SECTION 15100 –HVAC VALVES AND STRAINERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Divisions Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Furnish and install all shut-off, globe, check, strainers, balancing and other type valves as shown and as required to make a complete and operational system.

B. Provide isolation valves at all drains, piping mains and branches at all piping systems, equipment, risers and before and after all control valves.

C. Secure all permits and local/state approval for the installation of all components included under this Section.

1.3 RELATED SECTIONS

A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.4 REFERENCES

A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.

B. Material standards shall be as specified or detailed hereinafter and as follows:

1. MSS SP-67 – Butterfly Valves Manufacturers Standardization Society of the Valve and Fittings Industry.
2. MSS SP-69 – Pipe Hangers and Supports – Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry.
3. MSS SP –70 - Cast Iron Gate Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry.
4. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry.

5. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry.
6. MSS SP-80 – Bronze Gate, Globe, Angle and check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry.
7. MSS SP-85 – Cast Iron Globe & Angles Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry.
8. MSS SP-89 – Pipe Hangers and Supports – Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry.
9. MSS SP-11- Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry.
10. NFPA54 – National Fuel Gas Code; National Fire Protection Association.
11. NFPA 58 – Standard for the Storage and Handling of Liquefied Petroleum Gases; National Fire Protection Association.
12. UL 1479 – Standard for Fire Tests of Through-Penetration Firestops; Underwriters Laboratories Inc.

1.5 SUBMITTALS

A. See Section 15050 and General Conditions for additional requirements.

B. Product Data: Include date on valve materials, pressure class, construction, dimensions and ratings. Provide manufacturers catalogue information. All valves of one type shall be by one specific manufacturer.

C. Grooved joint couplings and fittings shall be shown on drawings and product submittals and shall be specifically identified with the applicable designation.

D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

E. Project Record Documents: Record actual locations of all valves and valve tag numbers.

F. Maintenance Data: Include spare parts list and exploded valve assembly views.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing valve and strainer products specified in this section, with documented experience.

B. Installer: Company specializing in performing work of the type specified in this section, with documented experience.

C. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

D. All valves and strainers shall contain manufacturer's name and pressure class marked on the valve body.

1.7 REGULATORY REQUIREMENTS

A. Perform Work in accordance with all State and Local codes.

B. Conform to all State and Local code for installation of boiler safety valves and backflow prevention devices.

C. Provide certificate of compliance from the authority having jurisdiction indicating approval of installation of all boilers, gas piping, vents and backflow prevention devices.

1.8 DELIVERY, STORAGE AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Weld end preparations shall be coated with 2 mil minimum thickness of "Deoxaluminate", "Bloxide" or equal to preserve the surface during storage.

PART 2 – PRODUCTS

2.1 GENERAL

A. One valve manufacturer's figure numbers are listed; valves from other manufacturers listed in the list of acceptable manufacturers will be accepted.

B. Provide all shutoff, gate, globe, check, strainers, balancing and other types of valves as shown on the drawings and required for proper operation, maintenance, isolation and safety of all piping systems.

C. Provide isolation valves at all drains and piping mains and branches for all water, steam and condensate piping, at all equipment connections and before and after automatic control valves.

D. Provide 1" diameter integral valved bypasses at all globe and gate valves 6" and larger for high pressure steam, medium pressure steam and condensate feedwater. All bypass shall conform to MSS-SP-45. If high performance butterfly valves are used 1" bypass shall be field-piped.

E. All gate and globe valves 2" and above shall have a bolted gland follower.

F. The pressure-temperature rating of valves shall not be less than 120% of the design criteria applicable to all components of the system.

G. All gate and globe valves shall be OS&Y type.

H. Face-to-face and end-to-end dimensions of flanged iron body valve shall conform to ANSI B16.10. Design workmanship, materials and testing shall conform to MSS-SP-70 (gates), MSS-SP-71 (swing checks) and MSS-SP-85 (globe).

I. Face-to-face and end-to-end dimensions of flanged steel body valves shall conform to ANSI B16.34.

J. End-to-end dimensions of grooved ductile iron body valves shall conform to the latest published dimensions.

K. Each valve body and seat shall be tested by the manufacturer and shall carry a permanently affixed indication that test have been successfully completed, with copy of the test data furnished. All steel valves shall be tested in accordance with ANSI B16.34 standards at 1.5 times design pressure (hydrostatic test).

L. All valves and/or strainers of the same type shall be of the same manufacturer. Before purchasing any valve, the Contractor shall submit for approval the name of the manufacturer, the figure number which he proposes to furnish and engineering data on each figure number. For acceptable manufacturers, see schedules herein.

M. Valves/Strainers in grooved piping systems may be grooved.

N. All valves used for balancing purposes at pump discharge, at coils and other similar equipment, shall have memory stops.

O. Provide handwheels for all manually operated gate and globe valves and for all valves equipped with gear operators. Handwheels shall accept bolt-on chain operators.

P. Provide chain operators for all valves located 7'-0" above floor or higher.

Q. Size valve handwheels for not more than 80 lbs. pull on one side of the handwheel to effect tight closure. Where the manufacturer's standard handwheel size is not large enough to accomplish this, provide a gear operator.

R. Weld end preparations shall be coated with 2 mil minimum thickness of "Deoxaluminate", "Bloxide" or equal to preserve the surface during storage.

S. Valve bonnets and gear operators shall be designed to withstand all forces which may be applied to the handwheels, including those from chain operators.

T. Valves and strainers shall be rated in accordance with the "Spec. Class No." Specified for that system.

2.2 ACCEPTABLE MANUFACTURERS CONTINGENT ON COMPLIANCE WITH THE SPECIFICATIONS

A. Gate, Globe, Drain

1. Bronze Valves and Cast Iron Valves

a. Crane
b. Jenkins
c. Kitz
d. Lunkenheimer
e. Pacific
f. Powell
g. Stockham
h. Vogt
i. Walworth
j. NIBCO
k. Milwaukee

2. Cast Steel Valves

a. Lunkenheimer
b. Pacific
c. Powell
d. Vogt
e. Kitz
f. Crane
g. Milwaukee

3. Forged Steel Valves

a. Vogt
b. Powell
c. Veland

4. Butterfly Valves

a. High Performance

1) Jamesbury
2) Bray
3) Keystone
4) Flow Seal
5) WKM

b. Soft Seated

1) Bray
2) Centerline
3) Keystone
4) Norris
5) Victaulic… (Masterseal 300)

5. Lubricated Plug Valves

a. Walworth
b. Miucan
c. Rockwell

6. Flow Control Balancing Valves

a. Tour & Anderson / TA Hydronics
b. Armstrong

7. Check Valves

a. Swing

1) Walworth
2) Kitz
3) Powell
4) NIBCO
5) Victaulic…

b. Silent

1) Mueller Steam Specialty
2) Mission Valve
3) Williams Hager
4) NIBCO
5) Victaulic…

8. Vacuum Breakers

a. Sarco
b. Armstrong

9. Ball Valves

a. Apollo
b. Kitz
c. NIBCO

10. Strainers

a. Y Type

1) Elliot
2) Armstrong
3) Mueller Steam Specialty
4) Sarco
5) Victaulic…

b. Basket

1) Mueller Steam Specialty

c. Duplex

1) Water

a) Zurn
b) Elliot
c) Kraissc

2) Oil

a) Preferred utilities MFG Corp.
b) Elliot

2.3 VALVE CHART

Service	Minimum Class and Material			Joints	
	2" and Less	**2½" to 12"**	**14" & Up**	**2" and Less**	**2½" & Up**
Chilled water supply and return	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged or Grooved*
Condenser water supply and return	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged or Grooved*
Boiler blowdown and blowoff	ANSI Class 300 Cast Steel	ANSI Class 300 Cast Steel	ANSI Class 300 Cast Steel	Threaded	Flanged
Hot water and glycol hot water supply and return	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged
Boiler feed	MSS Class 150 Bronze	ANSI Class 300 Cast Steel	ANSI Class 300 Cast Steel	Socket Weld	Flanged

Service	Minimum Class and Material			Joints	
	2" and Less	2½" to 12"	14" & Up	2" and Less	2½" & Up
Low pressure steam (0 to 15 psig)	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged
Medium pressure steam (16 psig to 70 psig)	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged
Hot well steam condensate and pump discharge to 2½" and up	MSS Class 200 Bronze	MSS Class 250 Cast Iron	ANSI Class 300 Cast Steel		Flanged
Hot well steam condensate and pump discharge to 2"	MSS Class 200 Bronze	MSS Class 250 Cast Iron	ANSI Class 200 Cast Steel	Threaded	
Low pressure condensate return	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged
Medium pressure condensate return	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged
Pumped condensate	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged
Makeup and fill	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged or Grooved*
Miscellaneous drains 2½" and up		MSS Class 125 Cast Iron			Flanged or Grooved*
Miscellaneous drains to 2"	MSS Class 150 Bronze			Threaded	
Refrigerant system	MSS Class 150 Bronze			Silver Brazed	Flanged
Fuel oil	MSS Class 300 Bronze UL Listed	ANSI Class 150 Cast Steel UL Listed	ANSI Class 150 Cast Steel UL Listed	Threaded	Butt Weld
Fuel oil supply and return (boiler room)	ANSI Class 150 Cast Steel UL Listed	ANSI Class 150 Cast Steel UL Listed	ANSI Class 150 Cast Steel UL Listed	Socket Weld	Butt Weld

Service	Minimum Class and Material			Joints	
	2" and Less	2½" to 12"	14" & Up	2" and Less	2½" & Up
Fuel oil supply and return below grade	ANSI Class 150 Cast Steel UL Listed	ANSI Class 150 Cast Steel UL Listed	ANSI Class 150 Cast Steel UL Listed	Socket Weld	Butt Weld
Other piping	MSS Class 150 Bronze	MSS Class 125 Cast Iron	ANSI Class 150 Cast Steel	Threaded	Flanged or Grooved*

* Grooved piping systems of standard wall or lighter shall be **roll** grooved according to Victaulic roll groove specification standards. On piping heavier than standard wall, cut grooving required per Victaulic **cut** groove specification standards.

2.4 GATE VALVES

A. Up to 2"

1. Bronze, threaded ends, solid wedge, inside screw, traveling stem union, bonnet.

   a. Class 150: Similar to NIBCO Fig. T-134
   b. Class 200: Similar to NIBCO Fig. T-154
   c. Class 300: Similar to NIBCO Fig. T-174

2. Bronze, socket ends, solid wedge, inside screw, non-rising steam, screw-in bonnet, for copper pipe.

   a. Class 150: Similar to Kitz Fig. C150E (Code64)

3. Iron body bronze mounted, OS&Y, rising stem, screwed ends, U bolt held bonnet.

   a. Class 150: Similar to Walworth Fig. 727F

4. Forged steel, bolted bonnet, solid wedge, OS&Y, rising stem.

   a. Class 800

      1) Threaded: Similar to Vogt Fig. 1110B
      2) Socket Weld: Similar to Vogt Fig.SW-1110B

B. 2 1/2" & Up

1. Iron body, bronze mounted, solid wedge, OS&Y, rising spindle, flanged.

   a. Class 125: Similar to NIBCO Fig. F-617
   b. Class 250: Similar to NIBCO Fig. F-667

2. Cast steel, stainless steel trim, solid wedge, OS&Y, rising stem, flanged.

a. Class 150

1) Welded Ends: Similar to Crane Fig. 47½
2) Flanged Ends: Similar to Crane Fig. 47

b. Class 300

1) Welded Ends: Similar to Crane Fig. 33½
2) Flanged Ends: Similar to Crane Fig. 33

2.5 GLOBE AND ANGLE VALVES

A. Up to 2"

1. Bronze, regrind/renew seat, 500 Brinell stainless steel plug disc and seat ring, union bonnet.

a. Class 150

1) Angle: Similar to Kitz Fig. AKCA (Code 38)
2) Globe: Similar to Stockham Fig. B-29

b. Class 200

1) Angle: Use Class 300
2) Globe: Similar to NIBCO Fig. T-256-AP

c. Class 300

1) Angle: Similar to NIBCO Fig. T-256-AP
2) Globe: Similar to NIBCO Fig. T-276-AP

2. Bronze, solder ends, composition disc, union bonnet, for use with copper tubing.

a. Class 300

1) Globe: Similar to Kitz Fig. AK300 (Code 17)

3. Bronze, socket ends, regrind bevel disc, screw-in bonnet, for use with copper pipe.

a. Class 150: Similar to Kitz Fig. ATC (Code 2)

B. 2 1/2" & Up

1. Regrind/renew, iron body, level bronze disc and seat ring, OS&Y, flanged.

a. Class 125

1) Angle: Similar to NIBCO Fig. F-818-B
2) Globe: Similar to NIBCO Fig. F-918-B

b. Class 250

1) Angle: Similar to NIBCO FigF-869-B
2) Globe: Similar to NIBCO Fig. F-768-B

2. Cast steel, stainless steel trim and plug, OS&Y, rising steam, flange.

a. Class 150

1) Welded Ends: Similar to Crane Fig. 143½
2) Flanged Ends: Similar to Crane Fig. 143 15CPF

b. Class 300

1) Welded Ends: Similar to Crane Fig. 151½
2) Flanged Ends: Similar to Crane Fig. 151

2.6 BALL VALVE

A. Up to 2 1/2" (for water below 200°F and below)

1. Full port
2. All stainless steel ball and stem
3. Extended stem for insulation
4. Two piece bronze body
5. 600 PSIG WOG
6. 250 PSIG steam trim
7. Threaded

a. Similar to Apollo Fig. 77-140-64

8. Soldered

a. Similar to Apollo Fig. 77-240-64

B. Up to 2-1/2" (for steam and water 200ºF and above)

1. Full port

2. All stainless steel ball and stem
3. Two piece steel body
4. 600 PSIG WOG 250 PSIG steam
5. Extended stem for insulation
6. 250 PSIG steam trim
7. Threaded:

    a. Two piece steel body
    b. Similar to Apollo Fig. Apollo 92-140-64

8. Socket Welded:

    a. Three piece steel body
    b. Similar to Apollo Fig. Apollo 83R-240-64

C. Fuel Oil up to 2-1/2"

1. 300 PSIG WOG
2. UL Listed

    a. YRPV
    b. YQNZ
    c. YRBX

3. Similar to Apollo 90-100

D. 3” and larger

1. Flanged body

    a. Similar to Apollo Fig No. 87-900-MG

2. Grooved body (for water service only)

    a. Victaulic Style 726.

2.7 SWING CHECK VALVES

A. Access to Elements

1. Up to 2" except as noted: Screw-in caps
2. 2" to 2-1/2": Bolted or coupled covers

B. Water (Except at Pump Discharge and as Noted)

1. Up to 2"

a. Bronze body, screwed ends, regrind bronze disc.

1) Class 150: Similar to NIBCO Fig. T-433

b. Bronze body, screwed ends, regrind bronze disc.

1) Class 200: Similar to NIBCO Fig. T-453

c. Bronze body, screwed ends, regrind bronze disc.

1) Class 300: Similar to NIBCO Fig. T-473

2. 2 1/2" and Up

a. Iron body, regrind/renew bronze disc, flanged.

1) Class 125: Similar to NIBCO Fig. F-918

b. Iron body, regrind/renew bronze disc, flanged.

1) Class 250: Similar to NIBCO Fig. E-968

c. Cast steel, swing type, bolted cover, stainless steel trim, flanged.

1) Class 300: Similar to NIBCO Fig. 159XU

d. Ductile iron body, stainless steel disc, grooved.

1) 300 PSIG CWP: Victaulic Series 712

C. Steam and Condensate Return

1. Up to 2"

a. Bronze body, regrind bronze disc.

1) Class 200: Similar to NIBCO Fig. T-453-B

b. Bronze body, regrind/renew nickel alloy disc and set ring, union cap for high and medium pressure condensate.

1) Class 300: Similar to NIBCO Fig. T-473

2. 2 1/2" and Up

a. As specified for water service.

1) Class 125: Similar to NIBCO Fig. F-918

b. As specified for water service.

1) Class 250: Similar to NIBCO Fig. F-968

c. As specified for water service.

1) Class 300: Similar to Crane Fig. 159XU

2.8 SILENT CHECK VALVES

A. Spring Loaded, Globe

1. Ductile iron body, stainless steel trim for valves up to 300 psi.
2. Iron body, bronze trim for valves up to 250 psi.
3. Cast steel body, stainless steel trim for valves above 250 psi.
4. Body Flanged.

a. Similar to Williams-Hager Fig. 636.

5. Body Grooved.

a. Victaulic Series 716 (Sizes to 12”)
b. Victaulic Series W715 (Sizes 14” to 24”)

2.9 LUBRICATED PLUG VALVES

A. Screwed ends up to 2", flanged ends for 2 1/2" and up.

B. Maximum port opening tapered plug suitable for lubrication under service pressure with plug in any position.

C. Lubricating Guns

1. One (1) for every (10) valves.
2. Extra heavy, lever type, hydraulic hand gun.
3. 15,000 psi gauge and 12" long connection hose.
4. Similar to Rockwell-Nordstrom Model #400-C.

D. Lubricant

1. Similar to Rockwell Sealant #421.

2. One (1) year supply for each valve.

E. Operators

1. Up to 6" (Wrench, Except as Noted)

a. Wrench set for each size valve.

2. 8" & Up (Gear Operated)

a. Permanently installed handwheel.

3. Where noted or required for inaccessible overhead valves:

a. Chain operated handwheel with rustproof chain and chain guide.

F. Motor operated as noted in other Sections of this Specification.

G. Piping less than 100 psi, minimum 200 lbs. WOG Class, cast iron body.

1. Up to 2": Screwed
2. 2 1/2" & Up: Flanged, 125 lbs. ANSI

H. Piping over 100 psi, 300 lbs. ANSI, carbon steel body.

1. Up to 2": Screwed
2. 2 1/2" & Up: Flanged, 300 lbs. ANSI

I. Similar to the following Rockwell-Nordstrom numbers:

1. 200 lbs. WOG Class

a. Up to 2": Fig. 114
b. 2 1/2" to 4": Fig. 115
c. 5" to 6": Fig. 185
d. 8" & 12": Fig. 149

2. 300 lbs. ANSI

a. Up to 2": Fig. 2024
b. 2 1/2" to 4": Fig. 2025
c. 6": Fig. 4285
d. 8" & Up: Fig. 4289

2.10 FLOW CONTROL BALANCING VALVES

A. Balancing valves shall be installed, as shown on the drawings and as required, to ensure the accurate balancing of all flows in the hydronic heating and cooling systems. The balancing shall meet the specified water flows with a maximum tolerance of ±5%.

B. Valves shall be of the "Y" pattern globe style design and must offer a minimum of (4) full rotations of the handwheel for accurate adjustment and for precise flow control.

C. Valves shall exhibit an accuracy of ±5% within the normal operating range.

D. Valves shall have integral self-sealing metering ports for measuring differential pressure, flow rates and temperature. Ports shall be protected with individual threaded caps.

E. Valves must offer 100% positive, leakproof shutoff against the same fluid pressure as the valve body rating to a nominal value of 300°F (230°F if grooved) at 250 psi.

F. Valves sizes 1/2" to 2" similar to TA (STAD/S) shall have a digital handwheel for positioning accuracy. Provide a transparent dust/paint cover to prevent destruction of the digits during construction. Sizes 2 1/2" to 12" similar to TA (STAF/G) shall have a numerical vernier sleeve for position readout.

G. All balancing valves must offer a hidden memory feature to prevent unauthorized adjustment and to ensure a return to the original setting after shutoff.

H. All balancing valves shall comply with international quality standard ISO 9001.

I. Valves larger than 12": use lubricated plug valve.

J. All balancing valves size 1/2" to 2" shall be manufactured from pressure diecast dezincification resistant AMETAL copper alloy which does not require dielectric fittings. Valve bodies size 2 1/2" to 12" shall be manufactured from a cast iron equivalent to ASTM 35B with all wetted, moving parts of dezincification resistant AMETAL copper alloy.

2.11 BUTTERFLY VALVES

A. High Performance (For services above 150°F and or above 150 PSIG)

1. Sizes 2 1/2" and larger shall be an **ANSI class valve** equal to or greater than the class specified for the service but in no case be less than ANSI Class 150.
2. Body carbon steel with a fully lugged body suitable for bi-directional tight shut off to full rated pressure without a downstream flange.
3. Valve shall have no disk contact with the seat when in the open position. Seal suitable for the operating service and operating temperature plus 50°F.
4. Bearings shall be constructed of SS/GRAPHITE
5. Seats shall be of Xtreme (X)
6. Valve shall be of the double off-set design.

7. The disk shall be 316 stainless steel.
8. The shaft shall be 17-4 stainless steel.
9. The disk pin shall be 316 or 17-4 stainless steel.
10. Seat retainer ring fasteners shall not in contact with system fluid.
11. The disk shall be stainless steel.

a. Operator

1) Lever Operator for Valve Sizes Less than 6" except steam service.

a) Infinite Positioner: Ductile iron ASTM A536. Provide operator with position indicator which shall also indicate "open" and "closed" position. Provide memory stop.

2) Gear Operator for Valve Sizes 6" and Greater as well as all sizes for steam service.

a) Cast iron ASTM A126 Class B housing. Bronze shaft bearings. Steel ASTM A216 worm gear. Ductile iron ASTM A536 segment gear. Ductile iron ASTM A536 handwheel. Minimum handwheel diameter shall be 12" for valve sizes through 20", and 18" for valves larger than 20". Provide operator with position indicator and shall also indicate "open" and "closed" position. Provide memory stop. All gearing shall be enclosed in a housing.

b. Similar to Neles-Jamesbury series 815 High performance wafer sphere butterfly valve.

B. Soft seated (For services below 150°F)

1. Sizes 2 1/2" and Larger: Suitable for bi-directional dead end service (full pressure rating of valve) with downstream flange removed.
2. Minimum 175 psig for 2-1/2” through 12” and minimum 150 psig 14” and larger bubble tight shut-off with flow in either direction. Valve shall comply with MSS-SP67, or MSS SP-68, unless more stringent requirements are specified.
3. Each valve shall be hydrostatically tested at the factory to 110% of pressure rating and proven bubble tight for a minimum of (1) minute.

a. Body:

1) Cast iron ASTM A126 minimum Class B, ductile iron ASTM A536, carbon steel ASTM A515 or A516 minimum grade 70, or cast carbon steel ASTM A216 WCB. Fully lugged body drilled and tapped for ANSI B16.5 Class 150 flanges.
2) Ductile iron ASTM A536. Grooved end body. (Sizes 14” through 24” supplied with AGS grooved ends.)

4. Disc: Valve disc shall be of a streamline design for low pressure drop and resistance to cavitation. Electroless nickel coated ductile iron ASTM A536, aluminum bronze ASTM B1011/1011M, or 316 stainless steel ASTM A351 CF8M. Disc shall be machined and polished to minimize seating torque and extend seat life. Disc shall be attached to shaft by stainless steel screws, pins or integral key. On valves 12" and smaller, the disc shall be offset from the stem centerline to provide continuous 360-degree seating. Disc flutter is not acceptable.

   a. Shaft: One-piece through shaft or 2-piece shaft design. Shaft shall be blowout proof and not rely on operator for retention. Shall be 316 stainless steel ASTM A276 type 316 or 17-4 PH stainless steel ASTM A564 Type 630. Seal by valve seat with secondary seal "O" ring or adjustable packing gland with Teflon packing.
   b. Shaft Bushings: Shaft bushings at each end of seat. Bushings shall be reinforced Teflon, fiberglass with TFE lining, 316 stainless steel backed TFE, low friction bronze ASTM B438 or stainless steel.
   c. Seat: Pressure responsive for valves 12" and smaller. Reinforced cartridge type, or seat with a mechanically attached retaining ring. With ethylene propylene diener monomer (EPDM) seat.

   d. Operator

      1) Lever Operator for Valves Sizes Less Than 6".

         a) Infinite Positioner: Ductile iron ASTM A536. Provide operator with position indicator which shall also indicate "open" and "closed" position. Provide memory stop.

      2) Gear Operator for Valve Sizes 6" and Greater

         a) Cast iron ASTM A126 Class B housing. Bronze shaft bearings. Steel ASTM A216 worm gear. Ductile iron ASTM A536 segment gear. Ductile iron ASTM A536 handwheel. Minimum handwheel diameter shall be 12" for valve sizes through 20", and 18" for valves larger than 20". Provide operator with position indicator and shall also indicate "open" and "closed" position. Provide memory stop. All gearing shall be enclosed in a housing.

   e. Grooved end valves:

      1) Victaulic Vic-300 MasterSeal™ for valves through 12"
      2) Victaulic W706 for valves 14" through 24"

   f. Similar to Bray Series 31 for valves through 12",
   g. Similar to Bray Series 31 for valves 14" through 20", except pressure rating 150 PSIG.

5. Grooved End Butterfly Valves:

   a. Steel Pipe Sizes 2” through 12”: Ductile iron grooved end body suitable for bubble-tight shutoff, bi-directional, dead-end service at full rated pressure. Electroless nickel-plated ductile iron disc offset from the stem centerline to provide continuous 360 degree seating. Blowout-proof 416 stainless steel stem, TFE lined fiberglass bearings, EPDM seat and seal material, lever handle or gear operator with handwheel and memory stop, rated at 300 psi, 230°F. Victaulic Vic-300 MasterSeal.
   b. Steel Pipe Sizes 14” through 24”: Ductile iron body and disc, PPS coated, two piece 17-4 PH stainless steel stem design, EPDM seat and seal material, reinforced PTFE bearings and gear operator with handwheel and memory stop, rated at 175 psi, 230°F, AGS grooved ends, suitable for bubble-tight shutoff, bi-directional, dead-end service at full rated pressure. Victaulic Series W709.
   c. Tri-Service Valve Assembly: Combination shut-off, throttling and non-slam check valve. Vic®-300 MasterSeal™ butterfly valve assembled with Style 779 Venturi Check. Working pressures to 300 psi (2065 kPa). Provide memory stops.
   d. Copper Tubing Sizes 2-1/2” through 6”: Bronze body, copper tubing sized grooved ends, elastomer encapsulated ductile iron disc, integrally cast stem, lever handle or gear operator with handwheel and memory stop, 300 psi, 230°F, suitable for bubble-tight shutoff, bi-directional, dead-end service at full rated pressure. Victaulic Series 608.

2.12 STRAINERS

A. General

1. Screwed ends to 2", flanged or grooved ends 2 1/2" and up.
2. Body

   a. 125 lbs. WSP Class, cast iron up to 100 psi. Note cast brass may be used for copper piping systems.
   b. 300 PSIG CWP, ductile iron or carbon steel to 300 psi.
   c. 250 lbs. WSP Class, cast iron for 100 to 250 psi.
   d. 300 lbs. WSP Class, forged steel or cast steel over 250 psi.

3. Screen

   a. 316 Stainless steel or Monel.
   b. Free area not less than 2.5 times inlet area.
   c. Perforations (unless noted otherwise)

      1) Water

         a) Up to 4": 1/16"

b) 6" & 8": 1/8"
c) 10" & Up: 5/32"

2) Steam and Condensate

a) Up to 2": 1/64"
b) 2 1/2 to 4": 1/32"
c) 5" & Up: 3/64"

d. Construction

1) Screen wire gauge to suit size and service.
2) Reinforced.

e. Magnets (Except for Handwheel Operated Type)

1) Water Strainers

a) All 8" and larger.
b) Each pump suction.

2) Provide continuous magnetic field around entire circumference of screen.
3) Removable cast Alnico #5 channel magnets or approved baskets constructed of magnetic alloy.
4) Secure magnets with stainless steel retaining lugs and threaded rods.

B. Y Type

1. Screwed

a. Faced cap, straight thread and gasket.
b. Similar to Mueller Steam Specialty Muessco #251-FC.
c. For 125 psig copper systems similar to Mueller Steam Specialty 358S.
d. For 250 psig copper systems similar to Mueller Steam Specialty 352M.

2. Grooved

a. Coupled cover.
b. Victaulic Style 732.

3. Flanged

a. Bolted cover.
b. Similar to Mueller Steam Specialty Muessco #751 or #752.

C. Basket Type

1. Bolted cover, bottom drain connection.

2. Similar to Mueller Steam Specialty Muessco #165.

D. Duplex Type

1. Fuel Oil

a. Cast Iron Body ASTM A-126 Hydrostatically tested at 300 PSIG

1) Screen size shall be 40 MESH.
2) Similar to Preferred utilities MFG Corp. No. 50.

2. Condenser Water

a. Up to 6" IPS

1) Cast iron body basket strainer.
2) Bolted cover and bronze plug valve.
3) Similar to Zurn Series 560FES.

b. 8" & Up

1) Gate type, iron body.
2) Monel basket
3) Integral mechanism to permit servicing without interrupting flow.
4) Similar to Zurn Series 570.

PART 3 – INSTALLATION OF VALVES AND STRAINERS

3.1 VALVES

A. Provide valves, check valves, balancing cocks and lubricated plug as noted and as indicated on drawings.

B. Shutoff Valves

1. Inlets and outlets of equipment.
2. All branch connections to mains.
3. As noted.

C. Check Valves

1. Pump Discharges: Silent check valves
2. Other Locations: Types as noted

D. Valves

1. Accessible, but no valve handles pointing down below horizontal position. Removable without separating or lifting piping in which valves are installed. Provide cap screws on threaded bodies. Where abutting flanged strainers or similar devices, position valve with respect to device so as to permit removal of bolts.

E. Drain valves at low points in water piping and where noted.

1. In Equipment Rooms

a. Up to 3" Pipe: 3/4" gate valve
b. 4" to 8" Pipe: 1 1/2" gate valve
c. 10" & Up Pipe: 2 1/2" gate valve

2. 1/2" drain valve with capped hose connection except in equipment rooms.

F. Manual air vents at high points and where required to expel air.

1. Up to 3" Pipe

a. Line size air chamber, 12" long, 1/2" gate valve.

2. 4" to 8" Pipe

a. Line size air chamber, 6" long, 1/2" gate valve.

3. 10" & Up

a. Line size pipe cap, 1/2" gate valve.

G. Where possible install gate, globe and ball valves with stems upright and not more than 15° off of vertical, not inverted.

H. Where possible install butterfly valves with stems in horizontal position and with the low point of disc opening with the direction of flow.

I. Provide stem extensions on all valves such that hand wheel or lever extends beyond insulation and is operable.

J. Ball valves (line sizes through 2") and butterfly valves (line sizes 2 1/2 " and larger) may be used interchangeably with gate valves for shut-off and isolating service in all water systems. Note soft seated butterfly valves can only be used in water services <u>below</u> 150°F. All butterfly valves in water services above 150°F shall be of the high performance type.

K. Use Globe valves (line sizes through 2") and flow control-balancing valve through 12" lubricated plug valves (line sizes 14" and larger) in water systems for throttling service. Use lubricated plug valves for line sizes smaller than 12" where shown on drawings.

L. Provide spring loaded silent type check valves on discharge of pumps.

M. Install swing check valves in horizontal position only.

N. Provide drain valves at low points between valves, low points of piping system and at equipment.

O. No butterfly valves shall be used in steam systems except high performance type where indicated.

P. All steam service high performance butterfly valves shall be provided with gear operators.

Q. Threaded valves shall be provided with a union adjacent to and downstream of valve.

R. Grooved end valves shall be provided with grooved joint couplings.

S. Butterfly valves shall not be used for balancing.

T. Butterfly valves shall be installed between weld neck flanges or with grooved joint couplings of the same manufacturer only.

U. Provide chain operated sheaves for valves in exposed areas located more than 7'-0" from floor. Provide chain lever kits for all ball valves in exposed areas located more than 7'-0" from floor. Extend chains to about 5'-0" from above floor and hook to clips arranged to clear walking aisles.

V. Pressure Relief Valves

1. Provide at:

a. Cooling coil side of isolation valve.
b. Sectionalized chilled water mains and submains.
c. Sectionalized chilled water and secondary chilled water mains and submains.
d. Equipment side of isolation valve.

1) Water chillers
2) Heat exchangers
3) Convertors in water piping.

e. Other locations as noted.

2. Pipe to spill over floor drain or slop sink unless otherwise indicated.

3.2 STRAINERS

A. Valved and provided with hose connection chain and cap. (See strainer assembly detail.)

B. Line size, except as noted.

C. Locate upstream of:

1. Pumps
2. Automatic control valves 2" and larger
3. Steam condensate drip traps
4. Pressure reducing valves
5. Other equipment as noted
6. At steam pressure reducing valves: Dripped
7. As indicated

END OF SECTION