

Construction Specification 745—Plastic Pipe

1. Scope

The work consists of furnishing and installing plastic pipe, and the necessary fittings and appurtenances as shown on the drawings or as specified herein. This specification does not include subsurface drainage systems.

2. Material

Pipe—The pipe shall be free from visible cracks, holes, foreign inclusions, or other defects, and conform to the requirements listed in Table 1 in this specification and as shown on the drawings.

Fittings and joints—Fittings and joints shall be of a schedule, SDR or DR, pressure class, external load carrying capacity, or pipe stiffness that equals or exceeds that of the plastic pipe. Joint and fitting material shall be compatible with the pipe material. The joints and fittings shall be free from visible cracks, holes, foreign inclusions, or other defects, and conform to the requirements of the applicable specification referenced in the ASTM or AWWA specification for the pipe and the requirements shown on the drawings.

Solvents—Solvents for solvent welded pipe shall conform to the requirements of the applicable specification referenced in the ASTM or AWWA specification for the pipe, fitting, or joint.

Mechanical joints may be used when joining plastic pipe and fittings with nonpressure flow and a free draining sand or gravel bedding material. Elastomeric-sealed (gaskets) mechanical joints shall be used when joining plastic pipe and fittings under pressure flow or where seepage cannot be tolerated. Rubber gaskets for pipe joints shall conform to the requirements of ASTM F477.

Unless otherwise specified, concrete shall conform to the requirements of Construction Specification 732, Concrete, for 3,000 psi concrete.

Unless otherwise specified, drainfill shall conform to the requirements of Construction Specification 724, Drainfill.

3. Handling and storage

Pipe shall be delivered to the job site and handled by means that provide adequate support to the pipe and does not subject it to undue stresses or damage. When handling and placing plastic pipe, care shall be taken to prevent impact blows, abrasion damage, and gouging or cutting (by metal edges and/or surface or rocks). The manufacturer's special handling requirements shall be strictly observed. Special care shall be taken to avoid impact when the pipe must be handled at a temperature of 40 degrees Fahrenheit or less.

Pipe shall be stored on a relatively flat surface so that the barrels are evenly supported. Unless the pipe is specifically manufactured to withstand exposure to ultraviolet radiation, it shall be covered with an opaque material when stored outdoors for 15 days or longer.

4. Excavation

Excavation shall be in accordance with Construction Specification 721, Excavation, and as required in this specification or as shown on the drawings.

The pipe foundation shall be excavated a minimum of 4 inches lower than the pipe grade shown on the drawings or staked in the field whenever bedrock, boulders, cobbles, or other material that may cause pipe damage is encountered at planned pipe grade.

5. Laying the pipe

Plastic pipe conduits and fittings shall be installed to the lines and grades shown on the drawings and specified in this specification. Install the pipe with no grade reversal, unless shown on the drawings. The pipe shall be carefully placed on the bedding or into the pipe trench. Just before placement, each pipe section shall be inspected to ensure that all foreign material is removed from inside the pipe. The pipe ends and the couplings shall be free of foreign material when assembled.

Care shall be taken to prevent distortion and damage during hot or cold weather. During unusually hot weather (daytime high temperature of more than 90 °F), the pipe assembled in the trench shall be lightly backfilled or shaded to keep it as near to ground temperature as possible until final backfill is placed. Backfill of the pipe shall be completed when ground temperature and pipe temperature do not vary by more than 40 °F.

Perforated pipe shall be installed with the perforations down and oriented symmetrically about the vertical centerline. Perforations shall be clear of any obstructions.

During installation, the pipe shall be firmly and uniformly bedded throughout its entire length. Bell-holes shall be placed in bedding material under bells, couplings, and other fittings to assure the pipe is uniformly supported throughout its entire length.

6. Pipe embedment

Earth bedding—The pipe shall be firmly and uniformly placed on earthfill with ample bearing strength to support the pipe without noticeable settlement.

Earth bedding shall be compacted to a density not less than adjacent undisturbed in-place earth material or be compacted earth backfill. Earthfill material used for compacted earth bedding shall be free of rocks, stones and earth clods greater than 1 inch in diameter. The pipe shall be loaded sufficiently during the compaction of bedding under the haunches and around the sides of the pipe to prevent displacement from its final approved placement.

Sand, gravel or crushed rock bedding—When sand, gravel, or crushed rock bedding is specified, the pipe shall be firmly and uniformly placed on the bedding material. Material for bedding shall not exceed 1 inch in diameter. Unless shown on the drawings, the coarse-grained bedding material shall be carefully placed and compacted to a depth equal to or greater than 1/3 of the diameter of the pipe above the bottom of the pipe. The pipe shall be loaded sufficiently during backfilling and compaction around the sides to prevent displacement of the pipe from its final approved placement.

7. Backfill

Earthfill backfill adjacent to pipe shall be carefully placed and spread in layers no greater than four (4) inches thick before compaction. Backfill material shall be free of rocks, stones or earth clods greater than 1 inch in diameter. The pipe shall be secured and loaded sufficiently during backfilling and compaction around the sides of the pipe to prevent displacement from its final approved placement.

Backfill material shall be manually tamped in a manner which will prevent damage to the pipe. Heavy equipment shall not be operated within two (2) feet of the pipe. Each lift of earthfill shall be compacted by making four (4) passes with the track or wheel of the compaction equipment over the entire surface. Earth backfill shall be compacted to a density not less than adjacent undisturbed fill or foundation material. Backfill material placed more than two (2) feet from pipe can be placed and spread in layers up to nine (9) inches thick before compaction. Final backfill material shall be placed four (4) inches above the surrounding surfaces to allow for settlement of the backfill material.

The water content of cohesive backfill material shall be such that when soil is kneaded in the hand it will form a ball which does not readily separate. For non-cohesive backfill material, water content is not a concern for lifts.

Vehicles or construction equipment shall not be allowed to cross the pipe until the depth of backfill over pipe is two (2) foot or one-half the diameter of the pipe, whichever is greater.

8. Joints

Pipe joints shall be watertight at the pressures specified except where unsealed joints are indicated.

Pipe shall be installed and joined in accordance with the manufacturer's recommendations except as otherwise specified on the drawings. Laying deflections and joint fitting or stab depths shall be within the manufacturer's recommended tolerances.

Flanged, banded, heat-fusion, or elastomeric-sealed mechanical joints shall be used when joining polyethylene (PE) pipe and fittings unless otherwise specified in this specification or as shown on the drawings.

Pipe ends shall be cut square and be deburred to provide a uniform, smooth surface for the jointing process. Reference marks shall be placed on the spigot ends to assist in determining when proper seating depth has been achieved within the joint.

9. Fittings

Unless otherwise specified, steel fittings, valves, and bolted connections shall be painted or coated as recommended by the manufacturer.

Fittings for nonpressure pipe shall be of the same or similar material as the pipe and shall provide the same durability, watertightness, and strength as the pipe unless otherwise specified.

10. Thrust blocks and anchors

When specified, concrete thrust blocks and anchors shall be installed as shown on the drawings.

Table 1 Pipe Specification

Pipe	Specification
Poly vinyl chloride (PVC) pipe	
Plastic pipe - Schedules 40, 80, 120	ASTM D 1785
	ASTM D 2466
Pressure rated pipe - SDR Series	AWWA C 900
	ASTM D 2241
Plastic drain, waste, and vent pipe and fittings.....	ASTM D 2665
Joints for IPS PVC pipe using solvent weld cement.....	ASTM D 2672
Composite sewer pipe.....	ASTM D 2680
Type PSM PVC sewer pipe and fittings	ASTM D 3034
Large-diameter gravity sewer pipe and fittings.....	ASTM F 679
Smooth-Wall Underdrain Systems for Highway, Airport, and Similar Drainage.....	ASTM F 758
Profile gravity sewer pipe and fittings based on controlled inside diameter	ASTM F 794
Corrugated sewer pipe with a smooth interior and fittings.....	ASTM F 949
Pressure pipe, 4-inch through 12-inch for water distribution	AWWA C 900
Water transmission pipe, nominal diameters 14-inch through 36-inch	AWWA C 905
Polyethylene (PE) plastic pipe	
Schedule 40	ASTM D 2104
12 to 60-inch annular corrugated profile-wall polyethylene (PE) pipe and fittings	ASTM F 2306
SDR-PR based on controlled inside diameter.....	ASTM D 2239
Schedules 40 and 80 Based on outside diameter	ASTM D 2447
SDR-PR based on controlled outside diameter.....	ASTM D 3035
High density polyethylene (HDPE) plastic pipe	
Plastic pipe and fittings	ASTM D 3350
SDR-PR based on controlled outside diameter.....	ASTM F 714
Heat joining polyolefin pipe and fittings	ASTM D 2657
Acrylonitrile-butadiene-styrene (ABS) pipe	
Plastic pipe, schedules 40 and 80.....	ASTM D 1527
Composite sewer pipe.....	ASTM D 2680

In addition to the pipes list above, the following are acceptable for watering facilities:

Polyethylene (PE) Plastic Tubing.....	ASTM D 2737
Polyethylene (PE) Pressure Pipe and Tubing 1/2" through 3" Diameter.....	AWWA C 901
Acrylonitrile-butadiene-styrene (ABS) Plastic Pipe, SDR-PR.....	ASTM D 2282
Thermoplastic Gas Pressure Pipe, Tubing and Fittings.....	ASTM D 2513