

GENERAL DUTY VALVES

GENERAL INFORMATION

1.1 This section applies to valves for hydronic and steam systems.

DESIGN REQUIREMENTS

2.1 Design Criteria

- a. Low pressure (LP) steam and condensate systems shall be defined as those systems designed and operated at 15 psig or less. High pressure (HP) steam and condensate systems shall be defined as those systems designed and operated above 15 psig or greater.
- b. The design drawings shall include a riser and flow diagram and details of system specialties for all HVAC systems. Collectively, the drawing elements shall illustrate all valve applications including: shut-off, balancing, bypass, control and direction flow control. Exception: drain valves can be noted on drawings.

2.2 Minimum test pressure for all valves shall be consistent with the system pressure.

2.3 Within each building there shall be a building valve to isolate service to the building. If no building isolation valve exists, it shall be brought to the attention of Operations and a suitable location for an isolation valve will be identified, and a valve installed.

2.4 Isolation valves shall be provided at all pumps, tanks, pressure reducing devices, automatic or mechanical flow control devices, terminal units, radiation, coils, heat exchangers, and at all other equipment and appurtenances requiring maintenance and servicing.

2.5 The isolation valves shall isolate the equipment without shutting down or draining complete or substantial portions of the system. Except where flanged valves are used, each connection to equipment shall be made with screwed or flanged union on the equipment side of the valve.

2.6 Isolation valves shall be provided at all branch takeoffs from system mains and risers and returns to system.

2.7 Steam mains shall have isolation valves spaced no further than 200 feet apart.

2.8 HP steam isolation valves on mains 8" and larger must be equipped with warm-up valves.

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- 2.9 Drain valves shall be provided on tanks, receivers, equipment, risers, low points and where they may be required or necessary for complete drainage of system. Drain valves shall have hose bibs and caps.
- 2.10 Check valves installed in the horizontal position shall be swing checks; valves installed in the vertical position shall be silent checks, except that all check valves in pump discharges shall be silent checks.
- 2.11 Provide blow-off valves at all strainers with caps.
- 2.12 Provide isolation valves at all steam traps.
- 2.13 Provide balancing valves in the branch lines of HVAC water systems where hydraulic disparities between the branches may exist. Balancing valves for HVAC water systems may also be used for equipment isolation.
- 2.14 Provide isolation valves on water piping leaving MER's to permit repairs on leaking pipes, etc. and without draining the entire system.
- 2.15 Provide either Pressure Independent Control Valves (PICV) to regulate flow through all air handling unit hydronic coils, FCU loops and hydronic equipment with a flow greater than 8 GPM. The use of Electronic Pressure Independent Valves requires approval from Plant Engineering.
- 2.16 Provide combination balancing and shutoff valve (flow control/balancing valve) for all hydronic terminal units unless otherwise indicated.
- 2.17 All bypass or flow control valves in steam piping shall be ball or butterfly type.
- 2.18 Triple duty valves are NOT permitted in ANY installation on Campus
- 2.19 Provide strainers in the inlet connections to each makeup connection, automatic control valve, pressure regulating valve, automatically controlled open-close devices, steam trap and pump.
- 2.20 Performance requirements and preferred manufacturers
 - a. **HVAC water - Isolation valves 2-1/2" and smaller:** Ball Valve, bronze, 2 piece, standard port, SS ball and trim, 600 psi CWP, 150 psi SWP, with stem extenders appropriate for insulation thickness. **Apollo 70-140-04, Milwaukee BA-100, Watts B-6000-SS-XH** (Preferred Manufacturer underlined)
 - b. **HVAC water - Isolation valves 3" and larger:** High Performance Butterfly Valve, Carbon Steel, Tapped Lug, SS Trim and disc, Class 150, lever handle 4" and smaller, worm gear operated sizes above 4". Valves shall provide absolute shut-off (zero leakage) to full

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ANSI Class rating, lug bolting, with pressure in either direction and downstream flange removed. **Apollo HP 150 215L**, **Bray HP Butterfly S41/466**, **Milwaukee HP1LCS (Preferred Manufacturer underlined)**

- c. **HVAC water - Flow control/balancing valves 2-1/2" and smaller:** Brass, Bronze or Copper alloy , Ball or globe valve design, Threaded (not sweated) tight shutoff, with position indicator, memory device, differential ports, checked metering points with drip caps and integral drain ports, max working temperature 250F, max working pressure 300 psi, port lengths to match insulation thickness. Provide one electronic differential meter and an additional meter for every 25 valves thereafter. **Armstrong CBV-VB**, **B&G CB-LF (Circuit Setter Plus)**, **Macon STV**, **Tour & Andersson 787 STAD**, **Watts CSM-61**
- d. **HVAC water - Flow control/balancing valves 3" and larger:** Cast 125, Iron, y-pattern, flanged ends, with position indicator, memory device, differential ports, checked metering points with drip caps and integral drain ports, port lengths to match insulation thickness. Provide one electronic differential meter and an additional meter for every 25 valves thereafter. **Macon STVA (to 6") STVC (8-12")**, **Tour & Andersson 788 STAF-SG** **Watts CSM-61**
- e. **HVAC water - Flow control/balancing valves 3" and larger (for constant volume pump applications):** Lubricated Plug Valves, Carbon Steel, Class 150, wrench operated, memory stop, 4" and smaller wrench or lever operated , worm gear operated sizes above 4" and over. In addition provide an Orifice plate (similar to **Armstrong**, **Macon Tour & Andersson**) with pair of differential ports over a fixed orifice (for the purposes of measuring the flow through the valve), port lengths to match insulation thickness. Provide one electronic differential meter and an additional meter for every 25 valves thereafter. **Nordstrom 1945 (3" – 4")**, **2449 (6" – 12")**, **4149 (above 12")**
- f. **HVAC water - Pressure Independent Control Valves:** Class 150, provided with multiple differential ports (port lengths to match insulation thickness). Provide one electronic differential meter and an additional meter for every 25 valves thereafter. **Flow Control Delta P Valve Series**, **Belimo PICCV (to 2")**.
- g. **HVAC water - Swing Check Valves 2-1/2" and smaller:** Bronze body and cap, Class 150 rated for 150 psi SWP, 300psi WOG, horizontal swing, y –pattern, bronze disc, threaded . Swing Check Valves: **Apollo 164T**, **Milwaukee 508**, **Nibco T-433-B (Preferred Manufacturer underlined)**
- h. **HVAC water - Swing Check Valves 3" and larger:** Class 150, cast steel body and bolted cap conforming to ASTM A216-WCB; horizontal swing, flanged ends. Valve shall be capable of being refitted while the valve remains in the line. **NEWCO CB2**, **Milwaukee 1570 CB2**, **Williams 151F2N (Preferred Manufacturer underlined)**

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- i. **HVAC water - Spring Check V valves 2" and smaller:** Bronze or SS body, rated for 125 psi SWP, 250psi CWP, Stainless steel throughout including guard cage, spring, valve disc, retaining ring and seat. **Apollo 61-100, Milwaukee 548, Nibco T-480. (Preferred Manufacturer underlined)**
- j. **HVAC water - Spring Check Valves 2-1/2" and larger:** Class 125, Cast Iron body, Stainless Steel spring, bronze seat and disc, flanged ends. **Watts TCVF-125, Mueller 105MAT**
- k. **HVAC water (indoor) Drain Valve 3/4":** Ball Valve, bronze or brass, 2 piece, standard port, SS ball and trim, 600 psi CWP, 150 psi SWP with hose connection, chain and cap. HVAC water drain valve 3/4" (located outdoors): Ball Valve, bronze, 2 piece, standard port, SS ball and trim, 600 psi CWP, 150 psi SWP with hose connection, chain and cap. **Apollo 70-140-HC, Jenkins 201 CJ, Nibco T-580-70-66-HC (Preferred Manufacturer underlined)**
- l. LP (<15 psig) Steam and Condensate - Isolation valves 2-1/2" and smaller:

Ball Valve, carbon steel body, 2 piece, full port, SS ball and trim, 1500 psi CWP, 250 psig Sat Steam trim, threaded, with stem extenders appropriate for insulation thickness. **Apollo 73a-140-64, Milwaukee 22 CS03XH (Preferred Manufacturer underlined)**

Or

Gate Valve, bronze: body, bonnet and wedge, rising stem, Class 150, threaded. **Apollo 107T, Milwaukee 1151, Powell 514 (Preferred Manufacturer underlined)**
- m. HP (>15 psig) Steam and Condensate - Isolation valves 2-1/2" and smaller: Gate Valve, forged steel, bolted bonnet, chrome wedge with hard faced satellite seat rings, Class 800 threaded. **Newco 18T-FS2, Vogt 12111, Williams F80T2N (Preferred Manufacturer underlined)**
- n. **LP (<15 psig) and HP (>15 psig) Steam and Condensate - Isolation valves 3" and larger:** High Performance Butterfly style, Carbon Steel, Tapped Lug, SS Trim and disc, lever handle 4" and smaller, worm gear operated sizes above 4". Valves shall provide absolute shut-off (zero leakage) to full ANSI Class rating, with pressure in either direction and downstream flange removed. Class 150 for LP: **Apollo HP 215L, Bray HP Butterfly S41/466, Milwaukee HP1LCS** Class 300 for HP: **Apollo HP 230L, Bray HP Butterfly S43/466, Milwaukee HP3LCS (Preferred Manufacturer underlined)**

Or

Gate Valve, cast carbon steel, OS&Y, bolted bonnet, cast carbon steel w/13% chrome wedge with hard faced satellite rings, flanged, Class 150 for LP: **Newco 11F-CB2, Williams 15F2N**, Class 300 for HP: **Newco 13F-CB2, Williams 30F2N (Preferred Manufacturer underlined)**

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- o. HP (>15 psig) Steam PRV Main Isolation Valve 3" and larger: Gear Operated, Class 300 Bray Trilok L1 series, Vanessa series 30,000, Zwick Tri-Con , (Preferred Manufacturer underlined)
- p. LP (<15 psig) **Steam and Condensate – Swing Check Valves 2-1/2" and smaller**: Bronze body and cap, Class 150 rated for 150 psi SWP, 300psi WOG, horizontal swing, y –pattern, bronze disc, threaded . Swing Check Valves: Apollo 164T, Milwaukee 508, Nibco T-433-B (Preferred Manufacturer underlined)
- q. HP (>15 psig) Steam and Condensate – Swing Check 2-1/2" and smaller: forged steel, welded and bolted bonnet, Class 800 threaded. Newco 38T-FS2, Vogt S701, WilliamsF801 T2N, (Preferred Manufacturer underlined)
- r. LP (<15 psig) and HP (>15 psig) **Steam and Condensate – Swing Check 3" and larger**: cast steel body and bolted cap conforming to ASTM A216-WCB; horizontal swing, flanged ends, satellite seats. Valve shall be capable of being refitted while the valve remains in the line. Class 150 for LP: Newco 31F-CB2, Williams 151F2N, Class 300 for HP: Newco 33F-CB2, Williams 301F2N (Preferred Manufacturer underlined)
- s. LP (<15 psig) **Steam and Condensate –Spring Check (Preferred Manufacturer underlined) valves 2" and smaller**: Bronze or SS body, rated for 125 psi SWP, 250psi CWP, Stainless steel throughout including guard cage, spring, valve disc, retaining ring and seat. Apollo 61-100, Milwaukee 548, NIBCO T-480 (Preferred Manufacturer underlined)
- t. HP (>15 psig) Steam and Condensate – Spring Check 2" and smaller: forged steel, bolted bonnet, Class 800 threaded. Newco 48T-FS2, Vogt 710, Williams F801 LT2N (Preferred Manufacturer underlined)
- u. Strainers shall have cast iron or bronze bodies of ample strength for the pressure to which they will be subjected. End connections 2" and smaller to be threaded. End connections 2-1/2" and larger to be flanged. Basket Perforations for steam and air shall be 0.020 in. (Perforations size / inch²) with 625 Perforations. Basket Perforations for Water to 6" shall be 0.0625 in. and water 6" and larger shall be 0.125 in. (Perforations size / inch²). Strainers in hydronic systems shall be rated: for 150 psi working pressure for building hot water and chilled water systems, 200 psi working pressure for Central Plant chilled water distribution, between plant and building. **Hydronic strainers 2" and smaller: Apollo 59-000 series, Watts LF777, Mueller 351M. Hydronic strainers 2-1/2" and larger: Apollo YCF, Mueller 781, Yarway M838.** Strainers in steam and condensate systems shall be rated: for 150 psi working pressure in LP (<15 psig) systems and 300 psi working pressure in HP (>15 psig) systems. **LP (<15 psig) steam and condensate strainers 2" and smaller: Apollo YCT series, Spirax Sarco IT, Yarway 901. LP (<15 psig) steam and condensate strainers 2-1/2" and larger: Spirax Sarco CSX 150#, Mueller 781, Yarway**

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M838. HP (>15 psig) steam and condensate strainers 2" and smaller: Apollo Series 612, Spirax Sarco fig 14, Mueller 581, Yarway 921. HP (>15 psig) steam and condensate strainers 2-1/2" and larger: Spirax Sarco CSX 300#, Mueller 782, Yarway M832.

CONSTRUCTION REQUIREMENTS

- 3.1 Submit shop drawings complete with: all valves, including valve type, size, service, temperature and pressure class, location, connections (screwed ends, flanged ends or brazing ends), brazing adapters, where required, valve identification tag, installation instructions and maintenance and operating instructions. Submit extension stems of suitable length on insulated piping.
- 3.2 Each valve shall have the maker's name or brand, the figure or list number and the guaranteed working pressure cast on the body and cast or stamped on the bonnet, or shall be provided with other means of easy identification.
- 3.3 Valve Identification:
 - a. Each valve in each piping system should be tagged with a brass or aluminum tag numbered consecutively for each system and attached to the valve with a brass or aluminum chain.
 - b. Valve tags should have stamped abbreviations of the system in addition to the valve number.
 - c. The Contractor should be asked to prepare a valve schedule listing each valve, system, location and purpose.
 - d. Tags for renovation projects shall be named consistently with building systems.
 - e. Valve numbering sequence shall be submitted for review and approval by Facility Operations Department.
- 3.4 All valves shall be installed with the best workmanship and are to have neat appearance and be arranged so that they are easily accessible.
- 3.5 Where insulation is indicated or specified, provide extended stems of suitable length to accommodate the insulation.
- 3.6 Install valves in horizontal piping with stem at or above center of pipe.
- 3.7 Install valves in position to allow full stem movement.
- 3.8 Install chain wheel operators on valves 4-inch and larger and more than 96-inches above floor. Extend chains to 60 inches above finished floor elevation.

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- 3.9 Install check valves for proper direction of flow and as follows: Swing Check Valves: In horizontal position with hinge pin level, Dual-Plate Check Valves: In horizontal or vertical position, between flanges. Lift Check Valves: With stem upright and plumb.
- 3.10 All strainers in water lines shall be Y-pattern set in a horizontal (or vertical downward) run of pipe.
- 3.11 Strainers shall be arranged to facilitate disconnection and opening up for cleaning.
- 3.12 Strainers shall installed line size, which means inlet pipe size. Not reduced pipe size of control valve.
- 3.13 Strainers shall be fitted with ball valve of the same size as blow-off plug thread. On steam systems pipe valve discharge with nipple and cap. For hydronic systems, pipe valve discharge with hose ended fitting with cap.

END OF SECTION