

SECTION 15100

VALVES

PART 1 –DESIGN DIRECTIVE

1.1 SUMMARY

- A. This Section includes general duty valves common to most mechanical piping systems, special duty valves are specified in individual piping system specifications.
- B. Valves used in fire protection systems are not included in this section

1.2 DESIGN CRITERIA

- A. The consultant is to confirm the application of the specified valves to insure suitability of use in the specified systems.
- B. Dynamic flow control valves shall be utilized wherever possible in water piping systems as this is the preferred method of hydronic balancing. Conventional type balancing valves are listed herein for use where dynamic valves are not practical. Where pumps are controlled with a variable frequency drive, a static balancing device shall be installed.
- C. Dynamic flow control valves must have a wye strainer with a 20 mesh stainless steel screen upstream of the valve.
- D. The use of pre-assembled dynamic flow control packages are encouraged for use at coils in AHU's and VAV boxes, and other critical hydronic terminals.
- E. Globe or ball valves shall be used as bypass valves for control valves. If there is a back-up system with another set of control valves, or if the system is determined by FO&M as non-critical, bypass valves are not required.
- F. Balancing valves shall not serve double duty as isolation valves.
- G. Triple duty valves are not allowed.
- H. Wafer type butterfly valves are not allowed.

1.3 QUALITY ASSURANCE

- A. American Society of Mechanical Engineers (ASME) Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- B. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with the various MSS Standard Practices referenced.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Keep valves in original shipping containers in a dry location until ready for installation.

**PART 2 – PRODUCTS**

**2.1 VALVE FEATURES, GENERAL**

- A. In mechanical spaces only, provide chain wheel operators, for valves 2½” and larger installed 96" or higher above finished floor elevation. Extend chains to an elevation of 60" above finished floor elevation.
- B. Where insulation is indicated or specified, provide extended stems of suitable length to accommodate the insulation.

**2.2 BALL VALVES**

- A. Ball Valves, 2" and Smaller, Carbon Steel Body: rated for 150 psi saturated steam pressure, 2000 psi WOG pressure for 1/4" through 1", 1500 psi WOG pressure for 1-1/4" through 2"; two piece construction; with carbon steel body, regular port, 316 stainless steel ball and stem, replaceable "Teflon" or "TFE" seats and seals, blowout proof stem, vinyl covered steel handle, threaded ends and extended stem for insulated piping.

Apollo	73A-14x series
Flowtech	S90
Neles-Jamesbury	4000 series
Watts	C-7000-SS series

- B. Ball Valves, 3" and Smaller, Bronze Body: rated for 150 psi saturated steam pressure, 400 psi WOG pressure; two piece construction; with bronze body, regular port, B-16 chrome plated ball and stem, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, vinyl covered steel handle, threaded or solder ends and extended stem for insulated piping.

	<b>Threaded</b>	<b>Solder</b>
Apollo	70-10x series	70-20x series
Flowtech	S51	
Neles-Jamesbury	351	341
Watts	B-6000 series	B-6001 series

- C. Low Point Drain Valves: ¾” inlet bronze body rated for 150 psi saturated steam pressure, 400 psi WOG pressure; two piece construction; with bronze body, regular port, B-16 chrome plated ball and stem, replaceable ‘Teflon’ or ‘TFE’ seats and seals, blowout-proof stem, vinyl covered steel handle. System end shall be thread or solder, opposite end shall be ¾" hose connection with brass cap.

	<b>Threaded</b>	<b>Solder</b>
Apollo	78-104-01 series	N/A
Watts	B-6000-CC series	B-6001-CC series

**2.3 GLOBE VALVES**

- A. Globe valves, 2" and smaller, malleable iron body: 125 SWP, body and union bonnet of ASTM A 338 malleable iron; with threaded ends, 13% chromium stainless steel disc and stem, TFE impregnated, non-asbestos packing, and malleable iron handwheel.

Crane	254XR
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**2.4 BUTTERFLY VALVES**

- A. Steam Service and Building Chilled Water Isolation: Hi-Performance butterfly valves, 2 1/2" and Larger: MSS SP-67; ANSI Class 150 carbon steel body conforming to ASTM A 216, type WCB. Provide lever operators with locks for sizes 2" through 6" and gear operators with position indicator for sizes 8" through 24". Lug type, bi-directional valves with 316 stainless steel disc, 17-4 PH stainless steel shaft, filled (reinforced) TFE with TFE packing or Extreme seats and enhanced filled TFE packing. Seat retainer ring to be bolted in place with stainless steel bolts.

Flowseal	1LA-121RTG
Neles-Jamesbury	Wafer Sphere #815-L-11-2236XZ
Bray	Series 40

- B. Water Service: Resilient seated lug type butterfly valves, 2-1/2" and Larger: MSS SP-67; ductile iron body. The disc shall be in constant contact with the seat, be constructed of aluminum bronze or 316 stainless steel, have a concentric self centering style, and shall be free floating without the use of pins or fasteners. The EPDM seat shall be rated for -20°F to 250°F. The shaft shall be stainless steel. Minimum pressure rating for valves ≤12" shall be 175 psi; valves >12" shall be 150 psi. Provide lever operators with locks for sizes 2" through 6" and gear operators with position indicator for sizes greater than 6".

Bray	<i>S31/32031 Series</i>
Demco	NE-C series

**2.5 CHECK VALVES**

- A. Swing Check Valves, 2" and Smaller Bronze Body: MSS SP-80; Class 125, cast bronze body and cap conforming to ASTM B-62; with horizontal swing, Y-pattern, bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

	<b>Threaded</b>	<b>Solder</b>
Crane	137	1342
Milwaukee Valve	509	1509
Watts	CVY	CVYS

- B. Swing Check Valves, 2" and Smaller Bronze Body: MSS SP-80; Class 300, cast bronze body and cap conforming to ASTM B-61; with horizontal swing, Y-pattern, bronze disc; and having threaded ends. Provide valves capable of being reground while the valve remains in the line.

Crane	76E
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- C. Swing Check Valve, 2" and Smaller, shall be malleable iron body, cap, disc and hinge conforming to ASTM A-338, 300 psi SWP, threaded ends.

Crane	3461/2
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- D. Swing Check Valve, 2 1/2" and Larger, Cast Iron: MSS SP-71, class 250 cast iron body and cap, bronze (ASTM B-62) disc ( $\leq 6"$ ) or bronze faced iron disk ( $> 6"$ ) and hinge.

Crane	39E
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- E. Spring Loaded Silent Check Valve, 2" and smaller: MSS SP-61; 300 psi non shock pressure rating, 18-8 stainless steel construction throughout including guard cage, spring, valve disc, retaining ring and seat.

Durabla	BSS
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- F. Split Disc Wafer Check Valves: Cast iron body 125lb., ASTM A126-B, with replaceable EPDM seat, non-slam design, lapped and balanced twin bronze valve plates, 316 stainless steel trim and torsion spring. Provide valves designed to open and close at approximately one foot differential pressure.

Mueller	71-A-H-B-6-H
Technocheck	5050

- G. Wafer Check Valves: Cast iron body, 125lb., ASTM A126, with replaceable Buna 'N' or Viton 'O'-ring, non-slam design, 304 stainless steel disc, and 316 stainless steel pin & spring.

Check Rite	Model 210
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2.6 GLOBE TYPE BALANCING VALVE:

- A. 3/8" through 2", with solder NPT connections, metal brass copper alloy construction with a minimum of four, 360° rotations of handwheel for maximum setting.
- B. 2 1/2" and larger, with flanged connections, cast iron body with all other parts of nonferrous copper alloy construction with eight or twelve 360° rotations of handwheel for maximum setting.
- C. Balancing valves to have provisions for measuring differential pressure, flow rates, flow temperature and air venting as an integral part of the valve body and be of the globe style, wye pattern design.
- D. Balancing valves to provide 100% positive, leakproof shutoff against the same fluid pressure as the valve body pressure rating.

- E. Provide manufacturer’s preformed insulation covers when valves are installed in insulated piping systems.

Tour & Andersson	STAD & STAF
Armstrong	CBV-T & CBV-G

**2.7 BALL TYPE BALANCING VALVE**

- A. Bronze body and brass ball construction with Teflon seat suitable for use in domestic water systems.
- B. Valves shall have differential pressure ports and drain/purge port.
- C. Valves shall have a memory stop.
- D. Valves shall have calibrated name plate.
- E. Manufacturers:
  - 1. Bell & Gossett – Circuit Setter
  - 2. Taco – Accu-Flo

**2.8 AUTOMATIC FLOW CONTROL VALVES:**

- A. Flow control cartridge assembly shall be precision ground, all stainless steel; shall be available in a minimum of two PSID control ranges (minimum range shall be capable of being activated by 2 PSID), and shall be capable of controlling flow within 5±% of rated flow. All valves shall be supplied with pressure and temperature test ports, be permanently marked to show direction of flow, and have body tag to indicate flow rate, model number and PSID control range.
- B. All products shall be warranted by the manufacturer for five years from date of shipment.
- C. Accessible valves, ≤2”:
  - 1. Bronze body rated at 300 PSI/250°F.
  - 2. NPT end connections.
  - 3. Cartridge shall be available of being removed without disturbing the piping system.
  - 4. Available flow rates of 0.55 GPM to 22.0 GPM in a 2-32 psid range.

Flow Design, Inc	Model YR
Griswold Controls	Isolator Y or Isolator R
Nexus	Ultramatic

- D. Pre-assembled systems, ≤2”, shall meet all of the requirements of part 'D', accessible valves, the supply side component shall be a single device that incorporates an isolation ball valve, strainer with blowdown, and one pressure/ temperature port (Griswold Isolator S). The return side shall include an accessible flow control valve, isolation valve, two pressure/ temperature ports (Griswold Isolator R), and the control valve. Assembly shall be Griswold CPP-2IRIS.

- E. Accessible valves, >2":
  1. Ductile or gray iron body be rated at 150 PSI.
  2. Flange end connections or be a wafer design.
  3. Available flow rates of 18 GPM to 6,400 GPM in a 2-32 psid range

Flow Design, Inc	Model WS
Griswold Controls	Steel Flange or Uni-Flange valve
Nexus	Ultramatic

**PART 3 – EXECUTION**

**3.1 VALVE INSTALLATIONS**

- A. Use ball or butterfly valves for shut off duty; globe, ball, or butterfly for throttling duty. Refer to piping system specification sections for specific valve applications and arrangements.
- B. Locate valves in accessible locations.
- C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Install isolation valves at all main branches.
- D. Install valves in horizontal piping with stem at or above the center of the pipe and in a position to allow full stem movement.
- E. Installation of Check Valves: Install for proper direction of flow as follows:
  1. Swing Check Valves: Horizontal position with hinge pin level.
  2. Wafer Check Valves: Horizontal or vertical position, between flanges.
- F. Install drain valves at the low points of all piping (except in LP gas) systems and at all drip legs.
- G. Install automatic flow control valves per the manufacturer’s written instructions and the following criteria:
  1. A minimum of 5 pipe diameters upstream of the valve to a pipe fitting, 10 pipe diameters upstream of a pump.
  2. A minimum of 2 pipe diameters downstream of the valve to a pipe fitting.
  3. All automatic flow control valves shall have a 20 mesh strainer upstream of the valve.
- H. Where automatic flow control valves control multiple heating devices (i.e. risers, entire floors, etc.), install a valve with a strainer upstream and an isolation valve downstream. Where automatic flow control valves control individual heating terminals, install pre-assembled systems (strainers on inlet and valves on outlet).
- I. Where butterfly type valves are installed as end of service, and are not rated as such, install a minimum 12” long spool piece with weld neck flanges and a blind flange.

**3.2 CONNECTIONS**

- A. Refer to Division 15 standards, “BASIC PIPING MATERIALS AND METHODS”.
- B. For solder connections close ball valves to the full closed position, open globe valves to full open position.

**3.3 FIELD QUALITY CONTROL**

- A. After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

**3.4 VALVE APPLICATIONS**

- A. Domestic Hot and Cold Water: Bronze bodied ball, globe, and check valves.
- B. HVAC Water Systems,  $\leq 210^{\circ}\text{F}$ : Resilient seated cast iron butterfly valves, bronze bodied ball, globe, and check valves for copper piping systems. Carbon steel ball valves, bronze ( $\leq 2"$ ) or malleable iron (all sizes) check and globe valves, and resilient seated cast iron body butterfly valves for steel piping systems. Install high performance butterfly valves on chilled water systems where the piping enters the building from the central distribution system.
- C. Steam and (Gravity and Pumped) Condensate: Carbon steel ball and hi-performance carbon steel butterfly valves, malleable iron (all sizes) check valves.
- D. Non-slam check valves: Where indicated on the drawings, install at discharges of reciprocating equipment, i.e. pump discharges.
- E. Balancing Valves:
  - 1. Use automatic flow control valves in all HVAC applications.
  - 2. Use ball type balancing valves in domestic hot water recirculating systems.
  - 3. Globe type balancing valves are used in special situations; consult with FO&M Engineering.

**3.5 VALVE PRESSURE/TEMPERATURE CLASSIFICATION SCHEDULES**

VALVES – 2" AND SMALLER			
SERVICE	BALL	CHECK	GLOBE
Domestic hot and cold water.	1500 wog see note 1	125	125
HVAC systems $\leq 210^{\circ}\text{F}$ supply and return	1500 wog see note 1	150	n/a
$\leq 30$ psig steam, gravity & pumped condensate return	1500 wog	300	125

Note 1: valve size may be extended to include  $\leq 3"$  pipe line size.

VALVES – 2½" AND LARGER			
SERVICE	BUTTERFLY	CHECK	GLOBE
Domestic hot and cold Water.	150	125	N/A
HVAC systems $\leq 210^{\circ}\text{F}$ supply and return	150	150	N/A
$\leq 30$ psig steam, gravity & pumped condensate return	150	300	125

END OF SECTION 15100