

SECTION 15420

DRAINAGE AND VENT SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section includes building storm drainage and vent piping systems, including drains and drainage specialties.

1.2 RELATED SECTIONS

- A. The following sections contain requirements that relate to this section:
 - 1. Division 2 "Earthwork for Mechanical System", for trenching and backfilling materials and methods for underground piping installations.
 - 2. Division 2 "Storm Sewage Systems" for storm water drainage piping.
 - 3. Division 15 "Mechanical Identification" for labeling and identification of drainage and vent piping.

1.3 DEFINITIONS

- A. Building drain: The part of the lowest piping of a drainage system which receives the discharge from soil, waste and other drainage pipes inside the walls of the building and conveys it to the building sewer.
- B. Building sewer: The part of the piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal.
- C. Drainage system: Includes all piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal. It does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.
- D. Vent system: A pipe or pipes installed to provide a flow of air to or from a drainage system, or to provide a circulation of air within such system to protect trap seals from siphonage and backpressure.

1.4 SUBMITTALS

- A. Product data for the following products:
 - 1. Drainage piping specialties.

1.5 QUALITY ASSURANCE

- A. Regulatory requirements: Comply with the provisions of the following:
 - 1. Uniform Plumbing Code (UPC).
 - 2. California Code of Regulations (CCR)

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the installation of roof drains, flashing and roof penetrations.
- B. Coordinate flashing materials installation of roofing, waterproofing, and adjoining substrate work.
- C. Coordinate the installation of drains in poured in place concrete slabs, to include proper drain elevations, installation of flashing, and slope of slab to drains.

- D. Coordinate with installation of storm sewer system as necessary to interface building drains with drainage piping system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide drainage and vent systems from one of the following:

- 1. Drainage piping specialties, including expansion joints, drains, and vandal proof vent caps.
 - a. Josam Mfg. Co.
 - b. J.R. Smith Mfg. Co.
 - c. Tyler Pipe

2.2 PIPING AND FITTINGS

- A. General: Materials shall be new domestic manufactured materials of standard manufacture and suitable for required use.
- B. Reference specifications: Pipe and fittings conform to latest editions of specified standard specification.
- C. Above ground drainage and vent piping and fittings.
 - 1. All pipe sizes: Hubless cast iron soil pipe. Conform to CISPI Standard 301, service weight, cast iron soil pipe and fittings, with neoprene gaskets conforming to CISPI Standard 310.
 - 2. Note: All storm drain and vent piping shall be provided with Factory Mutual approved number 1680 type couplings. Approved manufacturer: Husky series 4000 or Clamp All.

2.3 UNDERGROUND BUILDING DRAIN PIPE AND FITTINGS

- A. Pipe and fittings shall have heavy coating of coal tar varnish or asphaltum on both inside and outside surfaces.
- B. For pipe and fittings below grade and/or below finish floor of floors on grade, select from the following options:
 - 1. Pipe sizes 15 inch and smaller: Cast iron soil pipe. Conform to ASTM A74, for standard weight hub and spigot soil pipe and fittings, with clamps and neoprene gasket. Conform to ASTM C564.
 - 2. Pipe sizes 16 inch and smaller: Hubless cast iron soil pipe. Conform to CISPI Standard 301, service weight, cast iron soil pipe and fittings, with neoprene gasket conforming to CISPI standard 310. Joint connections shall be "Best" or MG couplings.

2.4 PUMP DISCHARGE

- A. ASTM A-120 Galvanized butt weld steel.

2.5 DRAINS

- A. ASTM B88 Copper tubing Type "L".

2.6 DRAINAGE PIPE SPECIALTIES

- A. Expansion joints: Cast iron body with adjustable bronze sleeve, bronze bolts with wing nuts.
- B. Cleanout plugs: Cast bronze or brass, threads complying with ANSI B2.1, countersunk head.

2.7 CLEANOUTS

- A. Floor cleanouts to be adjustable type
 1. Cleanouts on cast iron soil pipe; use iron body with brass plugs screwed into caulking ferrules.
 2. Cleanouts on steel pipe, use brass plugs.
 3. Where cleanouts occur in finished interior surfaces; use smooth polished chromium plated.
 4. Exposed parts of floor cleanouts in finished rooms; use non-slip polished nickel bronze.
 5. Where cleanouts occur in carpeted floor areas; the cover shall be elevated so as to be flush with finished carpeted areas.
- B. Floor cleanouts: Cast iron body and frame, with cleanout plug and adjustable round top as follows:
 1. Floor level type in rooms with concrete floors: Smith 4021, Josam 58330-2, or Zurn Z1420-25 with cast iron top.

2.8 FLASHING

- A. Flashing flanges: Cast iron watertight stack or wall sleeve with membrane flashing ring. Provide underdeck clamp and sleeve length as required.
- B. Vent flashing sleeves: Cast iron caulking type roof coupling for cast iron stacks, cast iron threaded type roof coupling for steel stacks, and cast bronze stack flashing sleeve for copper tubing.
- C. Vandal proof vent caps: Cast iron body full size of vent pipe, with caulked base connection for cast iron pipes, threaded base for steel pipes.

2.9 ROOF DRAINS

- A. Roof drains are specified in Section 15440 "Plumbing Fixtures".

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify all dimensions by field dimensions. Verify that all drainage and vent piping and specialties may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.
- B. Verify existing grades, inverts, utilities, obstacles, and topographical conditions prior to installations.
- C. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation.
- D. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed.
- E. Do not proceed until satisfactory conditions have been corrected.

3.2 PREPARATION FOUNDATION FOR UNDERGROUND BUILDING DRAINS

- A. Grade trench bottoms to provide a smooth, firm and stable foundation, free from rock, throughout the length of the pipe.
- B. Remove unstable, soft and unsuitable materials at the surface upon which pipes are to be laid and backfill with clean sand or pea gravel to indicated invert elevation.

- C. Shape bottom of trench to fit bottom of pipe for 90 degrees (bottom of 1/4 of the circumference). Fill unevenness with tamped sand backfill. At each pipe joint dig bell holed to relieve the bell of the pipe of all loads, and to ensure continuous bearing of the pipe barrel on the foundation.

3.3 PIPE APPLICATIONS - ABOVE GROUND, WITHIN BUILDING

- A. Select from the following options:

- 1. Install hubless, service weight, cast iron soil pipe and fittings for drainage and vent pipe.

3.4 PIPE APPLICATIONS - BELOW GROUND, WITHIN BUILDING

- A. Install hubless, service weight, cast iron, soil pipe and "Best" or MG couplings with neoprene gaskets.

3.5 PIPE AND TUBE JOINT CONSTRUCTION

- A. Cast iron soil pipe: Make compression joints, and hubless joints in accordance with the recommendations in the CISPI Cast Iron Soil Pipe and Fittings Handbook, Chapter IV.
- B. Install couplings per manufacturer's recommendations.

3.6 INSTALLATION

- A. Drawings indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into account many design considerations. So far as practical, install piping as indicated.
- B. Use fittings for all changes in direction and all branch connections.
- C. Install exposed piping at right angles, or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.
- D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- E. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- F. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Allow sufficient space above removable ceiling panels to allow for panel removal.
- G. Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.
- H. Fire barrier penetrations: Where pipes pass through fire rated walls, partitions, ceilings and floors, maintain the fire rated integrity.
- I. Make changes in direction for drainage and vent piping using appropriate 45 degree wyes, half wyes, or long sweep quarter, sixth, eighth or sixteenth bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long turn tees where two fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degree shall be made. 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.
- J. Install underground building drains to conform with the plumbing code, and in accordance with the Cast Iron Soil Pipe Institute Engineering Manual. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements.

- K. Install building drain pitched down at minimum slope of 1/4 inch per foot, (2%) for piping 3" and smaller, and 1/8 inch per foot (1%) for piping 4 inch and larger.
- L. Extend building drain to connect to storm drain piping, of size and in location indicated for service entrance to the building.
- M. Install sleeve and mechanical sleeve through foundation wall for watertight installation.

3.7 HANGERS AND SUPPORTS

- A. Hanger supports and anchor devices are specified in Division 15 "Basic Mechanical Materials and Methods". Conform to the table below for maximum spacing of supports:
- B. Install the following pipe attachments: Adjustable steel clevis hangers for individual horizontal runs less than 20' in length and as detailed on plans.
- C. Install hangers at the following intervals:

Pipe Material	Max. Horizontal Spacing in Feet	Max. Vertical Spacing in Feet
Cast iron pipe	5	15

3.8 INSTALLATION OF PIPE SPECIALTIES

- A. Install expansion joints on vertical risers as indicated, and as required by plumbing code.
- B. Above ground cleanouts: Install in above ground piping and building drain piping as indicated and:
 - 1. As required by plumbing code.
 - 2. At each change in direction of piping greater than 45 degrees.
 - 3. At minimum intervals of 50 feet for piping 4 inch and smaller and 100 feet for larger piping.
 - 4. At base of each interval stack.
- C. Cleanout covers: Install floor and wall cleanout covers for concealed piping.
- D. Flashing flanges: Install flashing flange and clamping device with each stack and cleanouts passing through roof, secure over stack flashing in accordance with manufacturer's instructions.

3.9 CONNECTIONS

- A. Locate piping run outs as close as possible to bottom of floor slab supporting fixtures or drains.

3.10 FIELD QUALITY CONTROL

- A. Inspections:
 - 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 the progress of the installation, notify the plumbing official having jurisdiction, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
 - a. Arrange for inspection of the piping system before concealed or closed-in after system is roughed in, and prior to setting fixtures.

- b. Arrange of a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.
 3. Whenever the piping system fails to pass the test for inspection, make the required corrections, and arrange for re-inspection by the plumbing official.
 4. Prepare inspection reports, signed by the plumbing official.
- B. Piping system test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows:
1. Test for leaks and defects all new drainage and vent piping systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report of each test, complete with a diagram of the portion of the system tested.
 2. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose all such work for testing, 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 the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10' head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints or leaks.
 4. Finished plumbing test procedures: After the plumbing has been set, their connections shall be tested and approved gas and watertight. Plug the stack openings on the roof and building drain where it leaves the building, and introduce air into the system equal to a pressure of 1 inch water column. Air pressure shall remain constant without the introduction of additional air throughout the period of inspection. Inspect all plumbing fixture connections for gas and water leaks.
 5. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
 6. Prepare reports for all tests and required corrective action.

3.11 ADJUSTING AND CLEANING

- A. Clean exterior of piping system. Remove dirt and debris as work progresses.
- B. Clean drain strainers, domes and traps. Remove dirt and debris.

3.12 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 whenever the work stops.

END OF SECTION