



Valtek[®] Multi-Z Axial Flow Anti-Cavitation Control Valve



Experience In Motion



Eliminate cavitation in high pressure drop applications

Operators in the power generation, oil and gas, and chemical industries are frequently confronted with extreme pressure differentials in their processes. To combat this, they need valves with continuous, steady-state flow curves with appropriate flow characteristics, long service life and low maintenance costs.

The Valtek® Multi-Z axial flow control valve eliminates cavitation often associated with high pressure drops. It is ideal for processes with entrained solids and in services where high rangeability is required.

Available in globe and angle configurations as well as a variety of standard materials, the Multi-Z valve:

- Effectively minimizes noise levels
- Passes solids up to 24.7 mm (1.0 in) without plugging
- Utilizes long strokes for finer control resolution

In addition to standard trims, a wide range of engineered trims are available with customized capacity and cavitation resistance for unusual or difficult applications.

Typical industries and applications

- All plants
 - Pump recirculation
 - High-pressure liquid letdown
- Power generation
 - Boiler feed pump recirculation
 - Seal pressure control
 - Feedwater start-up regulator
 - Water injection pump recirculation
 - Charge pump recirculation
- Oil refining
 - Glycol dehydrator letdown
 - Gas treater letdown
 - Feed charge pump
 - Hydrotreating sampling
 - Cold separator
 - Amine letdown

Confirmed performance and global support

Ideal anti-cavitation valve replacement: The Valtek Multi-Z valve comes with standard trims that have been confirmed through computational fluid dynamics (CFD) testing to match commonly accepted industry standard control valve flow capacities (Cv).

Global availability: The Multi-Z valve is available globally with production sites in Germany, India, Saudi Arabia and the U.S.

Prompt local support: Operators receive prompt engineering, sales and aftermarket support for the Multi-Z valve anywhere in the world.

Avoid costly safety recertification

Operators can avoid an expensive and time-consuming re-evaluation of safety relief systems in a maintenance of certification (MOC) review by choosing the Valtek Multi-Z valve with standard trim to replace existing equipment.

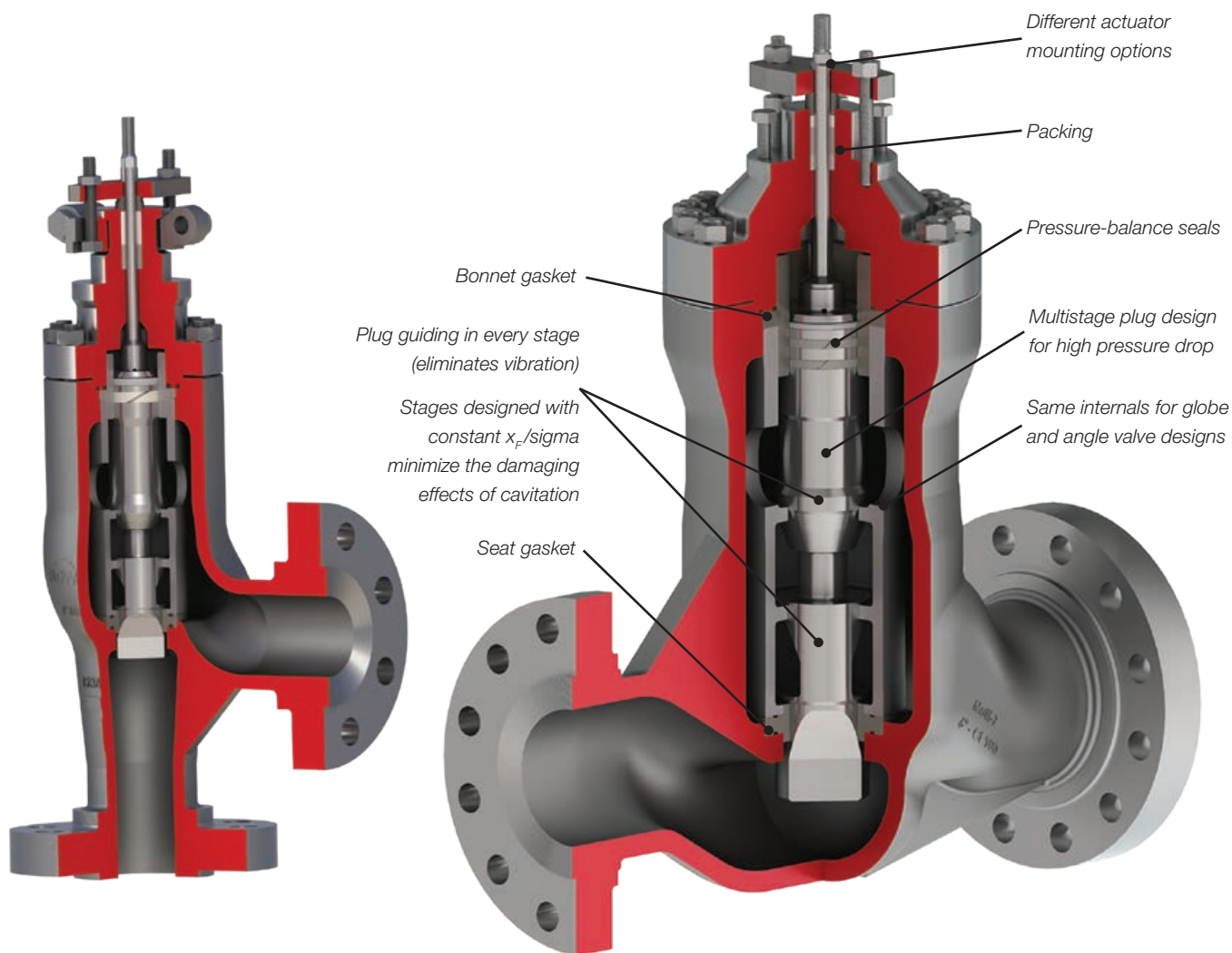
That's because verified valve flow capacities (Cv) of the Multi-Z valve exactly match commonly accepted industry standard capacities.

Solids and cavitation completely under control

Flowserve designed the Valtek Multi-Z valve to accommodate solids in liquid media, minimize high sound levels, tolerate high temperatures, eliminate cavitation formation and with a variety of materials to resist corrosion. The Multi-Z valve reduces cavitation by employing the following pressure drop mechanisms:

- Directional changes
- Frictional losses in small passages
- Mutual impingement of opposing streams
- Sudden expansion and contraction
- Turbulent mixing





Tailored to meet uniquely demanding performance requirements

- The Valtek Multi-Z valve features a multistage trim design that eliminates cavitation and cavitation noise, providing extended trim life.
- The Multi-Z valve is available with several staging options; three-, four-, five- and six-stage trims are available, depending on the severity of the cavitation.
- The axial flow design (where the flow moves parallel to the plug stem) utilizes large passage sizes, allowing passage of larger particulate compared to typical drilled hole or stacked disc designs.
- The Multi-Z valve's axial flow design provides superior rangeability. Long stroke lengths provide high throttling resolution not available in most cavitation-elimination designs. Trims are available with linear characteristic output or in equal percent when fine control at low openings is required.
- With a body available in both globe and angle configurations, and with a choice of carbon steel, stainless steel, chrome-moly steels and even high alloy nickel-based materials, the Valtek Multi-Z valve is suitable for a wide variety of applications. Custom options and configurations to meet highly unusual applications are also available upon request.

Superior cavitation control

Cavitation occurs when the pressure of a process medium temporarily drops below the vapor pressure and then rapidly recovers. Vapor bubbles form as the pressure drops below the vapor pressure and then collapse as the pressure recovers. As a result of cavitation, valve body walls and other components erode, degrading performance and shortening valve life.

The Valtek Multi-Z valve prevents cavitation by:

- Controlling the pressure drop as the process medium is directed through multiple trim stages (i.e., three to six, depending on the application)
- Ensuring the liquid pressure does not drop below the vapor pressure threshold

The CFD plot in Figure 1 illustrates the pressure drop relative to the Multi-Z valve trim. The trim design adheres to ISA-RP75.23.

The trim is available with linear and equal percent capacity over stroke position characteristics.

When the Multi-Z valve first opens, only the first stage opens; all downstream stages are held closed. This allows the seating surfaces to open wide while the pressure drop across the first stage is low, preventing seat damage. (See Figure 2, below.)

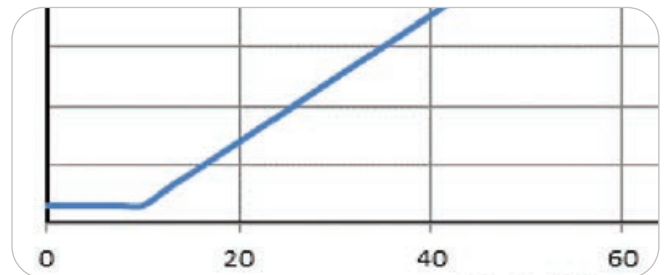


Figure 2: Flow curve

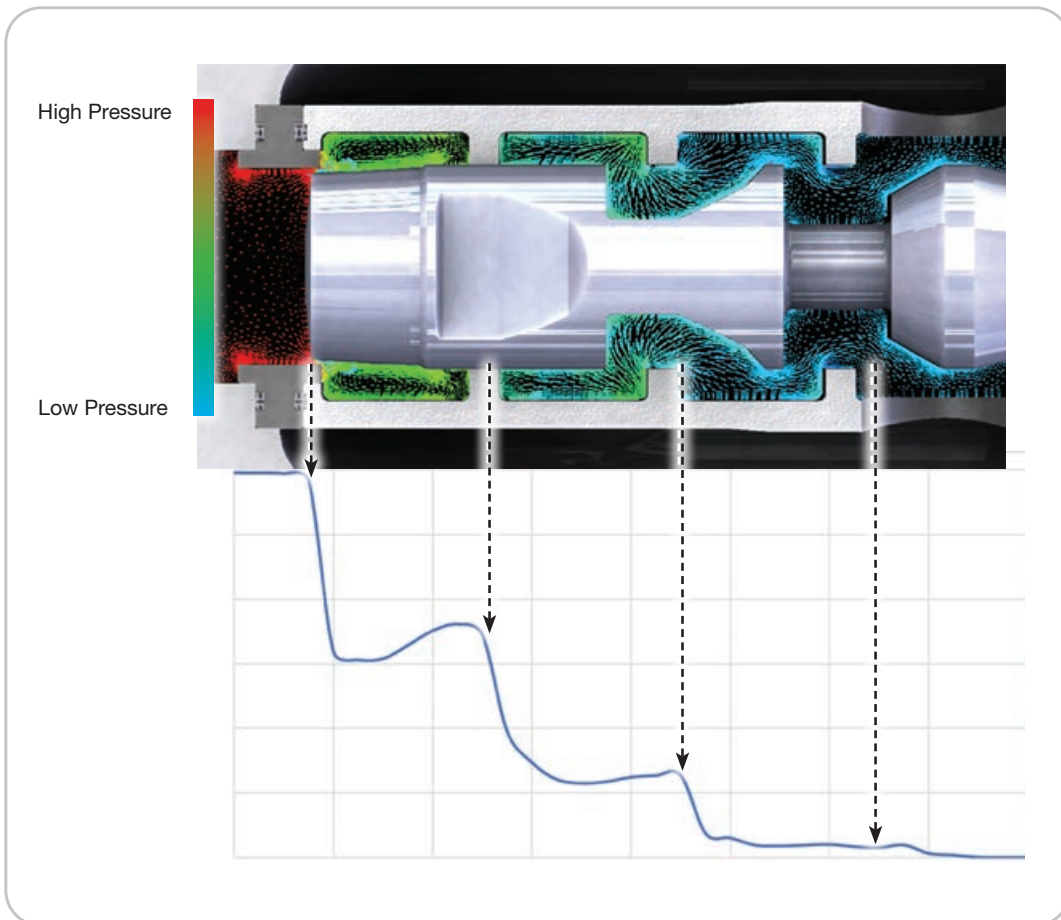


Figure 1: CFD analysis illustrates pressure drop across number of trim stages.

General specifications

| | |
|----------------------------|---|
| Size | ANSI NPS 1 to 8 |
| Body type | Angle, globe |
| Pressure class | Class 300 to 2500 |
| Body materials | Carbon steel, chrome moly, low-temperature carbon steel, stainless steel and duplex stainless steel <i>NACE-compliant materials available</i> <i>Contact factory for custom material requirements.</i> |
| End connections | <ul style="list-style-type: none"> • Buttweld • Raised face integral flange |
| Trim type | Multistage trim from three to six stages |
| Shutoff | ANSI Class IV and V |
| Flow characteristic | <ul style="list-style-type: none"> • Linear and equal percent • Custom capacity curves available |
| Actuator | <ul style="list-style-type: none"> • Piston types VL, VL-C and VL-ES • Spring diaphragm type KP (stainless steel) • Spring diaphragm type FlowAct (carbon steel) • Electric • Hydraulic • Manual operator |
| Certifications | <ul style="list-style-type: none"> • PED (EU), TR CU (Russia), CRN (Canada), TSG (China) • Fugitive emissions ISO 15848-1 • SIL 3 capable |

Packing options

Multi-Z valves are available with standard and live-loaded packing options to meet a broad range of temperature and pressure requirements.

| Packing Name | Packing Material | Maximum Temperature | Maximum Pressure at Ambient Temperature | Certifications |
|------------------------------------|--------------------|---------------------|---|---|
| | | °C (°F) | bar (psi) | |
| PTFE | PTFE | 220 (428) | 400 (5,800) | None |
| Graphite SAS 225 | Graphite | 550 (1,020) | 500 (7,250) | None |
| SureSeal HP LL | PTFE/Graphite | 280 (536) | 280 (4,061) | ISO 15848 Class A (Class B; Class C) TA-Luft |
| Graphite SAS402-4 (BAM) | Graphite | 550 (1,020) | 500 (7,250) | BAM certificate for oxygen service |
| SureSeal HP 325 LL | PTFE/Graphite | 220 (428) | 400 (5,800) | TA-Luft |
| SureGuard™ XT (fire-safe optional) | Perfluoroelastomer | 288 (550) | 276 (4,000) | None |
| PTFE/Graphite V-ring | Spring-loaded PTFE | 220 (428) | 325 (4,713) | BAM certificate for oxygen service |

Note: Metal bellows seal option available upon request

Standard trim designs

Trim designs are available as unbalanced or pressure-balanced, with the number of stages optimized for specific service conditions.

| Number of Stages | Valve Size | | Travel | | Minimum Controllable Capacity | Trim A | | | | | Trim B | | | | | Trim C | | | | |
|------------------|------------|-----|--------|-------|-------------------------------|--------|---------------|-------|-----------------|------|--------|---------------|-------|-----------------|------|--------|---------------|-------|-----------------|------|
| | ANSI | DIN | mm | in | | Cv | σ_{MR} | F_i | Max Particulate | | Cv | σ_{MR} | F_i | Max Particulate | | Cv | σ_{MR} | F_i | Max Particulate | |
| | | | | | | | | | mm | in | | | | mm | in | | | | mm | in |
| Three-stage | 1 | 25 | 10 | 0.394 | 0.12 | - | - | - | - | - | - | - | - | - | 2 | 1.041 | 0.96 | 2.16 | 0.09 | |
| | 1.5 | 40 | 15 | 0.591 | 0.29 | - | - | - | - | - | - | - | - | - | 3.8 | 1.041 | 0.96 | 2.13 | 0.08 | |
| | 2 | 50 | 15 | 0.591 | 0.29 | - | - | - | - | - | - | - | - | - | 9 | 1.041 | 0.96 | 6.35 | 0.25 | |
| | 3 | 80 | 25 | 0.984 | 0.59 | - | - | - | - | - | - | - | - | - | 20 | 1.041 | 0.96 | 8.86 | 0.35 | |
| | 4 | 100 | 40 | 1.575 | 0.92 | - | - | - | - | - | - | - | - | - | 34 | 1.041 | 0.96 | 11.31 | 0.45 | |
| | 6 | 150 | 60 | 2.362 | 1.49 | - | - | - | - | - | - | - | - | - | 65 | 1.041 | 0.96 | 14.40 | 0.57 | |
| | 8 | 200 | 60 | 2.362 | 2.10 | - | - | - | - | - | - | - | - | - | 135 | 1.041 | 0.96 | 24.72 | 0.97 | |
| Four-stage | 1 | 25 | 10 | 0.394 | 0.09 | 1 | 1.008 | 0.99 | 0.34 | 0.01 | 1.4 | 1.012 | 0.99 | 0.50 | 0.02 | 1.7 | 1.018 | 0.98 | 0.73 | 0.03 |
| | 1.5 | 40 | 15 | 0.591 | 0.23 | 1.9 | 1.008 | 0.99 | 0.34 | 0.01 | 2.5 | 1.012 | 0.99 | 0.46 | 0.02 | 3.2 | 1.018 | 0.98 | 0.72 | 0.03 |
| | 2 | 50 | 15 | 0.591 | 0.23 | 4.5 | 1.008 | 0.99 | 0.95 | 0.04 | 6 | 1.012 | 0.99 | 1.34 | 0.05 | 7.5 | 1.018 | 0.98 | 2.08 | 0.08 |
| | 3 | 80 | 25 | 0.984 | 0.49 | 10 | 1.008 | 0.99 | 1.35 | 0.05 | 13 | 1.012 | 0.99 | 1.86 | 0.07 | 16.5 | 1.018 | 0.98 | 2.96 | 0.12 |
| | 4 | 100 | 40 | 1.575 | 0.75 | 16.5 | 1.008 | 0.99 | 1.63 | 0.06 | 22 | 1.012 | 0.99 | 2.29 | 0.09 | 28 | 1.018 | 0.98 | 3.61 | 0.14 |
| | 6 | 150 | 60 | 2.362 | 1.23 | 34 | 1.008 | 0.99 | 2.41 | 0.09 | 45 | 1.012 | 0.99 | 3.39 | 0.13 | 56 | 1.018 | 0.98 | 5.26 | 0.21 |
| | 8 | 200 | 60 | 2.362 | 1.72 | 70 | 1.008 | 0.99 | 3.93 | 0.15 | 90 | 1.012 | 0.99 | 5.50 | 0.22 | 115 | 1.018 | 0.98 | 9.12 | 0.36 |
| Six-stage | 1 | 25 | 10 | 0.394 | 0.07 | 0.8 | 1.004 | 1.00 | 0.35 | 0.01 | 1 | 1.006 | 0.99 | 0.44 | 0.02 | 1.4 | 1.012 | 0.99 | 0.72 | 0.03 |
| | 1.5 | 40 | 15 | 0.591 | 0.18 | 1.4 | 1.004 | 1.00 | 0.32 | 0.01 | 1.8 | 1.006 | 0.99 | 0.41 | 0.02 | 2.5 | 1.012 | 0.99 | 0.67 | 0.03 |
| | 2 | 50 | 15 | 0.591 | 0.18 | 3.5 | 1.004 | 1.00 | 0.93 | 0.04 | 4.5 | 1.006 | 0.99 | 1.22 | 0.05 | 6 | 1.012 | 0.99 | 1.96 | 0.08 |
| | 3 | 80 | 25 | 0.984 | 0.37 | 7.5 | 1.004 | 1.00 | 1.27 | 0.05 | 9.5 | 1.006 | 0.99 | 1.65 | 0.06 | 13 | 1.012 | 0.99 | 2.72 | 0.11 |
| | 4 | 100 | 40 | 1.575 | 0.58 | 12 | 1.004 | 1.00 | 1.50 | 0.06 | 16 | 1.006 | 0.99 | 2.04 | 0.08 | 22 | 1.012 | 0.99 | 3.34 | 0.13 |
| | 6 | 150 | 60 | 2.362 | 0.95 | 25 | 1.004 | 1.00 | 2.23 | 0.09 | 35 | 1.006 | 0.99 | 3.23 | 0.13 | 45 | 1.012 | 0.99 | 4.95 | 0.19 |
| | 8 | 200 | 60 | 2.362 | 1.33 | 50 | 1.004 | 1.00 | 3.53 | 0.14 | 65 | 1.006 | 0.99 | 4.86 | 0.19 | 91 | 1.012 | 0.99 | 8.71 | 0.34 |



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