

**SECTION 23 05 23**  
**GENERAL-DUTY VALVES FOR HVAC PIPING**

**PART 1 - GENERAL**

**1.1 STIPULATIONS**

- A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

**1.2 SUMMARY**

- A. This Section includes general duty valves common to several HVAC piping systems.
- B. Additional Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 23 piping Sections for specialty valves applicable to those Sections only.
  - 2. Division 23 Section "Identification for HVAC" for valve tags and charts.
  - 3. Division 23 Section "Instrumentation and Control for HVAC" for control valves and actuators.
  - 4. Division 23 Section "Hydronic Piping" for hydronic piping system component and equipment pressure ratings which apply to this Section, and for specialty valves.
  - 5. Division 23 Section "Steam and Condensate Heating Piping" steam piping system component and equipment pressure ratings which apply to this Section.

**1.3 DEFINITIONS**

- A. The following are standard abbreviations for valves:
  - 1. CWP: Cold working pressure.
  - 2. EPDM: Ethylene-propylene-diene terpolymer rubber.
  - 3. PTFE: Polytetrafluoroethylene plastic.
  - 4. SWP: Steam working pressure (saturated steam in psig).
  - 5. TFE: Tetrafluoroethylene plastic (e.g. Teflon®).
  - 6. TFM: Modified, 2nd-generation TFE.
  - 7. RPTFE: Reinforced Polytetrafluoroethylene plastic (e.g. reinforced Teflon®).
  - 8. Low Pressure Steam and Steam Condensate: 15 psig or less

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

## **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For valves to include in the operation and maintenance manuals. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

## **1.6 QUALITY ASSURANCE**

- A. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.
- D. MSS Compliance: Comply with the latest edition of various MSS Standard Practice documents referenced.

## **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, and weld ends.
  - 3. Set globe and gate valves closed to prevent rattling.
  - 4. Set ball valves open to minimize exposure of functional surfaces.
  - 5. 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 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Gate Valves (Steam and Steam Condensate Service):
    - a. Bonney Forge Corp.
    - b. Milwaukee Valve Company, Inc. / Hammond Valve
    - c. NIBCO Inc.
    - d. Stockham ; a Div. of Crane Co.
    - e. Velan Inc.

- f. Or equal as approved by the Professional.
- 2. Ball Valves (Hydronic / Water Services):
  - a. Apollo Valves.
  - b. Jamesbury; a Div. of Metso Corp.
  - c. NIBCO Inc.
  - d. Milwaukee Valve Company/ Hammond Valve
  - e. Stockham; a Div. of Crane Co.
  - f. Or equal as approved by the Professional.
- 3. Ball Valves (Low and Medium Pressure Steam and Steam Condensate Service), 2 inches and smaller:
  - a. Apollo Valves
  - b. Jamesbury; a Div. of Metso Corp.
  - c. NIBCO Inc.
  - d. Velan Inc.
  - e. Or equal as approved by the Professional.
- 4. Globe Valves (Steam and Steam Condensate Service):
  - a. ARI Armaturen
  - b. Bonney Forge Corp.
  - c. Milwaukee Valve Company, Inc. / Hammond Valve
  - d. NIBCO Inc.
  - e. Stockham; a Div. of Crane Co.
  - f. Velan Inc.
  - g. Or equal as approved by the Professional.
- 5. Swing Check Valves:
  - a. Bonney Forge Corp.
  - b. Milwaukee Valve Company / Hammond Valve
  - c. NIBCO Inc.
  - d. Stockham; a Div. of Crane Co.
  - e. Velan Inc.
  - f. Or equal as approved by the Professional.

## 2.2 BASIC, COMMON FEATURES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. Gate and Globe Valve Stem Configuration: Rising stem or rising outside screw and yoke stems, except as specified below.
  - 1. Non-rising stem valves may be used only where headroom prevents full extension of rising stems.
- C. Pressure and Temperature Ratings: Not less than as indicated elsewhere in this Section, and as required to suit system pressures and temperatures.
- D. Sizes: Same size as the pipe in which the valve is installed, unless otherwise indicated.

- E. Operators: Use the following operators and handwheels:
1. Direct-Mount Handwheels: For valves other than quarter turn.
  2. Lever Handles: For quarter-turn valves 4 inches and smaller, where no more than 80 lbs. of force are required to fully open or close the valve
  3. Gear-Drive Operators: For quarter-turn valves 5 inches and larger, or where full closing or opening of the valve requires more than 80 lbs. of force. Gear-drive operator shall have a handwheel and a disc position/over-travel indicator to provide visual indication of disc position.
  4. Chain-Wheel Operators: For valves 5 inches and larger, installed 96 inches or higher above finished floor elevation.
- F. Threads: ASME B1.20.1.
- G. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.

## **2.3 GATE VALVES**

- A. Low and Medium Pressure Steam and Steam Condensate:
1. Gate Valves, 2 Inches and Smaller: MSS SP-80; Class 150, 300-psi CWP, 125 SWP; ASTM B 62 cast-bronze body and bonnet, solid-bronze wedge, copper-silicon alloy rising stem, graphite-impregnated packing with bronze packing nut, threaded end connections; and with aluminum or malleable-iron handwheel.
  2. Gate Valves, 2-1/2 Inches and Larger: MSS SP-70, Class 125, 200-psi CWP, 125 SWP, ASTM A 126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, graphite-impregnated packing with 2-piece packing gland assembly, flanged end connections; and with cast-iron handwheel.

## **2.4 BALL VALVES (HYDRONIC / WATER)**

- A. Ball Valves, 2 Inches and Smaller: MSS SP-110, 600-psi CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball; full port; blowout proof bronze or brass stem; Teflon (PTFE) seats and seals; threaded end connections:
1. Operator: Vinyl-covered carbon steel lever handle. Provide a lockshield where elsewhere specified or indicated on the Drawings.
  2. Stem Extension: For valves installed in insulated piping. The stem shall be enclosed in a protective sleeve that allows operation of valve without breaking the vapor seal to the sleeve or disturbing the insulation. The extension shall be 2" long.
  3. Non-Conductive and Insulated Extension Handle: For chilled water and other below-ambient piping applications, in lieu of the operator and stem extension specified immediately above, provide Milwaukee "The Insulator/MS", NIBCO "Nibseal", or Apollo "Therma-Seal" valve operator.

## **2.5 STEEL BALL VALVES (LOW AND MEDIUM PRESSURE STEAM AND STEAM CONDENSATE)**

- A. Ball Valves in Low and Medium Pressure Steam and Steam Condensate, 2 Inches and Smaller: 1500 WOG, 2-piece carbon steel body, suitable for 150 psig saturated steam (150 SWP), with 316 stainless steel vented ball and stem, RPTFE seats and stem packing, blow-out proof stem, standard or full port, and threaded end connections.

1. Operator: Vinyl-covered carbon steel lever handle.
2. Stem Extension: For valves installed in insulated piping.

## **2.6 BRONZE BALL VALVES (LOW AND MEDIUM PRESSURE STEAM AND STEAM CONDENSATE)**

- A. Ball Valves in Low and Medium Pressure Steam and Steam Condensate, 2 Inches and Smaller: 600 WOG, 2-piece bronze body, suitable for 125 psig saturated steam (125 SWP), with stainless steel vented ball and stem, full port, Multifill / Carbon-filled PTFE or RPTFE seats, RPTFE stem bearing, blow-out proof stem, and threaded end connections.

1. Operator: Vinyl-covered steel lever handle.
2. Stem Extension: For valves installed in insulated piping.

## **2.7 GLOBE VALVES**

- A. Low and Medium Pressure Steam and Steam Condensate:

1. Globe Valves, 2 Inches and Smaller: MSS SP-80; Class 150, 300-psi CWP; 125 SWP, ASTM B 62 cast-bronze body and screwed bonnet, rubber, bronze, or Teflon disc, silicon bronze-alloy rising stem, graphite-impregnated packing with bronze nut, threaded end connections; and with aluminum or malleable-iron handwheel.
2. Globe Valves, 2-1/2 Inches and Larger: MSS SP-85, Class 125, 200-psi CWP, 125 SWP, ASTM A 126 cast-iron body and bolted bonnet with bronze fittings, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, graphite-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron handwheel.

## **2.8 SWING CHECK VALVES**

- A. Hydronic / Water and Low and Medium Pressure Steam Services:

1. Swing Check Valves, 2 Inches and Smaller: MSS SP-80; Class 150, 300-psi CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded end connections:
2. Swing Check Valves, 2-1/2 Inches and Larger: MSS SP-71, Class 125, 200-psi CWP, ASTM A 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged end connections.

# **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. Shut-Off Valve Orientation on Horizontal Piping: Unless recommended otherwise by the valve manufacturer, install ball, gate, and globe valves with their stems vertical, with the valve actuator on top. Where valves on insulated piping are not easily visible from below, provide an identifying label at the valve, on the bottom of the pipeline.
  - 1. Exception: Where space restrictions prevent reasonable access to the operator with a vertical stem orientation, or where chain wheels are required, valves may be installed with their stems horizontal (actuator on side of pipeline), or at an intermediate position between horizontal and vertical, but only if permitted by the valve manufacturer.
- C. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.
- D. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
- E. Provide a union immediately downstream of threaded end valves.
- F. Locate valves for easy access and provide separate support where necessary.
- G. Install valves in a position to allow full stem movement.
- H. For chain-wheel operators, extend chains to 60 inches above finished floor elevation, unless directed otherwise by Engineer or Client Agency.
- I. Installation of Check Valves: Install for proper direction of flow as follows:
  - 1. Swing Check Valves: Horizontal position with hinge pin level.
- J. Install valve tags and valve schedules as specified in Division 23 Section "Identification for HVAC".
- K. Lubricate OS&Y and rising stem gate and globe valve threads with a high temperature grease acceptable to the valve manufacturer.
- L. Adjust valve packing as required to prevent leaks. Do not overtighten.

### **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.
- 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.

### **3.6 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.
  - 2. Steel Pipe Sizes, 2 Inches and Smaller: Threaded end.
  - 3. Steel Pipe Sizes, 2-1/2 Inches and Larger: Flanged.

### **3.7 APPLICATION SCHEDULE**

- A. General Application (Hydronic Systems): Use ball valves for shutoff duty; flow control valves and balancing cocks for throttling duty. Refer to piping system Specification Sections for specific valve applications and arrangements. Provide valves suitable for working pressures encountered in each system.
- B. General Application (Steam Systems): Use gate and ball valves for shutoff duty; globe for throttling duty. Refer to piping system Specification Sections for specific valve applications and arrangements. Provide valves suitable for working pressures encountered in each system.
  - 1. Refer to Division 23 Section "Steam and Condensate Heating Piping" for system pressure and temperature rating requirements.
- C. Pressure and Temperature Ratings: If valves with specified pressure classes, SWP classes, or CWP ratings are unavailable, the same types of valves with higher classes or ratings may be substituted.
- D. Domestic Make-Up Water Systems: Use the following valve types:
  - 1. Ball Valves: 600-psi CWP, with stem extension.
  - 2. Check Valves: Class 125, swing type.
- E. Hydronic Heating Hot Water Systems: Use the following valve types:
  - 1. Ball Valves: 600-psi CWP, with stem extension.
  - 2. Check Valves: Class 150, bronze body swing check with rubber seat or Class 125, cast-iron body swing check.
  - 3. Provide "spring-loaded "silent" check" valves at pumps as specified in Division 23 Section "Hydronic Piping".
- F. Low and Medium Pressure Steam and Condensate Return Systems: Use the following valve types:
  - 1. Gate Valves: Class 150, bronze body; or Class 125, cast-iron body.
  - 2. Globe Valves: Class 150, bronze body; or Class 125, cast-iron body.
  - 3. Check Valves: Class 150, bronze body swing check with composition seat or Class 150, cast-iron body swing check with bronze seat ring.
  - 4. Ball Valves: 125 psig SWP; bronze or carbon steel body, with stem extension.

### **3.8 JOINT CONSTRUCTION**

- A. Refer to Division 23 Section "Common Work Results for HVAC" for basic piping joint construction.

### **3.9 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**