



FiberSystems

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Technical Bulletin

The Benefits of FRP Composite Pipe versus Polypropylene Pipe

07-08-2010

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Pipe Features	FRP Composite Pipe	Polypropylene Pipe
Pipe Inside Diameters	FRP composite pipe, built to ASTM D-2996 Table 4, has constant and full normal inside diameters - regardless of the pressure rating.	The inside diameters of polypropylene, depend upon the pressure rating.
Flow Capabilities	The flow capabilities of FRP composite pipe can be calculated using the full nominal pipe diameter. Often, for equal flow capacity, FRP pipe can be one or two diameters smaller than polypropylene pipe.	For polypropylene pipe the engineer needs to use a larger nominal pipe size because of the significantly reduced i.d. - and thus lower flow capabilities. At least one full size larger polypropylene pipe is required to provide the full flow capacity.
Installation Equipment	FRP composite pipe can be installed with minimal field equipment and tools. Pipe shavers for field bell and spigot adhesive welds. Hand grinders, rollers, and brushes for field butt overlay welds.	Polypropylene pipe requires special costly, complex, difficult to adjust and calibrate equipment for making field fusion welds. In addition a separate fusion plate is required for each diameter.
Field Skills Required to Install Pipe	FRP composite pipe can be field installed and joined with skilled piping journeyman, who have received the appropriate classroom and job site training - including making qualifying joints. It is not unusual, or costly, to have multiple journeyman and crews qualified for large FRP composite pipe projects, so many joints can be worked on at one time	Polypropylene pipe requires pipe joiners with special factory training and skills in operating adjusting and calibrating complex equipment. Because of limitations of the cost of equipment and trained installation personnel, often only one joint can be made at a time.
Job Site Handling	FRP composite pipe, is much lighter weight, and often can be handled in the field with just one or two men. When longer lengths require lifting capability - much lighter lifting equipment, such as a back hoe, can be used.	Because of the heavier walls, and coiling of the smaller diameters, polypropylene pipe requires specialized handling equipment, and including cranes. In large diameter and single lengths a spreader bar with multiple lift points is typically required.



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Pipe Features	FRP Composite Pipe	Polypropylene Pipe
Attack from Rodents, and Other “Critters”	Thermoset FRP composite pipe has proven to be not at all attractive to and attacked by rodents. FRP composite pipe is also specified as the material of choice when microbial induced corrosion (MIC) can occur.	There have been many documented instances where polypropylene pipe is a favorite food of rodents, and mammals. Being a thermoplastic material it can even be attacked by microbial organisms.
Thermal and Pressure Expansion	The engineering and cost of supports for thermoset FRP composite pipe is well established with programs like Algor and Caesar available to provide easy engineering of the types, location, and number of supports; all at a much lower cost than for thermoplastic pipe.	Polypropylene pipe, because of its very high thermal coefficient and pressure expansion requires special design, and engineering support considerations. The costs for polypropylene pipe supports and expansion joints can be as much as 65% greater than those required for alternate materials.
Pumping Consideration	FRP composite pipe is the ideal material selection at pumps - being available also in an abrasion resistant version, where an abrasion slurry is being handled or cavitation might occur.	When used as a pressure pipe polypropylene pipe requires special design consideration, including often larger sizes, to prevent starving of pumps, with subsequent pump failure. Costly replacements have been required, especially in the power industry, where polypropylene pipe was originally installed on both the intake and output sides of pumps.
Service Life	FRP composite pipe has been in successful use for 60+ years (well over half a century). Many of those early installations, when inspected still look almost “new”.	Polypropylene pipe is a relatively new development and technology. Case history and experiences for specific service environments are relatively limited; and service life is difficult to predict.



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Chemical Service Environments and Capabilities	FRP composite pipe can be tailored; by the proper selection of resins, re-inforcements and manufacturing technologies; to handle the widest range of chemical service and pressure applications. Well over 82 different “Series” or types of FRP composite pipe and duct are readily available.	Polypropylene pipe is typically made from only a single or very limited ranges of polyethylene resins. Only the wall thickness is varied to handle the different pressure ratings and/or external loads. Polypropylene pipe lacks the ability to be optimized for severe and unusual chemical service environments.
Fire Retardancy	FRP composite pipe is available in fire retardant versions that can be certified to ASTM 84 flame spread rating of under 25. Other versions of FRP composite pipe are available for low smoke and low smoke toxicity.	Polypropylene pipe is highly flammable with very high smoke contributions and smoke toxicity.
Stiffness Factor	FRP composite pipe is installed as a flexible pipe (per the ring compression theory). But, yet it still has hoop and axial stiffness to allow easy field handling, installation, and when buried, backfilling.	Polypropylene pipe is also flexible. But, requires careful installation, handling, and backfilling to maintain roundness and axial straightness during installation.
Field Modifications and Repair	The technology and materials for making field modifications and repairs in FRP composite pipe are well established. The techniques for field modifications and repairs are easily learned and accomplished in a minimal amount of time.	Making changes in polypropylene piping systems in the field, requires specialized equipment and welding techniques. Field repairs are especially difficult to accomplish. Often the modifications, especially for T branches and saddles have to be “encased” with FRP composites to provide the necessary strength.
Lower Pumping Cost	Because of the larger diameter, over the life of the pipe, FRP composite pipe will have much lower energy pumping costs.	Because of the significantly smaller inside diameters for the same size pipe, polypropylene pipe will have much higher annual energy costs.