



SECTION 40_XX_XX PUMP CONTROL VALVES

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Submit detailed product data and descriptive literature including dimensions, weights, headloss data, pressure rating, and materials of construction.
- B. Provide shop drawings which clearly illustrate the general arrangement of the equipment and cross-sectional views of the components.
- C. Submittals are to be included with the bid to demonstrate compliance to these specifications.

1.02 QUALITY ASSURANCE

- A. Supplier shall have been manufacturing electric motor actuated pump control valves with built-in mechanical check device for a period of at least ten (10) years.

PART 2 - PRODUCTS

2.01 SmartCHECK PUMP CONTROL VALVE

- A. The pump control valve shall be APCO SmartCHECK Pump Control Valve, Electric Motor Operated with Built-In Check Valve as manufactured by DeZURIK, Inc.
- B. SmartCHECK Pump Control Valve shall consist of a main valve assembly, torque unit and electric motor operator, completely assembled, tested and ready for field installation and wiring. Valve size shall be [specify size].
- C. The valve shall function to control surges associated with the starting and stopping of pumps.
- D. Function:
 1. The valve shall open slowly upon receipt of open signal after the pump has been started and has come up to pressure.
 2. Upon receipt of close signal, the valve shall close slowly against the running pump. After the valve has fully closed, a valve-closed limit switch shall turn off the pump.
 3. Any time the valve is open and there is a power failure or other condition during which the valve outlet pressure exceeds valve inlet pressure, the valve shall close quickly and independently of the motor operator to prevent excess backflow through the pump. A valve-closed limit switch, independent of the electric operator and activated by the valve shaft, shall turn off the pump.

Specify for throttling pump control only:

4. The valve shall throttle in an intermediate position in response to a 4-20 mA input signal.

Optional, specify when the application requires a hold open feature:

- E. A hold open feature shall be provided to open the valve up to 10%, allowing reverse flow for back flushing, priming a pump or draining the system for repairs. For sizes 4"-12", the electric motor operator shall be equipped with extra limit switches and control circuitry to drive the valve open through the torque unit. Valve sizes 14"-20" shall be equipped with a bottom mounted oil-filled hydraulic cylinder with a manual hand pump to open the valve.

2.02 CONSTRUCTION

- A. The valve body shall be designed and constructed per AWWA Standard C508 "Swing Check Valves for Waterworks Service" and shall have a full waterway. Valve shall have a K-Factor of less than or equal to 1.0 for lowest energy cost during pump operation. Valves with globe, wye or angle style bodies or any style of valve that does not have straight-through full waterway are not acceptable.
- B. Valve disc design shall be internally pressure balanced to ensure positive closure upon emergency flow reversal. Valves that expose one end of the shaft to atmosphere such that the valve is biased to open when pressure is applied to the entire disc are not acceptable. Valve designs incorporating springs to facilitate stop check closing action are not acceptable. Limiting the open disc position to ensure closure is not acceptable.
- C. The valve disc shall be securely connected to the ductile iron disc arm by a rugged double clevis hinge that eliminates pivoting and assures even load distribution during closing. The double clevis hinge shall include a minimum of two stainless steel pins that secure the disc to the disc arm and provide a controlled connection. Single point disc connections are not allowed.
- D. The disc seat shall be renewable ultra-high molecular weight polyethylene (UHMW-PE), retained by a stainless steel follower ring and stainless steel screws. The replaceable body seat shall be ASTM A276 Type 316 stainless steel. The disc seat shall seal against the body seat by compression. Interference seating is not acceptable.
- E. Pivot shaft shall be heavy duty one-piece ASTM 564 Type 630, 17-4PH stainless steel. The pivot shaft shall have an integral retainer to prevent axial shaft movement. The pivot shaft shall have O-ring seals on both ends. An adjustable external lever and weight shall be provided to accelerate disc closure upon loss of pumping pressure.
- F. A lever and weight with an air cushion cylinder shall be provided to minimize slam upon emergency closure. The air cushion shall be totally enclosed. The cylinder shall have an anodized aluminum alloy cap, head and barrel. The bottom cylinder head shall be hinged to follow the change of angular force as the lever rises and lowers. The primary closing speed of the air cushion cylinder is to be field adjustable by means of a color-coded micrometer type control valve. Control valve to have a set screw lock to secure final setting accuracy.
- G. The valve body, disc and cover shall be constructed of ductile iron conforming to ASTM A536 with integral flanges faced and drilled to ANSI B16.1 Class [125] [250]. The body shall be one piece. Valves with multiple body pieces are not acceptable. Valve shall be inherently self-cleaning and have a flow area of not less than 100% of its nominal pipe size.
- H. The valve shall have a top access cover to allow inspection, repair or replacement of internal parts without removing the actuator from the valve, without removing the valve from the line or disturbing the adjacent piping.

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- J. The valve shall have a top access cover to allow inspection, repair or replacement of internal parts without removing the actuator from the valve, without removing the valve from the line or disturbing the adjacent piping.
- K. The valve shall be equipped with a limit switch actuated by the valve shaft lever assembly to signal when the valve disc has moved to the closed position. Limit switch shall be DPDT, with contacts rated at 10 amps (continuous) and NEMA 4, 13 and IP67 enclosure. Limit switch shall be Allen-Bradley 802T-DTP or equal. Valves which do not have direct limit switch indication of the disc position, independent of the electric operator, are not acceptable.

Optional bottom mounted buffer:

- L. A bottom mounted buffer, consisting of a high-pressure oil-filled hydraulic cylinder and buffer rod shall permit free opening, and positive controlled closure of the disc. The oil hydraulic buffer rod shall make contact with the disc during the final 10% of closure to control the disc until closed. An adjustable collar shall be provided on the buffer rod to adjust the starting position of valve control between 90% closed and fully closed, according to the hydraulic requirements of the pumping system. The buffer rod shall be ASTM A582 Type 303 stainless steel.
- M. The final closure speed shall be adjustable by means of a color-coded micrometer type control valve. The micrometer type control valve must have a locking set screw to secure final setting. The Oil Reservoir shall be ASTM A240 Type 316 stainless steel. Hydraulic hoses are to be S.A.E. certified.

2.03 TORQUE UNIT

- A. A torque unit shall convert the input torque from the electric motor operator into characterized, high torque output to the valve shaft. The torque unit shall utilize a heavy duty, dual lever design to distribute operating forces evenly and minimize wear. The main body and drive yoke shall be ASTM A536 ductile iron.
- B. There shall be an air gap between the torque unit and the valve body to facilitate inspection and to isolate valve packing from the torque unit. Torque unit shall be capable of being inspected, removed and repaired without removing the valve from the pipeline or opening the valve body. If the torque unit were removed from the valve body, the valve shall continue to function as an air cushioned swing check valve.
- C. In the event of loss of pump flow or anytime the outlet pressure exceeds the inlet pressure, the torque unit shall not interfere with disc closure, regardless of whether the SmartCHECK Pump Control Valve is used for open-close or throttling service.
- D. The torque unit shall be characterized to provide variable disc travel speed as the valve opens or closes, minimizing hazardous surge. When the valve starts to open, the disc travel is slow and accelerates as the valve continues to open. During valve closing the disc travel is fast and decelerates as the valve closes.

2.04 ELECTRIC MOTOR OPERATOR

- A. The valve shall be equipped with a multi-turn electric motor operator suitable for [open-close] [throttling] pump control.
1. The motor operator shall be sized by the valve manufacturer to positively close the valve against the maximum differential pressure generated at the pump shut-off head of [] psi with a downstream static system pressure of [] psi. The minimum time for (1) full stroke (full closed to full open, or full open to full closed) of the valve shall be [] seconds.
 2. The motor operator shall be in conformance with AWWA C540 "Standard for Power-Actuating Devices for Valves and Sluice Gates". Operator shall have a NEMA 4 enclosure. Controls shall include limit switches, reversing starter(s), control transformer, local-off-remote selector switch, local open-close pushbuttons, status lights, manual handwheel with hand-auto lever and visual position indicator. Motor operator controls shall be suitable for operation with [voltage/cycles/phase] power source.

Specify for open-close pump control:

- B. Motor operator controls shall include a stepping timer module that allows the valve stroking time to be increased for the entire or any portion of the valve travel. The start and stop point of the stepping mode shall be manually adjustable for any portion of the valve stroke. The on- and off-time intervals within the stepping mode shall be manually adjustable between 1 and 30 seconds.

Specify for throttling pump control:

- C. Motor operator controls shall include a positioner module that shall permit the valve to throttle in an intermediate position in response to a command input signal of 4-20 mA.

Optional pump and control valve interface:

2.05 ECB-CP ELECTRONIC PUMP AND SmartCHECK PUMP CONTROL VALVE INTERFACE

- A. The Pump and Control Valve Interface for Pump Control Valves shall be DeZURIK ECB-CP.
- B. The DeZURIK ECB-CP shall provide control between the SmartCHECK Pump Control Valve and the pump, to minimize pressure surges in the system when the pump starts or stops. The DeZURIK ECB-CP shall properly sequence and control the pump and pump control valve start-up and shut-down procedure, providing both visual and electronic status outputs for operating personnel. The DeZURIK ECB-CP shall protect the pumping system from damage due to mechanical or power failure.

The DeZURIK ECB-CP shall be pre-wired and include an integral programmable valve controller to sequence the pump and SmartCHECK Pump Control Valve during all modes of operation. The DEZURIK ECB-CP shall be pre-programmed for most common pump control applications. The DEZURIK ECB-CP shall be easy to wire and adjust. The DEZURIK ECB-CP shall include the following features:

1. Sequence timers
 2. Local visual indication of pump and control valve status
 3. Displays time for system to build pressure and for valve to open
 4. Contacts for remote or automatic start signal
 5. Local pump start and pump stop buttons
 6. Local emergency stop button
 7. Automatic shutdown of pump in emergency situations
 8. Terminal block connections for electric motor operator controls, valve limit switch, pump starter relay, remote automatic contact, pressure switch
 9. LOR switch for remote or local operation
- C. The DEZURIK ECB-CP shall include automatic recognition of common fault conditions and shall provide proper fault response sequencing to the SmartCHECK Pump Control Valve and pump starter as well as visual and electronic fault notification to operating personnel.
- D. The integral programmable valve controller shall be housed in a NEMA 4X fiberglass enclosure with polycarbonate window, gasketed door, continuous stainless steel hinge, stainless steel twist/latch door fasteners, and padlockable door hasp.
- E. The DEZURIK ECB-CP shall include alarms, adjustable timers, system indicators, providing local visual indicators for both normal operation and alarm conditions.
- F. The DEZURIK ECB-CP shall include an externally mounted three position "Local-Off-Remote" switch to provide local or remote pump start/stop operation. Externally mounted pump start and pump stop buttons shall be provided for local operation. The DEZURIK ECB-CP shall be supplied with contacts for remote start, a pressure switch and a valve limit switch.
- G. The DEZURIK ECB-CP shall require a minimal amount of field wiring.
- H. The pump and control valve interface shall be manufactured and supplied by the pump control valve manufacturer. The pump and pump control valve interface and the pump control valve shall be set up and tested as a complete assembly in the valve manufacturer's facility.

PART 3 - EXECUTION

3.01 Installation

- A. Install equipment in accordance with manufacturer's written instructions and approved submittals. Purchaser must specify at time of order if the valve will be installed in horizontal or vertical flow-up position.

3.02 Manufacturer's Field Service

- A. SmartCHECK Pump Control Valve is to be tested as a complete assembly by the manufacturer in their factory.
- B. Warranty: Valve shall be warranted by the manufacturer for defects in materials and workmanship for a period of two years (24 months) from date of shipment.
- C. Manufacturer's authorized representative shall be present at the jobsite for assistance during equipment start-up and to train owner's personnel in the operation, maintenance and troubleshooting of the equipment provided.