

SECTION 15493 - LABORATORY DRAINAGE SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of laboratory drainage systems work is indicated on drawings and schedules, and by requirements of this section.
- B. Trenching and backfill required in conjunction with exterior laboratory drainage piping is specified in applicable Division-15 section 15010, and is included as work of this section.
- C. Refer to other Division-15 sections for insulation of laboratory drainage piping; not work of this section.

1.2 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of laboratory drainage systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with laboratory drainage systems work similar to that required for project. The Contractor shall submit to the Architect/Engineer the names of the specific personnel who will be installing any acid waste and vent piping system along with documentation which verifies the named personnel have had factory training and are authorized for proper installation.
- C. Codes and Standards:
 - 1. PDI Compliance: Fabricate and install laboratory drainage systems in accordance with PDI "Code Guide 302".
 - 2. UPC Compliance: Fabricate and install laboratory drainage systems in accordance with IAPMO "Uniform Plumbing Code".
 - 3. Special Piping: Only Contractor's personnel who have received training in the installation of special piping materials and meet the manufacturer's qualifications shall assemble such material.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data and installation instructions for laboratory drainage systems materials and products.
- B. Shop Drawings: Submit scaled layout drawings of laboratory drainage systems piping and fittings including, but not necessarily limited to, pipe and tube sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, cleanouts, expansion joints, adapters, floor drains, and connections. Show interface and spatial relationship between piping and proximate equipment.
- C. Record Drawings: At project closeout, submit record drawings of installed systems products; in accordance with requirements of Divisions 1 and 15.

- D. Maintenance Data: Submit maintenance data and parts lists for laboratory drainage systems materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Divisions 1 and 15.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acid Waste Neutralizing Sumps:
 - a. GSR Fuseal
 - b. Enfield Industrial Corporation
 - 2. Acid Waste Piping and Fittings:
 - a. Polypropylene Systems:
 - 1) GSR Fuseal
 - 2) Enfield Industrial Corporation
 - b. High Silicon Cast Iron Pipe Systems:
 - 1) The Duriron Company
 - c. Glass Pipe Systems:
 - 1) KIMAX/SCHOTT Process System, Inc.
 - 2) Corning Process Systems

2.2 MATERIALS AND PRODUCTS:

- A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in laboratory drainage piping systems.
- B. Provide combination of material and products as specified in PART 3 EXECUTION.

2.3 BASIC IDENTIFICATION:

- A. General: Provide identification complying with Division-15 section 15190 "Mechanical Identification", in accordance with the following listing:
- B. Laboratory Drainage Piping Above Ground: Pipe markers.
- C. Laboratory Drainage Piping Underground: Underground- type line markers.

2.4 BASIC PIPES AND PIPE FITTINGS:

Edit the following product selection for each project, verify local code authority allows plastic piping, particularly return air plenum. Most plastic piping does not meet 25/50 flame/smoke rating for plenum service.

A. Polypropylene Pipe and Pipe Fittings:

1. Flame retardant polypropylene DWV piping and fittings, which meet ASTM D635 flame test and ASTM D-1785 dimensional requirements, with electric fusion/resistance joints.

Select schedule weight, Schedule 80 is not flame retardant.

2. Piping shall be Schedule 40 [80].
3. This product shall only be used for sizes and locations as described in PART 3.
4. Provide all necessary fittings, adapters, flanges, plugs, cleanouts, p-traps, drum traps, and tailpieces necessary to make the system complete and operational.
5. Manufacturer shall provide vertical expansion joints with Viton O-Rings for vertical risers, where required to compensate for expansion and riser movement.
6. All p-traps shall have mechanical joints for easy dis-assembly for maintenance.

B. High Silicon Cast Iron Pipe & Pipe Fittings Systems:

1. For pipe sizes 4 inches and smaller: Service weight, 14-1/2percent high silicon content cast-iron, hubless fittings, stainless steel 2-bolt couplings with one-piece sintered non-porous teflon inner sleeve liner.
2. For pipe sizes 6inches and larger: Service weight, 14-1/2percent high silicon content cast-iron, ball and spigot fittings, lead and special acid-resistant rope packing, caulked joints.
3. Provide all necessary fittings, adapters, flanges, plugs, cleanouts, p-traps, drum traps and tailpieces necessary to make the system complete and operational.

C. Glass Pipe and Pipe Fittings System:

1. The glass piping system shall be made of U.L. classified borosilicate glass conforming to ASTM specification C1053-85.
2. The glass piping system shall include all straight pipe lengths, fittings, p-traps, drum traps, compression type tetra-fluoro-ethylene lined couplings and padded hanger supports.
3. Glass to glass connections shall be made with compression type bead to bead and bead to plain end couplings. Coupling outer shell, bolt and nut shall be 300 series stainless steel. Bead to plain end coupling onto shell must encapsulate compression liner to prevent cold flow and ensure leak-free joint. Seal ring gasket shall be TFE.

4. Joints shall be capable of being leak free with deflection angle up to 4 degrees.
5. Provide engineered and manufactured adapter connectors where joints between glass and other piping material/systems are made.
6. For 8" glass pipe and fittings, provide flanged ends assemblies with TFE gaskets. The sealing surface of the glass shall be spherically ground in the form of a ball and socket configuration. Ball and socket flanges shall be capable of a 3 degree misalignment leak-free and stress-free.
7. Glass pipe installed, buried below grade shall be covered with factory applied expanded polystyrene protective covering.

2.5 BASIC PIPING SPECIALTIES:

- A. General: Provide piping specialties complying with Division-15 section 15140 "Piping Specialties", in accordance with the following listing:
 1. Pipe escutcheons.
 2. Drip pans.
 3. Pipe sleeves.
 4. Sleeve seals.

2.6 BASIC SUPPORTS AND ANCHORS:

- A. All acid waste and vent piping systems shall be supported and anchored in strict accordance with the manufacturer's instructions.

2.7 LABORATORY DRAINAGE PRODUCTS:

- A. Acid Waste Neutralizing Sumps: Provide acid waste neutralizing sumps, of size and capacity as indicated, constructed of acid resisting material, complete with inlet, outlet, and vent connections of indicated size.
 1. Provide submerged type inlet, complete with down pipe or baffle, and 2" minimum cleanout at top of vertical drop.
 2. Permanently mark fill line on inside of sump, 1" below outlet invert.
- B. Traps and Tailpieces: Provide traps and tailpieces for each fixture inlet connection to laboratory drainage system, constructed of same material and weight as piping system. Trap assemblies shall be mechanical joint. Mechanical joints for fused polypropylene piping systems may not be used for any other purpose.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. General: Examine areas and conditions under which laboratory drainage systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF PIPING:

- A. All acid waste and vent piping system installations (regardless of material type) shall have on site factory trained and authorized supervision made available to the Contractor on a regular basis throughout the installation process.

Each pipe and fitting system manufacturer shall conduct field inspections of the product installation of not less than once a week and provide a typed report to the Architect/Engineer confirming the product is being properly installed in accordance with manufacturer's requirements.

Failure to provide reports to the Architect/Engineer will be cause to hold all retainage from the Contractor.

- B. Provide and install UL listed fire-stop and sealant systems for all piping penetrating fire rated walls, floors or roof systems.
- C. All below grade buried acid waste and vent piping shall have trenching, backfill and compaction in accordance with Section 15010 and as specifically required by each manufacturer's written installation instructions.
- D. The Contractor shall provide any and all necessary pipe fittings and/or offsets necessary for proper expansion control as recommended by the pipe material manufacturer.
- E. Install acid waste and vent piping systems as indicated in the table below:

Design Note: Plastics have low temperature limitations, glass and duriron are subject to fracture due to temperature shock since they are brittle materials, carefully select materials

ACID WASTE & VENT PIPE SYSTEM APPLICATIONS TABLE	
APPLICATION	PIPE SYSTEM
ALL SIZES, BELOW GRADE (BURIED) INSIDE BUILDING	DURIRON OR POLY-PROPYLENE
ALL SIZES, BELOW GRADE (BURIED) OUTSIDE BUILDING	DURIRON
FOR SIZES 4" & SMALLER ABOVE GRADE, INSIDE BUILDING	POLY-PROPYLENE OR DURIRON OR GLASS
FOR SIZES 6" & LARGER ABOVE GRADE, INSIDE BUILDING	DURIRON OR GLASS
FOR ALL SIZES, SERVING EQUIPMENT (INCLUDING INDIRECT DRAINS) WHICH DISCHARGE WASTE AT TEMPERATURES ABOVE 120 F. (INCLUDING BUT NOT LIMITED TO GLASSWASHERS, DISHWASHERS, CAGE WASHERS, CART WASHERS, AUTOCLAVES, ETC.)	DURIRON OR GLASS

3.3 INSTALLATION OF SUPPORTS AND ANCHORS:

- A. Provide supports and anchors in accordance with piping manufacturer's recommendations.
 - B. High-Silicon Cast-Iron Pipe: Install with piping supports located on each length of pipe in horizontal lines, at each bend, and vertical supports at maximum intervals of 14feet. Locate supports near couplings, not in center of pipe.
 - C. Prior to backfill, wrap all buried below grade glass acid waste pipe systems with a polyvinyl film a minimum of 5 mil thick Scotch Wrap or equal.
- 3.4 INSTALLATION OF LABORATORY DRAINAGE PIPING PRODUCTS:
- A. 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 below slab;
 - 3. At sinks;
 - 4. At each upper terminal;
 - 5. At egress of building (surface cleanout).
 - 6. Select cleanout locations and access for minimum disturbance of occupant functions and building systems operation during cleanout servicing. Ascertain that Architect and Owner agree with location and appearance. Avoid conflicts with shelves, mirrors and any other architectural obstructions.
 - 7. Install cleanouts above all sinks (42inches AFF or at least above flood level of lav.).
 - 8. Install cleanouts 6inches above highest trap on that floor on the main vent of each group of fixtures and in vent stacks for isolated fixtures on each floor.
 - 9. Install cleanouts of full size at top and base of each stack and at end of each horizontal run. Do not exceed 40 feet on horizontal runs.
 - 10. Provide cleanout plugs line-size up to 3inches, 4inches for line sizes 4inches and larger.
 - 11. Specify wall cleanouts where piping is concealed in walls or non-accessible chases, 42inches AFF.
 - B. Cleanouts Covers: Install floor and wall brass or chrome plate cleanout covers for concealed piping, types as indicated in section 15420 and in accessible locations.
 - C. Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through waterproof membrane.
 - D. Acid Waste Neutralizing Sumps: Install as detailed on the drawings.
 - 1. Fill sumps up to fill line with 1inch calcium carbonate (marble) chips.
 - 2. Connect inlet and outlet piping, and vent piping as indicated. See detail on plans.
 - E. Connection to Building Sewer: At point of connection of laboratory drainage piping system to building sewer, provide T-Wye of same material as laboratory drainage piping.

3.5 EQUIPMENT CONNECTIONS:

- A. Drain Connections to Fixtures: Provide drain piping and traps for each fixture indicated to be connected to laboratory drainage system. Provide size indicated, but in no case smaller than that required by Uniform Plumbing Code.
- B. Mechanical Equipment Connections: Provide drain piping and traps for each item of mechanical equipment indicated to be connected to laboratory drainage system. Comply with manufacturer's installation instructions.

3.6 FIELD QUALITY CONTROL:

- A. Piping Tests: Test laboratory drainage piping systems in accordance with requirements of Uniform Plumbing Code.

3.7 ADJUSTING AND CLEANING:

- A. Cleaning, Flushing, and Inspecting: Clean, flush, and inspect laboratory drainage systems to ensure systems are functioning properly.

3.8 EXTRA STOCK:

- A. Furnish sufficient calcium carbonate (marble) chips to replenish charge in acid waste neutralizing sumps one time.
- B. Store where requested by Owner, obtain receipt.

END OF SECTION 15493