

Which Type of FRP Composite Pipe or Duct Should You Use?

FRP composite pipe and duct are built in two distinctly different types of dimensional construction or controls. This bulletin describes the two types of pipe and duct - and the ASTM standards that apply to the dimensional tolerances for each type.

One type of FRP composite pipe and duct is built to what is known as iron pipe o.d. standards (IPS) - where the **outside** diameter is a controlled diameter. For IPS pipe and duct, the dimensional tolerances are as provided in ASTM D-2996 Table 3, based on the o.d. (outside pipe dimensions) for FRP composite pipe.

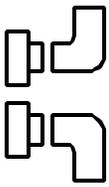
For this type of pipe there are no standards or tolerances on the inside diameter. The inside diameters will vary from manufacturer to manufacturer. The inside diameters of pipe for a given manufacturer may even vary, depending upon the pressure or vacuum rating, and the type and thickness of inner corrosion liner.

The iron pipe o.d. standards for FRP composite pipe and duct were originally established so that the pipe of one manufacturer could easily be used with the fittings of another manufacturer - making it easy for maintenance and installing projects from the customer's inventory. This didn't prove to be as helpful as originally thought. Each of the commodity pipe manufacturers that build pipe to these IPS o.d. standards often have different types of bells (sockets); and even different tapers of the bells.

When designing and specifying pipe built to iron pipe standards, also keep in mind that once you go past the 12-3/4" o.d iron pipe sizes, the o.d. of pipe built to IPS standards becomes the nominal. In other words, 14" and 16" pipe are actually the **outside** diameter of that IPS size. The inside diameter, and thus the flow capacity, is significantly less than nominal size.

In addition, certain pipe manufacturers, in an effort to reduce mandrel and tooling costs, have so called iron pipe sizes, especially for certain "schedules" of pipe that are under sized, and do not meet the dimensional tolerances of Table 3 of ASTM D-2996. You need to consult the manufacturer's dimensional tables for outside dimensions - to confirm that the dimensions do or do not meet the ASTM standards.

We currently have over 400 mandrels in 173 different sizes - so that we can provide IPS pipe meeting ASTM standards for o.d. dimensions - regardless of the pressure rating required, or the type and thickness of the corrosion liner.



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Technical Bulletin

Dimensional Standards for FRP Composite Pipe and Duct

The second type of FRP composite pipe and duct is often referred to as “chemical process pipe”, where the **inside** diameter is the controlled diameter. This pipe is built to the dimensional tolerances of ASTM D-2996, Table 4.

For ASTM D-2996 Table 4 process pipe and duct, the pipe or duct is built on a mandrel having the nominal size. That is, 12" diameter pipe or duct will have a nominal 12" **inside** diameter. The outside diameter for chemical process pipe will then vary - depending upon the pressure or vacuum rating (i.e. the structural wall thickness), and the type and thickness of the inner corrosion liner.

With the chemical process pipe, there is often variation, especially in the larger diameters, between various manufacturers on the actual inside diameter. As an extraction aid of getting the pipe or duct off of the mandrel, some manufacturers will “cardboard” the mandrel. Thus, a 24" diameter mandrel can end up for example having a 24-3/16" o.d. - providing a pipe or duct that has a 24-3/16" inside diameter.

The outside diameter of the pipe built to chemical process piping standards can vary greatly, again, depending upon the total pipe wall thickness, the actual mandrel o.d., and the winding tolerances. Thus, it is usually difficult to use the i.d. controlled pipe or duct with bell or socket fittings and flanges. In many cases, the bells or sockets of the fittings and flanges need to be custom matched to the specific grade and type of pipe being furnished on that specific project.

Again, we regularly build pipe built to both of these two ASTM D-2996 Standards and Tables. We have mandrels that can produce iron pipe o.d. dimensions; as well as pipe built to chemical process i.d. standards and tolerances. Each type of pipe has its advantages and specific applications.

Please consult with one of our engineers to determine which of the two types of pipe or duct is most appropriate for your specific application and project.