# SECTION 220523 – VALVES FOR PLUMBING PIPING SYSTEMS

Latest Update: 08-10-2024 See Underlined Text for Edits.

(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all "Underlines".)

## 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 this section and all other sections of Division 22.

### 1.2 SUMMARY

A. This section includes the requirements for shutoff, drain, specialty, and check valves installed in plumbing piping systems as follows:

1. Plumbing System ball valves.
2. Plumbing System butterfly valves.
3. Plumbing System check valves.
4. Plumbing System special valves.
5. Polypropylene ball valves.
6. Polypropylene diaphragm valves.
7. Polypropylene check valves.
8. Polypropylene check valves.
9. Special valves.
10. Wet tap process.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each product specified, include manufacturers cut sheets, dimensional data, performance data, installation instructions, accessories, specified options, and warranty information. Identify valves for each plumbing system application.

### 1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Include a copy of the approved submittal for each product and material along with any applicable maintenance data in the project operation and maintenance manual.

B. Additional Data: In addition to the approved submittals, for each valve type, include the manufacturers printed exploded view type parts and material list indicating how to dismantle, repair and reassemble the valve, and identifying each part.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: The installer shall be a qualified licensed installer within the jurisdiction and familiar with the installation of the valves specified herein for each piping system.

B. Compliance: Comply with the following:

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.
4. NSF Compliance: NSF 61 for valve materials for potable-water service.

C. Press End Valve Compliance: Valves in propress piping systems shall be in compliance with ASME B31.9 for building service piping valves.

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

1.6 PERFORMANCE REQUIREMENTS

A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Information in this article is paraphrased from MSS.

B. 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 ball and plug valves open to minimize exposure of functional surfaces.
4. Set butterfly valves closed or slightly open.
5. Block check valves in either closed or open position.

C. 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.

D. 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.

1.8 WARRANTY/GUARANTEE

A. See Division 22 Specification Section "Basic Mechanical Requirements – Plumbing" for warranty and guarantee requirements.

**PART 2 - PRODUCTS**

2.1 GENERAL PRODUCT REQUIREMENTS

A. Equipment Design and Selection: Valves shall be designed and selected, for the intended use, in accordance with the requirements of this specification.

B. Acceptable Manufacturers: Subject to compliance with requirements, provide lead free plumbing valves by one (1) of the following:

1. Ball Valves – Copper and Steel Piping Systems:
   a. Apollo.
   b. Milwaukee.
   c. Watts.
   d. Viega. (copper press systems only)

2. Ball Valves, Diaphragm Valves and Check – RO/DI Piping Systems:
   a. Harvel.
   b. IPex.
   c. Viega.

3. Butterfly Valves – Copper and Steel Piping Systems:
   a. Bray.
   b. Milwaukee.

4. Check Valves – Copper and Steel Piping Systems:
   a. Apollo.
   b. Milwaukee.
   c. Watts.

5. Special Valves:
   a. Watts.
   b. Spence.
   c. Wilkens.

6. Balancing Valves:
   a. Griswold Controls
   b. Bell & Gossett

C. See shut off, drain, & specialty valve application below for required valves.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream/downstream piping unless otherwise indicated.

F. Valve Operator Types:

1. Ball Valves: Handle.
2. Butterfly Valves:
   a. Manual Gear Operator: For shut off duty.
   b. Chainwheel Operator: For shut off duty.

G. Valves in Insulated Piping: With two (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.

H. Valve-End Connections:

1. Threaded Ball Valves: With threads according to ASME B1.20.1.
2. Flanged Butterfly Valves: With flanges according to ASME B16.1 for iron valves.
3. Press End Ball Valves: Where press end piping systems are used.
4. Union Ball Valves: RO/DI piping system.
5. Solder End Ball Valves: Where specified.

## 2.2 SHUT OFF, DRAIN, AND SPECIALITY VALVE APPLICATIONS

A. General Application: All Valves installed in Plumbing Piping Systems shall be as specified below. For this application, Plumbing Piping Systems, and Valves are defined as follows:

1. Domestic (Potable) Water System: Includes Cold Water, Hot Water, and Hot Water Recirculating Piping utilizing solder, press end, threaded, flanged and/or welded pipe joint method.
2. Laboratory (Non Potable) Water System: Includes Cold Water, Hot Water, and Hot Water Recirculating Piping utilizing solder, press end threaded, flanged and/or welded pipe joint method.
3. Laboratory Specialty Gas Systems: Includes Compressed Air, Vacuum, and Bottled Gases such as Nitrogen, Oxygen, Carbon Monoxide, and Argon utilizing solder joint and/or press end pipe joint method.
4. Laboratory Natural Gas Systems: Includes Natural Gas Piping utilizing threaded, flanged and/or press end pipe joint method.

5. RO/DI Water System: RO/DI Water Piping utilizing Sani Tech S.I.B type joints, socket fusion connections and/or press end pipe joint method.
6. Drain and Specialty Valves: Valves used at system drain points and at connections for P/T Plugs, DP Switches, & Pressure Gages.
7. Special Valves: Includes solenoid valves and pressure reducing valves.
8. Ball valves shall be full port valves as specified unless otherwise noted.

B. Shut Off, Drain and Specialty Valves – UMB Campus: Gate Vales will not be permitted for installation in these systems. Only listed manufacturers and model numbers below are acceptable to UMB.

1. Shut Off Valves for Domestic and/or Laboratory Water Solder Joint Piping Systems:

a. Shut Off Valves for Piping Systems One Half (1/2) Inch to Two (2) Inch: Use Two (2) Piece Full Port Lead Free Ball Valves and Trim as indicated below:

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

a) Apollo: 77FLF-140 Series, Brass Body. (FP)
b) Milwaukee: UPBA400S Series, Bronze Body. (FP)
c) Watts: LFB6080G2-SS, Bronze Body. (FP)

2) Description:

a) Standard: MSS SP-110.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two (2) piece.
f) Body Material: Bronze or Brass.
g) Ends: Threaded.
h) Seats and Seals: RPTFE.
i) Stem: Type 316 Stainless steel.
j) Ball: Type 316 Stainless steel, vented.
k) Port: Full (FP).
l) Handle: Lever Type.
m) Lead free valves.
n) Stem Extensions: Where necessary provide stem extensions on valves where pipe insulation affects the operation of the valve handle.

b. Shut Off Valves for Piping Systems Two and One Half (2-1/2) Inch and Larger: Use Bi-directional dead end service general purpose butterfly valves as indicated below:

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

a) Bray – Series 31H with Trim 390.
b) Milwaukee – CL223ES

2) Description:

a) Standard: MSS SP-67, Type I.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) CWP Rating: 200 psig.
d) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
e) Body Material: Ductile Iron, ASTM A 536.
f) Seat: EPDM double seal seats and seals.
g) Stem: 416 stainless steel stem.
h) Disc: Nylon – 11 coated ductile iron disk.
i) Service: Bidirectional.
j) Valve Operation: Manual gear operator with hand wheel.
k) Chain Operators: Provide chain operators for shut off valves installed in piping systems ten (10) feet or higher above the finished floor of Mechanical Equipment Rooms.
l) Extensions: Where necessary provide an extension for the wheel handle output shaft for the hand wheel to clear pipe insulation.

2. Shut Off Valves for Domestic and/or Laboratory Water ProPress (Press End) Piping Systems: (Contractor Option)

a. Shut Off Valves for Piping Systems One Half (1/2) Inch to Two (2) Inch: Use Two (2) Piece Full Port Lead Free Ball Valves and Trim as indicated below:

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

a) Viega: 2971.3ZL, Bronze Body
b) Apollopress: 77WLF-140, Bronze Body.
c) Milwaukee: UPBA480S, Brass Body.

2) Description:

a) Standard: MSS SP-110.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two (2) piece.
f) Body Material: Bronze or Brass.
g) Ends: Press ends, smart connect feature.
h) Seats and Seals: EPDM or PTFE.
i) Stem: Type 316 Stainless steel.
j) Ball: Type 316 Stainless steel, vented.
k) Port: Full.
l) Handle: Lever Type.
m) Lead free valves.
n) Stem Extensions: Where necessary provide stem extensions on valves where pipe insulation affects the operation of the valve handle.

b. Piping Systems Two and One half (2-1/2) to Four (4) Inch: Use Bi-directional dead end service general purpose butterfly valves as indicated below:

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

a) Bray – Series 31H with trim 390.
b) Milwaukee – CL224ES.

2) Description:

a) Standard: MSS SP-68.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) CWP Rating: 285 psig at 100ºF
d) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
e) Body Material: Ductile Iron
f) Seat: EPDM double seal seats and seals.
g) Stem: 416 stainless steel stem.
h) Disc: Nylon – 11 coated ductile iron disk.
i) Service: Bidirectional.
j) Valve Operation: Manual gear operator with hand wheel.
k) Chain Operators: Provide chain operators for shut off valves installed in piping systems ten (10) feet or higher above the finished floor of Mechanical Equipment Rooms.

l) Extensions: Where necessary provide an extension for the wheel handle output shaft for the hand wheel to clear pipe insulation.

3. Shut Off Valves for Domestic and/or Laboratory Water Copper Victaulic Piping Systems:

a. Piping Systems Two and One half (2-1/2) Inch to Eight Inch: Use Bi-directional dead end service general purpose butterfly valves as indicated below:

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

a) Bray – Series 31H with trim 390.
b) Milwaukee – CL224ES.

2) Description:

a) Standard: MSS SP-68.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) CWP Rating: 285 psig at 100ºF
d) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
e) Body Material: Ductile Iron
f) Seat: EPDM double seal seats and seals.
g) Stem: 416 stainless steel stem.
h) Disc: Nylon – 11 coated ductile iron disk.
i) Service: Bidirectional.
j) Valve Operation: Manual gear operator with hand wheel.
k) Chain Operators: Provide chain operators for shut off valves installed in piping systems ten (10) feet or higher above the finished floor of Mechanical Equipment Rooms.
l) Extensions: Where necessary provide an extension for the wheel handle output shaft for the hand wheel to clear pipe insulation.

4. Shut Off Valves for Domestic and/or Laboratory Water Stainless Steel Victaulic Piping Systems: (Contractor Option)

a. Piping Systems Four (4) Inch to Eight (8) Inch Use Bi-directional dead end service general purpose butterfly valves as indicated below:

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

a) Bray – Series 31H with trim 390.
b) Milwaukee – CL224ES.

2) Description:

a) Standard: MSS SP-68.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) CWP Rating: 285 psig at 100ºF
d) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
e) Body Material: Ductile Iron
f) Seat: EPDM double seal seats and seals.
g) Stem: 416 stainless steel stem.
h) Disc: Nylon – 11 coated ductile iron disk.
i) Service: Bidirectional.
j) Valve Operation: Manual gear operator with hand wheel.
k) Chain Operators: Provide chain operators for shut off valves installed in piping systems ten (10) feet or higher above the finished floor of Mechanical Equipment Rooms.
l) Extensions: Where necessary provide an extension for the wheel handle output shaft for the hand wheel to clear pipe insulation.

5. Drain and Specialty Valves for all Domestic and/or Laboratory Water Piping Systems:

a. Drain Valves for Piping Systems One Half (1/2) Inch to Two (2) Inch: Use Three Quarter (3/4) Piece Full Port Lead Free Ball Valves and Trim as indicated below:

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

a) Apollo: 77FLF-140 Series, Brass Body. (FP)
b) Milwaukee: UPBA400S Series, Bronze Body. (FP)
c) Watts: LFB6080G2-SS, Bronze Body. (FP)

2) Description:

a) Standard: MSS SP-110.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two (2) piece.

f) Body Material: Bronze or Brass.
g) Ends: Threaded.
h) Seats and Seals: RPTFE.
i) Stem: Type 316 Stainless steel.
j) Ball: Type 316 Stainless steel, vented.
k) Port: Full (FP).
l) Handle: Lever Type.
m) Lead free valves.
n) Stem Extensions: Where necessary provide stem extensions on valves where pipe insulation affects the operation of the valve handle.

b. Drain Valves for Piping Systems Two and One Half (2-1/2) Inch and Larger: Use Two (2) Inch, Two (2) Piece Full Port Lead Free Ball Valves with Stainless Steel Trim as indicated below:

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

a) Apollo: 77FLF-140 Series, Brass Body. (FP)
b) Milwaukee: UPBA400S Series, Bronze Body. (FP)
c) Watts: LFB6080G2-SS, Bronze Body. (FP)

2) Description:

a) Standard: MSS SP-110.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two piece.
f) Body Material: Bronze or Brass.
g) Ends: Threaded.
h) Seats and Seals: RPTFE.
i) Stem: Type 316 Stainless steel.
j) Ball: Type 316 Stainless steel, vented.
k) Port: Full (FP).
l) Handle: Lever Type.
m) Lead free valves.
n) Two and One Half (2-1/2) inch capped fire hose connection.
o) Stem Extensions: Where necessary provide stem extensions on valves where pipe insulation affects the operation of the valve handle.

c. Specialty Valves for Piping Systems: Use One Quarter (1/4) Inch, Two (2) Piece Full Port Lead Free Ball Valves and Trim as indicated below:

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

a) Apollo: 77FLF-140 Series, Brass Body. (FP)
b) Milwaukee: UPBA400S Series, Bronze Body. (FP)
c) Watts: LFB6080G2-SS, Bronze Body. (FP)

2) Description:

a) Standard: MSS SP-110.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two piece.
f) Body Material: Bronze or Brass.
g) Ends: Threaded.
h) Seats and Seals: RPTFE.
i) Stem: Type 316 Stainless steel.
j) Ball: Type 316 Stainless steel, vented.
k) Port: Full (FP).
l) Handle: Lever Type.
m) Lead free valves.

d. Drain Valves for Stainless Steel Piping Systems: Use Two (2) Inch, Two (2) Piece Full Port Lead Free Ball Valves with Stainless Steel Trim as indicated below:

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

a) Apollo: 76 F Series.
b) Milwaukee: BA260.
c) Watts: S-FBV-1.

2) Description:

a) Standard: MSS SP-110.
b) Lead Free Certification: NSF61 and NSF/ASSI 372.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two piece.
f) Body Material: Stainless steel.
g) Ends: Threaded.
h) Seats: EPDM

i) Stem: Type 316 Stainless steel.
j) Ball: Type 316 Stainless steel, vented.
k) Port: Full.
l) Handle: Lever Type.
m) Lead free valves.
n) Stem Extensions: Where necessary provide stem extensions on valves where pipe insulation affects the operation of the valve handle.

e. Specialty Valves for Stainless Steel Piping Systems: Use One Quarter (1/4) Inch, Two (2) Piece Full Port Lead Free Ball Valves and Trim as indicated below:

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

a) Apollo: 76 F Series.
b) Milwaukee: BA260.
c) Watts: S-FBV-1.

2) Description:

a) Standard: MSS SP-110.
b) Lead Free Certification: NSF61 and NSF/ANSI 372.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two piece.
f) Body Material: Stainless steel.
g) Ends: Threaded.
h) Seats and Seals: RPTFE.
i) Stem: Type 316 Stainless steel.
j) Ball: Type 316 Stainless steel, vented.
k) Port: Full.
l) Handle: Lever Type.
m) Lead free valves.

6. Shut Off Valves for Laboratory Specialty Gas Brazed Joint Piping Systems:

a. Piping Systems One Half (1/2) Inch to Two (2) Inch: Use Three (3) Piece Full Port Ball Valves and Trim as indicated below:

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

a) Apollo: 82-140 Series, Bronze Body.

b) Milwaukee: BA-300S, Bronze Body.
c) Watts: B6800SS.

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 and Seals: RPTFE.
h) Stem: Stainless Steel.
i) Ball: Stainless Steel.
j) Port: Full.
k) Handle: Lever Type.

b. Piping Systems Two and One Half (2-1/2) Inch and Three (3) Inch: Use Three (3) Piece Full Port Ball Valves and Trim as indicated below:

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

a) Apollo: 82-140 Series, Bronze Body.
b) Milwaukee: BA-300S, Bronze Body.

2) Description:

a) Standard: MSS SP-110.
b) SWP Rating: 150 psig.
c) CWP Rating: 600 psig.
d) Body Design: Three (3) piece.
e) Body Material: Bronze.
f) Ends: Threaded.
g) Seats and Seals: RPTFE.
h) Stem: Stainless Steel.
i) Ball: Stainless Steel.
j) Port: Full.
k) Handle: Lever Type.
l) Tube Extensions: Two (2) Six (6) Inch Long Copper Tubes

7. Shut Off Valves for Laboratory Specialty Gas ProPress (Press End) Piping Systems: (Contractor Option)

a. Piping Systems One Half (1/2) Inch to Two (2) Inch: Use Two (2) Piece Full Port Ball Valves and Trim as indicated below:

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

a) Apollo – 82-140 Series***
b) Watts – B6800SS***
c) Milwaukee – BA-300S***

2) Description:

a) Standard: MSS SP-110.
b) SWP Rating: 150 psig.
c) CWP Rating: 600 psig.
d) Body Design: Two (2) piece.
e) Body Material: Bronze or Brass.
f) Ends: Thread ends.
g) Seats and Seat: RPTFE
h) Stem: Type 316 Stainless steel.
i) Ball: Type 316 Stainless steel, vented.
j) Port: Full.
k) Handle: Lever Type.
l) *** Provide Viega press end/male threaded end pipe adapters Viega Model 2911ZL for valves installed in ProPress (Press End) Piping Systems.

b. Piping Systems Two and One Half (2-1/2) Inch and Three (3) Inch: Use Two (2) Piece Full Port Ball Valves and Trim as indicated below:

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

a) Apollo – 82-140 Series***
b) Watts – B6800SS***
c) Milwaukee – BA-300S***

2) Description:

a) Standard: MSS SP-110.
b) SWP Rating: 150 psig.
c) CWP Rating: 600 psig.
d) Body Design: Three (3) piece.
e) Body Material: Bronze or Brass.
f) Ends: Thread ends.

g) Seats and Seals: RPTFE.
h) Stem: Type 316 Stainless steel.
i) Ball: Type 316 Stainless steel, vented.
j) Port: Full.
k) Handle: Lever Type.
l) *** Provide Viega press end/male threaded end pipe adapters Viega Model 2911ZL for valves installed in ProPress (Press End) Piping Systems.

8. Shut Off Valves for Laboratory Natural Gas Threaded Piping Systems:

a. Piping Systems One Quarter (1/4) Inch to One (1) Inch: Use Two (2) Piece Full Port Ball Valves and Trim as indicated below:

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

a) Apollo: 94A Series.
b) Watts: FBV – 3C – UL/FM.

2) Description:

a) Standard: MSS SP-110.
b) Gas Approvals: UL Guide 'YRPV', ASME B16.38 and ASME B16.44.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two piece.
f) Body Material: Bronze.
g) Ends: Threaded.
h) Seats and Seals: RTPFE.
i) Stem: Brass.
j) Ball: Chrome Plated Brass, vented.
k) Port: Full.
l) Handle: Lever Type.

b. Piping Systems One and One Quarter (1-1/4) Inch to Three (3) Inch: Use Two (2) Piece Full Port Ball Valves and Trim as indicated below:

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

a) Apollo: 94A Series
b) Watts: FVB – 3C-UL/FM. (up to two (2) inches)

2) Description:

a) Standard: MSS SP-110.
b) Gas Approvals: UL Guide 'YRPV', ASME B16.38 and ASME B16.44.
c) SWP Rating: 150 psig.
d) CWP Rating: 600 psig.
e) Body Design: Two piece.
f) Body Material: Bronze.
g) Ends: Threaded.
h) Seats and Seals: RPTFE.
i) Stem: Chrome Plated Brass.
j) Ball: Chrome Plated Brass, vented.
k) Port: Full.
l) Handle: Lever Type.

9. Shut Valves for Laboratory RO/DI Polypropylene Piping Systems:

a. Piping Systems One Half (1/2) Inch to Two (2) Inch: Use Full Port Polypropylene Ball Valves matching the piping systems as follows:

1) Harvel Ball Valves: Harvel LXT quarter turn true union ball valves, full schedule 80 bore to minimize pressure drop, PTFE floating seal design, EDPM 'O' ring seals, 'T' shear stem, socket and threaded end connections, and true union design for ease of installation and maintenance conforming to the following:

a) Valve Sizes One Half (1/2) Inch to Two (2) Inch: Maximum pressure rating of 235 psi, non-shock @ 73ºF.
b) Valve Sizes Three (3) Inch and Four (4) Inch: Maximum pressure rating of 150 psi, non-shock @ 73ºF.

b. Diaphragm Valves: Diaphragm Valves for RO/DI Polypropylene Piping Systems One Half (1/2) Inch to Two (2) Inch:

1) Weir type polypropylene body, sanitary ends suitable for clamp type ends, 150 grit interior finish, seal Type 2 polypropylene bonnet, bronze bushings and compressor, EPDM diaphragm, EPDM backing cushion and stainless steel tube nut assembly by the piping system manufacturer.

10. Shut Off Valves for Laboratory RO/DI Stainless Steel Press End Piping Systems: (Contractor Option)

a. Piping Systems One Half (1/2) Inch to Two (2) Inch: Use Full Port Ball Valves and Trim as follows:

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

a) Viega: Model 4070

2) Description:

a) Standard: MSS SP - 110
b) SWP Rating: Maximum 200 psi
c) Operating Temperature: 0°F - 250°F
d) Body Design: One piece
e) Body Material: 316 Stainless steel
f) Ends: Pro Press with smart connect feature
g) Seats: EDPM
h) Stem: 316 SS
i) Ball: 316 SS
j) Port: Full
k) Seals: EDPM

11. Isolation Valves for Sewage Ejector and Sump Pumps: Shut off valves shall be as follows:

a. Ball Valves: Provide an isolation valve on the discharge of each sewage ejector and/or sump pump were indicated on the drawings as follows:

1) Discharge Piping Up to Two and One Half (2-1/2) Inches: Use Two (2) Piece Full Port Ball Valves and Trim as indicated below:

a) Apollo: 77F-140, Bronze Body
b) Milwaukee: BA400S, Bronze Body
c) Watts: B6080, Brass Body

2) Ball Valve Description:

a) Standard: MSS SP-110.
b) SWP Rating: 150 psig.
c) CWP Rating: 600 psig.
d) Body Design: Two (2) piece.
e) Body Material: Bronze or Brass.
f) Ends: Threaded.
g) Seats: Modified Teflon double seal seats and Teflon seals.
h) Stem: Type 316 Stainless steel.

i) Ball: Type 316 Stainless steel, vented.
j) Port: Full.
k) Handle: Lever Type.

b. Butterfly Valve: Provide an isolation valve on the discharge of each sewage ejector and/or sump pump ware indicated on the drawings as follows:

1) Discharge Piping Four (4) Inches and Larger: Use Bi-directional dead end service general purpose butterfly valves as indicated below:

a) Bray – Series 31H with Trim 390
b) Milwaukee – CL224ES

2) Butterfly Valve Description:

a) Standard: MSS SP-67, Type I.
b) CWP Rating: 200 psig.
c) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d) Body Material: Ductile Iron.
e) Seat: EPDM double seal seats and seals.
f) Stem: 416 stainless steel stem.
g) Disc: Nylon – 11 coated ductile iron disk.
h) Service: Bidirectional.
i) Valve Operation: Manual gear operator with hand wheel.
j) Extensions: Where necessary provide an extension for the wheel handle output shaft for the hand wheel to clear pipe insulation.

## 2.3 BALANCING VALVES – HOT WATER RECIRCULATING SYSTEMS

A. Domestic/Laboratory Hot Water Recirculating System Balancing Valves: Balancing valves shall be by one (1) of the following manufacturers:

1. Griswold Controls: Provide Griswold lead free 'K' balancing valves, one half (1/2) inch through one and one half (1-1/2) inch were indicated on the drawings, details and diagrams. Valve assembly shall include a lead free brass body, female NPT end connections, EPDM 'O' ring seals, P/T body tapings, AISI type 17-7 PH cartridge and a stainless steel 20 mesh strainer.

2. Bell & Gossett: Provide Bell & Gossett balancing valves, one half (1/2) inch through one and one half (1-1/2) inch, where indicated on the drawings, details and diagrams. Valve assembly shall include a lead free brass body, NPT end connections, stainless steel ball valve, integral readout ports, memory stop

screw/button, drain purge connection, calibrated name plate and be certified by CSA Group to NSF/ANSI 372 to conform to lead free requirements.

2.4 CHECK VALVES

A. General: All check valves used in Domestic and Laboratory Water Piping Systems shall be lead free construction.

B. Bronze Lift Check Valves – Metallic Disc: Use Class 125, Lift Check Valves with Bronze Disc as indicated below:

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

a. Apollo
b. Milwaukee Valve Company.
c. Watts Regulator Co.; a Division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Design: Vertical flow.
d. Body Material: ASTM B 61 or ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.
g. Lead free valves.

C. Bronze Lift Check Valves – Nonmetallic Disc: Class 125, Lift Check Valves with Nonmetallic Disc:

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

a. Apollo
b. Milwaukee Valve Company.
c. Watts Regulator Co.; a Division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 200 psig.
c. Body Design: Vertical flow.
d. Body Material: ASTM B 61 or ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: NBR, PTFE, or TFE.

g. Lead free valves.

D. Bronze Swing Check Valves – Metallic Disk: Use Class 125, Bronze Swing Check Valves with Bronze Disc as indicated below:

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

a. Apollo.
b. Milwaukee Valve Company.
c. Watts Regulator Co.; a Division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

E. Bronze Swing Check Valves – Nonmetallic Disk: Use Class 125, Bronze Swing Check Valves with Nonmetallic Disc as indicated below:

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

a. Apollo.
b. Milwaukee Valve Company.
c. Watts Regulator Co.; a Division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 4.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: PTFE or TFE.
g. Lead free valves.

F. Check Valves for RO/DO Piping Systems One Half (1/2) Inch to Two (2) Inch: Check Valves: Ball type polypropylene true union check valves suitable for clamp type ends, 150 grit interior finish, Viton ring seal matching the piping system.

G. Check Valves for Sewage Ejector and Sump Pumps: Install swing check valve, between pump and shutoff valve, on each sewage ejector and/or sump pump discharge.

2.5 SPECIAL VALVES

A. Solenoid Valves: Aluminum body, 120 volts AC, 60 Hz, Class B continuous duty molded coil; NEMA 4 coil enclosure; electrically opened/electrically closed; dual coils; normally closed; UL and FM approved and labeled.

B. Pressure Reducing Valves:

1. Provide lead free pressure reducing valves as manufactured by Watts Regulator, Spence, or approved equal.
2. Plumbing Water Systems: diaphragm operated, cast-iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut-down, and noncorrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory-set at operating pressure and have the capability for field adjustment. Valves shall be one (1) of the following or approved equal:
   a. Piping Two (2) Inches and Smaller: Watts Series LF25AUB-Z3 Pressure Reducing Valve with male thread end connections or Viega press end connections.
   b. Piping Two (2-1/2) Inches to Four (4) Inches: Watts Series LFN223BS Pressure Reducing Valve with integral lead-free strainer or approved equal.
3. Plumbing Compressed Air Systems: Select valve size, capacity, and operating pressure to suit system. Valve shall be factory-set at operating pressure and have the capability for field adjustment.

C. Water Temperature Limiting Devices:

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

   a. Powers; a division of Watts Water Technologies, Inc.
   b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
   c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig.
4. Type: Thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded inlets and outlet.
7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.

D. Safety Relief Valves:
   1. Provide as manufactured by Watts Regulator, Spence, or approved equal.
   2. 125 psig working pressure and 250ºF maximum operating temperature; designed, manufactured, tested, and labeled in accordance with the requirements of Section IV of the ASME Boiler and Pressure Vessel Code.
   3. Valve body shall be cast-iron.
   4. Valve shall have forged copper alloy disc, fully enclosed cadmium plated steel spring with adjustable pressure range and positive shut-off.
   5. Factory set valves to relieve at 10 psi above operating pressure.

E. Combined Pressure/Temperature Relief Valves:

   1. Provide as manufactured by Watts Regulator, Spence, or approved equal.
   2. Hydronic Systems: diaphragm operated, cast-iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut-down, and noncorrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory-set at operating pressure and have the capability for field adjustment. Safety relief valve designed, manufactured, tested, and labeled in accordance with the requirements of Section IV of the ASME Boiler and Pressure Vessel Code. Valve body shall be cast-iron, with all wetted internal working parts made of brass and rubber; 125 psig working pressure and 250ºF maximum operating temperature. Select valve to suit actual system pressure and Btu capacity. Provide with fast fill feature for filling hydronic system.

2.6 WET TAP PROCESS <Delete if not Required>

A. General: When existing plumbing systems cannot be shut off and drained for new connections the contractor shall make arrangements with UMB to wet tap the system requiring new connections as follows:

   1. Piping Systems up to Four (4) Inches: Use an Apollo 77FLF-140 full port ball valve only as specified. Size the valve to match the new pipe connection.
   2. Piping Systems Six (6) Inches and Larger: Provide an appropriately sized gate valve for the wet tap process. Provide a specified butterfly valve downstream of the gate valve for shut off duty. Size the butterfly valve to match the new pipe connection. Lock the gate valve in the open position.

**PART 3 - EXECUTION**

3.1 GENERAL

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 with new valves.

3.2 VALVE INSTALLATION

A. Valves shall be placed in such manner as to be easily accessible for smooth and easy hand wheel operation and packing maintenance.

B. Install valves in piping systems where shown on drawings, diagrams and details and where indicated below:

1. To Isolate:
   a. Toilet rooms.
   b. Laboratory sinks
   c. Laboratory gas outlets.
   d. Motorized flow control valves.
   e. Equipment.
   f. Pipe risers.
   g. Branch piping.

2. To Drain:
   a. Low points in piping systems.
   b. Pipe risers.
   c. Equipment.
   d. Trapped sections in the piping system.

3. To Balance:
   a. Flow in HWR piping systems.

C. Where piping or equipment may be subsequently remove, provide valves with bodies having integral flanges or full lugs drilled and tapped to hold valve in place so that downstream piping or equipment can be disconnected and replaced with blank-off plate while valve is still in service.

D. Valves for equipment and controls shall be installed full size of pipe before reducing size to make equipment connection.

E. Where there is no interference, shut-off valves shall be installed with handwheel up on horizontal runs of pipe to prevent accumulation of foreign matter in working parts of valves. In no case shall the stem be installed below the pipe centerline.

F. On valves, strainers, etc., installed in copper piping, provide a union on the discharge side of each valve and threaded adapters where copper piping connects to valves, strainers, etc.

G. Drawings indicate the general arrangement of piping, fittings, and specialties.

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

I. Install valves in a position to allow full handle movement.

J. Install safety relief valves on hot water generators, boilers, pressure vessels, etc. and elsewhere as required by ASME Boiler and Pressure Vessel Code. Pipe discharge without valves as shown on drawings, or to nearest floor drain if not shown on drawings. Comply with ASME Boiler and Pressure Vessel Code Section VIII, Division 01 for installation requirements.

K. Install shut-off valves upstream and downstream of each pressure regulator.

L. Where threaded ball valves are installed in brazed copper piping systems braze each threaded adapter on to the piping. After each adapter has cooled to the touch install the threaded ball valve. Do not connect the threaded adapter to the valve and then braze the adapter and valve to the piping as this will result in damage to the valve seals. If any valve, in the brazed piping systems are damaged due to faulty installation the damaged valves shall be replaced by the contractor at no cost to the University.

M. Where butterfly valves are installed in copper piping systems provide companion flanges and dielectric gasket kits for each flange. When valves and/or fittings are installed in piping where electrolysis may occur provide dielectric unions at each connection.

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

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

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

Q. Install chain wheels on operators for ball and butterfly valves four (4) inches and larger and more than ten (10) feet above floor. Extend chains to sixty (60) inches above finished floor. This requirement is limited to mechanical equipment rooms only.

R. Where solder end three (3) piece ball valves without tube extensions are installed in brazed copper piping systems, each valve shall be disassembled prior to installation. After the end sections are brazed to the pipe and after they have been cooled to the touch each valve shall be reassembled. Failure to disassemble the valve before brazing will result in damage to the valve seals. If any valve, in the brazed piping systems are damaged due to faulty installation the damaged valves shall be replaced by the contractor at no cost to the University.

S. Where solder end three (3) piece ball valves with tube extensions are installed in brazed copper piping systems, each valve shall be disassembled prior to installation. After the tube extensions have been brazed to the pipe and after they have been cooled to the touch each valve shall be reassembled. The manufacturer recommends the valve assembly be installed with one tube extension being covered with wet rags and the joint brazed. After the brazed tube extension has cooled to the touch, cover the other tube extension with wet rags and braze the joint. Do not braze the second tube extension while the first tube extension is still hot as this will result in damage to the valve seals. If any valve, in the brazed piping systems are damaged due to faulty installation the damaged valves shall be replaced by the contractor at no cost to the University.

T. Install balancing valves with memory stops in locations where they can easily be adjusted.

U. 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.

## 3.3 BALANCING VALVES – DOMESTIC HOT WATER RECIRCULATING SYSTEMS

A. Where balancing valves are installed in multiple branch recirculating pipes provide a check valve and a shut off valve in the branch piping at the connection to the main return riser.

## 3.4 SPECIAL VALVE APPLICATIONS

A. Install solenoid valves where indicated on the drawings and where required as make up water valves for HVAC Systems. See Division 23 Specification Sections for Building Automation Systems for interface with the BAS.

B. Install pressure-reducing valves at makeup-water connection to regulate system pressure.

## 3.5 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.

## 3.6 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.7 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.8 PRESS END CONNECTIONS

A. Press end connections shall be made according to the manufacturer's installation instructions.

B. Where thread end valves are installed in press end piping systems, provide threaded adaptors for each valve and follow manufacturer's installation instructions.

C. Where flanged valves are installed in press end piping systems, provide flange connections for each valve and follow manufacturer's installation instructions.

END OF SECTION 220523