

# WISCONSIN CONSTRUCTION SPECIFICATION

## 15. Plastic Pipe Conduits

### 1. SCOPE

The work shall consist of furnishing and installing polyvinyl chloride (PVC), acrylonitrile-butadienestyrene (ABS), and polyethylene (PE) plastic pipe and the necessary fittings as shown on the drawings. **This specification does not apply to corrugated polyethylene tubing used for subsurface drainage systems.**

### 2. MATERIALS

Polyvinyl chloride (PVC) pipe and fittings shall conform to the requirements of the following ASTM and AWWA specifications unless otherwise stated on the drawings.

#### Pressure Rated:

- a. ASTM D-1785 PVC Plastic Pipe, Schedules 40, 80, and 120.
- b. ASTM D-2241 PVC Pressure-Rated Pipe (SDR Series).
- c. ASTM D-2464 Threaded PVC Plastic Pipe Fittings, Schedule 80.
- d. ASTM D-2466 PVC Plastic Pipe Fittings, Schedule 40.
- e. ASTM D-2467 Socket-Type PVC Plastic Pipe Fittings, Schedule 80.
- f. ASTM D-2855 Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
- g. ASTM D-3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- h. AWWA C 900 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in.

#### Non-Pressure Rated:

- i. ASTM D-2729 PVC Sewer Pipe and Fittings.
- j. ASTM D-2855 Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
- k. ASTM D-3034 Type PSM PVC Sewer Pipe and Fittings.
- l. ASTM D-3212 Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.
- m. ASTM F-679 PVC Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- n. ASTM F-794 PVC Profile Gravity Sewer Pipe and Fittings, Based on Controlled Inside Diameter.
- o. ASTM F-949 PVC Corrugated Sewer Pipe with a Smooth Interior and Fittings.
- p. ASTM F-1760 Coextruded Poly (Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe having Reprocessed-Recycled Content.

Acrylonitrile-butadiene-styrene (ABS) plastic pipe and fittings shall conform to the requirements of the following ASTM specifications unless otherwise stated on the drawings.

Non-Pressure Rated:

- a. ASTM D-2661 Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.

Polyethylene (PE) plastic pipe and fittings shall conform to the requirements of the following ASTM specifications unless otherwise stated on the drawings.

Pressure Rated:

- a. ASTM D-2239 PE Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
- b. ASTM D-2683 Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
- c. ASTM D-3035 PE Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter.
- d. ASTM D-3261 Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- e. ASTM F-714 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- f. ASTM F-2620 Heat Fusion Joining of Polyethylene Pipe and Fittings.

Non-Pressure Rated:

- g. ASTM F-667 Large Diameter Corrugated PE Tubing and Fittings.
- h. ASTM F-2306 PE Plastic Pipe and Fittings - Annular Corrugated Profile Walled - Based on Inside Diameter

The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign matter, or other defects. The pipe shall be as uniform in color, opacity, density, and other physical properties as is commercially practicable.

3. JOINTS AND FITTINGS

Joints and fittings shall be of the same or similar materials as the pipe and equal to or exceeding that specified for the pipe to which it is attached.

Joints may be bell and spigot type with elastomeric gaskets, coupling type with elastomeric gaskets on each end or solvent cemented. The joints shall be installed according to the manufacturer's recommendations unless otherwise specified.

When a lubricant is required to facilitate joint assembly, it shall be a type having no detrimental effect on the gasket or pipe material.

4. HANDLING AND STORAGE

Pipe shall be delivered to the job site and handled by means which 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. All special handling requirements of the manufacturer shall be strictly observed. Special care shall be taken to avoid impact when the pipe must be handled at temperatures of 40°F or less.

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

## 5. LAYING AND BEDDING THE PIPE

The pipe shall be laid to the lines and grades as shown on the drawings and specified herein. The pipe shall be laid so that there is no reversal of grade between joints, unless otherwise shown on the drawings. The pipe shall not be dropped or dumped on the bedding or into the pipe trench. The ground surface near the pipe trench shall be free of loose rocks and stones greater than 1 inch in diameter. This ensures that rock will not be displaced and impact the pipe.

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. At the completion of a work shift, all open ends of the pipeline shall be temporarily closed off using a suitable cover or plug.

Care shall be taken to prevent distortion and damage during unusually hot (over 90°F) or cold weather (under 40°F). After the pipe has been assembled in the trench, it shall be allowed to reach ground temperature before backfilling to prevent pull out of joints due to thermal contraction.

Bell and spigot pipe shall be laid with the bell pointed upstream. The pipe ends and couplings shall be free of foreign material when assembled.

Perforated pipe shall be laid with the perforations down and oriented symmetrically about the vertical centerline. Perforations shall be clear of any obstructions when the pipe is laid and before the pipe is approved for backfill.

The pipe shall be firmly and uniformly bedded throughout its entire length. The bedding depth and materials to be used will be as shown on the drawings. For pipe with bell joints, the bedding material shall be excavated at the locations of the bells to prevent the pipe from being supported by the bells.

## 6. PIPE EMBEDMENT

Earth bedding – The pipe shall be firmly and uniformly placed on compacted earthfill bedding or an in-place earth material bedding of ample bearing strength to support the pipe without noticeable settlement. The earth material on which the pipe is placed shall be of uniform density to prevent differential settlement.

Unless otherwise specified, a groove that closely conforms to the outside surface of the pipe shall be formed in the bedding. The depth of the groove shall be equal to or greater than 0.3 of the pipe diameter.

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 or stones greater than 1 inch in diameter and earth clods greater than 2 inches 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 otherwise shown on the drawings, the coarse-grained bedding material shall be carefully placed and compacted to a depth equal to or greater than 0.3 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.

Pipe encased in drainfill – The pipe shall be firmly and uniformly placed on bedding of specified drainfill. Drainfill shall be placed and compacted as specified in Wisconsin Construction Specification 8, Drainfill or as shown on the drawings. The pipe shall be loaded sufficiently during backfilling around the sides and during compaction to prevent displacement of the pipe.

Pipe encased in concrete – Concrete encasement shall be carefully placed to form a continuous uniform support around the entire circumference of the pipe or as shown on the drawings. Pipes encased in concrete shall be securely anchored to prevent movement of the pipe during concrete placement. A clear distance of 1.5 inches shall be maintained between the pipe and any reinforcing steel.

## 7. BACKFILL

Initial backfill – Unless otherwise specified or shown on the drawings, initial backfill to 6 inches above the top of the conduit is required. Earth haunching and initial backfill material shall consist of soil material that is free of rocks, stones, or hard clods more than 1 inch in diameter. Coarse backfill material shall be the specified sand, gravel, crushed rock, or drainfill material.

Initial backfill shall be placed in two stages. In the first stage (haunching), backfill is placed to the pipe spring line (center of pipe). In the second stage, it is placed to 6 inches above the top of the pipe.

The first stage material shall be worked carefully under the haunches of the pipe to provide continuous support throughout the entire pipe length. The haunching backfill material shall be placed in layers that have a maximum thickness of about 6 inches and are compacted as shown on the drawings or as stated in the Wisconsin Construction Specification appropriate for the backfill material. During compaction operations, care shall be taken to ensure that the tamping or vibratory equipment does not come in contact with the pipe and the pipe is not deformed or displaced.

Final backfill – Final backfill shall consist of placing the remaining material required to complete the backfill from the top of the initial backfill to the ground surface, including mounding at the top of the trench. Final backfill material within 2 feet of the top of the pipe shall be free of debris or rocks larger than 3 inches nominal diameter. Coarse backfill material shall be the specified sand, gravel, crushed rock, or drainfill. Final backfill shall be placed in approximately uniform, compacted layers. Final backfill compaction and layer thickness requirements shall be as shown on the drawings or as stated in the Wisconsin Construction Specification appropriate for the backfill material.