

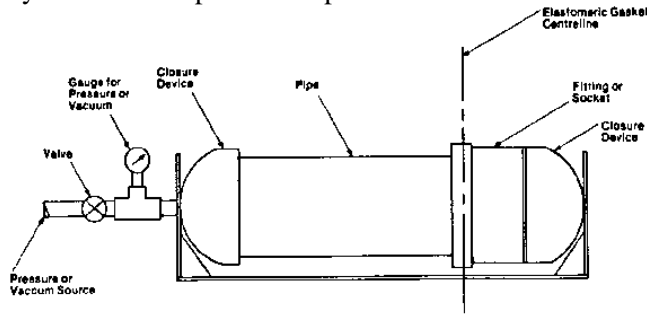


**Environmental
Hydraulics
Group**

Hydraulic Transients (HT)
– Water & Sewage

Project:	Laboratory Testing of Pipe Joints	1990-353
Location:	Toronto, Ontario, Canada	
Client:	Ontario Ministry of the Environment (MOE) and Municipality of Chesterville	
Completed:	December 1990	

Test Apparatus with elastomeric gasket seal joint, hydrostatic and pneumatic pressure.



Pipe deflection due to unbalanced load (i.e. uneven bedding or frost heave loading).



Smoke sucked into the pipe joint during a sub-atmospheric pressure condition.



Tests performed using ASTM procedures and protocols.

Description: EHG was retained to coordinate and supervise laboratory tests on a commercial piping product. The pipes being tested consisted of failed pipe sections dug out of the earth as well as new pipes recently delivered for construction.

The testing program was divided into two parts: a) high pressure test with pipe flattening; and b) sub-atmospheric pressure joint tests (by evacuating air out from a sealed pipe section).

Findings: led to the following conclusions:

- i) The pipe's hoop strength was sufficient to withstand high upsurge pressures (up to the specified tolerance limit).
- ii) Only minor leaks were observed in pipe joints during a sub-atmospheric pressure condition without the application of an external load.
- iii) The pipe was even with a small deflection due to an unbalanced external load; however, major air infiltration was observed during the sub-atmospheric pressure test.
- iv) Once the pipe joints were damaged (e.g., jammed with sand or debris), heavy leakage still occurred even when the pipe joints were cleaned, then reassembled in good alignment.

In a real situation, unequal external loads are routinely applied to pipes. The best way to minimize the negative impact due to sub-atmospheric conditions (and any subsequent leaking) is to have equally balanced external loads and a good earth back-fill.

Sub-atmospheric pressures were applied to the pipe gradually and uniformly during the lab tests. In a real system, a surge pressure wave travelling through the pipeline could result in short-lived but uneven loadings, which could weaken pipe joints.

Benefits to the Clients: These tests led to an advance in gasket design to improve seal performance and to an increased awareness by MOE of plastic pipe's low (internal) pressure tolerance (in addition to the more widely understood high pressure tolerance or "surge limit").