals last up to ten times longer.
- The seal can be used for rotary and sliding stem valves in zero leakage applications where higher-cost metal bellows seal valves are currently specified.
- Ownership cost is lower because the seals cost less, last longer, and are more reliable than bellows seals.

Retrofits into existing valves –

- Only minor modifications are usually required to retrofit CyberSeal's sealing kit into existing valves.

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Product summary

- CyberSeal's sealing kit for valves is a new type of barrier fluid seal that replaces standard valve packing and has several advantages over existing sealing products.
- Barrier fluid seals with a grease fitting, a lantern ring, and tandem packing have been used to seal hydrofluoric acid on rising-stem valves for many years. However, the seals require frequent maintenance (the addition of grease). CyberSeal's barrier fluid seal design totally eliminates this maintenance problem.
- CyberSeal's sealing kit changes the shaft-sealing problem from sealing the process fluid to sealing slightly higher-pressure barrier grease. The grease is maintained at a higher pressure than the process fluid. CyberSeal's sealing kit will not leak process fluid as long as there is grease in the reservoir.
- Sealing grease rather than process gas is at least 1000 times easier due to the high viscosity and excellent lubricity of greases.
- CyberSeal's sealing kit is capable of handling high pressures (up to 10,000 psi) and moderate temperatures (up to 500°F).
- CyberSeal's sealing kit has built-in redundant seals for failsafe reliability.
- CyberSeal's sealing kit can be used for both rotary and reciprocating valves.

Purchase savings:

- The cost of a valve using CyberSeal's sealing kit is significantly lower than the cost of a metal bellows seal valve.

Ownership savings:

- Unlike standard packing, periodic adjustment is not required for CyberSeal's sealing kit, saving on maintenance cost.
- CyberSeal's sealing kit lasts longer (up to ten times) and is more reliable than standard packing or metal bellows.
- The replacement cost of a sealing kit is much lower than the replacement cost of metal bellows seals.
- CyberSeal's sealing kit predicts when seal replacement is required and notifies operators (visually and electronically) before process fluid leakage occurs, reducing costly unscheduled repairs.
- CyberSeal's sealing kit has low static friction (stiction) resulting in low response level and providing more stable valve positioning, better process control, and reduced product waste.

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How it works

CyberSeal's sealing kit for valves fits into many valve packing box glands with very little modification. The existing valve packing flange is replaced with a new one and CyberSeal's sealing kit assembly is inserted into the packing box. For some valves, the packing gland bore may have to be machined larger. Krytox® barrier grease is injected into the annular packing gland volume after installation. Grease stored in the packing gland is pressurized by an annular intensifier to a higher pressure than the process fluid. The higher pressure grease acts as a barrier fluid, preventing process fluid leakage.

CyberSeal's sealing kit for valves uses an annular piston and sleeve intensifier to pressurize the barrier grease. The annular piston and sleeve intensifier surround the valve stem and inject barrier grease into a fluid ring between two dynamic seals (seals 3 and 5). The spring and process fluid pressure activate the piston and sleeve intensifier, always maintaining a higher barrier grease pressure than the process fluid pressure. Because the annular area exposed to the process fluid on the lower end of the intensifier is larger than the effective area exposed to the barrier fluid, the barrier fluid pressure is slightly higher (10 to 15 percent) than the process fluid pressure. The spring creates a biased force on the intensifier that is greater than the seal frictional force at low process fluid pressure, maintaining a higher barrier fluid pressure when the process fluid pressure is low. Since the Krytox grease is at higher pressure than the process fluid, there is no process fluid leakage to the atmosphere.

CyberSeal's sealing kit for valves changes the valve stem sealing problem from sealing a process fluid to sealing a grease. Because the viscosity of grease is high, and grease is an excellent lubricant, it is at least 1000 times easier to seal grease than process gas. This means the seals used in the system will last for an extended period of time – much longer than standard packing – without leakage, and are ideal for high-cycle valves such as control valves.

Unlike standard packing, CyberSeal's sealing kit does not require periodic adjustment or maintenance. And because the seals used in the system seal a lubricant and have only a small cross-section in comparison to packing, the valve stem friction is low. Low seal friction reduces seal wear and improves control valve performance. Standard packing requires periodic adjustment. If the packing is under-tightened, it will leak process fluid. If the packing is over-tightened, it can fail prematurely and cause valve stem damage. Over-tightening control valve packing can also adversely affect valve performance, influencing stiction, response, and control stability.

Barrier grease leakage can be measured visually or electronically, predicting when the seal is starting to fail. When the dynamic stem seals begin to leak grease after years of service, the piston and sleeve intensifier move up in the packing gland to compensate for the loss in grease volume. Movement of the sleeve extending from the bonnet can be measured visually with a visual indicator, or an electronic linear transducer with microprocessor can be connected to the sleeve to measure and monitor the movement electronically. Seal leakage information, measured by movement of the sleeve, can be communicated over a network to a host computer system. In this way, an information system can be developed for predictive seal replacement. When leakage is detected, grease can be added through the barrier fluid injector, delaying seal replacement and preventing unscheduled plant shutdowns.

Frequently asked questions about CyberSeal's sealing kit for valves

Can the barrier grease leak into the process fluid and contaminate the product?

It is highly unlikely that barrier grease can leak into the valve for several reasons. First, seals #4 and #5, the potential sources of barrier grease leakage, hold only 10 to 20 percent of the process fluid pressure and have a low probability of failure. Second, in the unlikely event these seals did leak, the barrier grease is contained in the chamber just below the piston and isolated from the process fluid, preventing the barrier grease from contaminating the process fluid. Third, when seal failure eventually occurs, one of the higher differential-pressure seals, for example seal #3, would most likely fail first causing all the seals in the system to be replaced.

What is Krytox grease?

Krytox grease is a product of DuPont. Krytox grease is a mixture of fluorinated oil and very small PTFE particles that thicken the grease. Krytox can be used effectively in low and high temperature applications (<-94° to >655° F) and has good anti-corrosion and anti-wear properties. And like PTFE, Krytox is virtually chemically inert. Krytox will not burn or support combustion, even in contact with 100% liquid or gaseous oxygen.

Can other barrier fluids besides Krytox grease be used?

Yes, other barrier fluids can be used. For best results, a barrier fluid that has a high viscosity and good lubricity for the valve operating temperature should be selected. Considerations, such as valve material chemical compatibility, seal material chemical compatibility, and process fluid compatibility and temperature should also be evaluated. Check with CyberSeal before changing from Krytox.

How is the total volume of barrier grease determined?

The total volume of the barrier grease in the valve bonnet is calculated based on an estimated leakage rate if the barrier grease does begin to leak. Enough volume is provided for leakage to occur over weeks. This time period allows for valve leakage identification and repair or the addition of barrier grease.