

SECTION 230523 - VALVES, COCKS AND SPECIALTIES: HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

1.2 SCOPE

- A. Provide those valves, cocks and specialties which are required for the HVAC piping systems. These items include, but are not necessarily limited to, the following:
 - 1. Gate valves.
 - 2. Check valves.
 - 3. Ball valves.
 - 4. Cocks and plug valves.
 - 5. Drain valves.
 - 6. Butterfly valves.
 - 7. Backflow preventers.
 - 8. Strainers.
 - 9. Safety valves.
 - 10. Pressure relief valves.
 - 11. Air vents.
 - 12. Flow indicating/balancing valves.
 - 13. Pump suction guide/strainer/elbows.
 - 14. Pump discharge/flow control valves.

1.3 RELATION TO OTHER WORK

- A. Refer to the section, "General Mechanical Provisions", for related requirements. Refer to other sections of the Division-23 and to all other applicable portions of the drawings and specifications.
- B. This section directly relates in particular to sections (which may or may not be included in this division) which describe the following:
 - 1. Piping systems.
 - 2. Pumps.
 - 3. Insulation.
 - 4. Equipment connected to piping systems in which work of this section is applicable.
 - 5. Air control equipment.
 - 6. Work which is described in Divisions 22 and 23 which relate to the plumbing systems and which requires valves, cocks and specialties shall be provided in compliance with this Section unless requirements of Divisions 22 and 23 specifically state otherwise.

1.4 APPLICABLE SYSTEMS

- A. These valves, cocks and specialties are intended for application in, but not necessarily limited to, the following HVAC piping systems as applicable to this project.

1. Chilled water systems.
2. Condenser water systems.
3. Other related HVAC piping systems.

1.5 VALVES, COCKS AND SPECIALTIES

- A. Valves, cocks and specialties may not be indicated in every instance on the drawings, but whether or not shown, all valves, cocks and check valves necessary to the proper operation of the system shall be furnished and installed in an approved manner and location. Valves shall have rising stems except in locations where space is limited; in these locations non-rising stem valves of equivalent material and pressure class will be accepted.

1.6 ACCEPTABLE MANUFACTURERS

- A. Products listed in this Section or on the plans are based on a specific manufacturer to establish the desired style, quality and type. Equivalent products, complying with the requirements of this Section and the installation requirements of the plans, by the following manufacturers are acceptable:

1. Mueller
2. Hammond
3. Crane
4. Powell
5. Walworth
6. Lunkenheimer
7. Stockham
8. Williams-Hager
9. APCO
10. Metraflex
11. ACFR
12. Keystone
13. Centerline
14. Demco
15. Gerand
16. Griswold
17. Aeroquip
18. Dezurick
19. Watts
20. Maxwell & Moore
21. Bell & Gossett
22. Beaton-Cadwell
23. McDonnell Miller
24. Maid-O-Mist
25. Sarco
26. Nibco
27. Jamesbury
28. Taco
29. Wheatley Pump & Valve
30. Conbraco
31. Grinnell
32. McDonald
33. Flow Design
34. Weksler

- B. Any model numbers listed are from one or more of these manufacturers and are given to provide an example of the item(s) required.

1.7 INDUSTRY STANDARDS

- A. Where compliance with an industry, society or association standard is specified or indicated, certification of such compliance shall be submitted with shop drawings.

1.8 PRESSURE AND TEMPERATURE RATINGS

- A. Temperature: Unless otherwise specified, ratings shall be as follows for all components specified herein.
 - 1. Chilled water systems: 150°F
 - 2. Condenser water systems: 150°F
- B. Pressure: Unless otherwise specified, all components must be of pressure class and rating to be recommended for operation at the following maximum allowable non-shock pressure ratings.
 - 1. Chilled water systems: 150 psig
 - 2. Condenser water systems: 150 psig

PART 2 - PRODUCTS

2.1 GATE VALVES

- A. 3" and smaller: Threaded or solder pattern as applicable, rising stem, iron wheel, rough brass body, solid wedge disc, screwed or union bonnet and finished gland nut, 150 psi class. Types as follows:
 - 1. Threaded Pattern: Crane 431, Powell 514S, Walworth 56, Lunkenheimer 2151, Stockham B-122.
 - 2. Soldered Pattern: Powell 1842S, Lunkenheimer 2151, Stockham B-124.
- B. 3-1/2" and Larger: Flanged, cast iron body, brass trim, brass seats, rising stem and iron wheel, 125 psi class. Types as follows: Crane 465-1/2, Powell 1793, Walworth 726F, Lunkenheimer 1430, Stockham G-623.

2.2 GLOBE VALVES

- A. 2-1/2" and Larger: Flanged, iron body, yoke bonnet, bronze trim and disc.
- B. 2" and Smaller: Screwed, bronze body, union bonnet composition disc.

2.3 CHECK VALVES

- A. Swing type:

1. 3-inches and Smaller: Threaded or solder pattern as applicable, pressure rating of not less than 200 psi threaded pattern and 125 psi solder pattern, wye pattern swing check, rough brass body, finished gland nut, regrounding bronze disc.
2. 4-inches and Larger (125 psi maximum working pressure): Flanged pattern, iron body, swing check, renewable brass seat, disc and trim. Types: Crane 373, Powell 559, Walworth M-928F, Lunkenheimer 1790, Stockham G-931.
3. 4-inch and Larger (200 psi maximum working pressure): Flanged brass-ferrosteel body, swing check, renewable brass seat, disc and trim. Types: Crane 39E, Powell 576, Walworth M-970F, Lunkenheimer 323.

B. Wafer Type:

1. 3-inch and Larger: Flanged pattern, globe type, semi-steel body, stainless steel spring, bronze disc and bronze seat ring. Types: Williams-Hager Figure 636; APCO Series 600; Mueller Nos. 105, 107, 109 and 113; Metraflex Series 900.

2.4 PLUG VALVES AND BALANCING COCKS

- A. General: Semi-steel, lubricated type, bolted cover or gland, position indication dial, full port, teflon coated plug. Over 6-inches shall have a geared or worm drive operator.
- B. 2 inches and Smaller: Screw pattern Powell F-2200, Walworth 1700, ACF R1430.
- C. 2-1/2 inches and Larger: Flanged end. Powell F2201, Walworth 1700F, ACF R 1431.

2.5 DRAIN VALVES

- A. General: Use only for low pressure drainage service.
- B. 2 inches and Smaller: Either threaded or soldered ends, class 125, bronze body, screwed bonnet, rising stem, disc with 3/4" hose thread outlet connect.
 1. Threaded Pattern: Crane 410, Stockham B-100.
 2. Soldered Pattern: Crane 1320, Stockham B108.

2.6 BUTTERFLY VALVES

- A. Pattern: Valves shall be of the threaded lug body type. All valves shall have extended necks for insulation clearance.
- B. Body: Semi-steel or cast iron or pattern specified hereinbefore.
- C. Disc: Bronze or semi-steel with welded nickel edge, 416 stainless steel shaft, bronze bearings, and Hycar seals.
- D. Seat: Hycar, bonded to a rigid reinforcing ring which is held in place by a metal retaining ring. All valves shall be capable of bubble tight shut-off at pressure differentials of 200 psig, and 200 psig dead end shut-off.
- E. Operators: Valves 2" through 6" shall have lever type actuator capable of infinite position (or minimum of 10 locking positions) and shall have adjustable memory stop. Valves 8" and larger shall have gear type actuator with chain wheel, hand wheel or crank type operating mechanisms, adjustable opening and closing memory stops, and position indicator. All

valves 4" and larger located more than 6'-0" above the floor shall be provided with chain wheel and chain. Provide stem extensions (in addition to insulation clearance extension specified hereinbefore) as required to place operators in an easily accessible location free of interference with adjacent piping, equipment structure, and the like.

F. Manufacturers: Grinnell, Keystone, Center-Line, Demco, DeZurick.

2.7 BALL VALVES

- A. 2-1/2 inches and Smaller: Threaded or soldered ends, port area equal to or greater than connecting pipe diameter, Class 125, two piece bronze body, bronze ball, bronze stem, teflon seat and seals. Acceptable manufacturers; Crane, Hammond, Jamesbury, Nibco, Stockham, and Walworth.

2.8 CALIBRATED BALANCING AND FLOW MEASURING VALVES

- A. 1/2" to 2": Globe type providing flow balancing, flow measurement, positive shut off, and drain connection. Balancing valves shall be provided with vernier-type setting with adjustment range through four 360 degree turns of handwheel. Valves shall have hidden memory feature to prevent tampering. Valves shall be provided with meter connections having positive shut off valves. All metal parts shall be of nonferrous, pressure die-cast, nonporous Ametal Copper Alloy. Valve shall provide accurate flow control regardless of valve orientation. Provide form-fitting polyurethane insulation cover. Design basis Armstrong CBV I. Acceptable Alternates: Accepted equivalents by Bell & Gossett, Taco, and Preso.
- B. 2-1/2" to 6": Globe type providing flow balancing, flow measurement, and positive shut off. Balancing valves shall be provided with vernier-type setting with adjustment range through eight 360 degree turns of handwheel. Valves shall have hidden memory feature to prevent tampering. Valves shall be provided with meter connections having positive shut off valves. Valves shall be cast iron with brass trim. Design basis Armstrong CBV II. Acceptable Alternates: Accepted equivalents by Bell & Gossett, Taco and Preso.
- C. Provide Owner: One portable differential pressure gauge kit of same manufacturer as valves. Kit shall be housed in a hand-carrying case and shall contain one 0-135" W.C. and one 0-60 foot pressure gauge, 5 foot meter hoses with disconnect ends, positive shutoff valves, operating instructions, and flow versus pressure drop curves for each size valve installed.

2.9 FLOW CONTROL VALVES, PRESSURE COMPENSATING, ACCESSIBLE

- A. Automatic pressure compensating flow control valves which operate as mechanically independent devices on a mechanically based variable orifice principal. Provide where specified and where indicated on piping plans and schematics, to enable the proper flow balancing of systems. Acceptable manufacturers: Griswold, Taco.
- B. Valves shall be factory set and shall automatically limit the rate of flow to required engineered capacity within 5% accuracy over an operating pressure differential of at least 14 times the minimum required for control.
- C. Control mechanism of valve shall be a self-contained, open-chamber cartridge assembly with unobstructed flow passages to eliminate accumulation of particles and debris. All internal working parts shall be type 300 passivated stainless steel. No plated materials are acceptable.

- D. Control valve mechanism shall be accessible for changeout if needed without disconnecting the piping system in which it is installed.
- E. Valves shall be available in four pressure differential ranges, with the minimum range requiring less than 2 psi to control flow. Cast iron valve bodies shall be provided with inlet and outlet tappings suitable for connection of instruments for verification of flow rates. Valve bodies shall be rated for use at not less than 150% of system designed operating pressures.
- F. Each automatic flow control valve shall be furnished with a valve kit consisting of 1/4 inch x 2 inch minimum size nipples, quick-disconnect valves (to be located outside of insulation), and fittings suitable for use with companion measuring instruments.

2.10 STRAINERS

- A. General: Y-type.
- B. Body: Cast iron, ductile iron, cast or forged steel as required for specified working pressure of piping system.
- C. Screen: 315 stainless steel or monel. Free area not less than three times inlet area.
 - 1. Perforations: 1/8" mesh for sizes to 8-inches. 5/32" mesh for sizes 10-inches and larger.
- D. Connections:
 - 1. Straight thread and gasket to 2-inch size.
 - 2. Flanged 2-1/2 inches and larger.
 - 3. Solder pattern when used in copper piping systems.
- E. Bolted cover in 2-1/2 inch and larger.
- F. Gate Valve: On 2-1/2 inch size and larger, provide a gate valve on each strainer cover blowdown connection; gate valve to be full size of blowdown connections.

2.11 SAFETY VALVES

- A. General: ASME rated as shown on the drawings and/or required by applicable codes.
- B. Manufacturers: Manning, Maxwell & Moore, Watts Regulator, or Bell & Gossett Co.

2.12 PRESSURE RELIEF VALVES

- A. One-half (1/2) or three quarter (3/4) inch size, brass, iron or steel, ASME rated.

2.13 AIR VENTS

- A. Automatic:
 - 1. 150 psi Working Pressure: Metraflex MV-15, Crane 976, Sarco 13W, Armstrong 1AV.
 - 2. 75 psi Working Pressure: Maid-O-Mist #7, Bell & Gossett #7, Hoffman 79.
- B. Manual: Brass manual cock, Crane 700 Series, with hose thread adapter.

2.14 PUMP SUCTION GUIDE/STRAINER ELBOW

- A. Sizes Allowable: 2" through 12".
- B. Construction: At the Contractor's option, in lieu of strainer and long sweep elbow, provide at each pump a suction guide/strainer elbow. Units shall consist of cast iron angle type body (175 psi pressure rated) with cast iron inlet vanes and a combination stainless steel diffuser strainer with 3/16" or 1/3" diameter openings for pump protection. (Unit shall be equipped with a disposable brass or bronze fine mesh start up strainer which shall be removable after 30 days). The body outlet pipe size shall be equal to the pump suction pipe size. The unit shall be provided with an adjustable support foot to relieve piping strains from the pump suction, threaded pressure gage tap at the body inlet and blowdown tapping in bottom.
- C. Acceptable Manufacturers: Armstrong Pumps, Inc., Taco, Inc.; Bell & Gossett or equivalent.

2.15 PUMP DISCHARGE/FLOW CONTROL VALVES

- A. Allowable Sizes: 1-1/2" through 10".
- B. Construction: At Contractor's option, install pump discharge valves on each pump discharge line in lieu of separate shutoff valve, check valve, and balance cock. Pump discharge flow control shall be cast-iron valve body, pressure rated for 175 psi, maximum operating temperature of 300°F. Provide check valve and calibrated adjustment feature permitting regulation of pump discharge flow and shutoff. Bronze gland, stainless steel stem, brass or bronze seat, graphited asbestos packing or double "O" ring seal straight or angle pattern. Angle pattern valves shall be provided with adjustable support foot.
- C. Acceptable Manufacturers: Armstrong Pumps, Inc., Bell & Gossett; Taco, Inc.; or equivalent.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install valves in horizontal piping with the valve stem in the vertical upright position.
- B. Install valves to provide adequate clearance to permit easy operation of the valve hand wheel and permit servicing of the valve packing.
- C. Provide blow down valve on 1-1/2" and larger strainers (except refrigerant piping). Use valve not less than 1/2 strainer blow down outlet size.

3.2 VALVES AND COCKS

- A. All valves, balancing cocks and similar items shall be installed in an easily accessible location. Provide access panels for all concealed valves. Where gate valves are indicated on the drawings, the Contractor may, at his option, furnish butterfly valves, provided they are in compliance with these specifications. Where butterfly valves are used, they shall be installed between properly spaced flanges, then run to the full open position before mounting bolts are tightened in order to insure a balanced pressure on the seat and prevent distortion.

3.3 PRESSURE RELIEF VALVES

- A. Install pressure relief valves where specified or indicated on the drawings. Pipe to spill over floor drain or service sink. Provide pressure expansion device for all valves set for 150-psig or greater.

3.4 PUMP DISCHARGE FLOW CONTROL VALVES

- A. Where such valves are used, install pump discharge/flow control valves on each pump discharge. Install in horizontal or vertical position with stem in upward position; allow clearance above stem for check valve mechanism removal. After hydronic system has been completed, mark calibrated name plate with stripe of yellow lacquer to permanently mark final balanced position.
- B. Install adjustable foot support for angle pattern valves to carry weight of discharge piping.

3.5 SAFETY VALVES

- A. Safety valves to have valve spindle enclosure with gland seal to minimize leakage and manual lift lever to check discharge required. Cut discharge pipe from safety valve on a 45 degree angle, pipe to floor and direct toward or into floor drain (unless noted otherwise on the drawings).

3.6 AUTOMATIC AIR VENTS

- A. Install automatic air vents with inlet isolation cock at locations indicated on drawings and at high points of hot and chilled water piping systems. Pipe vent discharge to drain pan, plumbing trap or to outside of building.

3.7 DRAIN VALVES

- A. Install drain valves at the base of all water piping risers (both supply and return) and at all low points in the piping system.

3.8 BALL VALVES

- A. Ball valves may be installed in lieu of gate valves for all individual fan coil unit supply and return piping 1" and smaller.

3.9 VALVED GAUGE CONNECTIONS

- A. Contractor shall provide valved gauge connections at diffuser inlet and pump suction to indicate when cleaning is needed. Install on pump suction inlets, adjust foot support to carry weight of suction piping. Install nipple and shutoff valve in blowdown connection. After cleaning and flushing hydronic piping system, but prior to balancing of hydronic piping system, remove disposable fine mesh strainer.

3.10 CALIBRATED BALANCING AND FLOW MEASURING VALVES

- A. Provide flow indicating balancing valves where shown on drawings. The locations shown on drawings or otherwise indicated are diagrammatic in nature and are intended basically to show the requirement for flow measurement and shut-off relative to a specific piece of equipment or portion of the system and not the exact physical location of the device. The exact physical location shall be determined using field measurements relating to the specific piping arrangement and the manufacturer's recommendations relating to upstream and downstream clearances. Install in accordance with manufacturer's recommendations including increases or decreases in pipe size at points of installation together with minimum recommended lengths of straight run pipe before and after points of installation. Balancing shall be done, using the master meter specified hereinbefore, as work of the section describing test and balance. At the conclusion of the test and balance work the meter shall be turned over to, and shall become the property of, the Owner.

3.11 MECHANICAL ACTUATORS

- A. Install mechanical actuators with chain operators where indicated, and where valves 4" and larger are mounted more than 7'-0" above floor in mechanical rooms, chiller rooms, boiler rooms; and where recommended by valve manufacturer because of valve size, pressure differential or other operating condition making manual operation difficult.

END OF SECTION 230523