

SECTION 05140 - MISCELLANEOUS VALVES

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing miscellaneous valves as indicated, complete and operable, including accessories and operators.

1.2 SUBMITTALS

- A. The following shall be submitted in compliance with Section 01300.

1. Shop Drawings

- a. Manufacturer's catalog data.
- b. Manufacturer's installation instructions.
- c. Manufacturer's certification that products comply with the indicated requirements.

2. OWNER's Manual

- a. Manufacturer's catalog data.
- b. Manufacturer's installation and operations instructions.
- c. Manufacturer's maintenance procedures.
- d. List of special tools.

PART 2 - PRODUCTS

2.1 BALL VALVES (6-inch and larger)

A. Construction

- 1. Except as otherwise indicated, ball valves in sizes 6-inches and larger shall comply with ANSI/AWWA C507, with cast iron, ductile iron, or cast steel bodies, support legs or pads, flanged ends, and shall be designed for velocities up to 35 fps, temperatures up to 125 degrees F, and design pressures of 250 psi.
- 2. The balls shall be fabricated of cast iron, ductile iron, or cast steel, and designed for shaft- or trunnion-mounting, with tight shut-off, single or double seat, and full bore.

3. The valves shall be rubber- or metal-seated, with stainless steel or monel shafts, and shall include at least one thrust bearing.
4. Ferrous surfaces of valves 6-inches and larger, where contact with water is indicated, shall be epoxy-coated conforming to Section 04100.

B. Operators

1. Except as otherwise indicated, ball valves shall have manual operators with handwheel, position indicator, and 2-inch square operating nut.

2.2 BALL VALVES (4-INCH AND SMALLER)

- A. Except as otherwise indicated, ball valves in sizes 4-inch and smaller shall have manual operators with lever.
- B. Ferrous surfaces of valves where contact with water is indicated shall be epoxy-coated conforming to Section 04100.
- C. Ball valves up to 1-1/2-inches in size shall have bronze or forged brass 2 or 3 piece bodies with ends threaded and shall be designed for a pressure rating of not less than 300 psi.
- D. Valves 2-inch to 4-inch in size shall have bronze forged brass or steel 2 or 3 piece bodies with flanged ends and shall be designed for pressure rating of 150 psi.
- E. The balls shall be fabricated of solid brass, chrome plated bronze, or Type 316 stainless steel, with full openings.
- F. The valve stems shall be of the blow-out proof design, and fabricated of bronze or Type 316 stainless. Seats shall be of Teflon or Buna-N.

2.3 PLASTIC BALL VALVES

- A. Plastic ball valves designed for use with corrosive fluids shall be fabricated of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), or polyvinylidene flouride (PVDF), as recommended by the manufacturer for use in the service indicated.
- B. Valves shall have manual operators except as otherwise indicated.
- C. Plastic ball valves shall have union ends or flanged ends conforming to ANSI B16.5, Class 150, except as otherwise indicated.
- D. Ball valves shall have full size ports and Teflon seats.
- E. Body seals, union O-ring seals, and stem seals shall be Viton.
- F. Valves shall be suitable for a maximum working pressure of 150 psi at 73 degrees F for PVC.

2.4. SWING CHECK VALVES (3-INCH AND LARGER)

- A. Except as otherwise indicated, swing check valves designed for water, sewage, sludge, and general service shall be of the outside lever and spring or weight type, complying with AWWA C508, and full-opening; valves shall be designed for a water working pressure of 150 psi and shall have a flanged cover piece designed to provide access to the disc.
- B. Corrosive surfaces of valves, 4-inch and larger, intended to be in contact with water, shall be epoxy-coated complying with Section 04100.
- C. The valve body and cover shall be fabricated of cast iron conforming to ASTM A126, with flanged ends conforming to ANSI F16.1, or mechanical joint ends, as indicated.
- D. The valve disc shall be fabricated of cast iron, ductile iron, or bronze conforming to ASTM B62.
- E. The valve seat and rings shall be fabricated of bronze conforming to ASTM B62 or B148, or of Buna-N.
- F. The hinge pin shall be fabricated of bronze or stainless steel.
- G. A proximity switch shall be provided to indicate when the disc is closed.

2.5. SWING CHECK VALVES (2-1/2-INCH AND SMALLER)

- A. Swing check valve intended for steam, water, oil, or gas in sizes 2-1/2-inch and smaller shall be designed for a stem pressure of 150 psi and a cold water pressure of 300 psi. They shall have threaded ends and caps.
- B. The valve body and cap shall be fabricated of bronze conforming to ASTM B61 and with threaded ends complying with ANSI/ASME B1.20.1.
- C. Valves designed for steam service shall have bronze discs, and valves designed for cold water, oil, and gas service shall have replaceable composition discs.
- D. The hinge pins shall be fabricated with bronze or stainless steel.

2.6. INTERNAL SPRING-LOADED CHECK VALVES (GLOBE STYLE)

- A. Internal spring-loaded check valves designed for water pumps, compressors, gas, air, and steam shall be of the full-flow internal spring-loaded poppet type. The valves shall be designed for a water-working pressure of not less than 150 psi unless otherwise indicated.
- B. Corrosive ferrous surfaces of valves 4-inch and larger shall be epoxy-coated complying with Section 04100.

- C. Bodies of valves in sizes 3-inch and larger shall be fabricated of cast iron with 125-lb flanged ends conforming to ANSI B16.1 unless otherwise indicated.
- D. Valves shall include positive, watertight seal between the removable seat and valve body and the stem guide shall be integrally cast with the body or screwed into the body.
- E. Valves smaller than 3 inches shall have bronze bodies suitable for the intended use with threaded ends conforming to ANSI/ASME B1.20.1 suitable for a minimum working pressure of 200 psi, and temperature of 250 degrees F, unless otherwise indicated.
- F. The disc and stem of valves in sizes 3-inch and larger shall be fabricated of bronze or stainless steel. The stem shall have two-point bearings with the downstream bearing fabricated of bronze or other suitable bushings designed to provide smooth operation.
- G. Valves smaller than 3 inches shall have discs and retaining rings of Teflon, Nylon, or other suitable material, and stems of bronze, brass, or stainless steel suitable for the intended service.
- H. Valves for general service at temperatures up to 250 degrees F shall have bubble-tight-shut-off with resilient seats of Buna-N, Teflon, or other suitable material.
- I. Valves for steam service and temperatures over 250 degrees F shall have metal-to-metal seating service condition.
- J. Resilient seats shall be firmly attached to the seating ring by compression-molding or other acceptable method.
- K. Valves in sizes 3-inch and larger shall have stainless steel springs, and valves smaller than 3-inch shall have stainless steel or beryllium copper springs and be suitable for the service. The spring tension of the valves shall be designed for the individual pressure condition indicated for each valve.

2.7 DOUBLE-LEAF CHECK VALVES

- A. Double-leaf check valves intended for air and gas service and where indicated shall be of wafer-type designed to fit between ANSI B16.1 flanges rated at 125 lb.
- B. The check valve leaves shall be spring-loaded.
- C. Flow from one direction shall cause the valve to open, and upon valve shutoff, the spring shall shut the valve leaves before reverse flow starts and at a point of zero velocity, with non-slam closure.
- D. The spring-tension of each valve shall be designed for the individual operating conditions.

- E. The valve body shall be fabricated of cast iron with integrally-cast seat, rated for minimum 150 lb. working pressure at up to 250 degrees F.
- F. The leaves shall be bronze, aluminum bronze, or ductile iron, revolving on stainless steel or monel hinge pins with retainers.
- G. The valves shall have resilient seats designed for bubble-tight shut-off suitable for temperatures up to 250 degrees F without sticking. The seats shall be Buna-N, Viton, or other material suitable for the intended purpose. The seat rings shall be firmly attached to the body or disc by compression-molding or proper method.
- H. The spring shall be of Type 316 stainless steel, or Monel and recommended by the manufacturer for use in the service indicated.

2.8 SLANTING DISC CHECK VALVES

- A. Slanting disc check valves intended for water service shall have a seating angle of approximately 55 degrees.
- B. Valves shall have replaceable seat rings and disc rings.
- C. The water pressure passage cross-sectional area shall be equal to the full pipe area.
- D. Valves shall have sufficient clearance around the pivot pins to permit free seating of the disc without binding and shall not stick in the closed position.
- E. Slanting disc check valves shall have position indicators with electrical signal switches for indication of disc position and two flanged connections for attachment of dashpots or hydraulic snubbers.
- F. The valves shall be designed for a water working pressure of 150 psi, except as otherwise indicated.
- G. The valve body shall be fabricated of cast iron conforming to ASTM A48 or A126, Class B, with flanged ends conforming to ANSI B16.1, Class 125 unless otherwise indicated.
- H. The valve disc shall be designed with an "aerofoil" configuration of cast iron or ductile iron, with bronze seating face, except that valves 10 inches or smaller shall have solid bronze or aluminum bronze discs.
- I. Discs shall be partially balanced with a short travel, designed to resist slamming.
- J. The seat ring shall be fabricated of centrifugally cast bronze, aluminum bronze, or stainless steel, with beveled edges, and be firmly clamped or screwed into the valve body.

- K. The pivot pins and bushings shall be fabricated of stainless steel, bronze, or aluminum bronze, designed to allow free movement of the disc without binding.
- L. A top mounted hydraulic dashpot shall be provided to control the opening and closing cycle of the valve to prevent surge and water hammer. The dashpot shall have two control flow rates: (1) 90 percent rapid rate and (2) 10 percent slow rate during shutdown and startup. Each rate shall be independently adjustable.
- M. The dashpot shall be a self contained oil system separate and independent from the water line media.
- N. The oil reservoir for the closing cycle shall be stainless steel and open to the atmosphere with an air breather cap to prevent oil spillage.
- O. The oil reservoir for the opening cycle shall be stainless and hermetically sealed to contain pressure (air over oil) and be equipped with a 3-inch diameter pressure gauge and pneumatic fill valve.

2.9 PLASTIC BALL CHECK VALVE

- A. Plastic ball check valves designed for corrosive fluids, in sizes up to 4-inch, shall be used for vertical upflow conditions only, unless the valves include spring actions.
- B. The valve bodies and balls shall be fabricated with polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polyvinylidene fluoride (PVDF), or polypropylene (PP) and recommended by the manufacturer for the service indicated.
- C. Valves shall include unions with socket connections, or flanged ends conforming to ANSI B16.5, Class 150.
- D. Seals shall have Viton O-rings and valve design shall minimize possibility of the balls sticking or chattering.
- E. Valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F.

2.10 PLASTIC SWING CHECK VALVES

- A. Plastic swing check valves intended for corrosive fluids, in sizes up to 8 inches, may be used for either horizontal or vertical upflow conditions.
- B. Valve bodies and discs shall be fabricated with PVC, PP, or PVDF and recommended by the manufacturer for use in the service indicated.
- C. Valves shall have flanged ends conforming to ANSI B16.5, Class 150, and flanged top access covers, and shall be designed for positive shut-off at no-flow conditions.

- D. Seats and seals shall be EPDM, Teflon, or Viton.
- E. PVC valves shall be rated for maximum non-shock working pressure of 150 psi at 73 degrees F for sizes 3-inch and smaller.
- F. For larger sizes and other materials and temperatures the pressure rating will be recommended by the manufacturer for use in the service indicated.

2.11 SILENT CHECK VALVES

- A. The Check Valve shall be of the silent operating type that begins to close as the forward flow diminishes and is fully closed at zero velocity preventing flow reversal and resultant water hammer or shock.
- B. Wafer style valves shall be provided in sizes 2-inch (50 mm) through 10-inch (250 mm) for installation between ANSI B16.1 Class 125 or Class 250 iron flanges or ANSI B16.5 Class 300 steel flanges.
- C. The valve design shall incorporate a center guided, spring loaded disc, guided at opposite ends and having a short linear stroke that generates a flow area equal to the pipe size.
- D. The operation of the valve shall not be affected by the position of installation. The valve shall be capable of operating in the horizontal or vertical positions with the flow up or down. Heavy duty springs for vertical flow down installations shall be provided when specified on 14-inch and larger valves.
- E. All component parts shall be field replaceable without the need of special tools. A replaceable guide bushing shall be provided and held in position by the spring. The spring shall be designed to withstand 100,000 cycles without failure and provide a cracking pressure of 0.5 psi and to fully open at a flow velocity of 4 ft/sec. (1.22 M/sec).
- F. The valve disc shall be concave to the flow direction providing for disc stabilization, maximum strength, and a minimum flow velocity to open the valve.
- G. The valve disc and seat shall have a sealing surface finish of 32 micro-inch or better to ensure positive seating at all pressures. The leakage rate shall not exceed one-half of the allowable rate for metal seated valves allowed by AWWA Standard C508 or 0.5 oz (15 ml) per hour per inch (mm) of valve diameter.
- H. The valve flow way shall be contoured and unrestricted to provide full flow areas at all locations within the valve. Cv flow coefficients shall be equal to or greater than specified below and verified by an independent testing laboratory.

<u>VALVE SIZE</u>		<u>Wafer Style Cv</u>	<u>Globe Style Cv</u>
2-inch	(50 mm)	66	N/A
2.5-inch	(65 mm)	88	110
3-inch	(80 mm)	130	155
4-inch	(100 mm)	228	278
5-inch	(125 mm)	N/A	435
6-inch	(150 mm)	520	525
8-inch	(200 mm)	900	1115
10-inch	(250 mm)	1450	1770
12-inch	(300 mm)	N/A	2500

- I. The valve body shall be constructed of ASTM A128 Class B cast iron for Class 250 valves. Class 150 and Class 300 steel valves shall constructed of ASTM A218 Grade WCB cast steel. Optional body material include ASTM A536 Grade 65-45-12 ductile iron.
- J. The seat and disc shall be ASTM B584 Allow C83600 cast bronze or ASTM B148 Alloy C95200 aluminum bronze. Optional trim material include ASTM A351 Grade CF8M stainless steel, as specified by the ENGINEER.
- K. The compression spring shall be ASTM A313 Type 302 stainless steel with ground ends.
- L. A Buna-N seal shall be provided on the seat when specified to provide zero leakage at both high and low pressures without overloading or damaging the seal. The seal design shall provide both a metal to metal and a metal to Buna-N seal.
- M. The valves shall be hydrostatically tested at 1.5 times their rated cold working pressure. Additional tests shall be conducted per AWWA, ANSI, MSS or API standards when specified. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals.

PART 3 - EXECUTION

3.1 GENERAL

- A. Valves shall be installed in accordance with Section 05100.

END OF SECTION