

Part 1 General

1.1 REFERENCES

- .1 ASME B16.22-2001 (R2005) - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .2 ASME B31.9-2011 - Building Services Piping.
- .3 ASTM A74-09 - Standard Specification for Cast Iron Soil Pipe and Fittings.
- .4 ASTM D2241-09 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- .5 MSS SP-58-2009 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.
- .6 MSS SP-80-2008 - Bronze Gate, Globe, Angle and Check Valves.

1.2 SUBMITTALS FOR REVIEW

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

1.3 CLOSEOUT SUBMITTALS

- .1 Record Documentation: Record actual locations of valves.

1.4 QUALITY ASSURANCE

- .1 Products of This Section: Manufactured to ISO 9000 certification requirements.
- .2 Perform Work to City of Saskatoon standards.
- .3 Valves: Manufacturer's name and pressure rating marked on valve body.
- .4 Identify pipe with marking including size, ASTM material classification, potable water certification and water pressure rating.

1.5 REGULATORY REQUIREMENTS

- .1 Perform Work to applicable plumbing code.
- .2 Conform to applicable code for installation of backflow prevention devices.
- .3 Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.6 DELIVERY, STORAGE, AND PROTECTION

- .1 Accept valves on site in shipping containers with labelling in place. Inspect for damage.
- .2 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

Part 2 Products

2.1 SANITARY SEWER PIPING, ABOVE GROUND

- .1 Cast Iron Pipe: CAN/CSA-B70.
 - .1 Fittings: Hubless Cast Iron Pipe Fittings: to FSWW-P-401.
 - .2 Joints: ASTM C564, rubber or compression gaskets.
- .2 PVC Pipe: CSA-B181.2 and CAN/ULC S102.2, flame spread rating 15.
 - .1 Fittings: CSA-B181.2, socket type and CAN/ULC S102.2, flame spread rating 15.
 - .2 Joints: ASTM D2564 solvent cement and primer.

2.2 DOMESTIC WATER PIPING, ABOVE GROUND

- .1 Copper Tubing: ASTM B88, Type L, hard drawn.
 - .1 Fittings: ASME B16.18 cast copper alloy ASME B16.22 wrought copper and bronze.
 - .2 Joints: ASTM B32, soldered.
- .2 Plumbing Piping - Water:
 - .1 Hangers for Pipe Sizes 13 to 38 mm (1/2 to 1-1/2 inch): Carbon steel, adjustable swivel, split ring.
 - .2 Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
 - .3 Vertical Support: Steel riser clamp.
 - .4 Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - .5 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.3 BALL VALVES

- .1 Ball Vaves 100 mm (4 inches) and Smaller: MSS SP-110, bronze, two-piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle.

2.4 BACKFLOW PREVENTERS

- .1 Double-Check Backflow-Prevention Assemblies:
 - .1 Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - .1 Conbraco Industries, Inc.
 - .2 FEBCO; SPX Valves & Controls.
 - .3 Flomatic Corporation.
 - .4 Watts Industries, Inc.; Water Products Div.
 - .5 Zurn Plumbing Products Group; Wilkins Div.

- .2 Standards: ASSE listed 1015, C-UL Classified, CSA Certified, AWWA
- .3 Operation: Continuous-pressure applications, unless otherwise indicated.
- .4 Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.
- .5 Size: Same as upstream pipe size.
- .6 Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 (DN 65) and larger.
- .7 End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged or grooved for NPS 2-1/2 (DN 65) and larger.
- .8 Configuration: Double check valve consisting of two independently operated spring-loaded center guided check valves. Designed for horizontal, straight through flow.
- .9 Accessories:
 - .1 Valves: Ball type with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller.
- .2 Backflow-Preventer Test Kits:
 - .1 Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

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2.5 FLOW CONTROLS

- .1 Flow Control: Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet.

2.6 SWING CHECK VALVES

- .1 Swing Check Valves Up To and Including 75 mm (3 inches): MSS SP-80, bronze body and cap, bronze swing disc with rubber seat.

2.7 WATER PRESSURE REDUCING VALVES

- .1 Water Pressure Reducing Valves Up to 50 mm (2 inches): MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, and strainer.

2.8 STRAINERS

- .1 Strainers 50 mm (2 inch) and Under: , Y pattern with 0.8 mm stainless steel perforated screen.

Part 3 Execution

3.1 EXAMINATION

- .1 Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.

- .1 Proceed with installation only after unsatisfactory conditions have been corrected.
- .2 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.
- .3 Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- .4 Examine threads on valve and mating pipe for form and cleanliness.
- .5 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.
- .6 Do not attempt to repair defective valves; replace with new valves.

3.2 PREPARATION

- .1 Ream pipe and tube ends. Remove burrs..
- .2 Remove scale and dirt, on inside and outside, before assembly.
- .3 Prepare piping connections to equipment with flanges or unions.

3.3 HANGER AND SUPPORT INSTALLATION

- .1 Hangers:
 - .1 Vertical Piping: MSS Type 8 or 42, clamps.
 - .2 Individual, Straight, Horizontal Piping Runs:
 - .1 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
 - .2 Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
 - .3 Longer Than 100 Feet (30 m) If Indicated: MSS Type 49, spring cushion rolls.
 - .3 Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - .4 Base of Vertical Piping: MSS Type 52, spring hangers.
- .2 Support vertical piping and tubing at base and at each floor.
- .3 Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).
- .4 Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - .1 NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
 - .2 NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
 - .3 NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
- .5 Install supports for vertical copper tubing every 10 feet (3 m).

- .6 Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.4 PIPING SCHEDULE

- .1 Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- .2 Flanges, grooved-end couplings, and unions may be used for aboveground joints unless otherwise indicated.
- .3 Aboveground domestic water piping, NPS 2 (DN 50) and smaller, shall be the following:
 - .1 Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); cast- or wrought- copper solder-joint fittings; and soldered joints.

3.5 VALVE APPLICATIONS

- .1 Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 (DN 50) and smaller.
- .2 Shutoff Service: Ball, butterfly valves.
- .3 Throttling Service: Ball, or globe valves.
- .4 Pump Discharge: Spring-loaded, lift-disc check valves.
- .5 If valves with specified CWP ratings are not available, the same types of valves with higher CWP ratings may be substituted.
- .6 Select valves, except wafer and flangeless types, with the following end connections:
 - .1 For Copper Tubing, NPS 2 (DN 50) and Smaller: Solder-joint or threaded ends.
 - .2 For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends.
 - .3 For Grooved-End, Copper Tubing and Steel Piping: Valve ends may be grooved.

3.6 DOMESTIC COLD-WATER VALVE SCHEDULE

- .1 Pipe NPS 2 (DN 50) and Smaller:
 - .1 Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - .2 Ball Valves: Two piece, full port, brass or bronze with bronze trim.
 - .3 Bronze Swing Check Valves: Class 125, bronze disc.

3.7 PIPING INSTALLATION

- .1 Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- .2 Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

- .3 Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- .4 Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- .5 Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- .6 Install piping adjacent to equipment and specialties to allow service and maintenance.
- .7 Install piping to permit valve servicing.
- .8 Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- .9 Install piping free of sags and bends.
- .10 Install fittings for changes in direction and branch connections.
- .11 Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- .12 Unions are not required in installations using grooved mechanical joint couplings. The couplings shall serve as unions and disconnect points.
- .13 Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump.

3.8 VALVE INSTALLATION

- .1 Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- .2 Locate valves for easy access and provide separate support where necessary.
- .3 Install valves in horizontal piping with stem at or above center of pipe.
- .4 Install valves in position to allow full stem movement.

3.9 JOINT CONSTRUCTION

- .1 Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- .2 Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- .3 Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - .1 Apply appropriate tape or thread compound to external pipe threads.
 - .2 Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- .4 Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

- .5 Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.10 ADJUSTING

- .1 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.

3.11 CLEANING

- .1 Clean and disinfect potable domestic water piping as follows:
 - .1 Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - .2 Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - .1 Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - .2 Fill and isolate system according to either of the following:
 - .1 Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
 - .2 Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
 - .3 Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - .4 Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
 - .2 Prepare and submit reports of purging and disinfecting activities.
 - .3 Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 SANITARY WASTE PIPING APPLICATIONS

- .1 Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- .2 Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be the following:
 - .1 Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
 - .2 Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - .3 Solid-wall, fire-rated PVC pipe, IPEX XFR 15-50 or equivalent; PVC socket fittings; and solvent-cemented joints.
- .3 Aboveground, vent piping NPS 4 (DN 100) and smaller shall be any of the following:

- .1 Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
- .2 Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- .3 Solid-wall, fire-rated PVC pipe, IPEX XFR 15-50 or equivalent; PVC socket fittings; and solvent-cemented joints.
- .4 Aboveground, soil and waste piping NPS 4 (DN 100) and smaller (ceiling spaces used as return air plenums) shall be the following:
 - .1 Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
 - .2 Solid-wall, fire-rated PVC pipe, IPEX XFR 15-50 or equivalent; PVC socket fittings; and solvent-cemented joints.

3.13 SANITARY WASTE PIPING INSTALLATION

- .1 Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- .2 Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- .3 Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
- .4 Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
- .5 Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
- .6 Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- .7 Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- .8 Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.14 HANGER AND SUPPORT INSTALLATION

- .1 Pipe Install the following:
 - .1 Vertical Piping: MSS Type 8 or Type 42, clamps.
 - .2 Install individual, straight, horizontal piping runs according to the following:
 - .1 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
 - .2 Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.

- .3 Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.
- .3 Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
- .4 Base of Vertical Piping: MSS Type 52, spring hangers.
- .2 Support vertical piping and tubing at base and at each floor.
- .3 Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.
- .4 Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - .1 NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
 - .2 NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
 - .3 NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
- .5 Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

3.15 FIELD QUALITY CONTROL

- .1 During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - .1 Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - .2 Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- .2 Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
- .3 Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- .4 Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction and in accordance with the following:
 - .1 Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - .2 Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - .3 Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

- .4 Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
- .5 Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
- .6 Prepare reports for tests and required corrective action.

END OF SECTION