



JUST  
THE  
FACTS

Concrete pipe vs.  
HDPE Pipe

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# Just The Facts – Pipe Installation

**Fact** - Flexible pipe design which uses the Modified Iowa Formula, assumes the installed pipe will deflect under an applied load and develop passive soil resistance in the surrounding soil envelope.

**Fact** - Concrete pipe design assumes the applied load is carried by the pipe and does not assume pipe deflection. OPSS 409 Construction Specification for Closed Circuit Television Inspection of Pipelines is the appropriate specification for this activity.

**Fact** - Corrugated polyethylene pipe is not a custom engineered product. It is not a “structure” on its own. It relies on the soil/pipe interaction for the majority of its strength thus placing the responsibility for the structural integrity of the installation on the shoulders of the low bidder.

**Fact** - Concrete Pipe is a custom engineered product. It is a structure on its own. The majority of strength of a concrete pipe installation arrives at the site, on the truck. It is not nearly as reliant upon proper installation for its strength as flexible pipe. After manufacturing, it can be easily tested at the plant, prior to shipping, to determine if it meets the design load.

**Fact** - The Corrugated Polyethylene Pipe Association publication “Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings” states:

- ...trenches that are very wide are not only costly to excavate and re-fill with backfill, they can actually detract from the structural integrity of the pipe/backfill system. (page 10)
- Water in the trench during pipe installation can create a safety hazard as well as make it almost impossible to install the pipe properly. Water will tend to float the pipe so that maintaining line and grade, or slope, becomes much more difficult. (page 10)
- The backfill material should be installed in layers, or lifts, uniformly on each side of the pipe as specified for a particular material in the CPPA technical booklet Structural Design Method for Corrugated Polyethylene Pipe. (page 12)
- For installations not involving a subtrench, dragging a trench box should only be done if it does not damage the pipe or joints, or disrupt the backfill; otherwise the box should be lifted vertically into its new position. (page 18)
- If compaction is required, it should be conducted in such a way that the pipe alignment is not disturbed. (page 12)

**Fact** - Concrete Pipe design includes consideration of trench conditions as parameters. An installation designed using PipePac 2000 can account for trench conditions as well as other installation variables. Concrete Pipe is heavy. It will not float. It will not shift during backfilling. It remains where it is placed

**Fact** - All installed drainage systems require inspection and installed performance testing. For flexible pipe, deflection testing using a properly gauged mandrel, must be undertaken to ensure the pipe deflection is within design limits. OPSS 410 Construction Specification for Pipe Sewer Installation in Open Cut states, “Ring deflection testing shall be performed on all pipe sewers constructed using plastic pipe.” The specification also states, “The device shall be pulled manually through the pipe not sooner than 30 days after the completion of backfilling and installation of service connections.” In order to gain a true perspective on deflection, an additional mandrel test, prior to final assumption by the owner, will ensure the installation is capable of performing as intended.

Make sure you know how your installed pipeline is performing.

## PERFORMANCE TESTING IS THE ONLY WAY.

**Fact** - OPSS 410 identifies mandrel testing based on ‘base’ inside pipe diameter. However, in recognition of manufacturing tolerances, specifications permit minimum and maximum limits on pipe diameter. This usually results in the ‘actual’ pipe diameter being greater than the ‘base’ pipe diameter.

The following example, based on CSA B182.11, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe Fittings, illustrates this mandrel sizing issue.

**Example:** An owner has installed an 18" corrugated HDPE (320 kPa) storm drain and wishes to mandrel test it prior to acceptance. The owner identifies CSA B182.11 as the testing specification. What size should the mandrel be?

**Solution:** Mandrel dimensions in CSA B182.11 are calculated using ‘base’ inside diameter, which is derived by subtracting a manufacturing tolerance and an out-of-roundness factor from the pipe’s average inside diameter.

Based on CSA B182.11, Table 8.4, the following would apply:

	Nominal Pipe Size	Base Inside Diameter (per CSA B182.11)
Pipe Inside Diameter	18" (457.2 mm)	436.18 mm
7.5% Deflection Mandrel Size	422.91 mm	403.47 mm

There is a significant difference between mandrel size calculated using the nominal pipe size and the ‘base’ diameter. CSA B182.11 uses the ‘base’ diameter; however, the actual pipe inside diameter is more consistent with the nominal pipe size. In fact, based on the example, a mandrel developed using the ‘base’ diameter (403.47 mm) will pass through a 18" (457.2 mm) HDPE pipe having an actual deflection in the order of 11.75%.

Is this deflection acceptable? Shouldn't the ‘actual’ inside pipe diameter be used as the basis for mandrel determination?

## YOU ARE IN CONTROL WHEN YOU SPECIFY CONCRETE PIPE.

Would you like more facts?  
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Be sure to visit  
[www.ocpa.com](http://www.ocpa.com) for a free  
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OCPA’s design software.