

SAFETY CONSIDERATIONS FOR AIR-TESTING OF PVC SEWER PIPES

Plastic sewer pipelines are typically leakage-tested after installation. The most common method is low-pressure air testing per ASTM F1417 "Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air." Since air is a compressible material that expands rapidly if released, safety precautions should be followed.

AIR-TEST THRUST FORCES FOR LARGE-DIAMETER PVC SEWER PIPE

ASTM F1417 recommends air testing at 4 psi. However, the standard calls for increasing the internal test pressure to counteract external pressure caused by groundwater above the joint. The maximum internal pressure permitted is 9 psi. The table below provides the thrust forces for large-diameter PVC sewer pipe for pressures in 1 psi increments from 4 to 9 psi.

Thrust Force Against Air-Test End-Plug						
Test Pressure						
Pipe Size (in)	4 psi	5 psi	6 psi	7 psi	8 psi	9 psi
Approximate Force Against End-Plug (lb)						
24	1700	2100	2600	3000	3400	3900
27	2200	2700	3300	3800	4400	4900
30	2900	3600	4300	5000	5700	6400
36	4100	5200	6200	7200	8200	9300
42	5500	6900	8300	9700	11000	12400
48	7200	9000	10800	12600	14400	16200
54	9300	11600	13900	16200	18600	20900
60	10600	13300	15900	18600	21200	23900

Although pressures are less than 10 psi, thrust forces become very large (for 60-inch pipe: over 10,000 lbs at 4 psi; about 24,000 lbs at 9 psi). With these high forces, it could be dangerous if an end-plug were to let go. Personnel should follow safety procedures.

SAFETY GUIDANCE

ASTM F1417: The ASTM air-testing standard cautions that measures should be taken to protect personnel. Section 6 provides safety precautions, including the following:

- Clause 6.1.1: "No one shall be allowed in the manholes during testing."
- Clause 6.1.3: "When lines are tested, it is mandatory that all the caps and plugs be braced as an added safety factor."
- Clause 6.1.5: "A regulator or relief valve set no higher than 9 psi shall be included on all pressurizing equipment."

It is recommended that jobsite air testing procedures conform to ASTM F1417.

Plug Manufacturer's Installation Instructions: The installer of end-plugs should also review and conform to the recommendations of the producer of the plug being used.

SAFETY IS PARAMOUNT

Although the pressures specified for sewer-pipe air testing are considered low, the resulting thrust forces on a pipeline's end plugs can be substantial.

Note: this document discusses low-pressure (maximum 9 psi) air testing for PVC gravity sewer pipes. Under no circumstances should high-pressure air testing be performed on any PVC pipes. Uni-Bell's *Handbook of PVC Pipe* makes this point in section 11.8.3: "Air pressure testing of installed PVC pressure pipe is expressly prohibited for reasons of safety."

References: ASTM F679 "Polyvinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings" (2015); ASTM F1417 "Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air," (2011); *Handbook of PVC Pipe*, Uni-Bell (2013)