ELECTRONIC CONTROL VALVES

INTRODUCTION

This specification covers the design, manufacture, and testing of 1 in. (25 mm) through 36 in. (900 mm) Electronic 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 ELECTRONIC CONTROL VALVES

A. FUNCTION

The Electronic Control Valve shall be capable of controlling downstream pressure, rate of flow, upstream pressure sustaining, tank level control (altitude and modulating), valve position, blending, pressure management or select combinations of any of these applications. Solenoid pilot controls equipped onto the electronic control valve are actuated by electrical signals received from SCADA and/or a local VC-22D electronic valve controller. The solenoid pilots either add or relieve line pressure from the cover chamber of the control valve, causing it to open or close, ensuring the process variable signal follows the set-point command signal. This enables remote control over the electronic control valve operations. The process variable signal would come from a flow meter, pressure sensor or other rapid fluctuating process. The electric solenoid pilot controls can also be combined with hydraulic or electronic motorized pilot controls to create dual function, or fail-safe capability. Upon receiving the remote setpoint command from SCADA or a local command from the electronic valve controller, the electron valve shall modulate and maintain the desired setpoint value. When the feedback signal deviates from the setpoint, the appropriate opening or closing solenoid on the valve will pulse. As the feedback signal approaches the setpoint, this on/off pulse time will gradually decrease to smoothly modulate the valve to setpoint. When the feedback signal is within a programmable dead band, the opening and closing solenoids will lock the cover and the electronic valve will maintain position.

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	*Position Indicator, Position Transmitter, Limit Switch, Opening & Closing Speed Controls, Check Feature, Isolation Valves, Gauges, Anti Cavitation Trim, Etc.*

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 be certified by NSF/ANSI Standard 61 as a safe drinking water system component.

2. End Connections:

   a. End Connections for control valve shall be flanged per ASME/ANSI B16.42, Class 150 or Class 300 (1-1/2" thru 36") or Threaded End Connections (1" thru 3") or Grooved End Connections (1-1/2" 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 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 retainer 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. The pilot control shall be through two direct acting two-way solenoid pilot valves controlled by an external power source. The pilot control system shall include strainers and solenoid manual by-pass valves. The pilot control system shall utilize copper control tubing and brass fittings. The solenoid pilot valves either add or relieve line pressure from the cover chamber of the main valve, causing it to open or close as directed by the electronic controller. Solenoids shall have NEMA IV enclosures.

5. Material Specification for Solenoid Pilot Controls:

Component	Material
Body	Brass B283 (standard) *303 Stainless Steel (optional)*
Pilot Trim	Brass & 303 Stainless Steel
Seals and Disc	NBR
Core and Plugnut	430F Stainless Steel
Core Springs	302 Stainless Steel
Shading Coil	Copper
Disc-Holder	CA
Core Guide	CA
Connections	FNPT
Pressure rating	400 psi Max.
Temperature Range	AC: Water to 125°F Max. DC: Water to 104°F Max.
Power Supply	120VAC / 60 Hz (standard) *Other AC Voltages (optional)* *Other DC Voltages (optional)*
Enclosure	NEMA Type 1, General Purpose, Watertight (standard) *Other NEMA Types, including Explosion proof (optional)*
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 1" through 36" 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. 131-01,** Electronic Control Valve, as manufactured by Cla-Val Co., Costa Mesa, CA 92627-4416.

END OF SECTION