

CHAPTER 3.8
PIPE AND APPURTENANCES

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CHAPTER 3.8 PIPE AND APPURTENANCES

3.8-1. GENERAL. This section will focus on the installation of plastic pipe. PVC and HDPE are the two most common types of plastic pipe used at hazardous waste sites. Some uses of plastic pipe at hazardous waste sites include:

- drainage layers in landfill covers and liners;
- ground water monitoring, extraction, and recharge wells;
- ground water extraction and recharge trenches; and
- soil vapor extraction, bioventing and air sparging systems.

Additional information on construction of pipe systems is available in Volume 1 of the Quality Assurance Representative's Guide, in the chapter titled "Underground Pipe Systems".

a. Preconstruction Submittals. The contractor should provide preconstruction submittals as required by the specifications. The following is a list of typical submittal requirements.

- (1) Manufacturer's pipe installation recommendations.
- (2) Manufacturer's QC manual and QC test results.
- (3) Samples of pipe (if required).
- (4) Samples of pipe bedding material (if required).
- (5) Samples of warning tape used to mark pipe locations (if used).
- (6) Samples of backfill material (if required).
- (7) If required, the QA Representative should see that QA test samples are obtained upon delivery of the pipe.
 - (a) Ensure that the pipe is identified according to its proper ASTM standard.
 - (b) Ensure that QA test results are approved prior to pipe deployment.

b. Construction Submittals. The contractor should provide construction submittals as required by the specifications. The following is a list of typical submittal requirements.

Results of leak and/or pressure tests (if required).

c. Delivery, Storage, and Handling. Both PVC and HDPE pipe are manufactured in lengths of approximately 6.1 m (20 ft) with varying wall thicknesses and configurations. They are placed on wooden pallets and bundled together with plastic straps for bulk handling and shipment.

- (1) The QA Representative should be present during delivery and unloading of pipe to inspect for damage.

(2) The QA Representative should record applicable pipe numbers, date delivered, name of manufacturer, and product type. This data is used to verify manufacturers QC data sheets have been submitted for the pipe being delivered.

(3) Steel cables and chains should not be used to handle pipe.

(4) Ensure that field storage is in an area where water can not accumulate. The pallets of pipe should be placed on level ground and oriented so the pipes do not pond water.

(5) Pallets of pipe should not be stacked more than three high. They should also be protected from direct sunlight if recommended by the manufacturer.

(6) Gaskets for bell and spigot pipe connections should not be stored in direct sunlight.

3.8-2. PRODUCTS.

a. General.

(1) Ensure the correct material type, strength, and diameter of pipe has been delivered to the job site.

(2) Verify the size, number and location of pipe perforations are as specified.

(3) Pipe with external gouges deeper than 10 percent of the wall thickness should be discarded or repaired before used.

(4) Out-of-round pipe which cannot be properly joined together should be repaired or rejected.

b. PVC Pipe. PVC pipe typically consists of resin, fillers, carbon black, pigment, and additives. PVC pipe does not contain any liquid plasticizers.

(1) Pipe tolerances and properties must meet the applicable standards required by the plans and specifications. ASTM D-1785 or ASTM D-2241 are often referenced when specifying PVC pipe.

(2) PVC pipe fittings are generally constructed in accordance with ASTM D-3034. The pipes are joined by couplings or bell and spigot ends.

c. HDPE Smooth Wall Pipe. HDPE pipe material consists of resin, carbon black, and additives. The pipes are generally joined together using butt-end fusion welds. Other joining methods such as bell and spigot, male-to-female and threading are also used.

d. HDPE Corrugated Pipe. Corrugated HDPE pipe is also called "profiled" pipe. This type of pipe can be perforated or slotted and the inside can be either smooth or corrugated depending on the site-specific requirements. The pipes should be joined together by couplings made by the same manufacturer as the pipe itself. This is important since the couplings are generally not interchangeable among the different manufacturer's products.

3.8-3. EXECUTION.

a. Placement. This section focuses on placement of pipe in trenches and landfill drainage layers.

(1) If pipe is to be placed above a geomembrane, check the specifications to see if a bedding layer should be placed between the pipe and membrane.

(2) Check compaction requirements for any bedding layers located around the pipe. The density of the material beneath, adjacent, and immediately above plastic pipe greatly affects its load-carry capacity.

(3) Pipe should be carried to the place of installation and not dragged.

(4) Inspect pipe carefully before it is placed. Reject any defective or damaged pipe.

(5) Pipe laying should proceed upgrade, beginning at the lower end of the pipeline.

(6) Ensure that pipe is not laid when trench conditions or weather is unsuitable. Under no circumstances should pipe be installed if standing water is present. Ensure the contractor has dewatered the trench prior to pipe placement.

(7) Ensure that pipe is placed at the lines and grades indicated in the plans and specifications.

(8) Perforated pipe should be installed with the perforations facing down unless otherwise specified.

(9) Pipe fittings or joints should be installed according to requirements stated in the specifications. Ensure pipe and fittings are clean of all dirt, debris, oil or any other contaminant which may inhibit the construction of a sound joint.

(10) Inspect and approve all in-place pipe before allowing backfill placement. Ensure all required leak tests are performed prior to backfilling.

b. Sumps, Manholes and Risers. A piping system may be specified as part of the primary or secondary leachate collection system of a landfill liner. Pipes used in landfill liners are usually made of high density polyethylene (HDPE). The purpose of the piping system is to rapidly remove leachate from the liner. Perforated feeder pipes are usually designed to flow to a central trunk line. The trunk line may or may not be perforated, depending on site-specific design requirements. The trunk line flows by gravity to a low point in the liner system referred to as a sump. The sump is typically filled with coarse granular material which provides storage for leachate. The leachate is periodically removed from the sump through a riser pipe using a submersible pump. Sumps can also consist of prefabricated vertical risers with a manhole extension rising through the waste and final cover.

(1) Sumps are very labor intensive and difficult to construct. Careful visual inspection is required in sump areas since these are the low points in the liner system where water will collect.

(2) Check compaction requirements for the subgrade material located beneath the sump.

(3) Carefully inspect placement of sump stone because its large diameter can easily damage underlying geosynthetics. The drop height of the first lift of sump stone should be small enough that underlying geosynthetics are not damaged (typically 300 mm (12 inches) or less).

(4) Check the specifications for pipe perforation requirements. Sump riser pipes for primary and secondary leachate removal are generally not perforated, except for the lowest section of pipe which allows leachate to enter the pipe.

(5) Carefully inspect riser pipe joints for primary and secondary leachate removal since neither destructive nor nondestructive tests can usually be performed.

(6) Verify that test operation of pumps, level alarms, valves, switches, and controls have been performed in accordance with manufacturer's recommendations.

c. Double Wall Containment Pipe. Double wall containment pipe is often required for carrying hazardous liquids outside the landfill liner system.

(1) Check the specifications to determine if and where double wall containment pipe is required.

(2) Check the specifications for special testing requirements for double wall containment pipe.

(3) Some double wall pipe requires the use of potentially hazardous glue to make pipe connections. Manufacturer's recommended safety precautions should be followed if this is the case.

(4) If piping is glued, ensure the glue is allowed to set within the recommended temperature range.

(5) If piping is glued, ensure there is adequate ventilation since the glue may be both hazardous and flammable.

(6) A double wall pipe manufacturer's representative should generally be on site at the beginning of pipe installation for training, and periodically during installation to ensure correct procedures are used.

(7) If an electrical leak detection system is used, it is critical to ensure ends of the containment piping are sealed overnight and when work is not ongoing. Dirt or water which enters the annular space will interfere with the leak detection cable and could cause operational problems.

(8) Inner (carrier) pipes should be hydrostatically tested and outer (containment) pipes should be pneumatically tested at the specified pressures.

(9) Frequently, double wall pipe is sloped so that if there is a leak in the carrier pipe, the fluid flows by gravity in the containment pipe to a sump or tank.