



On occasion we are asked which joining method for FRP composite pipe has the potential for the smallest joint gap inside of the pipe. There has been some concern raised about the efficiency of water treatment chemicals for small pockets or cavities that may exist at the joints of FRP composite pipe. The thought being that such cavities would "pocket" stagnant and untreated water - allowing mold and bacteria growth.

This concern of "gaps" has been raised mostly about mechanical couplings, such as Victaulic, TeeKay, Depend-O-Lok, Dresser, etc. Of course this concern applies equally to all types of pipe materials - including ductile iron, steel, alloy, etc.

The quality of the FRP composite joint, as with welded steel pipe, depends primarily upon the skills and experience of the welder. For properly trained journeymen - the clear preference for joining of FRP composite pipe, to provide the least possibility of a cavity or pocket at the joint, is the bell and spigot straight-taper structural adhesive joint.

See the attached drawings of both a pipe to pipe joint or pipe to fitting joint, and a flanged joint. When the adhesive is applied to the end of the pipe, and a thin layer of adhesive is applied to the pipe stop and bell socket - the joint is very unlikely to have any type of cavity or void in the bond line joint inside of the pipe.

This same rule does not apply to taper-taper joints and straight-straight bell and spigot adhesive joints. The taper-taper adhesive joint will always end up with an interior cavity, by the very nature of it's design. The straight-straight bell and spigot adhesive joint, because the shaved pipe does not bottom out at the pipe stop, typically will squeeze out adhesive that protrudes into the pipe, providing a "bump" in the flow line.

The straight-taper structural adhesive joint also then makes the best joint for attaching flanges. Since a flange joint can be easily monitored at the time of welding, this also provides additional assurance of a void free or cavity free internal joint.

ASTM D-3517 is typical of FRP pipe Standards that establish squareness of pipe ends at +/- 1/4 inch. This means that there could be up to 1/2 inch "gap" at where the pipe contacts the pipe stop of the flange or adjoining bell. At the time the joint is first "dry fit" in the field, that gap can be easily seen and later filled in with the same adhesive that is used to make the structural joint. Thus, when the final joint is made - the adhesive pushes against the true square of the pipe stop - providing a void free internal circumference around the entire joint.

While not as easy a joint to make - the butt overlay weld joint is also considered a field weld joint that can be made with minimal interior gapping or voids. This type of joint requires, that when the two ends of the mating pipe, or the pipe and fitting are fitted - the first step is to fill any voids with a thixotropic paste.



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### ***Which Type Of Joint Has The Smallest Gap***

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The butt overlay weld joint does not provide a true square pipe stop, the way that a structural adhesive joint does. Thus, for pipe built in accordance with ASTM D-3517, the gap between two ends of a pipe or fitting could be as much as one inch. Since you have to hold the joint together while the putty cures - you can get some internal squeezing of the putty out into the interior of the pipe. And, because of wider gap you still may find some finished interior joint gaps. Though such gaps however are minimal compared to the potential voids in a mechanical type joint.

Again, the field butt overlay weld type joints require considerably more attention to detail, and a much higher level of skill on the part of the welder, to make void free joints.

Attached are drawings of both the structural bell and spigot adhesive joint, and a butt overlay weld joint. Because of the trueness of the pipe stop in the adjoining bells - you can see that it is much easier in the field to get an interior void free weld, with the smallest possible gap in the joint, using a bell and spigot straight-taper structural adhesive field weld.