FLOWSERVE

Valtek® Survivor™

Advanced Erosion Control for Slurry and Flashing Applications

Experience In Motion

Extend valve life in extremely erosive and flashing applications

The Valtek Survivor control valve provides outstanding service life in extreme applications experiencing severe erosion due to flashing fluids that contain abrasive particulates. Process fluids that flash or outgas dramatically increase fluid velocities, resulting in severe erosion. The unique Survivor design stands up to near-sonic velocities and abrasive fluids, even in services containing corrosive fluids.

Engineered to last

Building on the solid performance of the popular Valtek Mark series of control valves, the Survivor incorporates special features that enable it to withstand the most severe applications.

- The **sweep angle** design significantly reduces erosion by making the flow turn gradually, rather than a sudden change in direction, which would increase erosion.
- The **clamped seat ring** design simplifies maintenance and extends service life. It eliminates the need for a cage, without introducing internal threads that will seize and make the seat ring difficult to remove.
- **Special packing configurations** provide extra protection in services where particulates could cause packing leaks.
- **Optional seat extensions** are available to protect tank walls and other downstream equipment from damaging jets associated with flashing.*
- **Optional ceramic trim** provides durable control in corrosive, flashing, slurry, high-velocity or other erosive applications.

Valtek Survivor control valve outfitted with Valtek VL-ES actuator and Logix 3800 positioner

**Flashing* is defined as when part of the liquid fluid flow turns to gas.

Built for the toughest applications

Since the mid-1980s, the Valtek Survivor valve has helped mining and refinery operators extend valve life under the harshest conditions. It is specifically engineered for applications that include aggressive erosion, corrosion and flashing.

Typical mining application — autoclave level control

- 20–25% flashing, resulting in sonic and even supersonic velocities
- 30–40% erosive crushed raw ore
- High concentration of sulfuric acid
- 61 bar (885 psi) inlet pressure; 50.5 bar (733 psi) pressure drop
- 270°C (518°F) inlet temperature

Typical refinery application — FCC tank bottoms

- Out-gassing of lighter hydrocarbons with near-sonic velocities
- Mixed hydrocarbons with erosive catalyst fines
- 8.6 bar (125 psi) inlet pressure; 6.3 bar (90 psi) pressure drop
- 360°C (680°F) inlet temperature

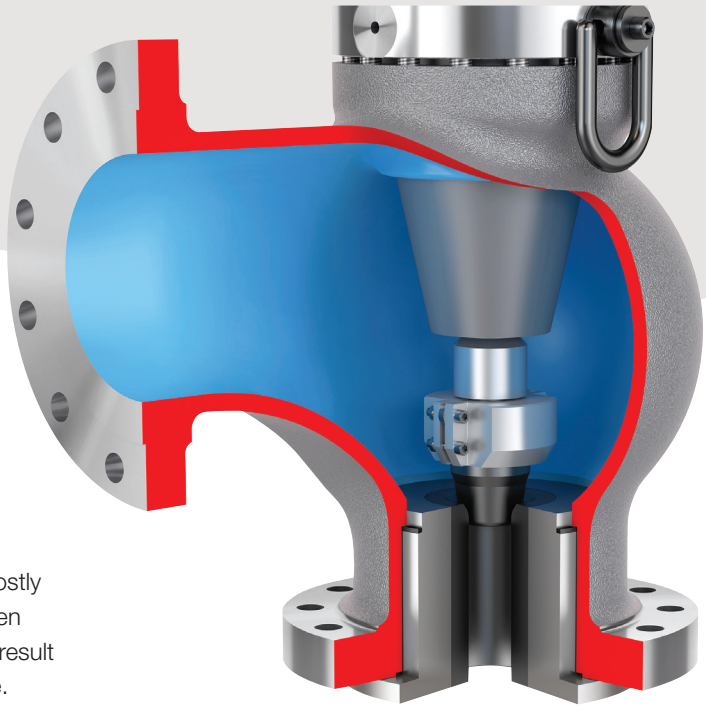
Specifications

Sizes	DN 25–350; NPS 1–14
Body form	Sweep angle
Pressure rating	PN 10–250; ASME 150–1500
End connections	Raised face flanged, RTJ
Packing	PTFE, graphite, AFPI, SafeGuard, SureGuard, customs available
Actuator types	Double-acting cylinder with fail-safe spring (25, 50, 100, 200, 300 square-in cylinder); electro-hydraulic
Positioners	Valtek®, beta pneumatic and electro-pneumatic; Logix series digital positioners
Shutoff	Metal seats: Class IV and V Ceramic seats: Class IV

Valtek Survivor valve installed in flashing slurry letdown service

Longer life through better erosion control

A valve is only as reliable as its weakest design element. Erosion, corrosion and flashing applications can take a costly toll. Every part of the Valtek Survivor control valve has been designed and refined to withstand these conditions. The result is a longer-lasting valve that helps you extend unit uptime.



Valtek Survivor valve cutaway depicting standard seat with ceramic plug and seat inserts

Velocity control

Engineered velocity control lowers wear rates and contributes to longer life.

- **Inlet —** The expansive gallery and sweep-angle design minimize erosion of critical metal surfaces by lowering inlet velocities and eliminating sharp turns and stagnant points.
- **Outlet —** The flow over (flow-to-close) design means only the plug tip and the seat ring inner surface are exposed to high velocities. All materials exposed to high velocities are hardened to maximize erosion resistance and extend service life.

Venturi seats

The Valtek Survivor valve features an extended Venturi seat to safely channel high-energy fluid through a hardened flow passage. This design protects the valve body from erosive damage caused by high velocities.

Longer-lasting packing

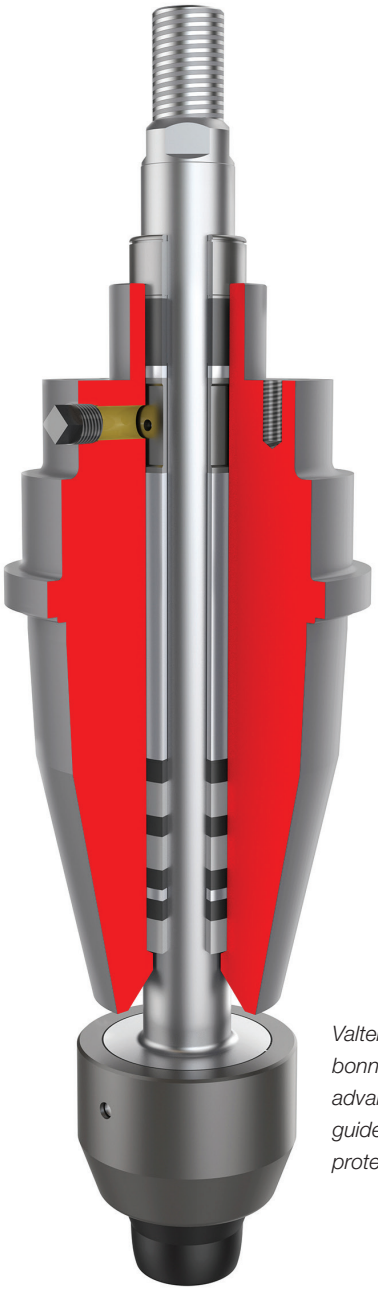
The Valtek Survivor valve has an exceptionally deep packing box that accommodates an extensive variety of packing configurations and prevents the process fluid from contacting the sealing packing set at the top of the bonnet. The standard dual packing arrangement, with a lubricator port, allows the lower packing set to protect the upper sealing packing set from particulate. The upper packing set is never directly exposed to process fluids, so packing life is greatly improved.

An optional wiper guide design further limits solids ingress into the packing box while cleaning the plug stem from buildup common to applications containing particulate.

Optional ceramic trim materials

The Valtek Survivor valve is available with a variety of solid ceramic trim components to maximize life in services that would quickly erode even the hardest metals. These include:

- Tungsten carbide
- Partially stabilized zirconia
- Silicon nitride
- Alpha sintered silicon carbide



Valtek Survivor bonnet with advanced wiper guide packing protection

Selecting the right materials for your application

Flowserve has spent decades developing and perfecting the ceramic trim options for the Valtek Survivor control valve. Many times harder and more resistant to both erosion and chemical attack than traditional valve materials of construction, ceramics can greatly extend valve service life. Flowserve's extensive experience can assist in guiding the user in selecting a suitable ceramic tuned for the application. A range of ceramics is available to meet the needs of:

- Erosion resistance
- Chemical compatibility
- Thermal shock
- Fracture resistance

Control stability

Actuator stiffness

Flowing over the plug (flow-to-close) can cause plugs to slam closed. Valtek Survivor valves are equipped with Valtek VL series actuators as standard. The exceptional stiffness of the Valtek VL actuator prevents damage from plug slamming, even when throttling close to the seat. This damage is common with diaphragm actuators that lack sufficient stiffness.

Characterized plugs

Characterized plugs enable reliable control without the need for cage guiding, which can bind or seize in slurry service, causing performance and maintenance issues. Standard thick stems with double top-stem guiding allow characterized plugs to be used despite the considerable loads generated by flashing services. These important features also lower loads on the packing, resulting in longer packing and guide life as well as reliable control.

VL-ES actuator with Logix 3800 positioner

The clamshell plug design simplifies replacement of worn ceramics by eliminating thread binding and strengthening the ceramic-to-stem connection.

Simple maintenance

Clamped seat ring

A unique clamped seat ring eliminates the need for a cage or threaded connections that could bind when exposed to process fluids. Disassembly is easy; unbolting the valve from the line releases the seat ring.

Fewer parts

For all its ruggedness, the Valtek Survivor valve is actually simply designed. Fewer components mean it is easy to work on when wear components need to be replaced.

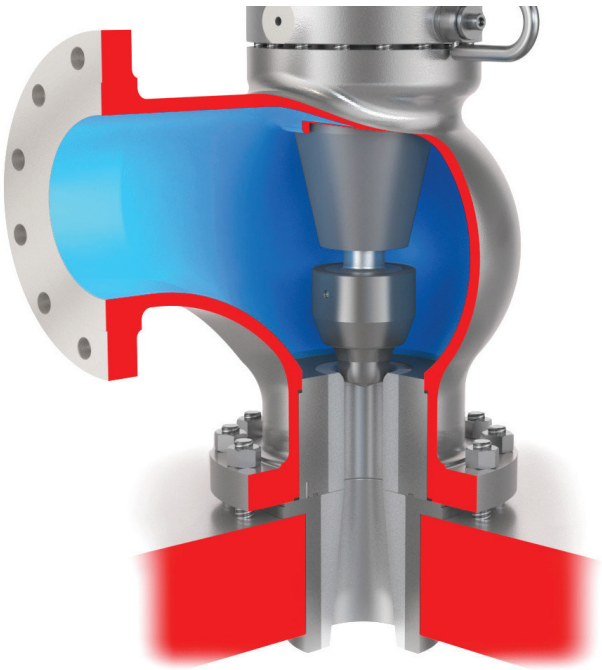
Customizing valves for extremely difficult applications

Seat extensions and diverging seats

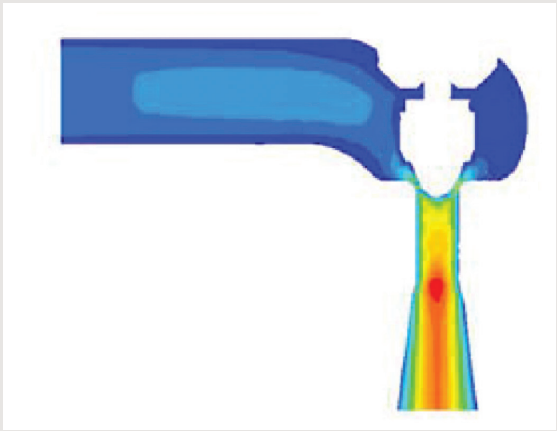
Downstream equipment or tank walls can be protected using optional diverging seats and seat extensions. Diverging seats provide better directional control of the fluid jets that result from flashing service. Seat extensions allow the hardened seat ring to contain the flashing fluid until it has passed the tank walls, protecting them from erosion.

Integrated solutions

As integrated parts of a let-down system, seat extensions and diverging seats can be customized for each specific application to reduce system equipment wear.



Valtek Survivor valve with diverging seat and seat extension



Protecting the whole system

When integrating Survivor into complex systems, optional CFD (computational fluid dynamics) can be used to provide better understanding and optimization of energy distribution patterns that can damage downstream equipment. Due to the complexity of modeling three-phase fluids under flashing conditions, end users will need to supply detailed system dimensions and operating parameters.

When and where you need us

Our network of manufacturing facilities, design centers of excellence, strategically located Quick Response Centers and customer on-site resources means customers never have to look far for support.

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