

## **SECTION 22 1005 - PLUMBING PIPING**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Pipe, pipe fittings, valves, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Domestic water.
  - 3. Storm water.
  - 4. Gas.

#### **1.02 RELATED SECTIONS**

- A. Drawings and General Provisions of the Contract apply to this section.

#### **1.03 REFERENCES**

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; The American Society of Mechanical Engineers.
- C. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers.
- D. ASME B16.4 - Gray Iron Threaded Fittings; The American Society of Mechanical Engineers.
- E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; (ANSI B16.18).
- F. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers.
- G. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers.
- H. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; The American Society of Mechanical Engineers.

- I. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers.
- J. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers; (ANSI/ASME B31.1).
- K. ASME B31.2 - Fuel Gas Piping; The American Society of Mechanical Engineers.
- L. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; (ANSI/ASME B31.9).
- M. ASME (BPV IV) - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; The American Society of Mechanical Engineers.
- N. ASME (BPV IX) - Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications; The American Society of Mechanical Engineers.
- O. ASTM A 47/A 47M - Standard Specification for Ferritic Malleable Iron Castings.
- P. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- Q. ASTM A 74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
- R. ASTM A 234/A 234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- S. ASTM B 32 - Standard Specification for Solder Metal.
- T. ASTM B 42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
- U. ASTM B 43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
- V. ASTM B 68 - Standard Specification for Seamless Copper Tube, Bright Annealed.
- W. ASTM B 68M - Standard Specification for Seamless Copper Tube, Bright Annealed (Metric).
- X. ASTM B 75 - Standard Specification for Seamless Copper Tube.
- Y. ASTM B 75M - Standard Specification for Seamless Copper Tube (Metric).
- Z. ASTM B 88 - Standard Specification for Seamless Copper Water Tube.
- AA. ASTM B 88M - Standard Specification for Seamless Copper Water Tube (Metric).

- AB. ASTM B 280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
- AC. ASTM B 306 - Standard Specification for Copper Drainage Tube (DWV).
- AD. ASTM C 564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- AE. ASTM C 1053 - Standard Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications.
- AF. ASTM D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- AG. ASTM D 2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
- AH. ASTM D 2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- AI. ASTM D 2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
- AJ. ASTM D 2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- AK. ASTM D 2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
- AL. ASTM D 2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- AM. ASTM D 2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- AN. ASTM D 2846/D 2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems.
- AO. ASTM D 2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- AP. ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- AQ. ASTM F 437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

- AR. ASTM F 438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
- AS. ASTM F 439 - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
- AT. ASTM F 441/F 441M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
- AU. ASTM F 442/F 442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
- AV. ASTM F 477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- AW. ASTM F 493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
- AX. ASTM F 679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- AY. ASTM F 708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
- AZ. ASTM F 1281 - Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.
- BA. ASTM F 1282 - Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.
- BB. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society.
- BC. AWS D10 - Welding and Brazing Qualifications, American Welding Society.
- BD. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; (ANSI/AWWA C105/A21.5).
- BE. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; (ANSI/AWWA C111/A21.11).
- BF. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; (ANSI/AWWA C151/A21.51).
- BG. AWWA C651 - Disinfecting Water Mains; American Water Works Association; (ANSI/AWWA C651).

- BH. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; Cast Iron Soil Pipe Institute.
- BI. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; Cast Iron Soil Pipe Institute.
- BJ. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- BK. MSS SP-67 - Butterfly Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- BL. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- BM. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- BN. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- BO. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- BP. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- BQ. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- BR. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- BS. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- BT. NFPA 54 - National Fuel Gas Code; National Fire Protection Association.
- BU. NFPA 58 - Liquefied Petroleum Gas Code; National Fire Protection Association.

#### **1.04 SUBMITTALS**

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

- B. Project Record Documents: Record actual locations of valves.

#### **1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of Pennsylvania, City of New Hope standards.
  - 1. Maintain one copy on project site.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.
- D. Welders Certification: In accordance with ASME (BPV IX) or AWS D10.
- E. Identify pipe with marking including size, material classification, specification, potable water certification, water pressure rating.

#### **1.06 REGULATORY REQUIREMENTS**

- A. Perform Work in accordance with State of Pennsylvania plumbing code.
- B. Conform to applicable code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

#### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- 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. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

#### **1.08 ENVIRONMENTAL REQUIREMENTS**

- A. Do not install underground piping when bedding is wet or frozen.

#### **1.09 EXTRA MATERIALS**

- A. Provide two repacking kits for each size valve.

## **PART 2 - PRODUCTS**

### **2.01 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Cast Iron Pipe: ASTM A 74 service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C 564 neoprene gaskets or lead and oakum.
- B. Copper Tube: ASTM B 306, DWV.
  - 1. Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
  - 2. Joints: ASTM B 32, alloy Sn50 solder.
- C. PVC Pipe: ASTM D 2665 or ASTM D 3034.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.
- D. PVC Pipe: ASTM D 2665, ASTM D 3034, or ASTM F 679.
  - 1. Fittings: PVC.
  - 2. Joints: Push-on, using ASTM F 477 elastomeric gaskets.

### **2.02 SANITARY SEWER PIPING, ABOVE GRADE**

- A. Cast Iron Pipe: ASTM A 74, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joint Seals: ASTM C 564 neoprene gaskets, or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. Copper Tube: ASTM B 306, DWV.
  - 1. Fittings: ASME B16.29, wrought copper.

- 2. Joints: ASTM B 32, alloy Sn50 solder.
- D. Brass Pipe: ASTM B 43, chrome plated.
  - 1. Fittings: ASME B16.23, cast bronze, chrome plated.
  - 2. Joints: Mechanical compression.
- E. Steel Pipe: ASTM A 53/A 53M Schedule 40, galvanized.
  - 1. Cast Iron Fittings: ASME B16.1, flanges and fittings; ASME B16.4, threaded fittings.
  - 2. Malleable Iron Fittings: ASME B16.3, screwed type.
  - 3. Malleable Iron Fittings: ASTM A 47/A 47M.
  - 4. Mechanical Grooved Couplings: Malleable iron, galvanized.
- F. PVC Pipe: ASTM D 2729.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.
- G. PVC Pipe: ASTM D 2665.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.

### **2.03 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Copper Pipe: ASTM B 42, hard drawn or annealed.
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
  - 2. Joints: ASTM B 32, alloy Sn95 solder or AWS A5.8, PCuP silver braze.
- B. Ductile Iron Pipe: AWWA C151/A21.51.
  - 1. Fittings: Ductile or gray iron, standard thickness.
  - 2. Joints: AWWA C111/A21.11, rubber gasket with 3/4 inch diameter rods.



C. PE Pipe: ASTM D 2239, or ASTM D 2447 Schedule 40.

1. Fittings: ASTM D 2609, PE.
2. Joints: Mechanical with stainless steel clamp.

## **2.04 WATER PIPING, ABOVE GRADE**

A. Copper Tube: ASTM B 88 (ASTM B 88M), Type L (B) or K (A), Drawn (H).

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Fittings: Cast iron, coated, mechanical couplings.
3. Joints: ASTM B 32, alloy Sn95 solder.
4. Joints: Grooved mechanical couplings.

B. Steel Pipe: ASTM A 53/A 53M Schedule 40, galvanized.

1. Fittings: Cast iron.
2. Joints: Grooved mechanical couplings or threaded.

C. CPVC Pipe: ASTM D 2846/D 2846M, ASTM F 441/F 441M, or ASTM F 442/F 442M.

1. Fittings: CPVC; ASTM D 2846/D 2846M, ASTM F 437, ASTM F 438, or ASTM F 439.
2. Joints: ASTM D 2846/D 2846M, solvent weld with ASTM F 493 solvent cement.

D. PVC Pipe: ASTM D 1785 or ASTM D 2241.

1. Fittings: ASTM D 2665, PVC.
2. Joints: ASTM D 2846/D 2846M, solvent weld with ASTM F 493 solvent cement.

## **2.05 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING**

A. Cast Iron Pipe: ASTM A 74 service weight.

1. Fittings: Cast iron.
2. Joint Seals: ASTM C 564 neoprene gaskets, or lead and oakum.

- B. Copper Tube: ASTM B 306, DWV.
  - 1. Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
  - 2. Joints: ASTM B 32, alloy Sn50 solder.
- C. PVC Pipe: ASTM D 2665 or ASTM D 3034.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.
- D. PVC Pipe: ASTM D 2665, ASTM D 3034, or ASTM F 679.
  - 1. Fittings: PVC.
  - 2. Joints: Push-on, using ASTM F 477 elastomeric gaskets.

## **2.06 STORM WATER PIPING, ABOVE GRADE**

- A. Cast Iron Pipe: ASTM A 74 service weight.
  - 1. Fittings: Cast iron.
  - 2. Joint Seals: ASTM C 564 neoprene gaskets, or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. Copper Tube: ASTM B 306, DWV.
  - 1. Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
  - 2. Joints: ASTM B 32, alloy Sn50 solder.
- D. PVC Pipe: ASTM D 2665 or ASTM D 3034.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.

## **2.07 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Steel Pipe: ASTM A 53/A 53M Schedule 40 black.
  - 1. Fittings: ASTM A 234/A 234M, wrought steel welding type.
  - 2. Joints: ASME B31.1, ASME B31.2, ASME B31.9 or ASME (BPV IX), welded.
  - 3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

## **2.08 NATURAL GAS PIPING, ABOVE GRADE**

- A. Steel Pipe: ASTM A 53/A 53M Schedule 40 black.
  - 1. Fittings: ASME B16.3, malleable iron, or ASTM A 234/A 234M, wrought steel welding type.
  - 2. Joints: NFPA 54, threaded or welded to ASME B31.1, ASME B31.2, ASME B31.9, or ASME (BPV IX).
- B. Copper Tube: ASTM B 88 (ASTM B 88M), Type K (A) annealed.
  - 1. Fittings: ASME B16.26, cast bronze.
  - 2. Joints: Flared.
- C. Copper Tube: ASTM B 68 (ASTM B 68M) O50 or O60 temper; or ASTM B 75 (ASTM B 75M) H58 (general purpose) drawn temper.
  - 1. Fittings: ASME B16.26, cast bronze.
  - 2. Joints: Flared.
- D. Copper Tube: ASTM B 280, O60 soft annealed.
  - 1. Fittings: ASME B16.26, cast bronze.
  - 2. Joints: Flared.

## **2.09 FLANGES, UNIONS, AND COUPLINGS**

- A. Unions for Pipe Sizes 2 Inches and Under:
  - 1. Ferrous pipe: Class 150 malleable iron threaded unions.

2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
  2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Grooved and Shouldered Pipe End Couplings:
1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
  2. Sealing gasket: "C" shape composition sealing gasket.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## **2.10 PIPE HANGERS AND SUPPORTS**

- A. Plumbing Piping - Drain, Waste, and Vent:
1. Conform to ASME B31.9, ASTM F 708, MSS SP-58, MSS SP-69, or MSS SP-89.
  2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
  3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  7. Vertical Support: Steel riser clamp.
  8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

**B. Plumbing Piping - Water:**

1. Conform to ASME B31.9, ASTM F 708, MSS SP-58, MSS SP-69, or MSS SP-89.
2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

**2.11 GATE VALVES**

**A. Manufacturers:**

1. Conbraco Industries

2. Nibco, Inc.
3. Milwaukee Valve Company

B. Up To and Including 3 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, threaded ends.

C. 2 Inches and Larger:

1. MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

## **2.12 GLOBE VALVES**

A. Manufacturers:

1. Conbraco Industries
2. Nibco, Inc.
3. Milwaukee Valve Company

B. Up To and Including 3 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, threaded ends.

C. 2 Inches and Larger:

1. MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

## **2.13 BALL VALVES**

A. Manufacturers:

1. Conbraco Industries
2. Nibco, Inc.
3. Milwaukee Valve Company

- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends.

## **2.14 BUTTERFLY VALVES**

- A. Manufacturers:
  - 1. Hammond Valve
  - 2. Crane Valve
  - 3. Milwaukee Valve Company
  - 4. Keystone Valve
- B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, lug or grooved ends, extended neck, infinite position lever handle with memory stop.
- C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

## **2.15 SWING CHECK VALVES**

- A. Manufacturers:
  - 1. Hammond Valve
  - 2. Nibco, Inc.
  - 3. Milwaukee Valve Company
- B. Up to 2 Inches:
  - 1. MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, threaded ends.
- C. Over 2 Inches:
  - 1. MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged ends.

## **2.16 SPRING LOADED CHECK VALVES**

### **A. Manufacturers:**

1. Hammond Valve
2. Crane Valve
3. Milwaukee Valve Company

### **B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.**

## **2.17 WATER PRESSURE REDUCING VALVES**

### **A. Manufacturers:**

1. Amtrol Inc.
2. Cla-Val Co.
3. Watts Regulator Company

### **B. Up to 2 Inches:**

1. MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded double union ends.

### **C. Over 2 Inches:**

1. MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

## **2.18 RELIEF VALVES**

### **A. Pressure Relief:**

#### **1. Manufacturers:**

- a. Cla-Val Co.
- b. Henry Technologies
- c. Watts Regulator Company

2. AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.



**B. Temperature and Pressure Relief:**

1. Manufacturers:
  - a. Cla-Val Co.
  - b. Henry Technologies
  - c. Watts Regulator Company
2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labeled.

**2.19 STRAINERS**

**A. Manufacturers:**

1. Armstrong International, Inc.
2. Green Country Filtration
3. WEAMCO

**B. Size 2 inch and Under:**

1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

**C. Size 1-1/2 inch to 4 inch:**

1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

**D. Size 5 inch and Larger:**

1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

**2.20 CONTAINMENT FOR PIPING**

- A. Liquid-carrying pipe: Fiberglass containment pipe with split-joint fittings, joined with bolts and pipe manufacturer's adhesive. Provide termination fittings with 3/4 inch NPT outlet. Test containment pipe with 10 psig air to provide tightness.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that excavations are to required grade, dry, and not over-excavated.

### **3.02 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- I. Establish elevations of buried piping outside the building to ensure not less than 4 feet of cover.
- J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- L. Provide support for utility meters in accordance with requirements of utility companies.

- M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- N. Install bell and spigot pipe with bell end upstream.
- O. Install valves with stems upright or horizontal, not inverted.
- P. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- Q. Install water piping to ASME B31.9.
- R. PVC Pipe: Make solvent-welded joints in accordance with ASTM D 2855.
- S. Sleeve pipes passing through partitions, walls and floors.
- T. Inserts:
  - 1. Provide inserts for placement in concrete formwork.
  - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- U. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9, ASTM F 708, and MSS SP-89.
  - 2. Support horizontal piping as scheduled.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
  7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  8. Provide copper plated hangers and supports for copper piping.
  9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
  10. Provide hangers adjacent to motor driven equipment with vibration isolation.
  11. Support cast iron drainage piping at every joint.
- V. Weld all high pressure gas piping (1 psig and above), both natural gas and propane, regardless of pipe size.
- W. Test all new piping. Correct leaks and retest.

### **3.04 APPLICATION**

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install globe valves for throttling, bypass, or manual flow control services.
- F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- G. Provide spring loaded check valves on discharge of water pumps.
- H. Provide plug valves in natural gas systems for shut-off service.
- I. Provide flow controls in water recirculating systems where indicated.

### **3.05 ERECTION TOLERANCES**

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot, 1/8 inch per foot, or 1/16 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

### **3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- A. Disinfect water distribution system in accordance with Section 33 1300.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and not less than a total of 5 outlets, and analyze in accordance with AWWA C651.

### **3.07 SERVICE CONNECTIONS**

- A. Provide new sanitary and storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves.
  - 1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
  - 2. Provide 18 gage galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.
- C. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 2 psi. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.

### **3.08 SCHEDULES**

#### **A. Pipe Hanger Spacing:**

##### **1. Metal Piping:**

- a. Pipe size: 1/2 inches to 1 inch:
  - 1) Maximum hanger spacing: 6.0 ft.
  - 2) Hanger rod diameter: 3/8 inches.
- b. Pipe size: 1-1/4 inches to 2 inches:
  - 1) Maximum hanger spacing: 9 ft.
  - 2) Hanger rod diameter: 3/8 inch.
- c. Pipe size: 2-1/2 inches to 5 inches:
  - 1) Maximum hanger spacing: 10 ft.
  - 2) Hanger rod diameter: 1/2 inch.
- d. Pipe size: 6 inches and larger:
  - 1) Maximum hanger spacing: 10 ft.
  - 2) Hanger rod diameter: 5/8 inch.

##### **2. Plastic Piping:**

- a. All Sizes:
  - 1) Maximum hanger spacing: 6 ft.
  - 2) Hanger rod diameter: 3/8 inch.

**END OF SECTION 22 1005**