

SECTION 22 11 20 VALVES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, Special Provisions apply to work of this section.
- B. Requirements of the following Sections apply to this section:
 - 1. "Basic Mechanical Requirements".
 - 2. "Basic Mechanical Materials and Methods".
 - 3. "Basic Piping Materials and Methods".

1.2 SUMMARY

- A. This Section includes general duty valves common to most mechanical piping systems.
- B. Special purpose valves are specified in individual piping system specifications.
- C. Valve tags and charts are specified in Section "MECHANICAL IDENTIFICATION".

1.3 SUBMITTALS

- A. General: Submit the following in accordance with General Conditions, Special Provisions and Division 220000 Specification Sections.
- B. Product data, including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

1.4 QUALITY ASSURANCE

- A. American Society of Mechanical Engineers (ASME) Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- B. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with the various MSS Standard Practices referenced.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation For Transport: Prepare valves for shipping as follows:
 - 1. Ensure valves are dry and internally protected against rust and corrosion.
 - 2. Protect valve ends against damage to threads, flange faces, and

weld-end preps.

3. Set valves in best position for handling. Set globe and gate valves closed to prevent rattling; set ball and plug valves open to minimize exposure of functional surfaces; set butterfly valves closed or slightly open; and block swing check valves in either closed or open position.

B. Storage: Use the following precautions during storage:

1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.
2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher

than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.

C. Handling: Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use hand wheels and stems as lifting or rigging points.

2.0 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, those listed in valve schedule.

2.2 VALVE FEATURES, GENERAL

A. Valve Design: Rising stem or rising outside screw and yoke stems.

1. Non-rising stem valves may be used where headroom prevents full extension of rising stems.

B. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Provide the following special operator features:

1. Handwheels, fastened to valve stem, for valves other than quarter turn.
2. Lever handles, on quarter-turn valves 6-inch and smaller.
3. Chain-wheel operators, for valves 2-1/2-inch and larger, installed 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5'-6" above finished floor elevation.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

- F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
- G. End Connections: As indicated in the valve specifications.
 - 1. Threads: Comply with ANSI B1.20.1.
 - 2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
 - 3. Solder-Joint: Comply with ANSI B16.18.
 - a. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.
- H. All exposed components of valves to be mounted in exterior of building shall be stainless steel.
- J. Exterior valves in-ground to have access covers set in concrete collar 16" x 16" min. typ. Brass Tag & Schedule.

2.3 VALVE SCHEDULE

Acceptable Manufacturers are: Crane, Armstrong, Keystone, Stockham, Jamesbury, Milwaukee, Grinnell, Nibco or Mueller.

A. Gate Valves:

- 1. 2" and Smaller, Screwed: Class 125, 200 psi W.O.G., non-rising stem, screwed bonnet, solid wedge disc, bronze body & disc. Equal to Crane Figure Number 438.
- 2. 2" and Smaller, Brazed: Class 150, 300 psi CWP, non-rising stem, screwed bonnet, solid wedge disc, bronze body & disc. Equal to Crane Figure Number 1324.
- 3. Under 2", Socket Welded: Class 800, 1800 psi (-20F to 200F), O S & Y, bolted bonnet, solid wedge disc, carbon steel with stainless steel trim, full port. Equal to Grinnell/Anvil Figure Number 811. Consult with Engineering, prior to use.
- 4. 2-1/2" and Larger, Welded: Class 150, 260 psi working pressure (-20F to 200F), O S & Y, bolted bonnet, solid wedge disc, carbon steel with universal (13% chromium) trim. Equal to Crane Figure Number 47-1/2.
- 5. 2-1/2" and Larger, Flanged: Class 125, 200 psi W.O.G. (2-1/2" to 12"), 150 psi W.O.G. (14" and larger), non-rising stem, bolted bonnet, tapered solid wedge disc, iron body, bronze trim and disc. Equal to Crane Figure Number 461.

B. Globe Valves:

- 1. 2" and Smaller, Screwed: Class 125, 200 psi W.O.G., renewable disc and seat, bronze body, bronze disc. Equal to Crane Figure Number 1.
- 2. 2" and Smaller, Brazed: Class 125, 200 psi W.O.G., renewable disc and

3. seat, bronze body, bronze disc. Equal to Crane Figure Number 1310. Under 2", Socket Welded: Class 800, 1800 psi (-20F to 200F), O S & Y, bolted bonnet, renewable disc, carbon steel with stainless steel trim. Equal to Grinnell/Anvil Figure Number 830.
4. 2-1/2" to 14", Welded: Class 150, 260 psi working pressure (-20F to 200F), O S & Y, bolted bonnet, renewable disc and seat, carbon steel with universal (13% chromium) trim. Equal to Crane Figure Number 143-1/2.
5. 2-1/2" to 10", Flanged: Class 125, 200 psi W.O.G. renewable disc and seat, iron body, bronze disc. Equal to Crane Figure Number 351.

C. Ball Valves:

1. 2" and Smaller, Screwed: 600 CWP, regular/full port, bronze body, brass stem and chrome plated brass ball, steel handle. Equal to Crane Figure Number 9302 (regular port), F-9303 (full port).
2. 2" and Smaller, Soldered: 600 CWP, regular/full port, bronze body, brass stem and chrome plated brass ball, steel handle. Equal to Crane Figure Number 9322 (regular port), F-9323 (full port).
3. 2" and Smaller, Socket Welded: 1500 psi W.O.G. (standard port), 1000 psi (full port), carbon steel body and stem, chrome plated carbon steel ball, and cold rolled zinc plated steel handle. Equal to Grinnell Figure Number 3913 (standard port), 3914 (full port).

D. Swing Check Valves:

1. 2" and Smaller, Screwed: Class 150, 300 psi W.O.G., hinged support, replaceable bronze seat rings, bronze body, bronze trim and disc. Equal to Crane Figure Number 137.
2. 2" and Smaller, Brazed: Class 150, 300 psi W.O.G., hinged support, replaceable bronze seat rings, bronze body, bronze trim and disc. Equal to Crane Figure Number 137.
3. Under 2", Socket Welded: Class 800, 1800 psi (-20f to 200F), piston check valve, bolted cap, renewable disc and seat, carbon steel with stainless steel trim. Equal to Grinnell/Anvil Figure Number 841.
4. 2-1/2" to 24", Welded: Class 150, 260 psi working pressure (-20F to 200F), hinged support, bolted cap, replaceable disc, carbon steel with universal (13% chromium) trim. Equal to Crane Figure Number 147-1/2.
5. 2-1/2" and Larger, Flanged: Class 125, 200 psi W.O.G. (2-1/2" to 12"), 150 psi W.O.G. (14" and larger), hinged support, replaceable bronze seat rings, iron body, bronze trim and disc. Equal to Crane Figure Number 373.

E. Butterfly Valves:

1. Above ground:
 - a. Two (2) inch thru forty-eight (48) inch diameter: Lug body type, bubble tight shut-off, cast iron body, aluminum-bronze or 316 SS

disc, Teflon upper and lower bushings. Valve shaft/stem to be 17-4 Ph or 416 Stainless Steel blow out proof. Manual shut-off/isolation valves are to be rated for 200 psi dead end service and control valves rated for 175 psi (minimum) dead end service. Valve seat shall be field replaceable phenolic backed Buna-N, cartridge type, mechanically retained in body. "Boot type" seats are not acceptable. Manual valves six (6) inch diameter and larger to have gear operators. Automatic/control valves to have pneumatic actuators sized to close against maximum system pressure with a 20% safety factor.

- b. Valves are to be installed with stem/shaft in the horizontal position.

3.0 EXECUTION

3.1 EXAMINATION

- A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.
- B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.
- C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.
- E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.
- F. Replace defective valves with new valves.

3.2 VALVE ENDS SELECTION

- A. Select valves with the following ends or types of pipe/ tube connections:
 - 1. Copper Tube Size, 2-Inches and Smaller: Solder ends.
 - 2. Steel Pipe Sizes, 2-Inches and Smaller: Threaded or grooved end.
 - 3. Steel Pipe Sizes, 2-1/2 Inches and Larger: Welded or flanged ends if approved by Engineering..

3.3 VALVE INSTALLATIONS

- A. General Application: Use gate, ball, and butterfly valves for shut-off duty; globe, ball, and butterfly for throttling duty. Refer to piping system specification sections for specific valve applications and arrangements.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.
- D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.
- E. Install valves in horizontal piping with stem at or above the center of the pipe.
- F. Install valves in a position to allow full stem movement.
- G. Installation of Check Valves: Install for proper direction of flow as follows:
 - 1. Swing Check Valves: Horizontal position with hinge pin level.
 - 2. Wafer Check Valves: Horizontal or vertical position, between flanges.
 - 3. Lift Check Valve: With stem upright and plumb.
- H. Valves Located Over Seven Feet Above Finished Floor: On each valve four (4) inches in diameter and larger, installed over seven (7) feet above the floor in equipment rooms, specify access platforms and/or catwalks to permit operation and periodic inspections/ maintenance. Provide chain operator for valve locations that will not permit the catwalks/ access platforms.
- I. Balancing Valves: Provide a combination shut-off and balancing valve at each air handling unit coil, pumps and any other consumer of chilled water. Valve shall have memory setting for balanced position, graduation scale, differential pressure taps and factory flow charts. Valves are to be equal to Bell & Gossett Circuit Setter calibrated balance valve or Tour & Anderson combination balancing and shut-off valve.

3.4 SOLDER CONNECTIONS

- A. Cut tube square and to exact lengths.
- B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.
- C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.
- D. Open gate and globe valves to full open position.
- E. Remove the cap and disc holder of swing check valves having composition discs.

- F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.
- G. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.5 THREADED CONNECTIONS

- A. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.
- B. Align threads at point of assembly.
- C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
- D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.6 FLANGED CONNECTIONS

- A. Align flange surfaces parallel.
- B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.
- C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.7 FIELD QUALITY CONTROL

- A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

3.8 ADJUSTING AND CLEANING

- A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

END OF DOCUMENT 221120

THIS PAGE INTENTIONALLY LEFT BLANK