

SECTION 15110
VALVES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 15050, "Basic Mechanical Materials and Methods" apply to work specified in this Section.

1.02 SUMMARY

- A. This Section specifies general duty valves common to most mechanical piping systems.
- B. Related Work Specified in Other Sections:
 - 1. Valve tags and charts: Section 15075, "Mechanical Identification".
 - 2. Special purpose valves: Section 15140, "Plumbing Piping and Specialties", Section 15180, "Hydronic Piping", and Section 15195, "Fuel Gas Piping".

1.03 SUBMITTALS

- A. 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. Include list indicating valve and its application.

1.04 OPERATION AND MAINTENANCE MANUALS

- A. The manuals shall include a table of contents, specifications, drawings, and description of equipment; installation instructions; operating instructions; Maintenance instructions; parts lists; and test data and performance curves. The table of contents shall be marked with the Owner's name, project name, equipment name, and the Owner's purchase order number.
- B. Where applicable, the information contained in the manual shall include a list of recommended spare parts and a schedule of required lubricants, as recommended by the Manufacturer. The data shall also include all nameplate information and shop order numbers for each item of equipment and component part thereof.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility: Furnish all valves of each type specified from a single source.
- B. American Society of Mechanical Engineers (ASME) Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.

- C. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with the various MSS Standard Practices referenced.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. 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-ends.
 - 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 check valves in either closed or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and 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. Use a sling to handle valves which require handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Gate Valves:
 - a. Crane
 - b. Grinnell
 - c. Hammond
 - d. Jenkins
 - e. Lunkenheimer
 - f. Milwaukee
 - g. Nibco
 - h. Powell
 - i. Stockham
 - 2. Ball Valves:
 - a. Conbraco (Apollo)
 - b. Grinnell
 - c. Nibco
 - d. Powell
 - e. Stockham
 - f. Watts
 - 3. Plug Valves:
 - a. Lunkenheimer
 - b. Powell.
 - 4. Globe Valves:

- a. Crane
 - b. Grinnell
 - c. Hammond
 - d. Jenkins
 - e. Lunkenheimer
 - f. Milwaukee
 - g. Nibco
 - h. Powell
 - i. Stockham
5. Butterfly Valves:
- a. Center Line
 - b. Crane
 - c. Conbraco (Apollo)
 - d. Grinnell
 - e. Keystone
 - f. Nibco
 - g. Powell
 - h. Stockham
 - i. Watts
6. Swing Check Valves:
- a. Crane
 - b. Grinnell
 - c. Hammond
 - d. Jenkins
 - e. Lunkenheimer
 - f. Milwaukee
 - g. Nibco
 - h. Powell
 - i. Stockham
7. Wafer Check Valves:
- a. Bell & Gossett
 - b. Center Line
 - c. Metraflex
 - d. Mission
 - e. Stockham
8. Lift Check Valves 2 Inch and Smaller:
- a. Hammond
 - b. Jenkins
 - c. Lunkenheimer

2.02 VALVE FEATURES, GENERAL

- A. Valve Design: Rising stem or rising outside screw and yoke stems.
 - 1. Nonrising 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, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.
 - 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'-0" above finished floor elevation.
 - 4. Gear drive operators, on quarter-turn valves 8-inch and larger.
- 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. Soldered end joints for use in plumbing piping 2-inches and smaller only.

2.03 GATE VALVES

- A. Gate Valves, 2-Inch and Smaller: MSS SP-80; Class 125, 200 psi cold working pressure, or Class 150, 300 psi cold working pressure, body and bonnet of ASTM B 62 cast bronze; with threaded or soldered ends, bronze wedge, copper-silicon alloy rising stem, brass packing gland, Teflon-impregnated packing with bronze packing nut, and aluminum or malleable iron handwheel
- B. Gate Valves, 2-1/2-Inch and Larger: MSS SP-70; Class 125, 200 psi cold working pressure, ASTM A126 cast-iron body and bonnet, solid cast iron wedge, brass alloy stem, outside screw and yoke, with flanged ends, "Teflon" impregnated packing, with two-piece packing gland assembly and cast iron handwheel.

2.04 BALL VALVES

- A. Ball Valves, 1 Inch and Smaller: MSS SP-110, Class 150, 600 psi cold working pressure; two-piece construction; threaded or soldered ends; with bronze body and bonnet conforming to ASTM B 62, standard port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl-covered steel handle. Provide stem extenders (1-inch long) on all valves used on insulated piping services.
- B. Ball Valves, 1-1/4-Inch to 2-Inch: MSS SP-110, Class 150, 600 psi cold working pressure; two-piece construction; threaded or soldered ends; with bronze body and bonnet conforming to

ASTM B 62, conventional port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout proof stem, and vinyl-covered steel handle. Provide stem extenders (1-inch long) on all valves used on insulated piping services.

2.05 PLUG VALVES

- A. Plug Valves, 2-Inch and Smaller: MSS SP-78; 175 psi cold working pressure; ASTM A126 cast-iron body and bonnet, cast-iron plug, Buna N, Viton, or Teflon packing, wrench operated, and threaded ends.
- B. Plug Valves, 2-1/2-Inch and Larger: MSS SP-78; 175 psi cold working pressure; ASTM A126 cast-iron body and bonnet, cast-iron plug, Buna N, Viton, or Teflon packing, wrench operated, and flanged ends.

2.06 GLOBE VALVES

- A. Globe Valves, 2-Inch and Smaller: MSS SP-80; Class 125, 200 psi cold working pressure or Class 150, 300 psi cold working pressure; body and screwed bonnet of ASTM B 62 cast bronze; with threaded or soldered ends, rubber, bronze or Teflon disc, silicon, bronze-alloy stem, "Teflon" impregnated packing with bronze packing nut, and aluminum or malleable iron handwheel.
- B. Globe Valves, 2-1/2-Inch and Larger: MSS SP-85; Class 125, 200 psi cold working pressure, iron body and bolted bonnet with bronze fittings conforming to ASTM A 126; with renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, flanged ends, and "Teflon" impregnated packing with cast-iron follower, and two-piece packing gland assembly.

2.07 BUTTERFLY VALVES

- A. Butterfly Valves, 2-1/2-Inch and Larger: MSS SP-67; 200 psi cold working pressure, 150 psi maximum pressure differential; cast-iron body and bonnet conforming to ASTM A126; field replaceable EPDM sleeve, extended neck, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide lug or wafer type as indicated.

2.08 CHECK VALVES

- A. Swing Check Valves, 2-Inch and Smaller: MSS SP-80; Class 125, 200 psi cold working pressure, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and rotating bronze disc with rubber seat or composition seat; and having threaded or soldered ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150, 300 psi cold working pressure valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.
- B. Swing Check Valves, 2-1/2-Inch and Larger: MSS SP-71; Class 125, 200 psi cold working pressure, cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal

swing, and bronze disc; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.

- C. Wafer Check Valves: Class 125, 200 psi cold working pressure, ASTM A126, cast-iron body; with bronze disc/plates, stainless steel pins and springs, Buna N seals, installed between flanges.
- D. Lift Check Valves, 2-Inch and Smaller: Class 125; bronze body and cap conforming to ASTM B 62; horizontal or angle pattern, lift-type valve, stainless steel disc holder with bronze disc or Buna N rubber disc, and threaded or soldered ends. Provide valves capable of being refitted and ground while the valve remains in the line.

PART 3 - EXECUTION

3.01 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.

3.02 VALVE END SELECTION

- A. Select valves with the following ends or types of pipe/tube connections:
 - 1. Copper Tube Size, 2-Inch and Smaller: Solder ends for plumbing piping; threaded ends elsewhere.
 - 2. Steel Pipe Sizes, 2-Inch and Smaller: threaded or grooved end.
 - 3. Steel Pipe Sizes 2-1/2 Inch and Larger: flanged or grooved.

3.03 VALVE INSTALLATIONS

- A. General Application: Use gate, ball, and butterfly valves for shut-off duty; globe, ball, and butterfly for throttling duty. Install shut-off duty valves at each branch connection to supply and return mains, at supply connection to each piece of equipment, and elsewhere as indicated.

Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.

- 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 on each pump discharge and elsewhere as required 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.

3.04 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.

3.05 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.

3.06 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.

3.07 ADJUSTING AND CLEANING

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

3.08 VALVE CLASSIFICATION SCHEDULES

- A. Valves, 2-inch and smaller:

| Service | Gate | Globe | Ball | Check |
|-----------------------------------|------|-------|------|-------|
| Energy Recovery Water | 150 | 150 | 150 | 150 |
| Chilled Water | 150 | 150 | 150 | 150 |
| Domestic Hot and Cold Water | 125 | 125 | 150 | 125 |
| Heating Hot Water | 150 | 150 | 150 | 150 |
| Low-Pressure Steam and Condensate | 150 | 150 | 150 | 150 |

- B. Valves, 2-1/2 inch and larger:

| Service | Gate | Globe | Plug | Butterfly | Check |
|-----------------------------|------|-------|------|-----------|-------|
| Energy Recovery Water | 125 | 125 | 175 | 200 | 125 |
| Chilled Water | 125 | 125 | 175 | 200 | 125 |
| Domestic Hot and Cold Water | 125 | 125 | 175 | 200 | 125 |
| Heating Hot Water | 125 | 125 | 175 | 200 | 125 |
| Low-Pressure Steam | 150 | 150 | 175 | 200 | 150 |

END OF SECTION 15110