

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and Divisions 00 and 01, apply to this Section.
- B. Related Sections:
 - 1. Division 23.

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 CODES AND STANDARDS

- A. Codes and Standards shall be the current version adopted by the Authority Having Jurisdiction.

1.5 SUBMITTALS

- A. General: See Section 23 05 00 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, 2-Inches and Smaller
 - 2. Gate Valves, Cast Iron, 2-1/2-Inches and Larger
 - 3. Gate Valves, Cast Steel, 2-1/2-Inches and Larger
 - 4. Ball Valves
 - 5. Globe Valves, 2-Inches and Smaller
 - 6. Globe Valves, Cast Iron, 2-1/2-Inches and Larger
 - 7. Globe Valves, Cast Steel, 2-1/2-Inches and Larger
 - 8. Butterfly Valves (125 psig)
 - 9. Butterfly Valves (250 psig)
 - 10. Swing Check Valves, 2-Inches and Smaller
 - 11. Swing Check Valves, 2-1/2-Inches and Larger
 - 12. Silent Check Valves, 2-Inches and Smaller
 - 13. 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.

1.6 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. Soldered Lead Free End Connections: Copper alloys with silicone content greater than 0.005% are not allowed.

1.7 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. Soldered Lead Free End Connections: Copper alloys with silicone content greater than 0.005% are not allowed.
- B. 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.
- C. 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.
- D. Sizes: Same size as upstream pipe, unless otherwise indicated.
- E. 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 valves.
 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.
- F. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
- G. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
- H. Threads: ASME B1.20.1.
- I. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.
- J. 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 (BRONZE AND CAST IRON)

- 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-Inches and Smaller: MSS SP-80; Class 125, 200-psi cold working pressure (CWP), or Class 150, 300-psi CWP as required in Application Schedule; ASTM B 62 cast-bronze body and bonnet, solid-bronze wedge, dezincification-resistant copper silicon alloy rising stem, union body-bonnet connection, non-asbestos packing, bronze packing nut, malleable-iron handwheel, and threaded or soldered end connections as required in Application Schedule.
- C. Gate Valves, 2½-Inches and Larger: MSS SP-70, Class 125 or Class 250, 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 GATE VALVES (CAST STEEL)

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

- a. Bonney Forge
 - b. Crane
 - c. Hammond Valve Corporation
 - d. Milwaukee Valve Company, Inc.
 - e. Velan
 - f. Or Approved Equal
- B. Gate Valves, Cast Steel, 2-1/2-Inches and Larger: ASME B16.34, API 600, Class 150, minimum 200-psi steam working pressure. ASTM A216-WCB cast steel body, flanged ends, cast steel bolted bonnet with corrugated steel/graphite gasket, stainless steel rising stem, outside screw and yoke, two-piece gland and cast iron hand-wheel.

2.4 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.

2.5 GLOBE VALVES (CAST IRON)

- 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 or Class 300, 600-psi CWP as required in the Application Schedule; 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 or Class 250; 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.

2.6 GLOBE VALVES (CAST STEEL)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 1. Globe Valves:
 - a. Bonney Forge
 - b. Crane
 - c. Hammond Valve Corporation
 - d. Milwaukee Valve Company, Inc.
 - e. Velan
 - f. Or Approved Equal
 - B. Globe Valves – Cast Steel, 2-1/2-Inches and Larger: ASME B16.34, API 598, Class 150, minimum 200-psi steam working pressure. ASTM A216-WCB cast steel body, flanged ends, cast steel bolted bonnet with corrugated steel/graphite gasket, stainless steel rising stem, outside screw and yoke, two-piece gland and cast iron hand-wheel.

2.7 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.
- D. Butterfly Valves (250 psig), 14 – Inch and Larger: High performance butterfly valve, MSS SP-68, rated at 250-psig at 70 degrees F operating temperature. Carbon steel body, Class 150 flange, full lug style, extended neck, stainless-steel stem, stainless steel disc, PTFE liner and stem seals. Gear operator with position indicator, chain wheel operator for mounting heights of 96-inches or greater above the floor. Mount in horizontal position. Suitable for bi-directional dead-end service at valve's rated pressure without need of downstream flange.

2.8 CHECK VALVES

- A. Swing Check Valves, 2-Inches and Smaller: MSS SP-80; Class 125, 200-psi CWP or Class 150, 300-psi CWP as required in the Application Schedule; 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 as required by Application Schedule.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Swing Check Valves:
 - b. Hammond Valve Corporation
 - c. Milwaukee Valve Company, Inc.
 - d. Nibco Inc.
 - e. Or Approved Equal
- B. Swing Check Valves, 2-1/2-Inches and Larger: MSS SP-71, Class 125, 200-psi CWP or Class 250, 500-psi CWP as required in the Application Schedule, 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 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.

3.4 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.

3.5 VALVE END SELECTION

- A. Select valves with the following ends or types of pipe/tube connections:
1. Copper Tube Size, 2-Inches and Smaller: Threaded ends, except solder ends can be used for non-potable water and compressed air systems. Press-Connect Mechanical Joint Fittings acceptable if specified in Division 23 "Hydronic Piping."
 2. Copper Tube Size, 2-1/2-Inches and Larger: Flanged ends. Grooved ends acceptable if specified in Division 23 "Hydronic Piping."
 3. Steel Pipe Sizes, 2-Inches and Smaller: Threaded ends.
 4. Steel Pipe Sizes, 2-1/2-Inches and Larger: Flanged ends. Grooved ends acceptable if specified in Division 23 Section "Hydronic Piping."

3.6 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. 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.
- C. Heating Water Systems: Use the following valve types:
1. Gate Valves, 2-Inches and Smaller: Class 150, bronze body.
 2. Gate Valves, 2-1/2-Inches and Larger: Class 125, iron body.
 3. Ball Valves: [2-piece][3-piece] with stem extension and memory stop.
 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: 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.
- D. Steam and Condensate Systems (up to 15-psig): Use the following valve types:
1. Gate Valves, 2-Inches and Smaller: Class [125][150], bronze body.
 2. Gate Valves, 2-1/2-Inches and Larger: Class [125][250], iron body.
 3. Globe Valves, 2-Inches and Smaller: Class [150][300], bronze body.
 4. Globe Valves, 2-1/2-Inches and Larger: Class [125][250], iron body.
 5. Swing Check Valves, 2-Inches and Smaller: Class [125][150], bronze body.
 6. Swing Check Valves, 2-1/2-Inches and Larger: Class [125][250], iron body.
- E. Steam and Condensate (16 to 125-psig), Boiler Feedwater and Boiler Blowdown: Use the following valve types:
1. Gate Valves, 2-Inches and Smaller: Class 150, bronze body.
 2. Gate Valves, 2-1/2-Inches and Larger: Class 150 cast steel body.
 3. Globe Valves, 2-Inches and Smaller: Class 300 bronze body.
 4. Globe Valves, 2-1/2-Inches and Larger: Class 150, cast steel body.
 5. Ball Valves: 2-piece with high temperature and stem extension options.
- F. Chilled Water Systems (up to 125 psig): Use the following valve types:
1. Gate Valves, 2-Inches and Smaller: Class 150, bronze body.
 2. Gate Valves, 2-1/2-Inches and Larger: Class 125, iron body.
 3. Ball Valves: [2-piece][3-piece] with stem extension and memory stop.
 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: 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.
- G. Chilled Water Systems (up to 250 psig): Use the following valve types:
1. Gate Valves, 2-Inches and Smaller: Class 150, bronze body.
 2. Gate Valves, 2-1/2-Inches and Larger: Class 250, iron body.
 3. Ball Valves: 2-piece with stem extension and memory stop.
 4. Butterfly Valves: Class 150, aluminum bronze disc.
 5. Swing Check Valves, 2-1/2-Inches and Larger: Class 250, iron body, use for all applications except at pump discharge.
 6. Silent Check Valves, 2-1/2-Inches and Larger: Class 250, iron body, use at pump discharge.
- H. Condenser Water Systems: Use the following valve types:
1. Gate Valves, 2-Inches and Smaller: Class 150, bronze body.
 2. Gate Valves, 2-1/2-Inches and Larger: Class 125, iron body.

3. Ball Valves: [2-piece][3-piece] with stem extension and memory stop.
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: 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.

3.7 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