

Composite Pilings



**FORTRESS
PILINGS**

For A Lasting Foundation

Product Overview

Fortress Pilings are fully composite piles comprised of structural fiberglass protected by a premium gel coat finish.

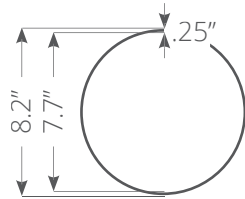
Fortress Pilings outperform and outlast pilings of traditional materials, while providing the most attractive finish available.



Standard Product Line

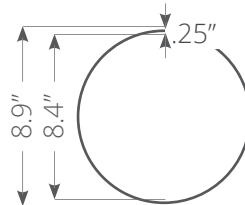
www.fortresspilings.com/products

8"



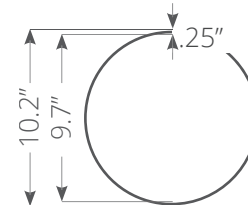
8" Standard - FP080-025

9"



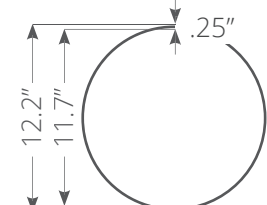
9" Standard - FP090-025

10"

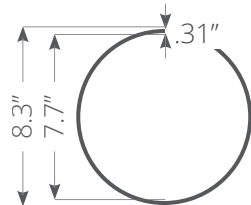


10" Standard - FP100-025

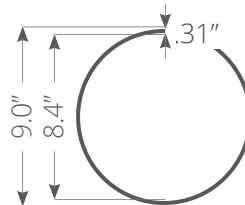
12"



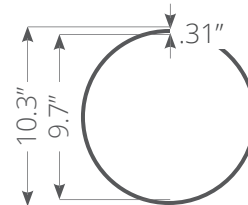
12" Standard - FP120-025



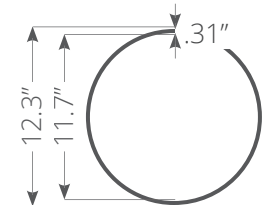
8" Medium - FP080-032



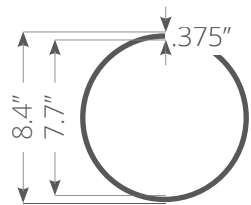
9" Medium - FP090-032



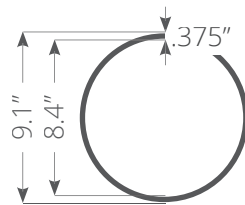
10" Medium - FP100-032



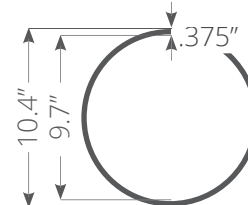
12" Medium - FP120-032



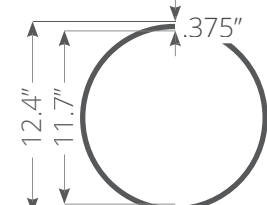
8" Super - FP080-038



9" Super - FP090-038



10" Super - FP100-038




12" Super - FP120-038

Custom Product Line

www.fortresspilings.com/custom

Custom Sizes. Fortress Pilings are available in an extensive variety of alternate diameters and thicknesses. Thus, the pilings can be fine tuned to economically match the application.

Custom Colors. Fortress Pilings can be matched to any color sample. Matching (or contrasting) the pilings to the surface structure makes for an impressive and elegant dock.



“ I was going to use wood pilings until I realized the foundation wouldn't outlast the dock. ”

Benefits of Fortress Pilings

www.fortresspilings.com/about

Engineers and Designers

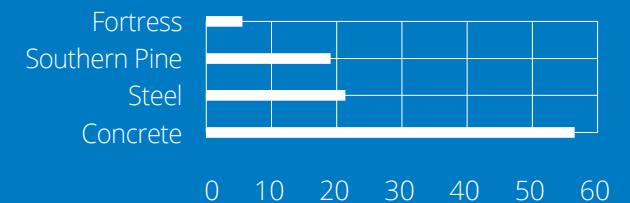
- Environmentally friendly – will not leach carcinogens (like chromium and arsenic as in CCA treated wood) into the environment.
- Regulatory friendly – more and more jurisdictions are banning CCA treated wood in sensitive waters.
- Customizable – geometries and moments of inertia can be tailored to specific loads and applications.
- Energy absorbing – protects vessels from damage in case of collision.
- Tremendous strength to weight ratio.



Contractors / Builders

- Increased production – piles are driven much faster than solid piles.
- Increased penetration – driving refusal is typically deeper than solid piles, enhancing structural performance.
- Versatility – can be filled with concrete or other fillers after driving.
- Reduced equipment requirements – vastly lighter than wood, concrete, or steel.

Weight of Fortress vs. Traditional Pilings



Owners

- Appeal – absolutely the most attractive option available for dock pilings.
- Lifespan – Provides a strong, lasting foundation which will lower the life cycle cost compared to traditional piling options. Your foundation needs outlast the materials you put on it.
- Safety – no pesticides.



Fortress Pilings will *stand the test of time* with only a modest increase in the overall project cost.





“ **When Hurricane Matthew struck, I found out the hard way that the tops of my piles were rotten. The wind and the upsurge ripped the stringers right off but ...**

... the new section built with Fortress Pilings held tight.

— Jeff Fortner, dock owner



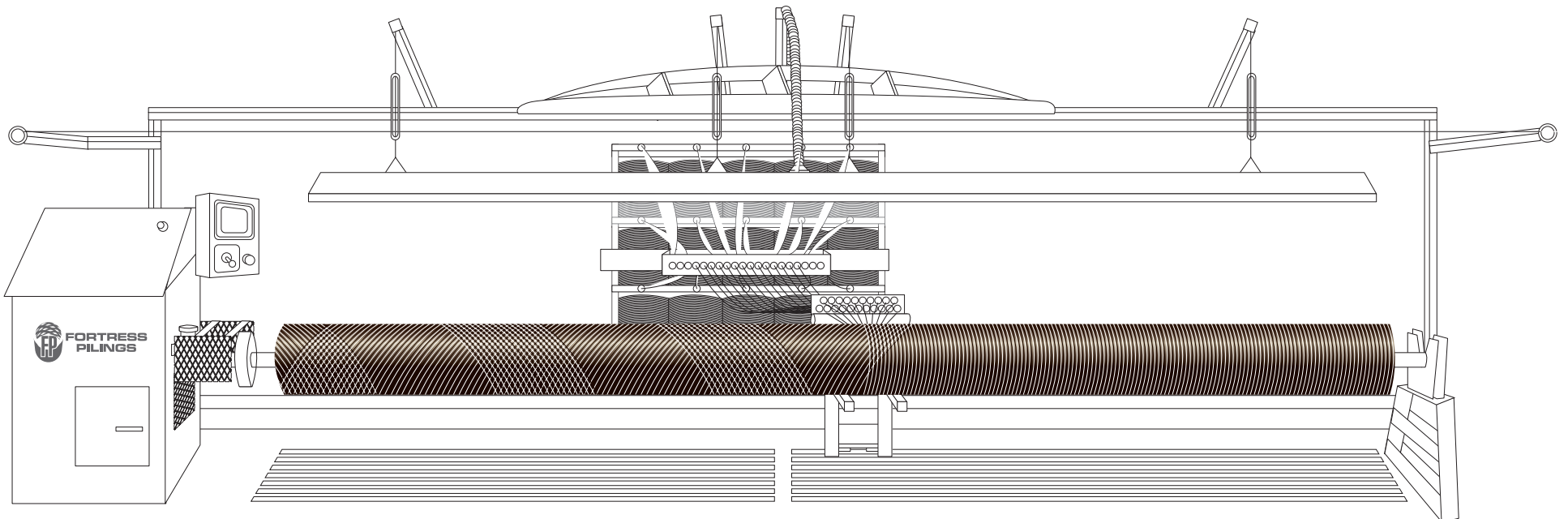
“ **It just didn't make sense to put something that will last practically forever on top of piles that will eventually rot. That is why we choose Fortress Pilings.**

— Danny Anseeuw, Waterfront Engineering



How are they made?

Filament Winding. Fortress Pilings are fabricated using the Filament Winding process, whereby CNC equipment winds individual fibers at precise angles on a mandrel. Varying angles are used to ensure that each piling has excellent compressive and lateral strength, while being lighter and easier to handle than traditional piles.

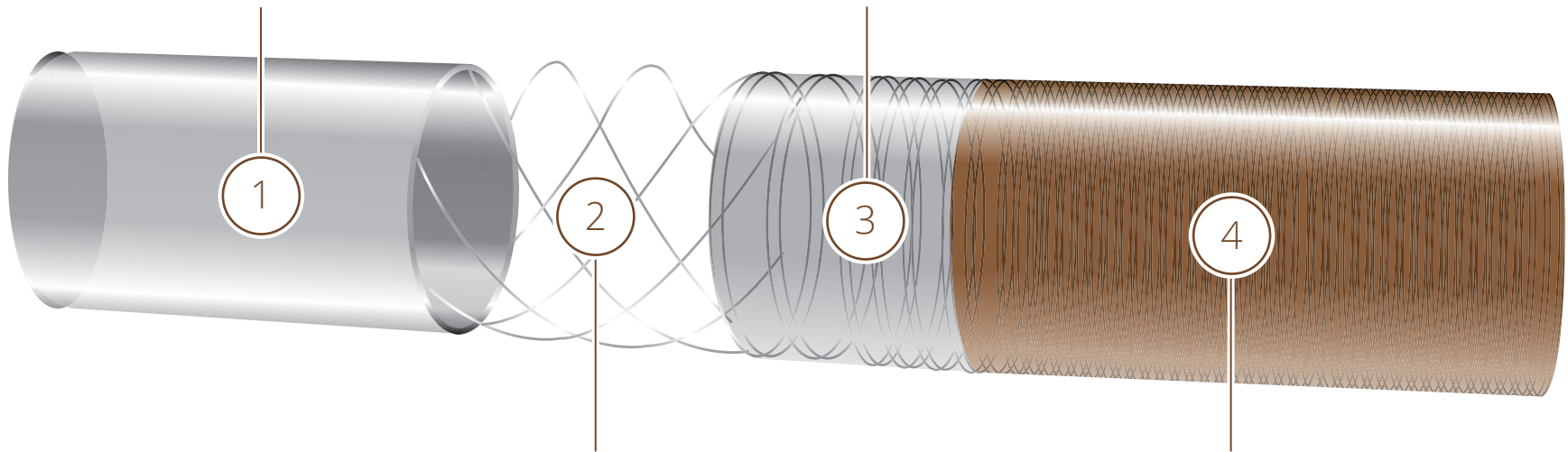


Materials of Construction

www.fortresspilings.com/process

Synthetic inner liner – this barrier layer is specifically added so that Fortress Pilings may be filled with concrete or any other material. The barrier protects the fiberglass from the caustic effects of concrete.

Vinyl Ester resin – Fortress Pilings use only 100% fire retardant vinyl ester resin. Never polyester, and never resin fillers.



Glass strands – each piling contains thousands of E-CR glass fibers, placed at precise angles by CNC equipment. Fortress Pilings never contain glass mats or cloths.

Gel coat exterior – Fortress Pilings are protected with a premium marine gel coat with UV protectants to provide the best weathering technology available.

Testing and Development

Fortress Pilings was founded in 2008 specifically to provide a safe, durable alternative to traditional dock pilings.

With support from Georgia Tech's School of Civil Engineering, a unique solution was derived and tested to provide the optimal synthetic piling.



Technical Engineering Data

www.fortresspilings.com/data

General Properties

(Selected sizes only. For complete general properties, visit www.fortresspilings.com/data.)

Nominal Diameter	Inches	8	8	9	10	10	12	12
Wall Thickness	Inches	1/4	3/8	5/16	1/4	3/8	1/4	3/8
Part Number		FP080-025	FP080-038	FP090-031	FP100-025	FP100-038	FP120-025	FP120-038
Inside Diameter	Inches	7.69	7.69	8.38	9.69	9.69	11.67	11.67
Outside Diameter	Inches	8.2	8.44	9.0	10.19	10.44	12.17	12.42
Weight	Lbs / ft	4.9	7.5	7.2	6.1	9.3	7.4	11.2
Specific Gravity		1.98	1.98	1.98	1.98	1.98	1.98	1.98
Chemical Resistance		Outstanding	Outstanding	Outstanding	Outstanding	Outstanding	Outstanding	Outstanding
Deflection Temperature	°F	>205	>205	>205	>205	>205	>205	>205
Burning Rate		Self extinguishing within 15 seconds						

Tested Products

(Selected sizes only. For complete tested products, visit www.fortresspilings.com/data.)

Compression

All Fortress Pilings have been full-scale compression tested in accordance with ASTM D5449, *Standard Test Method for Transverse Compressive Properties of Hoop Wound Polymer Matrix Composite Cylinders*.



Product		FP080-025	FP080-038	FP090-031	FP100-025	FP100-038	FP120-025	FP120-038
Area	In ²	6.0126	9.2315	9.0762	7.6925	12.0279	9.1117	13.9499
Peak Load	Lbf	134,382	212,387	203,280	130,457	235,109	154,061	256,410
Peak Stress	Psi	22,350	23,083	17,555	16,960	19,547	16,905	18,383
Modulus of Elasticity	Psi	2,033,100	2,114,800	1,721,200	1,555,800	2,160,700	1,846,200	2,069,400
Poisson's Ratio		0.19	0.315	0.229	0.142	0.269	0.154	0.308
Moment of Inertia	In ⁴	49	77	80	96	150	166	258

Tension

Fortress Pilings have been tension tested in accordance with ASTM D3039, *Standard Test Method for Tensile Properties of Polymer Matrix*

Product		FP080-025	FP080-038	FP100-025	FP100-038	FP120-025	FP120-038
Strain at Initial Break	In./In.	.0057	.0054	.0045	.0053	.0037	.0065
Load at Initial Break	Psi	1,784	2,560	1,396	2,479	1,129	2,161
Peak Load	Lbf	2,139	3,198	1,666	2,881	1,515	2,724
Stress at Initial Break	Psi	9,980	8,510	7,580	7,550	6,560	7,670
Tensile Strength	Psi	11,910	10,680	9,040	8,780	8,830	9,690
Tensile Modulus	Psi	2,267,000	1,840,300	1,660,000	1,665,700	1,393,100	1,398,600
Tensile Elongation	%	1.4	1.1	0.7	0.8	1.5	1.7

Bolted Connections

Fortress Pilings have been tested in accordance with ASTM D5961, *Standard Test Method for Bearing Response of Polymer Matrix Composite*

Product		FP080-025	FP080-038	FP100-025	FP100-038	FP120-025	FP120-038
Peak Load	Lbf	31,416	50,265	31,416	50,265	31,416	50,265
Peak Stress	Psi	20,000	32,000	20,000	32,000	20,000	32,000

Piling Material Comparisons

	Fortress	Southern Pine	Steel	Concrete
Yield Strength (psi)	7,975	464	36,000	6,000
Elastic Modulus (psi)	1,928,743	1,987,017	29,007,548	6,580,000

FAQs

What are some safety issues associated with fiberglass pilings?

Fiberglass and fiberglass dust are skin and eye irritants. The use of a dust mask, gloves, and long loose clothing is recommended. Always wear safety glasses when working with tools and machinery, always. Goggles are recommended to keep fiberglass dust away from the eyes.

How difficult is it to transport composite pilings at the job site?

Composite piles are significantly lighter than wooden piles and can typically be transported and placed by hand. If it is necessary or convenient to use machinery to lift or transport composite pilings, note that the slick and smooth outer surface will behave differently than that of wooden pilings. Pay special attention to the possibility of strap slippage.

How difficult is it to cut or drill composite pilings?

Composite pilings are incredibly tough, and will devour carbon steel blades and bits like candy. At a minimum, carbide-tipped tooling is required. Better yet, diamond-tipped tooling will last longer. Cost studies have indicated that diamond tooling provides a better value over the life of the tool. High speed abrasive cutting wheels prove very useful in cutting fiberglass. Gulleted/slotted blades are generally preferred over continuous rim wheels due to the ability to make faster cuts.

What are the recommended fasteners and connectors?

Composite pilings do not share the corrosive properties of pressure treated wooden pilings, and in certain applications standard carbon steel or aluminum hardware may be considered in lieu of stainless steel or hot-dip galvanized. Nails and screws are not recommended fastening devices for composite pilings; bolts and nuts are required to ensure secure connections.

Should composite pilings be filled?

Hollow composite pilings exhibit similar performance to wooden pilings. If additional stiffness is desired, the pilings may be filled with sand or non-shrinking concrete before or after installation.

How can composite piling sections be connected?

If longer piling lengths are required, piling sections may be connected together with a connector kit. This very simple connection kit avoids the use of any corrodible metal hardware and can be implemented before or during the driving process.

How difficult is it to set composite pilings?

Composite pilings may be driven, augered, or jetted using the same processes and equipment as for wooden pilings.

A note is in order regarding the use of any hollow pilings versus a solid piling. The ultimate piling bearing capacity is a function of the soil-to-shaft resistance plus the soil-to-toe resistance. As one would expect, a hollow piling will have lower toe resistance due to its lower toe surface area but will have a higher soil-to-shaft resistance due to the dual sided soil contact. Driven pilings typically exhibit higher shaft resistance than augered or jetted pilings, and the hollow pilings may suffice for these applications without modification. Augered or jetted pilings, by contrast, exhibit lower shaft resistance because of the larger diameter piling hole, and the toe resistance becomes a more critical factor. For these applications, the use of a toe cap may be appropriate. If a toe cap is used, drilling a ½" hole in the piling below the anticipated water line will overcome any buoyancy issues that arise.

How do you implement floating dock connections?

As with wooden pilings, floating dock connections to composite pilings should be implemented with roller guides. Non-roller hoop guides will eventually wear the surfaces of pilings.

What is the cost difference between Fortress Pilings and other options such as wood, steel or concrete?

In some cases, Fortress Pilings are initially more expensive and in other cases less. To get a true sense of the value, look at the overall cost of your project and consider the small % increase you may spend on Fortress Pilings. You know that you will eventually have to replace wooden piles because of either rot or insect/worms. A steel pile will rust and a concrete pile will crumble. The life cycle cost is much lower with Fortress Pilings. Other benefits include the fact that Fortress Pilings will not leach harmful chemicals into the environment and will require less equipment to handle because of the difference in weight compared to other types of pile. Overall, Fortress Pilings is the best, most cost-effective choice.

Contact Us

Fortress Pilings are widely distributed and readily available. Call us or visit us online for more information. Do you have a question or a specific application? Complete engineering support is just a phone call away.

229.228.7700

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