

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and Divisions 00 and 01, apply to this Section.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Special purpose valves are specified in other Division 22 sections.
  - 2. Valve tags and charts are specified in Division 22.

### 1.2 SUMMARY

- A. This Section includes general duty valves common to several plumbing piping systems.

### 1.3 DEFINITIONS

- A. Domestic Water Piping: Piping inside building that conveys potable cold and hot water to fixtures and equipment throughout the building.
- B. Non-Potable Water Piping: Piping inside building that conveys non-potable water to fixtures and equipment throughout the building.

### 1.4 SUBMITTALS

- A. General: See Division 23 for general requirements of Product Data, Shop Drawings, Reports and Certificates, and Operation and Maintenance data submittals.
- B. Product Data: Provide submittals of the following:
  - 1. Gate Valves, Cast Iron, 2-1/2-Inches and Larger
  - 2. Ball Valves
  - 3. Globe Valves, 2-Inches and Smaller
  - 4. Globe Valves, Cast Iron, 2-1/2-Inches and Larger
  - 5. Butterfly Valves (125 psig)
  - 6. Swing Check Valves, 2-Inches and Smaller
  - 7. Swing Check Valves, 2-1/2-Inches and Larger
  - 8. Silent Check Valves, 2-Inches and Smaller
  - 9. Silent Check Valves, 2-1/2-Inches and Larger
- C. Shop Drawings: None required.
- D. Reports and Certificates: Provide submittals of the following:
  - 1. Summary table indicating each type of valve and application required for project.

### 1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: Comply with the requirements specified in Division 01 Section "Materials and Equipment," under "Source Limitations" Paragraph.

- B. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- C. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.
- D. Comply with the Reduction of Lead in Drinking Water Act of 2011. This act redefines "lead free" as "not containing more than 0.2 percent lead when used with respect to solder and flux and not more than a weighted average of 0.25 percent lead when used with respect to wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures". Products required to be "lead free" shall have NSF 61-G or NSF 372 certification.
- E. Soldered Lead Free End Connections: Copper alloys with silicone content greater than 0.005% are not allowed.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads, flange faces, grooves, and weld ends.
  - 3. Set globe and gate valves closed to prevent rattling.
  - 4. Set ball and plug valves open to minimize exposure of functional surfaces.
  - 5. Set butterfly valves closed or slightly open.
  - 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection.
  - 2. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use a sling to handle large valves. Rig to avoid damage to exposed parts. Do not use handwheels and stems as lifting or rigging points.

### PART 2 – PRODUCTS

#### 2.1 BASIC, COMMON FEATURES

- A. Lead free products and materials shall be used where required by the Applications Schedule in Part 3.
- B. Soldered Lead Free End Connections: Copper alloys with silicone content greater than 0.005% are not allowed.
- C. Design: Rising stem or rising outside screw and yoke stems, except as specified below.
  - 1. Nonrising stem valves may be used only where headroom prevents full extension of rising stems.
- D. Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.

- E. Sizes: Same size as upstream pipe, unless otherwise indicated.
- F. Operators: Use specified operators and handwheels, except provide the following special operator features:
  - 1. Handwheels: For valves other than quarter turn.
  - 2. Lever Handles: For quarter-turn valves 6 inches and smaller, except for plug valves, which shall have square heads. Furnish Owner with one wrench for every 10-plug valve.
  - 3. Chain-Wheel Operators: For valves 4 inches and larger, installed 96 inches or higher above finished floor elevation.
  - 4. Gear-Drive Operators: For quarter-turn valves 8 inches and larger.
- G. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
- H. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
- I. Threads: ASME B1.20.1.
- J. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.
- K. Solder Joint: ASME B16.18.
  - 1. 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.

## 2.2 GATE VALVES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Gate Valves:
    - a. Hammond Valve Corporation
    - b. Milwaukee Valve Company, Inc.
    - c. Nibco Inc.
    - d. Or Approved Equal
- B. Gate Valves, 2-1/2-Inches and Larger: MSS SP-70, Class 125, ASTM A 126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, bolted body-bonnet connection, teflon-impregnated packing with 2-piece packing gland assembly, flanged end connections; and with cast-iron handwheel.

## 2.3 BALL VALVES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Ball Valves:
    - a. Conbraco Industries, Inc.; Apollo Division

- b. Hammond Valve Corporation
  - c. Nibco Inc.
  - d. Milwaukee Valve Company, Inc.
  - e. Viega
  - f. Or Approved Equal
- B. Ball Valves, 2-Inches and Smaller: MSS SP-110, 600-psi CWP, Class 150, ASTM B 584 bronze body and end piece(s), 2-piece or 3-piece construction as required in the Application Schedule; stainless steel solid ball, full port, blowout proof; stainless steel stem; teflon seats and seals; threaded or soldered end connections as called for in Part 3. Vinyl-covered steel lever handle.
- 1. Options:
    - a. Stem Extension: For valves installed in insulated piping (if required in Application Schedule) equip with 2-inch extended handle of non-thermal material. Provide protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
    - b. Memory Stop: For operator handles (if required in Application Schedule).
- C. Hose End Drain Valves: MSS SP-110, 3/4-inch NPS, 400 psi CWP, Class 150, ASTM B 584 bronze body and end piece, two-piece construction, chrome plated ball, full port; brass stem; Teflon seats and seals; threaded or soldered end connections as called for in Part 3. Vinyl covered steel lever handle.
- 1. Outlet: Short threaded nipple with ASTM B1.20.7 garden-hose thread, cap, and drain.

## 2.4 GLOBE VALVES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 1. Globe Valves:
    - a. Hammond Valve Corporation
    - b. Milwaukee Valve Company, Inc.
    - c. Nibco Inc.
    - d. Or Approved Equal
- B. Globe Valves, 2-Inches and Smaller: MSS SP-80; Class 150, 300-psi CWP; ASTM B 62 cast-bronze body and bonnet bronze or teflon seat disc, dezincification-resistant copper silicon alloy rising stem, union body-bonnet connection, bronze packing nut, malleable-iron handwheel, threaded end connections.
- C. Globe Valves, 2-1/2-Inches and Larger: MSS SP-85, Class 125 ASTM A 126 cast-iron body and bonnet with bronze fittings, bolted body-bonnet connection, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron handwheel.

## 2.5 BUTTERFLY VALVES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Butterfly Valves:
  - a. Demco
  - b. Keystone Valve USA, Inc.
  - c. Dezurik
  - d. Hammond Valve Corporation
  - e. Nibco Inc.
  - f. Victaulic
  - g. Milwaukee Valve Company, Inc.
  - h. Or Approved Equal

B. Butterfly Valves (125 psig): MSS SP-67, 200-psi CWP 2-1/2-inch to 12-inch and 150-psi for 14-inch and larger, 150-psi maximum pressure differential, ASTM A 536 ductile-iron body, full lug style, extended neck, stainless-steel stem, EPDM liner and stem seals. Suitable for bi-directional dead-end service at valve's rated pressure without need of downstream flange.

1. Disc Type: Aluminum bronze or elastomer-coated ductile iron as indicated in Application Schedule.
2. Operator for Sizes 2-1/2-Inches to 6-Inches: [Standard lever handle with memory stop][Lever handle with latch lock].
3. Operator for Sizes 8-Inches to 24-Inches: Gear operator with position indicator.
4. Operator for Sizes 8-Inches and Larger, 96 Inches or Higher above Floor: Chain-wheel operator.

C. Butterfly Valves (250 psig), 2 1/2 – Inch to 12 - Inch: MSS SP-67, rated at 250-psig at 70 degrees F operating temperature. ASTM A 536 ductile-iron body, full lug style, plated ductile iron disc, extended neck, stainless-steel stem, EPDM seat. Suitable for bi-directional dead-end service at valve's rated pressure without need of downstream flange.

1. Operator for Sizes 2-1/2-Inches to 6-Inches: Standard lever handle with memory stop.
2. Operator for Sizes 8-Inches to 24-Inches: Gear operator with position indicator.
3. Operator for Sizes 8-Inches and Larger, 96 Inches or Higher above Floor: Chain-wheel operator.

## 2.6 CHECK VALVES

A. Swing Check Valves, 2-Inches and Smaller: MSS SP-80; Class 125, 200-psi CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with renewable seat and disc, threaded or soldered end connections.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Swing Check Valves:
  - 1) Hammond Valve Corporation
  - 2) Milwaukee Valve Company, Inc.
  - 3) Nibco Inc.
  - 4) Or Approved Equal

B. Swing Check Valves, 2-1/2-Inches and Larger: MSS SP-71, Class 125, 200-psi CWP, ASTM A 126 Class B cast-iron body and bolted bonnet, horizontal-swing, bronze disc, flanged connections.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Swing Check Valves:
    - 1) Hammond Valve Corporation
    - 2) Milwaukee Valve Company, Inc.
    - 3) Nibco Inc.
    - 4) Or Approved Equal
  
- C. Silent Check Valves, 2-Inches and Smaller: MSS SP-80, Class 125, 250-psig CWP, inline spring actuated lift type, ASTM B 584 bronze body, stainless steel spring, Buna-N seat, threaded connections.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Silent Check Valves:
      - 1) Hammond Valve Corporation
      - 2) Milwaukee Valve Company, Inc.
      - 3) Mueller.
      - 4) Nibco Inc.
      - 5) Or Approved Equal
  
- D. Silent Check Valves, 2-1/2-Inches and Larger: Class 125, 200-psi CWP, twin disc, spring actuated type, ASTM A 126 Class B case iron body, bronze disc, stainless steel spring, Buna-N seat, wafer, lug or grooved style connections.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Silent Check Valves:
      - 1) Hammond Valve Corporation
      - 2) Milwaukee Valve Company, Inc.
      - 3) Mueller.
      - 4) Nibco Inc.
      - 5) Or Approved Equal

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.
  
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

- C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. 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.
- F. Do not attempt to repair defective valves; replace with new valves.

### 3.2 INSTALLATION

- A. Install valves as indicated, according to manufacturer's written instructions.
- B. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.
- C. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
- D. Locate valves for easy access and provide separate support where necessary.
- E. Install valves in horizontal piping with stem a minimum of 30° above horizontal at or above the center of the pipe.
- F. Install valves in a position to allow full stem movement.
- G. For chain-wheel operators, extend chains to 60-inches above finished floor elevation.
- H. Installation of Check Valves: Install for proper direction of flow as follows:
  - 1. Swing Check Valves: Horizontal position with hinge pin level or vertical upflow position.
  - 2. Silent Check Valves: Horizontal or vertical position.

### 3.3 SOLDERED 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.
- 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 fully 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 melts on 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.

### 3.4 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.

### 3.5 FLANGED CONNECTIONS

- A. Align flange surfaces parallel.
  - 1. 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.
  - 2. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

### 3.6 VALVE END SELECTION

- A. Select valves with the following ends or types of pipe/tube connections:
- B. Piping and Tube Size, 2-Inches and Smaller: Threaded ends, except solder ends can be used for plumbing cold water, hot water and non-potable water systems. Press-Connect Mechanical Joint Fittings acceptable if specified in Division 22 Sections "Water Distribution Piping".
- C. Piping and Tube Size, 2-1/2-Inches and Larger: Flanged ends. Grooved ends acceptable if specified in Division 22 Sections "Water Distribution Piping".

### 3.7 APPLICATION SCHEDULE

- A. General Application: Use gate, ball, and butterfly valves for shutoff duty; globe for throttling duty as indicated. Refer to piping system Specification Sections for specific valve applications and arrangements.
- B. Domestic Water Piping Systems: Use the following valve types:
  - 1. Common Features: Valves shall be "lead free". Provide valve tags per Section Identification for Mechanical Piping and Equipment. Exception: Gate valves 2-1/2-Inches and Larger.
  - 2. Gate Valves, 2-1/2-Inches and Larger: Class 125, iron body.
  - 3. Ball Valves: [2-piece][3-piece] with stem extension.
  - 4. Globe Valves, 2-Inches and Smaller: Class 150, bronze body.
  - 5. Globe Valves, 2-1/2-Inches and Larger: Class 125, cast-iron body.

6. Butterfly Valves: Elastomer-coated ductile iron or aluminum bronze disc.
7. Swing Check Valves, 2-Inches and Smaller: Class 125, bronze body, use for all applications except at pump discharge.
8. Swing Check Valves, 2-1/2-Inches and Larger: Class 125, iron body, use for all applications except at pump discharge.
9. Silent Check Valves, 2-Inches and Smaller: Class 125, bronze body; use at pump discharge.
10. Silent Check Valves, 2-1/2-Inches and Larger: Class 125, iron body, use at pump discharge.

C. Nonpotable Water Systems: Use the following valve types:

1. Gate Valves, 2-1/2-Inches and Larger: Class 125, iron body.
2. Ball Valves: [2-piece][3-piece] with stem extension.
3. Globe Valves, 2-Inches and Smaller: Class 150, bronze body.
4. Globe Valves, 2-1/2-Inches and Larger: Class 125, cast-iron body.
5. Butterfly Valves: Elastomer-coated ductile iron or aluminum bronze disc.
6. Swing Check Valves, 2-Inches and Smaller: Class 125, bronze body, use for all applications except at pump discharge.
7. Swing Check Valves, 2-1/2-Inches and Larger: Class 125, iron body, use for all applications except at pump discharge.
8. Silent Check Valves, 2-Inches and Smaller: Class 125, bronze body; use at pump discharge.
9. Silent Check Valves, 2-1/2-Inches and Larger: Class 125, iron body, use at pump discharge.

### 3.8 ADJUSTING

- A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

**END OF SECTION**