

SECTION 15140  
PLUMBING PIPING AND SPECIALTIES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 15050, "Basic Mechanical Methods and Materials," apply to work specified in this section.

1.02 SUMMARY

- A. Work Included: Plumbing piping systems and specialties to a point 5 feet outside the building.
  - 1. Potable and non-potable water distribution, including cold and hot-water supply and hot-water circulation.
  - 2. Compressed air distribution systems.
  - 3. Laboratory vacuum distribution systems.
  - 4. Carbon dioxide distribution systems.
  - 5. Emergency water distribution system.
  - 6. Sanitary waste and vent piping system.
  - 7. Storm drainage system.
- B. Related Work Specified in Other Sections:
  - 1. Piping joining materials and joint construction: Section 15050, "Basic Mechanical Materials and Methods"
  - 2. Plumbing piping insulation: Section 15080, "Mechanical Insulation."
  - 3. Thermometers, pressure gages, and fittings: Section 15120, "Meters and Gages"

1.03 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working pressure ratings, except where indicated otherwise:
  - 1. Water Distribution Systems, Above Ground: 125 psig.
  - 2. Soil, Waste, and Vent Systems: 10-foot head of water.
  - 3. Storm Drainage Systems: 10-foot head of water.
  - 4. Compressed Air, Vacuum & CO2 Systems: 150 psig.

1.04 SUBMITTALS

- A. Product data for the following plumbing piping products:
  - 1. Couplings and fittings for no-hub piping systems.
  - 2. Strainers.
  - 3. Hose bibbs
  - 4. Drain valves.
  - 5. Water hammer arresters.

10. Trap seal primer valves.
  12. Cleanouts, cover plates, and access panels.
  13. Air-admittance valves.
  14. Vent caps, vent terminals, and roof flashing assemblies.
  16. Floor drains and open receptors.
  17. Sleeve penetration systems.
  18. Emergency fixtures.
  19. Copper piping and fittings for all services.
- B. Operating and Maintenance data for inclusion in the project Operating and Maintenance manuals as specified in Section 01700, "Contract Closeout" for the following:
1. Emergency fixtures.
- C. Test results and reports specified in "Field Quality Control."
- D. Report of water piping purging and disinfection required by the "Purging and Disinfection" article, with water analysis attached. Do not put water distribution piping into service until water tests definitively show that water delivered from the piping is clean and free of contamination above permissible limits.
1. Include date or dates on which purging and disinfection were performed, locations and extent, identification of water samples taken.
  2. Have the report signed by the individual who supervised the purging and disinfection.
  3. Attach 1 copy of water analysis and commentary from the authority having jurisdiction for each water sample taken.
  4. If the initial sample showed evidence of contamination, describe subsequent purging and disinfection and attach test reports and commentary obtained for the second and subsequent samples, until water is free of contamination.
  5. Submit one copy each of the report to the Architect and the Clerk-of-the Works and place one copy in the Project Record File.
- 1.05 QUALITY ASSURANCE
- A. Comply with the provisions of ASME B31.9 "Building Services Piping" for materials, products, and installation.
- B. Electrical Component Standard: NFPA 70, "National Electrical Code."
- C. Listing and Labeling: Provide equipment that is listed and labeled.
1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code," Article 100.
  2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- D. Design Concept: The Drawings indicate capacities, sizes, and dimensional requirements of system components. Components having equal performance characteristics that deviate from the indicated size and dimensions may be considered provided deviations do not change the design concept or intended performance. The burden of proof for equality of products is on the Contractor. Refer to Division 1 Section "Product Substitutions."

1.06 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below. Package them with protective covering for storage and identify with labels clearly describing contents.
- C. Operating Keys (Handles): Furnish 1 extra key for each type of key-operated hose bibb.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Water Hammer Arresters, (Shock Absorbers): Subject to compliance with requirements, provide products by one of the following:
  - 1. Precision Plumbing Products, Inc.
  - 2. Smith by Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
  - 3. Zurn by Hydromechanics Div., Zurn Industries, Inc.
  - 4. Watts Drainage, (Ancon).
  - 5. Amtrol, Inc.
- B. Trap Seal Primer Valves: Subject to compliance with requirements, provide products by one of the following:
  - 1. Precision Plumbing Products, Inc.
  - 2. Smith by Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
  - 3. Zurn by Hydromechanics Div., Zurn Industries, Inc.
- C. Floor Drains: Subject to compliance with requirements, provide products by one of the following:
  - 1. Josam Co.
  - 2. Smith by Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
  - 3. Zurn by Hydromechanics Div., Zurn Industries Inc.
  - 4. Watts Drainage, (Ancon).
- D. Sleeve Penetration Systems: Subject to compliance with requirements, provide products by one of the following:
  - 1. Proset Systems, Inc.
  - 2. Hilti Systems
  - 3. 3M Corporation
- E. Emergency Equipment: Subject to compliance with requirements, provide products by one of the following:
  - 1. Encon Safety Products.
  - 2. Guardian Equipment / Leonard Water Temperature Controls.
  - 3. Haws Drinking Fountain Co.
- F. Hose Bibbs: Subject to compliance with requirements, provide products by one of the following:
  - 1. Chicago Faucet Co.
  - 2. Royal Brass Mfg. Co.

3. T & S Brass & Bronze Works, Inc.

## 2.02 MISCELLANEOUS PIPING SPECIALTIES

- A. Piping specialties such as escutcheons, dielectric fittings, sleeves, and sleeve seals are specified in Section 15050 "Basic Mechanical Materials and Methods."
- B. Strainers: Y pattern, except where otherwise indicated, full size of connecting piping. Include Type 304 stainless-steel screens with 3/64-inch perforations except where other screens are indicated.
1. Pressure Rating: 125-psig minimum steam working pressure except where otherwise indicated.
  2. Sizes 2 Inches and Smaller: Bronze body, with female threaded ends.
  3. Sizes 2-1/2 Inches and Larger: Cast-iron body, with interior FDA-approved epoxy coating and flanged ends.
  4. Y-Type Strainers: Screwed screen retainer with centered blow down.
    - a. Drain: Factory- or field-installed, hose-end drain valve.
- C. Hose Bibbs: Bronze body, with renewable composition disc, 1/2- or 3/4-inch threaded or solder-joint inlet. Provide ASME B1.20.7 garden-hose threads on outlet and integral or field-installed, nonremovable, drainable, hose-connection vacuum breaker.
1. Finish: Chrome or nickel plated.
  2. Operation: Operating key (handle). Provide 1 operating key.
- D. Hose-End, Drain Valves: 3/4-inch ball valve, rated for 400 psig WOG. Include 2-piece bronze body conforming to ASTM B 62, standard port, chrome-plated brass ball, replaceable "TFE" seats and seals, blowout-proof stem, and vinyl-covered steel handle.
1. Inlet: Solder-joint or threaded.
  2. Outlet: Short-threaded nipple with ASME B1.20.7 garden-hose thread and cap.
  3. Hose-End, Drain Valve Option: MSS SP-80, gate valve, Class 125, ASTM B 62 body, with 3/4-inch solder-joint or threaded inlet and ASME B1.20.7 garden-hose thread outlet and cap. Hose bibbs are prohibited for this application.
- E. Stop-and-Waste Drain Valves: Ball valve or MSS SP-80 gate valve, rated for 200 psig WOG minimum, ASTM B 62 bronze body, with 1/8-inch side drain outlet and cap.
- F. Water Hammer Arresters: ASME A112.26.1M, ASSE 1010, or PDI WH-201, bellows or piston type with pressurized cushioning chamber. Sizes are based on water-supply fixture units, ASME A112.26.1M sizes "A" through "F" and PDI WH-201 sizes "A" through "F."
- G. Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:
1. 125-psig minimum working pressure.
  2. Bronze body with atmospheric-vented drain chamber.
  3. Inlet and Outlet Connections: 1/2-inch threaded, union, or solder joint.
  4. Gravity Drain Outlet Connection: 1/2-inch threaded or solder joint.
  5. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

## 2.03 CLEANOUTS

- A. General: Size cleanouts as indicated on drawings, or where not indicated, same size as connected drainage piping. Cleanouts larger than 4 inches are not required except where indicated.
- B. Cleanouts: ASME A112.36.2M, cast-iron body with straight threads and gasket seal or taper threads for plug, flashing flange and clamping ring, and a brass closure plug. Cleanouts for installation in floors not having membrane waterproofing may be furnished without clamping ring.

## 2.04 FLOOR DRAINS

- A. General: Provide products as indicated in Drain Schedule on the drawings.
- B. Floor Drains: ASME A112.21.1M, cast-iron body, with seepage flange and clamping device. Floor drains for installation in floors not having membrane waterproofing may have seepage flange without clamping device. Floor drains for use as area drains in exterior slab on grade may be furnished with anchor flange instead of seepage flange and clamping device.
- C. Deep Seal Traps: Cast iron or bronze, with inlet and outlet matching connected piping, cleanout where indicated, and trap seal primer valve connection where indicated.
  - 1. 2-Inch Size: 4-inch-minimum water seal.
  - 2. 2-1/2 Inches and Larger: 5-inch-minimum water seal.
- D. Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.
- E. Products: Subject to compliance with requirements, provide one of the products specified in "Drain Schedule" on drawings.

## 2.05 EMERGENCY EQUIPMENT

- A. General: Provide equipment as supplied by one manufacturer. All items shall be in compliance with the most recent version of ANSI Z358.1.
- B. Mixing Valves: Thermostatic type mixing valve with cold water by-pass fail condition. The unit shall supply water at a temperature of 80-85°F. The unit shall supply 20-30 gpm for showers and 3-5 gpm for eye/face washes.
  - 1. Basis of design: As scheduled on the drawings.
- C. Shower & eye/face washes: Combination units with stay open actuation valves. Shower actuation shall be via a solid pull rod. Eye/face wash actuation shall be via wrist blade.
  - 1. Shower flow rate: 20 gpm.
  - 2. Eye/face wash flow rate: 3 gpm minimum.
  - 3. Basis of design: As scheduled on the drawings.
- D. Eye/face washes: Wall mounted bowl type with stay open actuation valve. Activation shall be via a wrist blade.
  - 1. Eye/face wash flow rate: 3 gpm minimum.

2. Basis of design: As scheduled on the drawings.

## 2.06 SLEEVE PENETRATION SYSTEMS

- A. Description: UL 1479, through-penetration fire stop assembly consisting of sleeve and stack fitting with fire stopping plug.
  1. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on 1 end for installation in cast-in-place concrete slabs.
  2. Stack Fitting: ASTM A 48, cast-iron, hubless-pattern, wye branch stack fitting with neoprene O ring at base and cast-iron plug in thermal-release harness in branch. Include PVC protective cap for plug.
    - a. Special Coating: Include corrosion-resistant interior coating on fittings for plastic chemical waste and vent stacks.

## 2.07 PIPES AND TUBES

- A. General: The application of the following pipe, tube, and fitting materials and joining methods required for plumbing piping systems are indicated in Part 3 Article "Pipe and Fittings Applications."
- B. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.
- C. Hard Copper Tube, Cleaned for Oxygen Service: ASTM B 88, Type L. Capped and sealed, in accordance with NFPA-99.
- D. Steel Pipe: ASTM A 53, Type S, Grade A, Schedule 40, seamless, galvanized, plain ends.
  1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53 or ASTM A 106, Schedule 40, seamless, galvanized, carbon-steel pipe.
- E. Hub and Spigot, Cast-Iron Soil Pipe: ASTM A 74, Service Class.
- F. Hubless, Cast-Iron Soil Pipe: CISPI 301.

## 2.08 PIPE FITTINGS AND TUBE FITTINGS

- A. Wrought-Copper, Solder-Joint Pressure Fittings: ASME B16.22.
- B. Wrought-Copper, Solder-Joint Pressure Fittings, Cleaned for Oxygen Service: ASME B16.22, individually bagged for cleanliness, in accordance with NFPA-99.
- C. Cast-Copper-Alloy, Solder-Joint Pressure Fittings: ASME B16.18.
- D. Wrought-Copper, Solder-Joint, DWV Drainage Fittings: ASME B16.29.
- E. Cast-Copper-Alloy, Solder-Joint, DWV Drainage Fittings: ASME B16.23.
- F. Bronze Flanges: ASME B16.24, Classes 150 and 300.

- G. Copper Unions: ASME B16.18, cast-copper-alloy body, hexagonal stock, with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends.
  - 1. Threaded Ends: Threads conforming to ASME B1.20.1.
- H. Malleable-Iron Unions: ASME B16.39, Classes 150 and 300, hexagonal stock, with ball-and-socket joint, metal-to-metal bronze seating surfaces, and female threaded ends having threads conforming to ASME B1.20.1.
- I. Galvanized, Cast-Iron Threaded Fittings: ASME B16.4, Classes 125 and 250, standard pattern, with threads conforming to ASME B1.20.1.
- J. Galvanized, Cast-Iron Threaded Drainage Fittings: ASME B16.12, recessed drainage pattern, with threads conforming to ASME B1.20.1.
- K. Ductile-Iron and Gray-Iron Flanged Fittings: AWWA C110, 250-psig minimum pressure rating, with AWWA C104 cement-mortar lining.
- L. Hub and Spigot, Cast-Iron Soil Pipe Fittings: ASTM A 74, Service Class.
- M. Hubless, Cast-Iron Soil Pipe Fittings: CISPI 301.

## 2.09 JOINING MATERIALS

- A. Solder, brazing, and welding filler metals are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- B. Cast-Iron Soil Pipe and Fittings: ASTM C 564 neoprene rubber gaskets and lubricant.
- C. Stainless Steel, Heavy-Duty Couplings for Hubless Cast-Iron Soil Pipe and Fittings: ASTM C 564 neoprene sealing gasket, with Type 304 stainless-steel housing or shield and stainless-steel clamps. Coupling shall be 3 inches wide in sizes 1-1/2 to 4 inches and 4 inches wide in sizes 5 to 10 inches.
- D. Cast-Iron, Heavy-Duty Couplings for Hubless Cast-Iron Soil Pipe and Fittings: ASTM C 564 neoprene sealing gasket, with cast-iron housing and stainless steel bolts.
- E. Joints in cleaned copper tubing systems shall be brazed only.

## 2.10 VALVES

- A. Refer to Section 15110 "Valves" for gate, globe, ball, butterfly, and check valves.
- B. Valves in brazed systems shall be either 3-piece ball valves, or 2-piece ball valves with factory applied tube extensions. All of the valves used in brazed systems shall be cleaned for oxygen service, in accordance with NFPA-99.

## PART 3 - EXECUTION

### 3.01 PIPE AND FITTINGS APPLICATIONS

- A. General: Use pipe, tube, fittings, and joining methods for piping systems according to the following applications.
- B. Compressed Air Piping: Hard copper tube, Type L; wrought-copper pressure fittings; copper unions; bronze flanges; and brazed joints, oxygen cleaned materials and procedures, in accordance with NFPA-99-1996, paragraph 4-3.1.2.3, and related paragraphs.
- C. Carbon Dioxide, (CO<sub>2</sub>) Piping: Hard copper tube, Type L; wrought-copper pressure fittings; copper unions; bronze flanges; oxygen cleaned materials and procedures, in accordance with NFPA-99-1996, paragraph 4-3.1.2.3, and related paragraphs.
- D. Laboratory Vacuum Piping: Hard copper tube, Type L; wrought-copper pressure fittings; copper unions; bronze flanges; and solder joints with Alloy Sn95 solder
- E. Water Distribution Piping Above Ground: Hard copper tube, Type L; wrought-copper or cast-copper-alloy pressure fittings; copper unions; bronze flanges; and solder joints with Alloy Sn95 solder.
- F. Soil, Waste, and Vent Piping Above Ground: Hubless cast-iron soil pipe; hubless cast-iron soil pipe fittings; stainless-steel, cast-iron, or FM-type heavy-duty couplings for hubless cast-iron soil pipe and fittings; and hubless joints.
  - 1. Waste Vent Piping Option: Hard copper, Type L water tube; wrought-copper or cast-copper-alloy pressure fittings; and soldered joints with Alloy E or Alloy Sn50 solder.

### 3.02 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Shutoff Duty, (Liquid Service): Use gate or ball valves for services up to 3-inch. Use Ball or Butterfly valves for services 4-inch and larger.
  - 2. Shutoff Duty, (Compressed Gas and Vacuum Service): Use ball valves.
  - 3. Throttling Duty, (Liquid Service): Use globe valves.
  - 4. Throttling Duty, (Compressed Gas and Vacuum Service): Use diaphragm valves.

### 3.03 PIPING INSTALLATION, GENERAL

- A. Basic piping installation requirements are specified in Section 15050 "Basic Mechanical Materials and Methods."
- B. Clean interior of piping system to remove dirt and debris as work progresses.
- C. Due to the nature of the structural design of this floor slab, Drilling, Coring, or Cutting of this slab is strictly forbidden, without the approval of the Architect and Structural Engineer of Record at SMMA. In the event that coring is required it will be the responsibility GC and subcontractors to seek approval from SMMA prior to performing any Coring or Drilling.



### 3.04 COMPRESSED GAS AND VACUUM PIPING INSTALLATION

- A. General: Care shall be taken to insure that components intended for compressed gas and vacuum service are not mixed with components intended for liquid service, (i.e.; wrought copper vs. cast copper alloy fittings).

### 3.05 WATER DISTRIBUTION PIPING INSTALLATION

- A. Install piping with 1/32-inch-per-foot (1/4 percent) slope downward toward drain.
- B. Install vent valves at system high points to facilitate bleeding air from systems.
- C. Install drain valves at system low points to facilitate complete system drainage.

### 3.06 DRAINAGE AND VENT PIPING INSTALLATION

- A. Install cast-iron soil pipe and cast-iron soil pipe fittings according to CISPI 1990 revised and edited edition of "Cast Iron Soil Pipe and Fittings Handbook, Volume I," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- B. Make changes in direction for drainage and vent piping using appropriate Y branches, Y branches with 1/8 bends, and long-sweep 1/4, 1/5, 1/6, 1/8, and 1/16 bends. Sanitary tees and short-sweep quarter bends may be used on vertical stacks of drainage lines where change in direction of flow is from horizontal to vertical. Use long-turn double-Y-branch and 1/8-bend fittings where 2 fixtures are installed back to back or side by side and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. Make no change in direction of flow greater than 90 degrees. Where different sizes of drainage pipes and fittings are connected, use proper size standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.
- C. Lay buried building drains beginning at low point of each system, true to grades and alignment indicated, with unbroken continuity of invert. Place hub or bell ends of piping facing upstream. Install required gaskets according to manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Maintain swab or drag in piping and pull past each joint as completed.
- D. Install drainage and vent piping at the following minimum slopes, except where another slope is indicated:
  - 1. Horizontal Storm and Sanitary Drainage Piping: 1/4 inch per foot (2 percent) for piping 3 inches and smaller; 1/8 inch per foot (1 percent) for piping 4 inches and larger.
  - 2. Vent Piping: 1/8 inch per foot (1 percent).
- E. Sleeves are not required for cast-iron soil pipes passing through concrete slab, without membrane waterproofing, on grade.

### 3.07 JOINT CONSTRUCTION

- A. Basic piping joint construction is specified in Section 15050 "Basic Mechanical Materials and Methods."

- B. Cast-Iron Soil Pipe and Cast-Iron Soil Pipe Fitting Joints: Make joints according to recommendations in CISPI 1990 revised and edited edition of "Cast Iron Soil Pipe and Fittings Handbook, Volume I," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
  - 1. Compression Joint: Make with neoprene gasket matching class of pipe and fittings.
  - 2. Hubless Joint: Make with neoprene gasket and sleeve or clamp.

### 3.08 INSTALLATION OF VALVES

- A. Sectional Valves: Install sectional valves close to main on each branch and riser serving 2 or more plumbing fixtures or equipment connections and where indicated. Use gate or ball valves for sectional valves 2 inches and smaller. Use gate or butterfly valves for sectional valves 2-1/2 inches and larger.
- B. Shutoff Valves: Install shutoff valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated. For shutoff valves 2 inches and smaller, use gate or ball valves; for shutoff valves 2-1/2 inches and larger, use gate or butterfly valves.
- C. Drain Valves: Install drain valves specified in Division 15 Section "Plumbing Specialties" on each plumbing equipment item located to drain equipment for service and repair. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain water distribution piping system.
  - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
  - 2. Install stop and waste drain valves where indicated.
- D. Check Valves: Install swing check valve on discharge side of each pump and elsewhere as indicated. Use MSS SP-80, Class 125, cast-bronze body for 2-inch and smaller piping and MSS SP-71, Class 125, cast-iron body for 2-1/2-inch and larger piping.
- E. Balance Stations: Install valve in each hot-water circulating loop, where indicated on the drawings. Station to consist of a paddlewheel, globe valves, ball valve, and unions.
- F. Valves for oxygen cleaned piping systems: Install where shown on drawings, and strictly follow the procedures outlined in NFPA-99.

### 3.09 PIPING SPECIALTY INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated, at each water supply connection to mechanical equipment and systems, and to other equipment and systems as indicated. Comply with plumbing code and authority having jurisdiction. Locate in same room as equipment being connected. Install air-gap fitting on units having atmospheric vent connection and pipe relief outlet drain to nearest floor drain. Do not install bypass around backflow preventer.
- B. Install pressure-regulating valves with inlet and outlet shutoff valves and balance cock bypass. Install pressure gage on valve outlet and install valved bypass where indicated.
- C. Install strainers on supply side of each control valve, pressure-regulating valve, and solenoid valve, and where indicated.

- D. Install hose bibbs with integral or field-installed vacuum breaker.
- E. Install trap seal primer valves with valve outlet piping pitched down toward drain trap a minimum of 1/8 inch per foot (1 percent) and connect to floor drain body, trap, or inlet fitting. Adjust valve for proper flow.
- F. Install expansion joints on vertical risers, stacks, and conductors as indicated.
- G. Install cleanouts in above-ground piping and building drain piping as indicated, and where not indicated, according to the following:
  1. Size same as drainage piping up to 4-inch size. Use 4-inch size for larger drainage piping except where larger size cleanout is indicated.
  2. Locate at each change in direction of piping greater than 45 degrees.
  3. Locate at minimum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping.
  4. Locate at base of each vertical soil or waste stack.
- H. Install cleanout deck plates (covers), of types indicated, with top flush with finished floor, for floor cleanouts for piping below floors.
- I. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

### 3.10 FLOOR DRAIN INSTALLATION

- A. Install floor drains according to manufacturer's written instructions, in locations indicated.
- B. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
- C. Set drain elevation depressed below finished slab elevation as listed below to provide proper floor slope to drain:
  1. 5-Foot Drain Area Radius: 1/2-inch depression.
  2. 10-Foot Drain Area Radius: 3/4-inch depression.
  3. 15-Foot Drain Area Radius: 1-inch depression.
  4. 20-Foot Drain Area Radius: 1-1/4-inch depression.
  5. 25-Foot Drain Area Radius: 1-1/2-inch depression.
- D. Trap drains connected to sanitary building drain.
- E. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
- F. Position drains for easy accessibility and maintenance.

### 3.11 CONNECTIONS

- A. Supply Run outs to Fixtures: Install hot- and cold-water supply piping run outs to fixtures of sizes indicated, but not smaller than required by plumbing code.

- B. Drainage Run outs to Fixtures: Provide drainage and vent piping run outs to plumbing fixtures and drains, with approved trap, of sizes indicated, but not smaller than required by plumbing code.
- C. Locate drainage piping run outs as close as possible to bottom of floor slab supporting fixtures or drains.

### 3.12 HANGERS AND SUPPORTS INSTALLATION

- A. Hanger and support devices are specified in Section 15060 "Hangers and Supports ."

### 3.13 FIELD QUALITY CONTROL

- A. Inspect water distribution piping as follows:

1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the authority having jurisdiction and an SMMA representative..
2. During progress of the installation, notify the plumbing official having jurisdiction at least 24 hours prior to time inspection must be made. Perform tests specified below in presence of the plumbing official.
  - a. Roughing-In Inspection: Arrange for inspection of piping system before concealed or closed-in and prior to setting fixtures.
  - b. Final Inspection: Arrange for final inspection by plumbing official to observe tests specified below and to ensure compliance with requirements of plumbing code.
3. Reinspections: When a plumbing official finds that piping system will not pass test or inspection, make required corrections and arrange for reinspection by the plumbing official.
4. Reports: Prepare inspection reports signed by plumbing official.

- B. Test water distribution piping as follows:

1. Test for leaks and defects in new water distribution piping systems and parts of existing systems 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 system tested.
2. Leave uncovered and unconcealed in new, altered, extended, or replaced water distribution piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved for testing.
3. Cap and subject the piping system to a static water pressure of 50 psig above the operating pressure without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.

4. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
  5. Prepare reports for tests and required corrective action.
- C. Inspect drainage piping as follows:
1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction.
  2. During progress of installation, notify the plumbing official having jurisdiction at least 24 hours prior to time such inspection must be made. Perform tests specified below in presence of the plumbing official.
    - a. Roughing-In Inspection: Arrange for inspection of piping system after system roughing-in, before concealing, and prior to setting fixtures.
    - b. Final Inspection: Arrange for final inspection by plumbing official to observe tests specified below and to ensure compliance with requirements of plumbing code.
  3. Reinspections: Make required corrections and arrange for reinspection by plumbing official when piping system fails to pass test or inspection.
  4. Reports: Prepare inspection reports signed by the plumbing official.
- D. Drainage and Vent Piping System Tests: Test drainage and vent systems according to procedures of authority having jurisdiction or, in absence of published procedure, as follows:
1. Test for leaks and defects in new drainage and vent piping systems and parts of existing systems that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
  2. Leave uncovered and unconcealed in new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose for testing work that has been covered or concealed before it has been tested and approved.
  3. Rough Plumbing Test Procedure: Except for outside leaders and perforated or open-jointed drain tile, test piping of plumbing drainage and venting systems on completion of roughing-in piping installation. Tightly close all openings in piping system and fill with water to point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before inspection starts through completion of inspection. Inspect joints for leaks.
  4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and their traps filled with water, test connections and prove gastight and watertight. Plug stack openings on roof and building drain where it leaves the building and introduce air into the system equal to pressure of 1-inch water column. Use a U tube or manometer inserted in the trap of a water closet to measure this pressure. Air pressure shall remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
  6. Prepare reports for tests and required corrective action.
- E. Test Compressed Gas and Vacuum piping as follows: Installing Contractor to provide all necessary cylinder gas and related appurtenances to facilitate testing and cleaning.
1. Pressurize the system to 200 psig with oil-free dry nitrogen. Maintain the pressure for 2 hours.
  2. Repair defects with new materials and retest until satisfactory results are obtained.
  3. Prepare and submit test reports.

### 3.14 PURGING AND DISINFECTION

- A. Before putting potable water service piping into service, purge the potable water distribution piping systems, including new systems and parts of existing potable water systems that have been altered, extended, or repaired.
- B. Use purging and disinfecting procedure prescribed by authority having jurisdiction or, if a method is not prescribed by that authority, the procedure described in either AWWA C651 or AWWA C652 or as described below:
1. Flush piping system with clean, potable water until dirty water does not appear at outlets.
  2. Fill system or part thereof with water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) and allow to stand for 24 hours.
  3. Drain system or part thereof of previous solution and refill with water/chlorine solution containing at least 200 parts per million of chlorine. Isolate and allow to stand for 3 hours.
  4. Flush system with clean, potable water until chlorine does not remain in water coming from system following allowed standing time.
  5. Submit water samples in sterile bottles to authority having jurisdiction.
- C. Repeat purging and disinfection procedure if biological examination made by the authority shows evidence of contamination.
- D. Prepare and submit reports for purging and disinfecting activities. Refer to "Submittals" section for report content.

### 3.15 SYSTEMS START-UP

- A. Fill water systems. Check compression tanks to determine that they are not air bound and that system is completely full of water.

- B. Preparation: Perform the following checks before start-up:
  - 1. Systems tests are complete.
  - 2. Damaged and defective specialties and accessories have been replaced or repaired.
  - 3. There is clear space for servicing of specialties.
- C. Before operating systems, perform these steps:
  - 1. Close drain valves, hydrants, and hose bibbs.
  - 2. Open shutoff valves to full open position.
  - 3. Open throttling valves to proper setting.
  - 4. Remove plugs used during testing of piping systems and plugs used for temporary sealing of piping during installation.
  - 5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
  - 6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used, clean, and ready for use.
  - 7. Verify drainage and vent piping are clear of obstructions. Flush with water until clear.
- D. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.
- E. Check plumbing specialties and verify proper settings, adjustments, and operation.
- F. Energize pumps and verify proper operation.
- G. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturer, proceed as follows:
- H. Adjust operation and correct deficiencies discovered during start-up, adjustment & testing.
- I. Clean Compressed Gas and Vacuum piping systems as follows:
  - 1. Pressurize the system with oil-free, dry nitrogen, with all outlets closed. Maintain this pressure for a half hour prior to proceeding to step 2.
    - a. Pressures incurred in the piping system shall not exceed the system operating pressure.
  - 2. Open the piping outlet that is farthest from the purge source. Keep this outlet open for 15 seconds, and then close. Open the next farthest outlet for 15 seconds, and then close. Proceed in this fashion back to the purge source, until all outlets have been purged.
  - 3. Perform the above procedure twice.
  - 4. If the piping system requires alteration or repair after cleaning has been done, than repeat the cleaning procedure once alterations or repairs, and re-testing have been completed

### 3.16 DEMONSTRATION

- A. Train Owner's maintenance personnel on procedures related to startup and servicing of interceptors.

3.17 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of day or when work stops.

END OF SECTION 15140