FIVE STAR PRODUCTS, INC.
Rehabilitation & Stabilization for
Marine Facilities & Underwater Structures

Marine Encapsulation Systems

For use in hostile marine environments.

Don't Replace. Restore.

Most trusted to provide the total solution™
FRP Pile Rehabilitation Jackets

Meeting the challenge in hostile marine environments such as exposure to ice, floating debris, chemical pollution, oils, acids, salt water and tidal action.

Five Star® PileForm™ F FRP (Fiberglass Reinforced Plastic) pile rehabilitation jackets meet and exceed marine engineering specifications for use in hostile marine environments where exposure to ice, floating debris, chemical pollution, oils, acids, salt water and where tidal action may occur. PileForm™ F FRP Pile Rehabilitation Jackets are available in translucent or may be gel coated to any specified color.

These fiberglass encasement jackets are field tested and proven in actual marine conditions by experienced commercial divers and engineers. Developed to offer ease of installation you are more productive on your projects with positive support to bottom line effectiveness. And you will experience that productive repeatability, reliability and consistency every time. But don’t stop with our pile solutions; we engineer our products with the kind of science that is geared to overcome the difficulty in marine environments. We develop what our customers require to complete their work with excellent results! You’ll find more details about each of the offerings in this brochure on our website.

USES

- For application around timber, steel or concrete pile.
- Available in permanent reusable varieties that can be assembled topside or in the water.
- Permanent repair of steel, timber or concrete marine piles.
- Offshore platform risers and platform legs.

FEATURES

- Engineered for easy installation so projects go faster
- Lightweight for easy maneuvering by divers
- Easy to install in or out of the water
- Non-corrosive
- Excellent solvent and chemical resistance
- High abrasion and impact resistance
- High-strength with interlocking tongue and groove closures available for any pile size
- Safe for use in marine environments
- Handmade in the USA with a quick manufacturing turnaround time

Pile Encapsulation System

- Epoxy coated mesh
- Type 316 SS self tapping screw
- Nylon ratchet straps every 12-18" for external bracing while pumping, remove afterward.
- Self tapping stainless steel screws every 6'
- PileForm™ F jacket extends approx. 2' below mud line
- Contour of original pile
- Ocean floor
Sizing and Configuration

PileForm™ F FRP jackets can be manufactured in lengths from 1 to 20 feet (0.30 to 6.10m) with nominal and minimum wall thicknesses of 1/8 inch (0.32cm) to 1/2 inch (1.27cm), or greater.

An engineering specialist will work with you to create the length and thickness required for your specific application.

Jacket closures are tongue and groove.

### PileForm™ F FRP Pile Rehabilitation Jackets

Your cost effective alternative to the high expense of driving new piles. Plus, FRP does not add any substantial weight to the piling. FRP jackets can be wrapped around a deteriorated pile to create an impervious layer of high confining pressure. Then the annular space is filled with an appropriate Five Star® cementitious or epoxy fill to penetrate all voids and cracks in the pile. This provides a much stronger and stable pile which is resistant to the constantly harsh marine environment.

Commercial structures such as piers, docks, and bridges rely on the incredible strength of their substructure. FRP jackets address the constant threat of the harsh marine environment. Don't trust your project to anything less than Five Star® Marine products and systems. Products offered range from initial preventive measures to full structural rehabilitation. Whether rehabilitating one pile or an entire structure, Five Star® Marine is the only manufacturer providing Total Care Solutions.

### Professional Engineering Support

Five Star® professional support engineers will help you consider a number of design elements for the perfect custom solution and are available for job site assistance when required.

**Call for a free consultation:**

1.800.243.2206

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**Flexural Strength, ASTM D 790** 34,000 psi (230 MPa)

**Flexural Modulus, ASTM D 790** 1.0 x 10^6 psi (6.9 GPa or 6,900 MPa)

**Ultimate Tensile Strength, ASTM D 638** 20,000 psi (137.9 MPa)

**Tensile Modulus, ASTM C 638** 1.5 x 10^6 psi (10,342.1 MPa)

**Elongation, ASTM D 638** 1.6%

**Izod Impact (Notched), ASTM D 256** 20 ft lbs/inch

**Barcol Hardness, ASTM D 2583** 40-50

**Water Absorption, ASTM D 570** < 0.3%

**Standard Color** Translucent

**Wall Thickness (nominal and minimum)** 1/8" to 1/2"

**UV Resistance, Carbon Arc Weathering, ASTM G153-04** 500 Hours Pass (No Detrimental Effect)
**Cementitious & Epoxy Fill Materials**

**Fluid Grout UW**

**High-Strength, Cementitious, Underwater Fluid Grout**

*Five Star® Fluid Grout UW* is a highly flowable, cement-based, non-metallic, non-shrink fluid grout with anti-washout admixture system designed for marine applications where pumping long distances may be required. It is formulated with Air Release technology that combines high performance with the greatest reliability. *Five Star® Fluid Grout UW* provides increased corrosion protection with migrating corrosion inhibitor technology.

**Cementitious Underwater High-Strength Grout**

**Cementitious Pile Jacket Grout**

*Five Star® Cementitious Underwater High-Strength Grout* is an underwater pump grade, cement-based, non-shrink grout for pile restoration and similar applications. It is designed for applications including pile repair, rehabilitation and restoration, grouting of underwater structures, grouting areas subject to freshwater, saltwater or brackish exposure, and the installation of anchors and dowels. Contains migrating corrosion inhibitors for superior corrosion resistance.

**Cementitious Underwater Grout**

**Pumpable Underwater Grout**

*Five Star® Cementitious Underwater Grout* is an underwater pump grade, cement-based, non-shrink grout. It is designed for applications including pile repair and restoration, grouting underwater, grouting areas subject to saltwater exposure, and installation of anchors and dowels.

**Pile Jacket Epoxy Grout LPL**

**Long Pot Life Underwater Epoxy Grout System**

*Five Star® Pile Jacket Epoxy Grout LPL* is a high-performance epoxy system designed for underwater grouting and pile encapsulation where a longer pot life system is required. *Five Star® Pile Jacket Epoxy Grout LPL* is a three-component low viscosity epoxy which is mixed with graded sand aggregate to encapsulate concrete, timber, or steel pilings. It may be pumped or poured in place.

**Pile Jacket Epoxy Grout LV**

**Low Viscosity Underwater Epoxy Grout System**

*Five Star® Pile Jacket Epoxy Grout LV* is a three component, 100% solids epoxy system specifically designed for underwater grouting and marine pile encapsulation. *Five Star® Pile Jacket Epoxy Grout LV* is a low viscosity resin & hardener system which is mixed with aggregate to encapsulate concrete, timber, or steel pilings in hostile marine environments.

**Pile Jacket Epoxy Grout HP**

**Underwater Pile Jacket Epoxy Grout**

*Five Star® Pile Jacket Epoxy Grout HP* is a multi-purpose, three component, 100% solids epoxy grout system specifically designed to cure underwater. Pile Jacket Grout HP has excellent flowability and exhibits outstanding physical properties when placed in wet or dry environments. Moisture insensitive before, during, and after cure, Pile Jacket Epoxy Grout HP also exhibits excellent adhesion to masonry, concrete, wood, steel and most structural materials; it is designed to encapsulate and provide corrosion protection for concrete, timber, or steel pilings.

**Fluid Grout UW**

**High-Strength, Cementitious, Underwater Fluid Grout**

*Five Star® Fluid Grout UW* is a highly flowable, cement-based, non-metallic, non-shrink fluid grout with anti-washout admixture system designed for marine applications where pumping long distances may be required. It is formulated with Air Release technology that combines high performance with the greatest reliability. *Five Star® Fluid Grout UW* provides increased corrosion protection with migrating corrosion inhibitor technology.

**Cementitious Underwater High-Strength Grout**

**Cementitious Pile Jacket Grout**

*Five Star® Cementitious Underwater High-Strength Grout* is an underwater pump grade, cement-based, non-shrink grout for pile restoration and similar applications. It is designed for applications including pile repair, rehabilitation and restoration, grouting of underwater structures, grouting areas subject to freshwater, saltwater or brackish exposure, and the installation of anchors and dowels. Contains migrating corrosion inhibitors for superior corrosion resistance.

**Cementitious Underwater Grout**

**Pumpable Underwater Grout**

*Five Star® Cementitious Underwater Grout* is an underwater pump grade, cement-based, non-shrink grout. It is designed for applications including pile repair and restoration, grouting underwater, grouting areas subject to saltwater exposure, and installation of anchors and dowels.

**Pile Jacket Epoxy Grout LPL**

**Long Pot Life Underwater Epoxy Grout System**

*Five Star® Pile Jacket Epoxy Grout LPL* is a high-performance epoxy system designed for underwater grouting and pile encapsulation where a longer pot life system is required. *Five Star® Pile Jacket Epoxy Grout LPL* is a three-component low viscosity epoxy which is mixed with graded sand aggregate to encapsulate concrete, timber, or steel pilings. It may be pumped or poured in place.

**Pile Jacket Epoxy Grout LV**

**Low Viscosity Underwater Epoxy Grout System**

*Five Star® Pile Jacket Epoxy Grout LV* is a three component, 100% solids epoxy system specifically designed for underwater grouting and marine pile encapsulation. *Five Star® Pile Jacket Epoxy Grout LV* is a low viscosity resin & hardener system which is mixed with aggregate to encapsulate concrete, timber, or steel pilings in hostile marine environments.

**Pile Jacket Epoxy Grout HP**

**Underwater Pile Jacket Epoxy Grout**

*Five Star® Pile Jacket Epoxy Grout HP* is a multi-purpose, three component, 100% solids epoxy grout system specifically designed to cure underwater. Pile Jacket Grout HP has excellent flowability and exhibits outstanding physical properties when placed in wet or dry environments. Moisture insensitive before, during, and after cure, Pile Jacket Epoxy Grout HP also exhibits excellent adhesion to masonry, concrete, wood, steel and most structural materials; it is designed to encapsulate and provide corrosion protection for concrete, timber, or steel pilings.
**Structural Concrete® Underwater PG**

High Early Strength Pump Grade Underwater Repair

*Five Star Structural Concrete® Underwater PG* is a high early strength, single component, permanent concrete repair material designed for pumping underwater. This concrete repair material features excellent pumping properties and minimal washout during large volume placements underwater and is designed for placement in tidal zones and underwater. *Five Star Structural Concrete® Underwater PG* provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor.

**Mortars and Concrete**

**Structural Concrete® Underwater HP**

Hand Applied Underwater Repair

*Five Star Structural Concrete® Underwater HP* is a rapid strength gain, permanent concrete repair material intended for underwater application by hand or trowel. This concrete repair material allows small volume underwater hand placements with minimal washout. It is designed for placement in tidal zones and underwater where application thickness may range from one-half inch (13 mm) to several inches in a single installation.
HP Anchor Gel
Epoxy Acrylate Anchor Bolt Adhesive

Five Star® HP Anchor Gel is a 100% solids, all weather, solvent-free structural epoxy acrylate anchoring adhesive. Using the latest technology, Five Star® HP Anchor Gel has been engineered to gun down to -15°F (-26°C), set up quickly in damp and water-filled holes and attain high early strength.

PileForm™ Joint Filler
Underwater Joint and Seam Filler

Five Star® PileForm™ Joint Filler is a one component, 100% solids, solvent-free adhesive and void filler for use on multiple substrates in continuous contact with water. This product is suitable for use in both fresh and saltwater. Five Star® PileForm™ Joint Filler can be used to fill voids or gaps of up to 3/4”. Perfect as a sealer/adhesive for use with PileForm™ F Fiberglass Reinforced Jackets and for bridging marine material transitions and joints and seams.

Splash Zone™
Underwater Epoxy Mastic
Coating

Five Star® Splash Zone™ is a 100% solids, two component epoxy compound used to protect metal, wood and concrete against corrosion and deterioration from salt or fresh water. Five Star Splash Zone™ is designed for underwater or tidal zone placements.

RS Anchor Gel
Rapid Set Epoxy Gel Adhesive

Five Star® RS Anchor Gel is a rapid setting, two component, 100% solids structural epoxy for anchoring rods, bars and bolts in concrete, as well as filling cracks and setting ports for epoxy injection. Five Star® RS Anchor Gel is a non-sag, moisture insensitive epoxy adhesive that can be used for both vertical and horizontal installations. This system offers chemical resistance, excellent adhesion and rapid strength gain.

Underwater Epoxy Gel
Epoxy Gel Adhesive

Five Star® Underwater Epoxy Gel is a multi-purpose, two component, 100% solids, moisture insensitive structural epoxy adhesive used in filling cracks up to 1/2 inch (13 mm). Ideal for steel, concrete, and masonry applications, Five Star® Underwater Epoxy Gel is a smooth, nonabrasive gel that can be pressure injected or hand applied.
Erosion Control Products

PileForm™ ABMs – Articulating Block Mat

Five Star PileForm™ ABMs are superior geo-fabric articulating block mats, that exceed engineering specifications for use in severely hostile marine environments. These erosion control revetments flex (articulate) with changing soil and water conditions. Five Star PileForm™ ABM material is a spun-bond polyester weave.

PileForm™ SPB – Scour Protection Bags

Five Star PileForm™ SPBs are superior geo-fabric grout bags which exceed engineering specifications for use in severely hostile marine environments. Ice, floating debris, chemical pollution, oils, acids, salt water and tidal pumping and wave action are no threat to the PileForm™ SPBs. PileForm SPB material is spun bond polyester weave.

Pile Repair Accessories

FNTT Ports
Foam Seal
Standoffs
Friction Clamps
Mesh/Rebar
Stainless Steel Screws
Nylon Ratchet Straps
Overfill Troughs
Soffit Assemblies
Upset Cavities
Brackets for External Bracing
High Pressure Concrete/Epoxy Hose

Don’t take the risk of do-overs or problem projects. Go with the proven solution line of products.

Under, In or Near the Water: Five Star marine systems have you covered!
About Five Star® Marine Products

Five Star® Products, Inc. is the industry leader in the development of systems and products designed for the rehabilitation and stabilization of marine facilities and underwater structures. All of our products are designed and field-tested by experienced commercial divers and engineers with an emphasis on ease of installation, reliability, safety and consistency.

From preventative measures to full structural rehabilitation, Five Star’s comprehensive range of products and services offers the solution you need for today’s harsh marine environments. With an outstanding track record of customer satisfaction, our staff of commuted, experienced personnel is available for job site assistance whenever needed.

Five Star® Products, Inc. has been a top-tier supplier of high-performance cement and epoxy-based products for the industrial, infrastructure, commercial and marine markets since 1955.

For worldwide availability, additional product information and technical support, contact by our local Five Star® sales representative, or call Five Star® Products’ Engineering and Technical Service Center at 1.800.243.2260

WARRANTY: “FIVE STAR PRODUCTS, INC. (FSP) PRODUCTS ARE MANUFACTURED TO BE FREE OF MANUFACTURING DEFECTS AND TO MEET FSP’S CURRENT PUBLISHED PHYSICAL PROPERTIES WHEN APPLIED IN ACCORDANCE WITH FSP’S DIRECTIONS AND TESTED IN ACCORDANCE WITH ASTM AND FSP STANDARDS. HOWEVER, SHOULD THERE BE DEFECTS OF MANUFACTURING OF ANY KIND, THE SOLE RIGHT OF THE USER WILL BE TO RETURN ALL MATERIALS ALLEGED TO BE DEFECTIVE, FREIGHT PREPAID TO FSP, FOR REPLACEMENT. THERE ARE NO OTHER WARRANTIES BY FSP OF ANY NATURE WHATSOEVER, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IN CONNECTION WITH THIS PRODUCT. FSP SHALL NOT BE LIABLE FOR DAMAGES OF ANY SORT, INCLUDING PUNITIVE, ACTUAL, REMOTE, OR CONSEQUENTIAL DAMAGES, RESULTING FROM ANY CLAIMS OF BREACH OF CONTRACT, BREACH OF ANY WARRANTY, WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR FROM ANY OTHER CAUSE WHATSOEVER. FSP SHALL ALSO NOT BE RESPONSIBLE FOR USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT HELD BY OTHERS.”

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