SECTION 23 05 23

GENERAL DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this and other Sections of Division 23.

1.2 SUMMARY

A. Section Includes:
1. Brass ball valves.
2. Bronze ball valves.
3. Iron, single-flange butterfly valves.
4. Bronze lift check valves.
5. Bronze swing check valves.
6. Iron swing check valves.
7. Iron swing check valves with closure control.
8. Bronze globe valves.
9. Iron globe valves.
10. Chain wheels.
11. Automatic flow control limiting valves.
12. Circuit balancing valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Non-rising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 SUBMITTALS

A. Compliance Review: In addition to the submittal requirements of this section, preorder bidders shall provide a Compliance Review of the Specifications and Addenda. The Compliance Review shall be a paragraph-by-paragraph review of the Specifications with the following information, “C”, “D,” or “E” marked in the margin of the original Specifications and any subsequent Addenda.

1. “C”: Comply with no exceptions.
2. “D”: Comply with deviations. For each and every deviation, provide a numbered footnote with reasons for the proposed deviation and how the intent of the Specification can be satisfied.
3. “E”: Exception, do not comply. For each and every exception, provide a numbered footnote with reasons and possible alternatives.
4. The notes associated with “D” and “E” responses shall be typewritten and submitted alongside the compliance review for review by the Engineer.
5. Unless a deviation or exception is specifically noted in the Compliance Review, it is assumed that the Bidder is in complete compliance with the plans and Specifications. Deviations or exceptions taken in cover letters, subsidiary documents, by omission or by contradiction do not release the Bidder from being in complete compliance, unless the exception or deviation has been specifically noted in the Compliance Review submitted with the Bid.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from a single source from a single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

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 angle, gate, and globe 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 valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to GENERAL REQUIREMENTS FOR VALVE APPLICATIONS.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures as indicated in equipment schedules.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
2. Handwheel: For valves other than quarter-turn types.
3. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug-valve head.
5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
2. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

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

a. Bray Controls; a division of Bray International.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Kitz Corporation.
d. Milwaukee Valve Company.
e. NIBCO Inc.
f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
a. Standard: MSS SP-110.
b. SWP Rating: 150 psig
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.3 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. Class 150 CHWS/R, CWS/R, & MUW, Iron, Single-Flange Butterfly Valves with EPDM Seat and Stainless-Steel Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Bray Controls; a division of Bray International (Basis of Design)
b. Crane Co.; Crane Valve Group; Jenkins Valves
c. Crane Co.; Crane Valve Group; Stockham Division
d. DeZurik Water Controls
e. Kitz Corporation.
f. Milwaukee Valve Company
g. NIBCO Inc.
h. ProValve Armaturen GmbH & Company
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
a. Standard: MSS SP-67, Type I.
b. CWP Rating: 150 psig
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: EPDM.
f. Stem: One- or two-piece stainless steel.
g. Disc: Stainless steel and aluminum bronze.

2.4 BRONZE SWING CHECK VALVES

A. Class 150 CHWS/R, CWS/R & MUW, Bronze Swing Check Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Co.; Crane Valve Group; Crane Valves
   b. Crane Co.; Crane Valve Group; Jenkins Valves
   c. Kitz Corporation.
   d. Milwaukee Valve Company
   e. NIBCO Inc.
   f. ProValve Armaturen GmbH & Company
   g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-80, Type 4.
   b. CWP Rating: 150 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded.
   f. Disc: PTFE or TFE.

2.5 IRON SWING CHECK VALVES

A. Class 125 CHWS/R, CWS/R & MUW, Iron Swing Check Valves with Nonmetallic-to-Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Stockham Division.
   c. Kitz Corporation.
   d. ProValve Armaturen GmbH & Company
2. Description:
   a. Standard: MSS SP-71, Type I.
   b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
   c. NPS 14 to NPS 24, CWP Rating: 150 psig
   d. Body Design: Clear or full waterway.
   e. Body Material: ASTM A 126, gray iron with bolted bonnet.
   f. Ends: Flanged.
   g. Trim: Composition.
   h. Seat Ring: Bronze.
   i. Disc Holder: Bronze.
   j. Disc: PTFE or TFE.
   k. Gasket: Asbestos free.

2.6 IRON, CENTER-GUIDED CHECK VALVES

A. Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat, Class 150:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Co.; Crane Valve Group; Crane Valves
   b. Crane Co.; Crane Valve Group; Jenkins Valves
   c. Kitz Corporation.
   d. Milwaukee Valve Company
   e. NIBCO Inc.
   f. ProValve Armaturen GmbH & Company
   g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-125.
   b. NPS 2-1/2 to NPS 12, CWP Rating: 300 psig.
   c. NPS 14 to NPS 24, CWP Rating: 250 psig.
   d. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
   e. Style: Compact wafer.
   f. Seat: Bronze.

2.7 CHAINWHEELS

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

1. Babbitt Steam Specialty Co.
2. Roto Hammer Industries.
3. Trumbull Industries.

B. Description: Valve actuation assembly with sprocket rim, brackets, and chain.

1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
2. Attachment: For connection to ball butterfly and plug valve stems.
3. Sprocket Rim with Chain Guides: Ductile or cast iron, of type and size required for valve. Include zinc coating.
4. Chain: Hot-dip, galvanized steel for indoors, Stainless steel for outdoors, of size required to fit sprocket rim.

2.8 AUTOMATIC FLOW CONTROL LIMITING VALVES

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

1. Bell & Gossett.
2. Griswold.
3. Nexus.

B. Description:

1. Automatic flow control valve cartridges shall automatically control flow rates with ±5% accuracy over an operating pressure differential range of at least 14 times the minimum required for control. Four operating pressure ranges shall be available with the minimum range requiring less than 3 PSID to actuate the mechanism.
2. Valve internal control mechanism shall consist of a stainless steel one-piece cartridge with segmented port design and full travel linear coil spring.
3. Manufacturer shall be able to provide certified independent laboratory tests verifying accuracy of performance.
4. The flow control valve cartridges shall be warranted by the manufacturer for five (5) years from the date of sale.
5. The automatic flow control limiting valve cartridges shall be sized for the equipment flow rate, while rounding up to the nearest cartridge size.
6. The manufacturer shall provide a full 100% cartridge exchange for up to one (1) year from date of delivery at no charge. Exchange shall be provided for flow rate changes within the same valve body.

C. K Valve (DCA Units)

1. The valve shall consist of forged brass bodies from 1/2” to 3” and stainless steel cartridge assembly. The K Valve shall be rated for 400 PSI/250°F. The valves shall be provided with dual pressure or pressure/temperature test valves for verifying accuracy of flow performance for all sizes combined with a manual air vent.
2. The body design shall allow inspection or removal of cartridge without disturbing piping connections.
3. The valve shall come fully assembled and be permanently marked to show direction of flow; shall have a body tag to indicate flow rate and model number.

D. Accessories:

1. A portable meter kit shall be provided with a double-hose portable kit; pressure gauge with 4-1/2" dial and range of -14.7 to 150 PSI; portable kits shall be available with end connections for either pressure only or pressure/temperature test valves, and shall include a carrying case, and a flow rate chart for determining flow rates.
2. Pressure/temperature test valves or pressure only test valves shall be available at 1/4" NPT for measuring pressure or temperature in fluid systems.
3. Hoses shall be equipped with swivel end connections at the terminal unit. The end connections shall be crimped to meet stated pressure ratings. Serrated/slip fit connections are not acceptable.
4. Identification tags shall be available for all valves; tags shall be indelibly marked with flow rate, model number, zone identification: tags shall be 3" x 3" aluminum.
5. Provide one meter test kit for the facility to accommodate each type of valve furnished.

2.9 CIRCUIT BALANCING VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Armstrong
   2. Bell & Gossett
   3. Griswold

B. Description: Typical Specifications for 1/2” – 2” Valves
   1. Furnish and install, as shown on plans and in accordance with manufacturer’s installation instructions, Circuit Balancing Valves. Valves are to be of the ‘Y’ pattern, equal percentage globe-style and provide three functions: 1) Precise flow measurement, 2) Precision flow balancing, 3) Positive drip-tight shut-off.
   2. Valve shall provide multi-turn, 360° adjustment with micrometer type indicators located on the valve handwheel. Valves shall have a minimum of five full 360° handwheel turns. 90° ‘circuit-setter’ style ball valves are not acceptable. Valve handle shall have hidden memory feature, which will provide a means for locking the valve position after the system is balanced.
   3. Valves shall be furnished with precision machined venturi built into the valve body to provide highly accurate flow measurement and flow balancing. The venturi shall have two, ¼" threaded brass metering ports with check valves and gasketed caps located on the inlet side of the valve. Valves shall be furnished with flow smoothing fins downstream of the valve seat and integral to the forged valve body to make the flow more laminar. The valve body, stem, and plug shall be brass. The handwheel shall be high-strength resin.

C. Typical Specifications for 2-1/2” – 12” Valves
   1. Furnish and install, as shown on plans and in accordance with manufacturer’s installation instructions, Circuit Balancing Valves. Valves are to be of the ‘Y’ pattern, equal percentage globe-style and provide three functions: 1) Precise flow measurement, 2) Precision flow balancing, 3) Positive drip-tight shut-off.
   2. Valve shall provide multi-turn, 360° adjustment with micrometer type indicators located on the valve handwheel. Valves shall have a minimum of five full 360° handwheel turns. 90° ‘circuit-setter’ style ball valves are not acceptable. Valve handle shall have hidden memory feature, which will provide a means for locking the valve position after the system is balanced.
   3. The valve body shall be either cast iron with integrated cast iron flanges (2-1/2” to 12”) or ductile iron with industrial standard grooved ends (2-1/2” to 12”). The valve stem and plug disc shall be bronze with ergonomically designed handwheel that permits multi-turn adjustments. Sizes 2-1/2” and 3” – 5 turns; sizes 4” to 6” – 6 turns; sizes 8” and 10” – 12 turns and size 12” – 14 turns. Armstrong flange adapters shall be supplied, to prevent rotation.
   4. The valve shall be installed with flow in the direction of the arrow on the valve body and installed at least five pipe diameters downstream from any fitting, and at least ten pipe diameters downstream from any pump. Two pipe diameters downstream from the CBV should be free of any fittings. When installed, easy and unobstructed access to the valve handwheel and metering ports for adjustment and

measurement are to be provided. Mounting of valve in piping must prevent sediment build-up in metering ports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. 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.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace them with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. For flanged connections, the mating surfaces shall be brought together with a bolt sequence that ensures initial contact with flanges and gaskets are flat and true.

C. Obtain bolt torque requirements from the valve manufacturer and the gasket manufacturer. Should torque requirements differ this contractor shall reconcile with both parties and submit a written report indicating procedure and torque requirements as approved by the manufacturers.

D. Torque bolts using a star pattern using valve manufacturer specified torque.

E. Maintain a record of each flanged connection and the final torque for each bolt. The record shall be turned over to the owner at project closeout.

F. Locate valves for easy access and provide separate support where necessary.

G. Install valves in horizontal piping with stem at or above center of pipe.

H. Install valves in position to allow full stem movement.

I. Install chain wheels on operators for butterfly, and gate and plug valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

1. Valves installed with stem above piping and with chain operators shall have shaft extensions to allow for operation from the ground without the chain riding against the insulation.
2. Refer to the Valve Chain Labeling and Securement sections in the 230553 Identification for HVAC Piping and Equipment specification for additional requirements.

J. Install check valves for proper direction of flow and as follows:
1. Swing Check Valves: In horizontal position with hinge pin level.
2. Lift Check Valves: With stem upright and plumb.

K. Stem Position: Valves shall be installed with stems upright or horizontal, not down. Stem extensions shall be provided for ball valves installed on insulated lines. Butterfly valves shall be installed with the stems horizontal, with the exception of those with chain operators. These may be installed with the stems pointing up to facilitate operation.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:
1. Shutoff Service: Ball or butterfly valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service: Globe valves.
4. Pump-Discharge Check Valves:
a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
b. NPS 2 1/2 and Larger: Iron swing check valves with lever and weight or with spring or iron, center-guided, metal, or resilient-seat check valves.
5. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

B. Select valves, except wafer types, with the following end connections:
1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2 1/2 to NPS 4: Flanged ends.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2 1/2 to NPS 4: Flanged ends.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.5 CHILLED-WATER AND CONDENSER WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:
   1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Ball Valves: Two, or Three piece, full port, with stainless-steel trim.
   3. Bronze Swing Check Valves: Class 150, bronze disc.
   4. Bronze Globe Valves: Class 150, bronze disc.

B. Pipe NPS 2 1/2 and Larger:
   1. Iron, Single-Flange Butterfly Valves, NPS 2 1/2 to NPS 12: 150 CWP, EPDM seat, stainless-steel or aluminum bronze disc.
   2. Iron, Single-Flange Butterfly Valves, NPS 14 to NPS 24: 150 CWP, EPDM seat, stainless-steel or aluminum bronze disc.
   3. Iron Swing Check Valves: Class 150, metal or nonmetallic-to-metal seats.
   4. Iron Swing Check Valves with Closure Control, NPS 2 1/2 to NPS 12: Class 125, lever and spring.
   5. Iron Globe Valves: Class 150.

END OF SECTION

This page intentionally left blank.