PRESSURE RELIEF / SURGE ANTICIPATOR CONTROL VALVE

INTRODUCTION

This specification covers the design, manufacture, and testing of 2-1/2 in. (65 mm) through 18 in. (450 mm) Control Valves

PART 1 - GENERAL

1. Standard products - use the same manufacturer for multiple units of same type.

2. "Tying" of equipment into packages for the purpose of thwarting competition shall be considered to be in non-compliance with these specifications.

3. Manufacturers shall price items under different subsections or sections separately.

PART 2 - PRODUCTS

2.01 PRESSURE RELIEF / SURGE ANTICIPATOR CONTROL VALVE

A. FUNCTION

The Pressure Relief / Surge Anticipator Control Valve shall control high pressures and power failure surges by bypassing system pressure that exceeds the high-pressure control setting and also by opening a preset amount when sensed pressure decreases below a preset minimum in anticipation of a surge.

B. MATERIALS

1. Material Specification for the Pressure Relief/Surge Anticipator Control Valves Main Valve as follows:

Component	Material
Body & Cover	Ductile Iron-ASTM A536 (standard) *Cast Steel or Bronze (optional)*
Main Valve Trim	Stainless Steel *Other Materials Available (optional)*
Disc Retainer	Cast Iron
Diaphragm Washer	Cast Iron
Seat	Stainless Steel *Other Materials Available (optional)*
Stem, Nut and Spring	Stainless Steel
Seal Disc	Buna-N® Rubber
Diaphragm	Nylon Reinforced Buna-N® Rubber
Internal Trim Parts	Stainless Steel: Bronze; Brass
End Detail	Flanged (2” – 18”) Threaded (2” – 3”) Grooved (2” – 8”)
Pressure Rating	Class 150 lb. (250psi Max.) Class 300 lb. (400psi Max.)
Temperature Range	Water to 180°F
Any other wetted metallic parts	Stainless Steel; Bronze; Brass
Coating (optional)	Fusion Bonded Epoxy Coating (Interior and Exterior); ANSI / NSF 61 Approved / AWWA coating specifications C116-03.
Optional Accessories	*Anti-Cavitation Trim.*

C. MANUFACTURE

1. Main Valve:

   a. The main valve shall be hydraulically operated, single diaphragm actuated, globe or angle pattern. The valve shall consist of three major components; the body with seat installed, the cover with bearing installed and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating the operating pressure from line pressure. Packing glands, stuffing boxes and/or rolling diaphragm technology will not be permitted and there shall be no pistons operating the main valve or pilot controls. No fabrication or welding shall be used in the manufacturing process. Y-pattern valves shall not be permitted. Main valve shall comply with NSF/ANSI Standard 61 and certified lead free to NSF/ANSI 372 as a safe drinking water system component.

2. Main Valve End Connections:

   a. End Connections for control valve shall be flanged per ASME/ANSI B16.42, Class 150 or Class 300 (2-1/2" thru 18") or Threaded End Connections (2-1/2" thru 3") or Grooved End Connections (2-1/2" thru 8").

3. Main Valve Body:

   a. No separate chamber(s) below the diaphragm shall be allowed between the main valve cover and body. No fabrication or welding shall be used in the manufacturing process.

   b. The valve shall contain a resilient, synthetic rubber disc with a rectangular cross-section contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. No O-ring type discs (circular, square, or quad type) shall be permitted as the seating surface. The disc guide shall be of the contoured type to permit smooth transition of flow and shall hold the discs firmly in place. The disc retainer shall be of a sturdy one-piece design capable of withstanding opening and closing shocks. It must have straight edge sides and a radius at the top edge to prevent excessive diaphragm wear as the diaphragm flexes across this surface. No hours-glass shaped disc retainers shall be permitted, and no V-type or slotted-type disc guides shall be used.

   c. The diaphragm assembly containing a non-magnetic 303 stainless steel stem; of sufficient diameter to withstand high hydraulic pressures and shall be fully guided at both ends by a bearing in the main valve cover and an integral bearing in the valve seat. The valve seat shall be a solid, one-piece design and shall have a minimum five-degree taper on the seating surface for a positive, drip-tight shut off. No center guides shall be permitted. The stem shall be drilled and tapped in the cover end to receive and affix such accessories as may be deemed necessary. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating the operating pressure from the line pressure. No bolts or cap screws shall be permitted for use in the construction of the diaphragm assembly.

   d. The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The diaphragm's center hole for the main valve stem must be sealed by the vulcanized process or a rubber grommet sealing the center stem hole from the operating pressure. The diaphragm must withstand a Mullins Burst Test of a minimum of 600 X per layer of nylon fabric and shall be cycled tested 100,000 times to insure longevity. The diaphragm shall not be used as the seating surface. The diaphragm shall be fully supported in the valve body and cover by machined surfaces which support no less than one-half of the total surface area of the diaphragm in either the fully opened or fully closed position. Bellofram type rolling diaphragms shall not be permitted.

   e. The main valve seat and stem bearing in the valve cover shall be removable. The cover bearing and seat in the 6" and smaller size valve shall be threaded into the cover and body. The valve seat in the 8" and larger size valves shall be retained by flat head machine screws for ease of maintenance. The lower bearing of the valve stem shall be contained

concentrically within the seat and shall be exposed to the flow on all sides to avoid deposits. To insure proper alignment of the valve stem, the valve body and cover shall be machined with a locating lip. No “pinned” covers to the valve body shall be permitted. Cover bearing, disc guide and seat shall be made of the same material. All necessary repairs and/or modifications other than replacement of the main valve body shall be possible without removing the valve from the pipeline. The valve shall be designed such that both the cover assembly and internal diaphragm assembly can be disassembled and lifted vertically straight up from the top of a narrow opening/vault. Y-pattern valves shall not be permitted. The seat shall be of the solid one-piece design. Two piece seats or seat inserts shall not be permitted. Packing glands and/or stuffing boxes shall not be permitted.

4. Pilot Control System:

   a. High Pressure Surge Relief Pilot: The pressure relief/sustaining pilot shall be a direct-acting, adjustable, spring-loaded, diaphragm valve designed to permit flow when controlling pressure exceeds the adjustable spring setting. The pressure relief pilot control is normally held closed by the force of the compression in the spring above the diaphragm and it opens when the pressure acting on the underside of the diaphragm exceeds the spring setting. Pressure relief pilot control sensing shall be upstream of the pilot system strainer so accurate control may be maintained if the strainer is partially blocked. Pilot shall comply with NSF/ANSI 61 and certified lead free to NSF/ANSI 372 as a safe drinking water system component.

   b. Low Pressure Pilot: The pressure reducing pilot control shall be a direct-acting, adjustable, spring-loaded, normally open, diaphragm valve designed to open when the sensed pressure falls below the control setting and close when pressures are normal. The pilot control is held open by the force of the compression on the spring above the diaphragm and it closes when the delivery pressure acting on the underside of the diaphragm exceeds the spring setting. The pilot control system shall include a fixed orifice. The pilot control shall have a second downstream sensing port which can be utilized to install a pressure gauge. Pilot shall comply with NSF/ANSI 61 and certified lead free to NSF/ANSI 372 as a safe drinking water system component.

   c. Flow Limiter: The pilot system shall contain an adjustable flow limiter to limit main valve travel during low pressure opening without affecting high pressure relief valve travel. This unique hydraulically operated flow limiter has two calibrated orifices, each positioned proportional to valve position, to vary main valve cover control chamber operating pressure. The hydraulically operated flow limiter regulates flow through main valve pilot systems based on valve position to prevent main valve exceeding predetermined flow. A manually adjustable orifice provides reference valve position. Valve position is linked to an integral sensor orifice. When valve position is below reference set-point of the hydraulically operated flow limiter, it allows unhindered pilot system flow. As valve position rises and approaches the reference control setting, the hydraulic flow limiter limits pilot system outward flow to build pressure in the main valve control chamber. Pressure continues to build until flow equals and hydraulically locks the valve at the flow limiters valve position set-point. Mechanical flow limiters shall not be permitted.

   d. The pilot controls shall be hard piped, or bracket mounted to the main valve.

   e. The pilot control system shall include a strainer, an adjustable closing speed and all required control accessories, equipment, control tubing and fittings. The pilot system shall include isolation ball valves on sizes as standard equipment. A full range of spring settings shall be available in ranges of 0 to 400 psi. Pilots to be manufactured by control valve manufacturer.

   f. The Pressure Relief / Surge Anticipating Control Valve shall include a visual position indicator assembly on all sizes, as standard equipment.

5. Material Specification for Pilot Control System:

Component	Material
Flow Limiter	

Flow Limiter Body	Brass
Flow Limiter Adjustment Tube	Brass
Flow Limiter O-Rings	Buna-N
Flow Limiter Stem	Stainless Steel
Pilots (High & Low)	
Body & Cover	Bronze, Low Lead CuZn21Si3P or UNS C87850
	Stainless Steel (optional)
Pilot Trim	Brass & Stainless Steel 303
Pilot(s) rubber	Buna-N
Pilot(s) Connections	FNPT
Pressure rating	400 psi Max.
Temperature Range	Water to 180°F Max.
Control Tubing	Copper
	Stainless Steel (optional)
	Flexible Braided Stainless Steel (optional)
	Polyethylene (optional)
Control Fittings	Brass
	Stainless Steel (optional)

6. Factory Assembly:

   a. Each control valve shall be factory assembled.

   b. The Quality Management System of the factory shall be certified in accordance with ISO 9001: 2008.

   c. For all control valves, the factory assembly shall include the complete main valve, pilot valve(s), and all associated accessories and control equipment.

   d. During factory assembly the control valve manufacture shall make all necessary adjustments and correct any defects.

7. Nameplates:

   a. Each Control Valve and associated pilot(s) shall be provided with an identifying nameplate.

   b. Nameplates, depending on type and size of control valve, shall be mounted in the most practical position possible, typically on the inlet side of the valve body.

   c. Nameplates shall be brass and a minimum of 3/32” thick, ¾” high and 2-3/4” long.

   d. Pertinent control valve data shall be etched or stamped into the nameplate. Data shall include control valve Catalog number, function, size, material, pressure rating, end- connection details, type of pilot controls used and control adjustment range.

8. Factory Testing:

   a. Each control valve shall be factory tested.

   b. The Quality Management System of the factory shall be certified in accordance with ISO 9001: 2008

   c. Tests shall conform to approved test procedures.

   d. The standard factory tests shall include a valve body and cover leakage test, seat leakage test and a stroke test. Control valves and pilot valves, in the partially open position, with both ends closed off with blind flanges (valves) and pipe plugs (pilots), shall be subject to an air test. The applied air pressure shall be 90 psi minimum. All air pressure tests shall be applied for a minimum of 15 minutes. No visible leakage is permitted through the valve seat,

the pressure boundary walls of the valve body, valve cover, pilot body, pilot cover or the body-cover joint.

e. Control valve manufacturer shall, upon request, offer additional testing, such as high-pressure hydrostatic testing, positive material inspection testing, ferrite testing, liquid penetration inspection testing, magnetic particle examination testing and radiographic examination testing.

D. PRODUCT DATA

1. The following information shall be provided:

   a. Control Valve manufacturer's technical product data.

   b. Control Valve manufacturer's Installation, Operation and Maintenance manual (IOM).

2. Provide specific information on all optional features specified above and confirm that these items are provided.

3. The valve manufacturer shall be able to supply a complete line of equipment from 2-1/2" through 16" sizes and a complete selection of complementary accessories and equipment.

4. The control valve manufacture shall provide a computerized cavitation analysis report which shows flow rate, differential pressure, and percentage of valve opening. Cv factor, system velocity, and if there will be cavitation damage.

5. The manufacturer must also provide valve noise levels according to International Standards over the flow range of the valve. Noise calculation program will be specific to the control valve manufacturer, and based upon tests conducted by a third party, independent laboratory and will be able to provide dBA values for octave band frequencies between 31.5 and 8000 Hz. (Valves with KO trim calculations are per another industry accepted standard without the octave band frequency noise levels). Generic, third party noise calculation for non-specific control valves will not be accepted.

PART 3 - EXECUTION

A. DELIVERY, STORAGE AND HANDLING

1. Delivery

   a. The Manufacture shall deliver the control valves to:

      Address, City, State, Zip. Attention: Phone number:
      Call 48 hours prior to delivery.

   b. Upon delivery, control valves to be unloaded and stored by the

      Owner, district or municipality.

2. Packing and Shipping

   a. Control valves specified herein shall be factory assembled. Any control valve appurtenances, accessories, parts and assemblies that are shipped unassembled shall be packaged and tagged in a manner that will protect the equipment from damage and facilitate the final assembly in the field.

   b. Care shall be taken in loading, transporting and unloading to protect control valves, appurtenances, or coatings from damage. Equipment shall not be dropped. All control valves and appurtenances shall be examined before installation and no piece shall be installed which is found to be defective. Any damage(s) shall be repaired.

   c. Prior to shipping, the control valves and all associated accessories shall be acceptably packaged and covered to prevent entry of foreign material.

   d. All packaged control valves shall be shipped, remain covered and stored on site until they are

installed and put into use.

B. FIELD TESTING

1. A direct factory representative shall be made available by the equipment supplier for start-up service, inspection and necessary adjustments.

The Control Valve manufacturer shall warrant the valve to be free of defects in material and workmanship for a period of three years from date of shipment provided the valve is installed and used in accordance with all applicable instructions. Electrical components shall have a one-year warranty.

The control valve shall be **CLA-VAL Company Model No. 52-03,** Pressure Relief / Surge Anticipator Control Valve, as manufactured by Cla-Val Co., Costa Mesa, CA 92627-4416.

END OF SECTION