

Concrete Pipe Joint “Resistance”

Concrete pipe joint resistance sounds like an odd title to describe joint performance, but it is how the American Concrete Pipe Association (ACPA) apparently classifies concrete pipe joints. In the ACPA *Concrete Pipe Insights*, they state concrete pipe joints are designed for these two predominant performance criteria:

- Resistance to infiltration of groundwater and backfill material
- Resistance to exfiltration of sewage or storm water



Sinkhole from Joint Infiltration

Resistance, by definition, is an attempt to act against something not stop it. Exfiltration of stormwater contaminants, especially those included in the first flush, has the potential to pollute groundwater or aquifers. Fines that can enter the system via pipe joints can also increase the turbidity and siltation of the receiving waters, and for these reasons, the Clean Water Act has identified watertight joints as a Best Management Practice (BMP) in some parts of the country. Pipe with definitive watertight leakage requirements, not just water resistant pipe, must be specified where these concerns exist. Watertight pipe has actually been defined by the Environmental Protection Agency (EPA) and this maximum leakage allowance of 200 gallons per inch of diameter per mile of pipeline per day is a definitive value not an arbitrary resistance factor.

Watertight joints are necessary on some gravity flow projects for structural reasons. In situations involving a high or fluctuating groundwater table, or short-term internal pressures, a watertight joint will limit or eliminate flow into or out of the sewer system. Soil infiltration or water exfiltration is capable of eroding backfill material around buried structures, which may ultimately damage the system or structures adjacent to the system. With the use of watertight joints, the backfill quality is preserved, and the integrity of the pipe and surrounding structures is maintained.



Concrete Pipe Joint Leaks Every 8-feet

The ASTM standards for concrete pipe, as those for HDPE pipe, are good tools for obtaining quality joints and watertight performance. These tools, however, are only as good as the care and attention given to the production process. If manufacturers promote weak performance requirements or none at all, the best manufacturing standards in the world will not yield a system that works well. If one promotes joints that are resistant to leakage, it sets a low expectation for all parties involved with the manufacturing and installation of the pipe system.

We all know a watertight leakage requirement sets a different expectation in the minds of the engineer, contractor and manufacturer. All parties are more diligent in their work and product that is produced. A contractor installing a watertight sanitary sewer system will be much more careful in the installation and joining of the pipe than one installing a culvert. Pipe production personnel are no different.

The integrity of concrete pipe joint surfaces, more than any other pipe joint, is affected by the attention the production workers pay to manufacturing and quality procedures. Concrete pipe joint surfaces are directly related to the care taken in consolidation of the concrete, cleaning and maintenance of the form equipment, and removal and handling of the finished product. Any out-of-round surfaces, porosity, cracks, chips, “bug holes”, and rough finishes will affect a concrete pipe’s joint integrity. If low expectations, such as target of “resistant joints”, are set for the work force, it is unlikely a high quality product will result.

Corrugated HDPE pipe, on the other hand, is made with certified resin material manufactured to a consistent quality every time, rather than being subject to the variability of “material ingredients” and a somewhat random batching process that produce the concrete mix. The human error factor or low quality attitude problem that can exist in concrete pipe production is not a problem in the production of HDPE pipe, since there is no human handling of the pipe during production. Each piece of corrugated HDPE pipe is the same regardless of the time of day, day of the week or project type.

You as a specifier and owner deserve to have a pipe joint performance with the measurable and quantifiable performance, rather than an undefined water “resistant” joint performance. Therefore, when you need a watertight pipe to protect your investment in the infrastructure and meet environmental regulations, specify the EPA watertight requirements for pipelines and set the appropriate level of production expectations for the installation of concrete pipe and corrugated polyethylene pipe.