HYDRAULIC PRESSURE MANAGEMENT CONTROL VALVES

INTRODUCTION

This specification covers the design, manufacture, and testing of 2 in. (50 mm) through 10 in. (250 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 HYDRAULIC PRESSURE MANAGEMENT CONTROL VALVES

A. FUNCTION

Pressure Management Control Valve shall be a 100% hydraulically operated pressure reducing control valve. Valve shall automatically throttle to reduce a higher incoming pressure and maintain an accurate and constant lower downstream pressure(s) regardless of changing flow rate and/or inlet pressure. If downstream pressure increases above the pilot spring setting, the valve shall close. Valve shall allow for two adjustable downstream set points. One downstream high pressure set point is selected for high flow demand and a second downstream low pressure set point is selected for low flow demand. This dual set point arrangement shall allow for reduction in water loss by not over pressurizing the system during times of low demand, while providing adequate pressure during high flow or fire flow demand. The transition point at which the pressure changes based on the flow shall be adjustable to fine tune the valve to system requirements. The transition rate of change between the two set points shall be a smooth hydraulically dampening to gradually increase or decrease pressure to prevent downstream piping system surges.

Valve shall not utilize an orifice plate or other restriction in the main line as part of the valve control. It shall operate only under hydraulic control without electrical or electronic (powered or battery operated) controls.

Existing Pressure Reducing Valves from the same manufacturer shall be easily retrofitted to the Pressure Management Control Valve without removal of the valve from the line.

B. MATERIALS

1. Material Specification for the Pressure Reducing Control Valves Main Valve as follows:

Component	Material
Body & Cover	Ductile Iron-ASTM A536 *Cast Steel or Bronze (optional)*
Main Valve Trim	Bronze, Stainless Steel *Other Materials Available (optional)*
Seat	Bronze, Stainless Steel *Other Materials Available (optional)*
Stem, Nut and Spring	Stainless Steel
Seal Disc	Buna-N® Rubber
Diaphragm	Nylon Reinforced Buna-N® Rubber *Other Materials Available (optional)*

Internal Trim Parts	Stainless Steel: Bronze; Brass
End Detail	Flanged (1-1/2" – 36") Threaded (1" – 3") Grooved (1-1/2" – 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	Fusion Bonded Epoxy Coating (Interior and Exterior); ANSI / NSF 61 Approved / AWWA coating specifications C116-03.
Optional Accessories	*Opening & Closing Speed Controls, Isolation Valves, Gauges, Anti Cavitation Trim, Etc.*

C. MANUFACTURE

1. Main Valve:

   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.

   a. 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.

   b. The diaphragm assembly containing a non-magnetic 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.

   c. 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.

   d. 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.

2. Pilot Control System:

   a. The dual outlet pressure reducing pilot control shall be a direct-acting adjustable, spring loaded, normally open, diaphragm valve designed to permit flow at predetermined pressure set points when controlled pressure is less than the spring setting. The pilot control system shall include separate adjustments for setting the high pressure, low pressure, and flow rate (based on valve position) at which pressure increases or decreases between set points. It shall have an integral bias chamber which allows switching between the low and high pressure set points.

   b. Separate external bias chambers, either above or below the pilot shall not be allowed. The pilot control system shall incorporate a stem valve that either blocks or allows upstream pressure into the pressure reducing pilot control internal bias chamber for switching between high and low set point pressures. The switching between low and high set point pressures shall be hydraulically dampened to prevent downstream pressure surges. Two separate pilot controls with no dampening shall not be allowed.

   c. The high flow pressure reducing control shall have an adjustable setting of 15-75 PSI Maximum. The low flow pressure reducing control shall have an adjustable low pressure setting up to 30 psi below the high pressure set point.

   d. The pilot system adjustments shall only require simple tools to make changes and allow for changes to be made to the flow switch point without resizing an orifice plate, readjusting a restriction in the line, or reprogramming electronic control.

   e. The pilot control system shall include a strainer and a fixed orifice closing speed. No variable orifices shall be permitted. All pilots to be manufactured by control valve manufacturer.

3. Material Specification for Pilot Control:

Component	Material
Body & Cover	Bronze, Low Lead CuZn21Si3P or UNS C87850 *Stainless Steel (optional)*
Pilot Trim	Brass & Stainless Steel 303
Rubber	Buna-N®
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)*

4. 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.

5. 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.

6. 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 1" through 48" 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.

PART 4 – LINK2VALVES™ CONTROL VALVES SERVICE ASSET MANAGEMENT

A. GENERAL FUNCTION

A maintenance scheduling software package is to be provided with the control valves supplied. This software shall be available to be run on mobile devices, available on either Google or Apple app sites and will be synchronized with a custom website portal. The software will allow for picture taking, geo-locating, and detailed service records to be maintained and available both on a website and remotely on a hand-held device.

B. STORAGE

Hosting servers are to be secure and maintained in the valve supplier’s own servers and facility, not a third-part location. The program is to be custom developed for automatic control valves by the control valve manufacturer and must be able to prove a minimum of 3,000 valves in the database in order to be considered.

C. Software is to be Link2Valves™ by Cla-Val Company.

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. 98-06,** Hydraulic Pressure Management Control Valve, as manufactured by Cla-Val Co., Costa Mesa, CA 92627-4416.

END OF SECTION