

STORM-DRAINAGE JOINTS: WATERTIGHT IS THE BEST LONG-TERM DESIGN

In the storm-drainage industry, there is a confusing array of terminology for joint designs. Concrete, vitrified clay, corrugated polyethylene, polypropylene and metal pipes use three joint types: soil-tight, silt-tight, and watertight. There is a clear hierarchy going down the list from soil-tight (the worst-performing) to watertight (the best-performing). PVC pipes use only watertight joints.

JOINT TYPES

For polyethylene and polypropylene pipes, joint types are defined in ASTM Standard F2306:

- **Soil-tight** – this type is specified as a function of opening size, channel length, and backfill particle size; gaskets are not required.
- **Silt-tight** – used where backfill material has a high percentage of fines. This type requires an elastomeric gasket to prevent infiltration of all soil particles. The joint must pass internal pressure and vacuum tests at 2 psi using the ASTM D3212 test method.
- **Watertight** – uses an elastomeric gasket to prevent infiltration and exfiltration of all soils and liquids; the joint must pass internal pressure and vacuum tests of 10.8 psi (25 feet of head) per ASTM D3212.

Concrete and corrugated steel pipe joints are available as soil-tight or watertight and are covered by ASTM and ASHTO standards.

WATERTIGHT JOINTS ARE THE MOST SUSTAINABLE AND BEST PERFORMING

It should come as no surprise that the top-performing joint systems are watertight. All PVC joints are watertight per ASTM D3212.

Joints that are not watertight all suffer from the same performance problems:

1. They don't keep the storm water inside the pipe.
2. They don't keep the ground water outside the pipe.
3. They don't keep soil from leaching into the pipe.

The movement of ground water and soil into pipe joints causes ongoing loss of backfill materials. If pipes are below roadways, this will create voids in the pavement base resulting in costly street maintenance and repair. Non-watertight pipe joints can also cause sinkholes, damage to adjacent buried utilities, and loss of capacity inside storm drains due to silting – resulting in additional costs and premature pipe failures.

WATERTIGHT SYSTEMS PROTECT INFRASTRUCTURE AND SAVE MONEY

When a life cycle cost analysis includes long-term expenditures for leaking joints and soil settlement, the low initial costs of alternative pipes don't measure up. The solution is to specify watertight PVC pipe joining systems.

PVC PIPE JOINTS KEEP IT SIMPLE AND DON'T LEAK

All PVC pipe storm-drain joints are designed to be watertight. Nothing gets in and nothing gets out.

PVC pipes use a simple gasketed bell-and-spigot system.

- The designer does not need to consider:
 - Leakage amounts allowed by different joint designs.
 - Multiple gaskets and exterior bell wraps required for watertight polyethylene and polypropylene joints.
 - Leak-prone mastic and asphaltic materials for concrete and corrugated metal pipe joints.
- The installer merely slides the spigot into the bell until the spigot's insertion line is flush with the lip of the bell.

In addition, PVC pipe joints are not subject to long-term degradation of their sealing capability. Along with its superior pipe stiffness and watertight joints, PVC pipe provides a design life of 100-plus years. As a result the owner enjoys the benefit of a leak-free system that saves money over the life of the pipeline.



Leaking joints damage infrastructure.

References: ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals" (2013); ASTM F2306 "Standard Specification for 12" to 6" (300 to 1500 mm) Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications" (2014); "Joint Info," ACPA ePipe (2014); "Pipe Joints and Critical Performance Requirements by System Application," D. Sanders (2009)