

PVC PIPE GASKETED JOINTS — PART 2: TECHNICAL CONSIDERATIONS

The most common joining system for PVC pipe uses an elastomeric seal (gasket). The PVC Pipe Association (PVCPIA) estimates that more than 500 million gaskets are currently in use in PVC pipe in North America.

INDUSTRY STANDARDS: LEAKAGE NOT ALLOWED

Requirements for gaskets for PVC pipe are found in ASTM F477, “Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.” The standard includes requirements for the following:

- Tensile strength
- Elongation
- Durometer (hardness)
- Ozone resistance
- Effects of aging
- Compression set

The ASTM F477 requirements for these properties must be met no matter which gasket material is used.

For pressure-pipe joints, ASTM D3139 provides the requirements for joint qualification tests. The standard requires a joint to be axially deflected and then pressurized to:

- Internal pressure of 50% of the pressure rating of the pipe for one hour
- Internal pressure of 2.5 times the pressure rating of the pipe for one hour; the internal pressure is then raised to the short-term rupture requirement of the pipe
- Internal vacuum of 22 inches of mercury (10.8 psi) for one hour

Leakage is not allowed during any of the tests.

For non-pressure joints, ASTM D3212 gives the requirements for joint qualification. The standard requires a joint to be axially deflected and then pressurized to:

- Internal pressure of 10.8 psi (25 feet of head) for ten minutes; this test is conducted with the pipe filled with water
- Internal vacuum of 22 inches of mercury (10.8 psi; 25 feet of head) for ten minutes; this test is run with the pipe filled with air

These tests are conducted 3 times: with the pipe in straight alignment, with the pipe axially deflected, and with the pipe radially deflected.

These two standards for gasketed pipe joints and the F477 standard for gaskets have been instrumental in the development of reliable joining systems for PVC pipe. Additional requirements apply for potable water applications. Like all materials in contact with drinking water, gasket materials must be certified to NSF Standard 61 “Drinking Water System Components - Health Effects.” All of the gaskets used for PVC water pipes are certified to Standard 61.

FACTORS TO CONSIDER

In North America the elastomer material most often used for PVC pipe gaskets is SBR. Other gasket materials are sometimes used for special applications. Important factors to consider for gasket materials are:

- Conditions of service, including chemical exposure anticipated. Exposure to some chemicals may require that a material other than SBR be used. Chapter 3 of the PVCPIA’s *Handbook of PVC Pipe* includes a guide for material selection based on chemical resistance
- Availability: the pipe manufacturer should be consulted regarding the availability of a specific elastomeric compound.

THE BOTTOM LINE: LEAK-FREE JOINING SYSTEMS

Gasketed joints for PVC pipe have been used extensively for more than fifty years. The vast majority of gaskets in PVC pipe are made from SBR, which has proven to be the material of choice for most applications. Strict industry standards for gaskets and for gasketed pipe joints have resulted in long-life, leak-free joining systems for PVC pipe.

References: ASTM D3139 “Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals” (2011); ASTM D3212 “Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals” (2013); ASTM F477, “Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe” (2014); NSF Standard 61 “Drinking Water System Components - Health Effects” (2016); “Handbook of PVC Pipe: Design and Construction,” Uni-Bell PVC Pipe Association (2013).