Expedient Pile Repair
Solicitation Number: W912HZ-5316-2373

Repair and protective technologies for damaged and/or deteriorated timber, concrete and steel marine piles

Prepared for:
U.S. Army Corps of Engineers

Submitted by:
Five Star Products, Inc.

April 1, 2016
# Table of Contents

INTRODUCTION .......................................................................................................................... 1

OVERVIEW ................................................................................................................................... 1

Section A – Contact Information: ................................................................................................... 2

Section B – Company Information: ................................................................................................ 3
   About Five Star Products ............................................................................................................ 3
   International ................................................................................................................................ 3
   Five Star Products is Proud to be ISO 9001 - 2008 Certified ..................................................... 4

Section C – Product Description: .................................................................................................... 4
   Section C-1 – Structural Capacity Restoration: .......................................................................... 5
   Section C-2 – Installation: ........................................................................................................... 6
   Section C-3 – Shelf Life of Repair Materials:............................................................................. 6
   Section C-4 – Adaptability: ......................................................................................................... 6

Section D – Technical Data: ........................................................................................................... 7

Section E – Environmental & Safety: ............................................................................................. 7

Section F – Transportation: ............................................................................................................. 9

Section G – Availability: ................................................................................................................ 9

Section H – Federal Contracts: ....................................................................................................... 9

Section I – Past Performance References: .................................................................................... 10

Section J – Literature: ................................................................................................................... 11

Appendix ....................................................................................................................................... 12
   Product Data Sheets .................................................................................................................. 12
INTRODUCTION

The Corps of Engineers requires product/system information for expedient repair technologies for damaged and/or deteriorated timber, concrete and steel piles that are part of overwater pier/wharf structures.

Any variety of outside influences such as marine organisms, rot, and impact can result in reduced load allowances and usability for pier structures. This white paper will provide background, insights, and technical information to address these marine pile concerns through proven solutions that are cost effective and practical.

OVERVIEW

Five Star® marine products are field-tested by experienced commercial divers and engineers; the very construction professionals who depend upon these products to work. Five Star develops systems and products designed for the rehabilitation and stabilization of marine facilities and underwater structures. All products in this category are engineered to meet the many challenges in the marine environment; variations in tidal heights, currents, and a range of marine environments. Five Star marine product solutions are easy to install, and assure reliability and consistency. To support these products, Five Star maintains a field engineering support group and a research laboratory available to customize products for unique applications.

While commercial off-the-shelf (COTS) technologies such as pile jacketing can provide a quick and less costly alternative to pile replacement in these situations, other technologies can expediently reinforce a pile back to its original structural capacity. This white paper will address the alternatives as well as:

- Ability to rapidly restore the pile's axial- and flexural capacities
- Speed and ease of installation
- Low logistics for tools and materials
- Time from installation to achieving full pile capacity
- Functional in both fresh- and saltwater environments
- Adaptability of the repair method to varied pile sizes, shapes, materials, and levels of degradation
- Shelf life of repair materials

Unique aspects required for military expeditionary operations include:

- Repair of damage required for a 3- to 10-feet length of pile within the surf zone; i.e. full-length repair to the mud line is not required however the system can be used for full length encapsulations.
- Restitution of structural capacity is the priority. Protection from deleterious effects such as water penetration, rot, or marine borers is secondary priority.
- Longevity of the repair beyond 3 months is not a priority.
Section A – Contact Information:

Five Star Products
60 Parrott Drive
Shelton, CT 06484

Phone: 203 336 7900
Fax: 203 336 7930

Tax ID – 06-1036407
DUNS # - 82-463-7375

Contacts:

Bobby Carlson
Business Development Manager – Marine, Ports & Piers
Mobile: 862-268-4039
E-mail: CarlsonB@FiveStarProducts.com

Debbie O’Connor
Sales Administration
Mobile: 203 258 1788
E-mail: OConnorD@FiveStarProducts.com
Section B – Company Information:

About Five Star Products

Five Star Products, Inc. is a team of professional specialists who inspire practical and creative industrial construction and rehabilitation solutions. Built on over five decades of innovative leadership, Five Star Products, Inc. holds a singular focus to provide solutions that meet the ever-increasing demands of modern industrial construction. When it comes to harsh conditions and environments, your installations must perform. Professionals in the industrial, infrastructure, marine, and commercial industries depend on our product solutions every day across the world. Five Star Products, Inc. provides a comprehensive support system including technical, specification and customer support with an unsurpassed record in the industry. Customers can be confident they will be supported every step of the way with superb expert technical service and by a network of certified distributors and licensees.

Our proprietary formulations include high-performance cement and epoxy-based products developed specifically for challenging environments and applications. Our renowned high performance, precision, non-shrink Five Star® machinery grouts, structural repair mortars, and anchoring and foundation systems have proven to be the products of choice among engineers and specifiers who are responsible for significant projects and cannot afford to be anything but successful.

It’s not just a fact that we have been serving industry since 1955; it’s that we’ve done so with a superior record of achievement for our customers. A great deal has happened since the inception of Five Star Products, Inc. Today, our products are produced worldwide in strategically located manufacturing facilities under a strict quality control system that conforms to the ISO9001-2008 standard.

Since the company began as The Nash Babcock Engineering Company in 1955, founded by H. Nash Babcock, the company’s focus has been to develop products that industrial and commercial customers can trust. Mr. Babcock steered the engineering consulting firm into product development and received more than 100 patents worldwide. As a result of 30 years of growth and an expanding international customer base, the company was renamed Five Star Products, Inc. in 1985 and began marketing an array of precision grouting, waterproofing and concrete restoration products for industrial use. Five Star Products Inc. continues its seamless commitment to provide technically advanced products of quality and reliability to meet customer needs. Advanced Technology from Advanced Thinking.™

International

The Five Star® global network assures a broad international presence. The customer advantages are hands-on assistance for international project specifications, on-site technical support and product availability to all points overseas.

Five Star® provides products and technical support to many of the most demanding industries throughout the world, including power generation, petrochemical, oil and gas production and transmission, pulp and paper, mining and metals, heavy industry and infrastructure. Five Star® customers benefit from our dedicated engineering and technical support teams. We believe the importance of technical expertise is of the greatest value to customers. Five Star® also understands the vital importance of fostering creative know-how to assure innovative solutions.
across our spectrum of products. As a result, Five Star® machinery grouts and concrete repair products have been used in some of the world’s most recognizable and prominent projects.

Five Star Products is Proud to be ISO 9001 - 2008 Certified

Quality Policy

Five Star Products goal is to continuously improve the quality of our products and services in order to meet the needs of our customers and other interested parties. We insist that this goal be achieved in a professional and ethical manner.

Each employee is responsible and accountable for the quality of his/her work and we favor suppliers who have outstanding quality assurance programs.

Section C – Product Description:

Based on the scope of this RFI, Five Star Products are proposing six products from our Marine line that when used together as a system provide pile rehabilitation and protection timber, concrete, and steel piles. Please see attached Technical Data Sheets, SDS sheets, Design-A-Spec (installation sheets) at the end of this white paper. General descriptions of these products are as follows:

1. **PileForm™ F Fiberglass Reinforced Plastic (FRP) Pile Jacket:**
   Five Star PileForm F fiberglass reinforced plastic (FRP) 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. Five Star PileForm F jackets are available in translucent or may be gel coated to any specified color. PileForm™ F fiberglass pile jackets are manufactured in 1’ to 20’ long sections with wall thickness up to 1/2” as required; custom sizes outside these ranges are available. PileForm™ F pile jackets are manufactured under a strict 16-point quality control procedure using the highest quality raw materials, ensuring consistent product quality and long working life.

2. **Five Star® 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 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.
3. **Five Star® 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.

4. **Five Star Structural Concrete® Underwater PG (pump grade):**
   **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.

5. **Structural Concrete® Underwater HP (Hand Pack):**
   **Hand Pack 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.

6. **Five Star Marine® Pile Jacket Grout HP:**
   **Underwater Pile Jacket Epoxy Grout.** Five Star® Pile Jacket Grout HP is a 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 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.

**Section C-1 – Structural Capacity Restoration:**

Structural repairs of deteriorated timber, concrete and steel piles have been accomplished with varying methods and technologies over the years. In the case of timber piles some university testing and state department of transportation testing has been done. To date we have not conducted or authorized a third party to perform a comprehensive testing program. We are in the process of drafting a program and will be soliciting quotations from test agencies and universities to perform the testing. The testing that we are aware of was performed by Rutgers University in 2003. Multiple manufacturers’ products were tested in a variety of different configurations. The repaired piles were tested in a cantilever type condition by fixing one end of the pile while applying a lateral load at the other end. The repaired piles used Fiber Reinforced Plastic jackets or forms with epoxy grout placed in the annulus between the existing pile and the interior surface of the FRP jacket. In most cases, some type of reinforcement was used to improve the strength of the system. The reinforcement came in the form of reinforcing steel, carbon fiber rods, and carbon mesh.
Among all repair techniques, piles repaired with FRP jackets and epoxy grout annulus reinforced with steel rebar performed the best. The performance improvement in bending was about 50% greater in capacity compared to an unrepairsed existing timber pile of the same size.

Texas A & M University has also conducted testing on timber piles that had experienced reduction in cross sectional area due the “hour glassing” effect. In this study, the repaired piles used FRP jackets, epoxy or cementitious grout in the annulus, a reinforcement grid comprised of a carbon fiber material. One of the repaired piles used cementitious grout in the annulus with steel reinforcement and FRP jackets. In this study, the piles were tested in bending. The piles were placed horizontally and simply supported at the ends. Equal loads were applied at equal distances from the mid-point of the pile. The results of this testing indicated that the repaired piles exceeded the bending strength of a control pile, (100% of cross sectional area intact), by at least 2 times.

**Section C-2 – Installation:**
The typical installation of the FSM PileForm F System requires the following steps.

1. Determine pile dimensions; diameter and length
2. Add the required annulus. Typically 1” Example: Pile diameter is 14” +1” annulus = 16” Pile Encasement.
3. Clean piles of marine growth and all unsound materials.
4. Select proper size PileForm F Encasement based on information collected in Item 2.
5. Please FSM Joint Compound into female grooved side of PileForm F Encasement
6. Please PileForm F Encasement around the cleaned pile
7. Engage Tongue into Groove using ratchet straps
8. Secure with Stainless Steel Screws at 6” O.C. along the length of the Tongue and Groove Closure
9. Install temporary bottom seal
10. Fill annulus between existing pile and FSM PileForm F Encasement with FSM Pile Jacket Epoxy Grout; HP, LV or LPL
11. Allow approximately 24 hours to cure. Note: This is assuming 72 degrees F

**Section C-3 – Shelf Life of Repair Materials:**
Shelf life of the FSM Epoxy Grouts is 1 year in un-opened containers. However this may be extended providing samples are sent to the FSM Lab for evaluation.

The shelf life of the FSM PileForm F Encasements is as much as 20 years.

**Section C-4 – Adaptability:**
1. FSM PileForm F ROUND Encasements can be designed to allow for a change in diameter of 1”. Example: A 16” PileForm F ROUND Encasement can be reduced to 15” diameter (possibly smaller) and increase to 17” diameter.
2. FSM PileForm F SQUARE Encasements can be reduced in dimension by cutting the sides and overlapping. These encasements can converted to rectangles using the same technique.
3. FSM can also provide 90 degree corner pieces and flat panels that can be cut to fit many different pile conditions.
Section D – Technical Data:

Typical material costing is dependent on size of jacket (diameter, thickness, shape, and length) and type and annular size of material fill (cementitious or epoxy). In very general terms material costs typically range from $90 to $120 per linear foot for system consisting of rehabilitation jacket and fill material. Installed or In-Place costs tend to run 2 to 3 times that estimate. Five Star technical team can consult with USACE personnel to determine the optimal solution based on both utility performance specifications and cost.

Section E – Environmental & Safety:

For the six products that are inclusive with this RFI, the following is a general discussion of the safety requirements for Personal Protective Equipment required and disposal considerations for each product. Please also see the SDS sheets for each product, except for the PileForm F Jackets which do not require a SDS sheet, attached at the end of this report:

1. **PileForm™ F Fiberglass Reinforced Plastic (FRP) Pile Jacket:**
   - Tight fitting eye protection as well as impervious gloves and impervious clothing should be worn. Handle in accordance with good industrial hygiene and safety practice.

2. **Five Star® Pile Jacket Epoxy Grout LPL consisting of 3 Components:**
   - **Component A (resin).** Face shield and safety glasses. Use equipment for eye protection that meets the standards referenced for OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment. Wear protective gloves. Rubber or polyethylene material is recommended. Consult manufacturer specifications for further information. Wear protective clothing. Clothing with full length sleeves and pants should be worn. Handle according to established industrial hygiene and safety practices. Provide readily accessible eye wash stations and safety showers. Wash at end of shift and before eating, smoking, or using the toilet. Remove contaminated clothing and launder or discard. The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

   - **Component B (hardener).** Wear chemical safety goggles and full face shield. Ensure that eyewash stations and safety showers are close to the workstation location. Use equipment for eye protection that meets the standards referenced for OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment. Wear protective gloves. Rubber or polyethylene material is recommended. Consult manufacturer specifications for further information. Wear protective clothing. Clothing with full length sleeves and pants should be worn. Wear respiratory protection. If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator with organic vapor cartridge, or self-contained breathing apparatus must be sued when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators. The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.
• **Component C (aggregate).** Tight fitting eye protection as well as impervious gloves and impervious clothing should be worn. Handle in accordance with good industrial hygiene and safety practice. Always wash your hands immediately after handling this product, and once again before leaving the workplace. Wear suitable protective clothing. Wash contaminated clothing before reuse. If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations. This material as supplied is not a hazardous waste according to Federal regulations (40CFR261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered.

3. **Five Star® Underwater High-Strength Grout:**
   
   • Tightly fitting safety goggles, impervious gloves, and impervious clothing should be worn when using product. If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations. Handle according to established industrial hygiene and safety practices.

4. **Five Star Structural Concrete® Underwater PG (pump grade):**
   
   Tightly fitting safety goggles, impervious gloves, and impervious clothing should be worn when using product. If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations. Handle according to established industrial hygiene and safety practices.

5. **Structural Concrete® Underwater HP (Hand Pack):**
   
   Wear personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Do not breathe dust. Prevent contact with skin, eyes, and clothing. Wash thoroughly after handling.

6. **Five Star Marine® Pile Jacket Grout HP:**
   
   Face shield and safety glasses. Use equipment for eye protection that meets the standards referenced for OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment. Wear protective gloves. Rubber or polyethylene material is recommended. Consult manufacturer specifications for further information. Wear protective clothing. Clothing with full length sleeves and pants should be worn. Handle according to established industrial hygiene and safety practices. Provide readily accessible eye wash stations and safety showers. Wash at end of shift and before eating, smoking, or using the toilet. Remove contaminated clothing and launder or discard.
Section F – Transportation:
For transport of the jackets, the pallets are custom built for the jackets and usually about 6 inches longer than the longest length of the jacket. The width and height depend on sizes and quantities. They are not shrink wrapped. To secure the jackets we add outside braces at the corners of the pallets much like an open crate. None of our pallets are stackable and we use 40” x 48” pallets when not being custom built. All bagged items are 56 bags per pallet on 40” x 48” pallets and they are shrink wrapped with a pallet cover. This would be the UW HS Grout, FSSC UW PG, and the FSSC UW HP. All epoxy products (pailed resins and bagged aggregates) would be palletized as follows:

- LPL Epoxy Grout & HP Pile Jacket Epoxy Grout
- Resin – 36 pails per pallet
- Hardener – 36 pails per pallet
- Sand/aggregate – 60 bags per pallet

The packaging meets with DOT requirements and the Bill of Ladings are marked accordingly.

Section G – Availability:
At the request of the United States Government and in the interest of National Security; Five Star Products / Five Star Marine will put orders for materials on a Priority Build List. This will include operating the production facility overtime to accommodate the requirements of the project. If needed we will also work with other suppliers of these materials to outsource and increase production capacity.

The typical production timeline for FSM PileForm F Encasements is 14 – 21 days from receipt of order.

FSM Pile Jacket Epoxy Grouting Materials are in stock and available upon request.

Section H – Federal Contracts:

NWS Yorktown, Yorktown, VA. Seaward Marine Corp.

Contact: Bill Spallina, Phone: 757-558-3939
Products: FSM PileForm F Encasements
FSM Pile Jacket Epoxy Grouts

Groton Submarine Base, Groton, CT. Triton Marine Corp.

Contact: Paul Johnson, Phone: 360-731-6495
Products: FSM PileForm F Encasements
FSM Cementitious Underwater High Strength Grout
Intrepid Pier Museum, NY, NY. Spearin, Preston, Burroughs.

*Contact:* Patrick Cumiskey, Phone: (973) 902-6754  (Note: Patrick is now with Schiavone Construction.)

*Products:* FSM PileForm F Encasements

Pier Charlie at Guantanamo Bay, Cuba – Orion Contracting

*Products:* FSM PileForm F Encasements/Soffits

---

**Section I – Past Performance References:**

NWS Earle, Colts Neck, NJ. Seaward Marine Corp.

*Contact:* Bill Spallina, Phone: 757-558-3939

*Products:* FSM PileForm F Encasements

FSM Pile Jacket Epoxy Grouts


*Contact:* Paul Johnson, Phone: 360-731-6495

*Products:* FSM PileForm F Encasements

SCSPA (South Carolina State Ports Authority) Cape Romain Constructors.

*Contact:* Sonny DuPre, Phone: 843-884-5167

*Products:* FSM PileForm F Encasements

FSM Pile Jacket Epoxy Grouts

Jose D. Leon Guerrero Commercial Port, Guam – BME & Sons

*Products:* FSM PileForm F Encasements

FSM Pile Jacket Epoxy Grouts
Section J – Literature:
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 preventive measures to full structural rehabilitation, Five Star's comprehensive range of products and services has the solution you need for today's harsh marine environments. With an outstanding track record of customer satisfaction, our staff of committed, experienced personnel is available for job site assistance whenever you need it.

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.

FIVE STAR PRODUCTS, INC.
60 Parrott Drive
Shelton, CT 06484-4733
Phone: 800-243-2206
Fax: 203-336-7913
FiveStarProducts.com
Five Star Marine, Inc. brings to market over 25 years of developing systems and products designed for the rehabilitation and stabilization of marine facilities and underwater structures.

Product offerings from Five Star Marine are designed and field-tested by experienced commercial divers and engineers. Products are produced with a keen awareness of the importance of ease of installation, reliability and consistency.

Products and systems offered by Five Star Marine range from initial preventative measures to full structural rehabilitation. Whether rehabilitating one pile or an entire structure, Five Star Marine is the only manufacturer which provides a total solution.

Committed to maintaining an outstanding track record in customer satisfaction and meeting all project needs, Five Star Marine maintains a staff of experienced personnel available for job site assistance in the use of our products.

Five Star Marine produces industry-leading pile jackets which meet engineering specifications in severely hostile marine environments.

The PileForm™ F fiberglass pile jacket system provides superior protection against ice, floating debris, chemical pollution, oils, acids, salt water and tidal pumping. Epoxy gels and cement or epoxy fill materials available from Five Star Marine complete the rehabilitation.

PileForm™ F fiberglass pile jackets can be manufactured in 1' to 20' long sections with a wall thickness up to 1/2" as required. Basic jacket material is roven and fiberglass mat woven in a polyester resin plastic matrix. The longevity and strength of PileForm™ F jackets are derived from long glass fibers interlocked in sheets during production and from the resin system which is then rolled thoroughly into this weave.

Full concrete pile rehabilitation using the PileForm™ F system on the Savannah River Bridge-Georgia DOT.
An affiliate of Five Star Products, Inc., a company with a rich history of over 60 years offering high-performance cement and epoxy-based solutions for the industrial, infrastructure, and commercial markets, Five Star Marine, Inc. is a worldwide provider of high-performance marine pile encapsulation and protection systems specifically designed for the rehabilitation and stabilization of marine facilities and underwater structures. Our Systems provide piling restoration, corrosion protection, and pile rehabilitation jackets. In addition, Five Star Marine® also offers cementitious and epoxy fill materials, plus protective gels and adhesives, providing a total solution to pile repair needs.

**PRECISION NON-SHRINK PILE JACKET GROUTS**

**Cementitious Underwater Grout (Pumpable Underwater Grout)**
Underwater pump grade, cement-based, non-shrink grout for pile repair and similar applications.

**USES**: pile repair and restoration; grouting underwater; grouting areas subject to saltwater exposure; installation of anchors and dowels

**Underwater High-Strength Grout (Cementitious Pile Jacket Grout)**
Underwater pump grade, cement-based, non-shrink grout for pile repair and similar applications.

**USES**: pile repair, rehabilitation and restoration; grouting underwater structures and as a pile jacket fill material; grouting areas subject to freshwater, saltwater or brackish exposure; installation of anchors and dowels

**Pile Jacket Epoxy Grout (Low Viscosity Underwater Epoxy Grout System)**
Underwater grouting and marine pile encapsulation.

**USES**: marine pile repair and restoration when used with Five Star Marine® PileForm™ F Fiberglass (FRP) Jackets; engineered epoxy grouting system for corrosion protection of concrete, steel and wood marine piles; excellent adhesion to masonry, concrete, wood, steel and most marine structural materials

**Pile Jacket Epoxy Grout LPL (Long Pot Life Underwater Epoxy Grout System)**
Underwater grouting and marine pile encapsulation where a longer pot life system is required.

**USES**: marine pile repair and restoration when used with Five Star Marine® PileForm™ F Fiberglass (FRP) Jackets; engineered epoxy grouting system for corrosion protection of concrete, steel and wood marine piles; excellent adhesion to masonry, concrete, wood, steel and most marine structural materials

**Pile Jacket Epoxy Grout HP (Underwater)**
Multi-purpose, moisture insensitive epoxy grout specifically designed to cure underwater. Can be pumped or poured into place.

**USES**: Encapsulation material for concrete, steel and wood; corrosion protection for concrete, steel, and wood; pile repair and restoration

**CONCRETE REPAIR PRODUCTS**

**Structural Concrete® Underwater Handpack (Hand Applied, Rapid Strength)**
Rapid strength gain, permanent concrete repair for underwater application by hand or trowel.

**USES**: Underwater repair of concrete tanks, dams and hydraulic structures; underwater repair of concrete piles, piers, seawalls and marine structures; filling underwater concrete cavities and voids

**Structural Concrete® Underwater PG (Pump Grade Repair)**
High early strength, permanent concrete repair material designed for pumping underwater.

**USES**: large volume underwater concrete repairs; tanks, dams, marine and hydraulic structure repairs; filling underwater concrete cavities and voids

**ADHESIVES AND SEALANTS**

**Underwater Epoxy Gel (Adhesive)**
Multi-purpose, moisture insensitive structural epoxy adhesive used in filling cracks up to 1/2 inch (13 mm).

**USES**: sealing jacket seams; pressure injection of cracks in structural concrete, masonry, wood and other substrates; surface repair of non-moving cracks on new or existing structures; anchoring of bolts, dowels, pins and special fasteners; general purpose gel adhesive; re-pointing concrete block and timber drydocks

**Epoxy Adhesive LV (Low-Viscosity)**
Moisture insensitive, structural epoxy adhesive used in filling cracks and voids.

**USES**: gravity feed cracks or voids in horizontal concrete and masonry; pressure injection of cracks in structural concrete, masonry, wood and other substrates up to 1/4 inch (6 mm) wide; sealing tunnels, cable vaults, tanks and basements; gravity feed or pressure inject as void filler under equipment; binder for epoxy patching mortar of horizontal surfaces

**HP Anchor Gel (High-Performance Epoxy Underwater Anchoring Adhesive)**
High early strength, solvent-free structural epoxy acrylate anchoring adhesive.

**USES**: heavy-duty anchoring of rebar, threaded rods and epoxy-coated smooth dowels in all concrete, brick or stone masonry; best choice for structural bonding of heavy loads; grouting bolts, dowels, or pins where extremely rapid setting and fast turn-around times are needed; performs in damp or water-filled holes

**RS Anchor Gel (Rapid Set Epoxy Gel Adhesive)**
Rapid setting, non-sag, moisture insensitive structural epoxy adhesive used in filling cracks and voids.

**USES**: gravity feed cracks or voids in horizontal concrete and masonry; pressure injection of cracks in structural concrete, masonry, wood and other substrates up to 1/2 inch (13 mm) wide; sealing tunnels, cable vaults, tanks and basements; gravity feed or pressure inject as void filler under equipment; binder for epoxy patching mortar of horizontal surfaces

**Structural Concrete® Underwater Handpack (Hand Applied, Rapid Strength)**
Rapid strength gain, permanent concrete repair for underwater application by hand or trowel.

**USES**: Underwater repair of concrete tanks, dams and hydraulic structures; underwater repair of concrete piles, piers, seawalls and marine structures; filling underwater concrete cavities and voids

**Structural Concrete® Underwater PG (Pump Grade Repair)**
High early strength, permanent concrete repair material designed for pumping underwater.

**USES**: large volume underwater concrete repairs; tanks, dams, marine and hydraulic structure repairs; filling underwater concrete cavities and voids

*Continued on Next Page.*
**Product Line Card**

**Adhesives and Sealants, Continued**

**Splash Zone™ Compound (Underwater Epoxy Mastic Coating)**
Epoxy compound used to protect metal, wood and concrete against corrosion and deterioration from salt or fresh water.

**USES**: repair and protect concrete, steel, wood, fiberglass, and aluminum from salt and fresh water in splash zone, tidal zone, and waterline applications.

**PileForm™ Joint Filler (Underwater Joint and Seam Filler)**
Solvent-free adhesive and void filler for use on multiple substrates in continuous contact with fresh or saltwater. Five Star Marine® PileForm™ Joint Filler can be used to fill voids or gaps of up to 3/4”.

**USES**: fill and repair voids up to 3/4” in multiple substrates above or below the waterline; PileForm™ F Tongue-and-Groove closures; can be used as emergency water stop above or below the waterline; concrete, fiberglass, galvanized metals, pressure-treated lumber, masonry, steel, wood, wood piles; underwater mechanical penetrations; detailing filler for underwater applications.

**Structural Rehabilitation and Corrosion Control Products, Continued**

**PileForm™ F (FRP) Pile Rehabilitation Jackets**
Fiberglass reinforced plastic (FRP) pile rehabilitation jackets for use in hostile marine environments where exposure to ice, floating debris, chemical pollution, oils, acids, salt water and where tidal action may occur.

**USES**: can be used around timber, steel or concrete piles. PileForm™ F is available in permanent and reusable varieties that can be assembled topside or in the water.

**PileForm™ N Nylon Pile Jacket System**
Nylon pile jackets for use in severe hostile marine environments where exposure to chemical pollution, oils, acids, salt water and tidal action may occur.

**USES**: can be used around timber, steel or concrete piles. PileForm™ N is made of high-strength synthetic ballistic nylon and woven to create a water-permeable fabric that can serve as both a filter and fabric form.

**Concrete System by Pilecap, Inc.® (Concrete Piling Restoration)**
100% structural jacket designed to repair severely spalled and damaged sections. Can be injected with Five Star® Grout or Five Star® Epoxy to fill voids and damaged areas.

**USES**: long-term repair of concrete marine piles.

**PileForm™ W Retrowrap™ HD (Heavy Duty) Corrosion Control System by Corrosion Control International**
Heavy-duty, multi-scrim wrap around corrosion protection system used for inshore splash zone and underwater corrosion protection for piles, pipelines and risers. Totally encapsulates and protects the substrate without the use of primers, fillers or tapes.

**USES**: easily installed retrofit installation for corrosion protection of subsea pipelines and jetty piles.

**Erosion Control Products**

**PileForm™ ABM (Articulating Block Mat)**
Superior geo-fabric articulating block mats for use in severely hostile marine environments. These erosion control revetments flex (articulate) with changing soil and water conditions and can be cast as easily under water as in-the-dry.

**USES**: underpinning and scour protection where the erosion of foundation materials results in the undercutting of bridge piers and abutments.

**PileForm™ SPB (Scour Protection Bags)**
Superior geo-fabric grout bags for use in severely hostile marine environments where ice, floating debris, chemical pollution, oils, acids, salt water and tidal pumping and wave action are a threat.

**USES**: underwater forms for void repair; rip rap to prevent undermining; pipeline support to fill scour areas; channel lining to prevent future scouring; cable protection to cover cable and providing anchoring; waterfront protection to dissipate wave action along riverfronts, canals or beaches.

**FIVE STAR MARINE, INC.**
60 Parrott Drive
Shelton, CT 06484-4733 U.S.A.
Phone: +1 203-336-7900
Toll-Free: 1-800-243-2206 (U.S.)
Fax: +1 203-336-7913
FiveStarProducts.com
Specifications subject to change.

PileForm™ is a registered trademark of Five Star Marine, Inc.
PILECAP® is a registered trademark of PILECAP, Inc.
Retrowrap™ and Geon™ are registered trademarks of Corrosion Control International.

© 2015 Five Star Products, Inc.
Printed in the U.S.A. 12104 Rev. B • 102115
Appendix

Product Data Sheets
DESCRIPTION

Five Star® PileForm™ F fiberglass reinforced plastic (FRP) 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. Five Star® PileForm™ F jackets are available in translucent or may be gel coated to any specified color.

USES

- Used around timber, steel or concrete piles
- Available in permanent reusable varieties that can be assembled topside or in the water

ADVANTAGES

- Easy installation
- Lightweight for easy maneuvering by divers
- Non-corrosive
- High strength
- Excellent solvent and chemical resistance
- High abrasion and impact resistance

SIZING & CONFIGURATION

Five Star® PileForm™ F jackets are available in lengths of 1 to 20 feet (.30 to 6.1m) with wall thicknesses of 1/8 inch (.32cm) to 1/2 inch (1.27cm). Custom sizes are also available. Consult Five Star® for further details.

<table>
<thead>
<tr>
<th>Typical Properties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flexural Strength, ASTM D 790</strong></td>
<td>34,000 psi (230 MPa)</td>
</tr>
<tr>
<td><strong>Flexural Modulus, ASTM D 790</strong></td>
<td>$1.0 \times 10^6$ psi (6.9 GPa or 6,900 MPa)</td>
</tr>
<tr>
<td><strong>Ultimate Tensile Strength, ASTM D 638</strong></td>
<td>20,000 psi (137.9 MPa)</td>
</tr>
<tr>
<td><strong>Tensile Modulus, ASTM C 638</strong></td>
<td>$1.5 \times 10^6$ psi (10,342.1 MPa)</td>
</tr>
<tr>
<td><strong>Elongation, ASTM D 638</strong></td>
<td>1.6%</td>
</tr>
<tr>
<td><strong>Izod Impact (Notched), ASTM D 256</strong></td>
<td>20 ft lbs/inch</td>
</tr>
<tr>
<td><strong>Barcol Hardness, ASTM D 2583</strong></td>
<td>40-50</td>
</tr>
<tr>
<td><strong>Water Absorption, ASTM D 570</strong></td>
<td>&lt; 0.3%</td>
</tr>
<tr>
<td><strong>Standard Color</strong></td>
<td>Translucent</td>
</tr>
<tr>
<td><strong>Wall Thickness</strong></td>
<td>1/8&quot; to 1/2&quot;</td>
</tr>
<tr>
<td><strong>UV Resistance, Carbon Arc Weathering, ASTM G153-04</strong></td>
<td>Pass (No Detrimental Effect)</td>
</tr>
</tbody>
</table>

The data shown above reflects typical results based on testing at 1/8” thickness. Variations from the data shown may occur at other thicknesses.
INSTALLATION GUIDELINES

SURFACE PREPARATION:
Concrete, steel, or timber piles must be thoroughly clean and sound prior to installation of Five Star® PileForm™ F fiberglass reinforced plastic (FRP) jackets. Clean existing pilings using a minimum of 4,000 psi high-pressure washer or other mechanical means of clearing pile caps of marine growth, rust, scaling, and other contaminants.

PLACEMENT:
Five Star® PileForm™ F jackets may be of one or two-piece construction. Place PileForm™ F pile jackets to desired elevation and secure. Apply epoxy gel to all vertical or horizontal seams and secure using stainless steel self-tapping/drilling screws if joining more than one section. Establish a suitable bottom seal for jacket that will withstand the pressures developed during the placement or pumping of filler material. Bottom seal may be closed foam, oakum and expanding resin or other appropriate material. Once the end is sealed, begin filling the pile jackets with repair material using one of two methods.

1. Use a pressure pump and start pumping from the bottom via pumping ports. Space evenly and move from one end to the other as the jacket fills.

2. Use the pour method by pouring the material from the top of the jacket starting at one end and moving to the other. In many cases pouring from both sides is used to ensure even filling. Continue filling the jackets until repair material reaches within 1 inch of the tops and then stop.

(Note: Larger jackets may require external bracing and strapping on the outside of the jacket to prevent bulging during placement of filler material into jacket. Place strapping system every 18 to 24 inches (45.72 to 60.96cm) along jacket length.)

After the initial set of the repair material, fill the remaining 1 inch (2.54cm) with a Five Star® Cementitious or Epoxy Grout product. This will seal the top of the jackets preventing any water from getting between jackets and fill or pile cap and fill and will prevent any problems as a result of the freeze/thaw cycle. Then, using Five Star® Splash Zone Compound, create a 45° bevel from the top of the filled jackets to the existing piles. This will create a run-off and additional seal so that no water gets trapped on the tops of the jackets.

For additional Installation instructions, please refer to Five Star® PileForm™ F Installation Guide or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

<table>
<thead>
<tr>
<th>SKU / PRODUCT CODE</th>
<th>DESCRIPTION</th>
<th>UNIT SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>32509</td>
<td>Square, Single Piece, Tongue and Groove, Translucent, 3/16&quot;, SLS</td>
<td>Call</td>
</tr>
<tr>
<td>32527</td>
<td>Square, Single Piece, Tongue and Groove, Translucent, 1/8&quot;, SLS</td>
<td>Call</td>
</tr>
<tr>
<td>32510</td>
<td>Round, Single Piece, Tongue and Groove, Translucent, 3/16&quot;, SLS</td>
<td>Call</td>
</tr>
<tr>
<td>32528</td>
<td>Round, Single Piece, Tongue and Groove, Translucent, 1/8&quot;, SLS</td>
<td>Call</td>
</tr>
<tr>
<td>32511</td>
<td>Rectangle, Single Piece, Tongue and Groove, Translucent, SLS</td>
<td>Call</td>
</tr>
<tr>
<td>32512</td>
<td>Octagon, Single Piece, Tongue and Groove, Translucent, SLS</td>
<td>Call</td>
</tr>
<tr>
<td>32513</td>
<td>Hexagon, Single Piece, Tongue and Groove, Translucent, SLS</td>
<td>Call</td>
</tr>
<tr>
<td>32514</td>
<td>H-Beam, Single Piece, Tongue and Groove, Translucent, SLS</td>
<td>Call</td>
</tr>
<tr>
<td>32515</td>
<td>T-Beam, Single Piece, Tongue and Groove, Translucent, SLS</td>
<td>Call</td>
</tr>
</tbody>
</table>

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.”
DESIGN-A-SPEC™ GUIDELINES

PILEFORM™ F PILE JACKET

CONTENTS

► PART A - GENERAL CONDITIONS
► PART B - MATERIAL SPECIFICATIONS
► PART C - PREPARATION

This document is provided as a general guideline for consideration by contractors and engineers. While every reasonable effort has been made to ensure that this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information or for its appropriateness for any particular purpose. The user of this document remains solely responsible for the specification of all methods, materials and practices.
PART A - GENERAL CONDITIONS

1.01 SCOPE

The work covered by this document consists of furnishing all materials and performing all operations required for pile repair / encapsulation using fiberglass pile jackets.

These repairs can include, but are not limited to, chipping out loose concrete, exposing rebar, cleaning rebar, replacing or adding rebar and filling the repaired area with grout.

1.02 QUALITY ASSURANCE

The manufacturer shall have a 10 year history of use in the manufacture of fiberglass pile jackets. The manufacturer shall provide on site technical service at no cost to the engineer or contractor when sufficient advance notice is provided.

1.03 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered to the jobsite in their original, unopened packages, clearly labeled with the product identification, printed instructions and batch code.

B. Store the fiberglass jackets at 60°F to 80°F (16°C to 27°C) for at least 24 hours prior to use. Refer to the product data sheet for more information.

C. For handling instructions, refer to the Safety Data Sheet.

1.04 PROJECT / SITE CONDITIONS

A. Refer to Part C – PREPARATION, ENVIRONMENTAL CONDITIONS, or contact the manufacturer directly for any physical or environmental limitations required by the product.

PART B - MATERIAL SPECIFICATIONS

2.01 MATERIALS (FIBERGLASS PILE JACKET)

A. The pile jacket shall consist of a fiberglass mat woven in a polyester resin matrix. Wall thickness of jacket shall be 1/8 inch (+/- manufacturing tolerances) unless otherwise specified. Jacket closures shall be tongue and groove. The manufacturer shall have at least 10 years experience in the manufacture of fiberglass jackets. The manufacturer shall offer technical services and provide a representative at the job site for product training prior to product installation.
B. The fiberglass jacket shall meet all the following typical performance criteria:

1. Flexural Strength, ASTM D 790                              34,000 psi (230 MPa)
2. Flexural Modulus, ASTM D 790                             1.0 x 10^6 psi (6.9 GPa or 6,900 MPa)
3. Ultimate Tensile Strength, ASTM D 638                  20,000 psi (137.9 MPa)
4. Tensile Modulus, ASTM D 638                              1.5 x 10^6 psi (10,342.1 MPa)
5. Elongation, ASTM D 638                                 1.6%
6. Barcol Hardness, ASTM D 2583                           40-50
7. UV Resistance, Carbon Arc Weathering
   ASTM G 153, 500 hours                                   Pass (No Detrimental Effect)

C. An acceptable product that meets this criteria is: **Five Star® PileForm™ F** as manufactured by Five Star Products, Inc. Shelton, CT 06484.

---

**Diagram A: Typical Five Star® PileForm™ F Configurations**
PART C – PREPARATION

3.01 CONCRETE SURFACES

A. Completely remove all loose, delaminated and weak concrete, oil, grease, laitance, marine growth and other contaminants. Prepare concrete using acceptable mechanical means and concrete cleaners and degreasers as necessary to obtain clean, sound and rough surfaces. Coarse aggregate shall be exposed and all marine growth removed. High pressure water blasting is a minimum recommendation for conditioning surfaces.

B. All cracks shall be brought to the attention of the engineer and a determination made of whether the cracks are subject to movement. The cracks shall be repaired as directed prior to installation of fiberglass jacket and grout.

C. For more detailed information, refer to the following publication: “Selecting and Specifying Concrete Surface Preparation for Coating Polymers and Concrete Repair, ICRI Technical Guideline 310.2R.”

3.02 REINFORCEMENT

A. All reinforcing steel that has lost bond with the concrete or has more than one-half of its circumference exposed shall be undercut by at least 3/4 inch (18 mm) or two times the maximum aggregate size.

B. If more than 20% of the diameter of a reinforcing bar has been deteriorated, the bar may require replacement or will need to be spliced as directed by the engineer.

C. All reinforcement shall be rigidly secured and supported.
D. All exposed reinforcing steel shall be free of all loose scale, rust, oxidation and other contaminants. Exposed reinforcing steel may be sealed or primed if a delay occurs between surface preparation and epoxy grout placement.

3.03 JACKET PLACEMENT

A. One piece jackets are typically full circle and will fully cover the pile. Two piece jackets are typically used on square or H piles. Spacers / standoffs inside jackets are placed at regular intervals to provide the maximum support and maintain the annular space between the jacket and the pile. Spacers / standoffs may be pre-molded into jackets or an applied at job site. Spacers can be made of wood, plastic or metal. When placing spacers in the field, use a fast setting epoxy adhesive suitable for exposure to water such as Five Star® RS Anchor Gel.

B. For pumping applications, secure suitable pump ports to jacket. Mount port approximately 12 inches from the bottom of the pile. Additional ports may be needed for jacket lengths over 5 feet. Where necessary, place an additional port approximately three feet above the first port and 180º opposite the first port. If additional ports are needed alternate the placement 180º from the previous port and three feet above.

C. Use epoxy adhesive to fill the groove side of the opening. Five Star® RS Anchor Gel is an excellent rapid setting epoxy gel adhesive that can be used to seal the tongue and groove joint. RS Anchor Gel is packaged in a dual cartridge system with a static mixer tip. Insert the mixer tube into the groove and inject a generous amount of epoxy in the entire length of the groove. Hold the jacket up right next to the pile. Pull open the jacket and slip it around the pile. Allow the tongue to slip into the groove. Position the jacket to cover the area desired. Press the jacket closed and the tongue into the groove as far as it will go. Use ratcheting straps around the jacket to secure it.

D. Wooden braces, battens or strong backs, should be placed on the outside of the jacket to prevent bulging during filling. Use 2 x 4 or 2 x 6 that is about the same length as the jacket and attach one with screws to the middle of each jacket face. Place straps 12 to 18 inches apart vertically and around the braces to insure that the jacket is secure. When the jacket is in position and the straps tight use stainless steel self drilling/tapping screws to secure the tongue and groove joint. Locate the screws so that they go through both sides of the groove and the tongue. Use screws that are long enough to penetrate the jacket but not long enough to extend to the pile itself. Place screws three to six inches apart for the entire length of the jacket.

3.04 JACKET SEALING

A. Pile jackets need a seal at the bottom of the jacket to prevent the grout from leaking out of the bottom of the jacket. The choice of bottom seal can be determined by environmental restrictions, owner preference or contractor experience. The most common types include closed foam strips, oakum and resin, nylon retainers and epoxy packing. Depending on the type used it will be put in place before or after the positioning of the jacket around the pile.
B. High density foam should be placed around the interior bottom of the jacket before the jacket is placed around the pile. The foam should be of sufficient height and thickness to form a tight seal. Foam should be three to four times the thickness of the annular space and three to five inches in height. Be sure that the ends of the strips overlap when in place to prevent leaks. Secure the bottom seal with stainless steel strapping or nylon ratchet straps.

C. Jackets can also be sealed with an integral nylon sleeve. This sleeve is molded into the bottom of the jacket at the time of manufacture of the jacket. It has a water tight zipper closure and is attached to the pile below the jacket with stainless steel straps or nylon zip strapping.

3.05 FILL MATERIAL

A. Mix and place cementitious or epoxy fill material in accordance with manufacturer’s guidelines.

B. Check jacket seams, joints, ports and bottom seal for leaks during filler material installation. Seal all leaks immediately.
PILE JACKET EPOXY GROUT LPL
Long Pot Life Underwater Epoxy Grout System

PRODUCT DESCRIPTION
Five Star® Pile Jacket Epoxy Grout LPL is a three-component, 100% solids epoxy system specifically designed for underwater grouting and marine pile encapsulation where a longer pot life system is required. Five Star® Pile Jacket Epoxy Grout LPL is a low viscosity resin and hardener system which is mixed with aggregate to encapsulate concrete, timber, or steel pilings in hostile marine environments.

ADVANTAGES
- Pumpable and pourable, with adjustable aggregate
- High strength
- 100% solids, no solvents
- Long pot life for hot weather placement
- Low odor formulation

USES
- Marine Pile repair and restoration when used with Five Star® PileForm™ F Fiberglass Jackets
- Engineered epoxy grouting system offers corrosion protection for concrete, steel and wood marine piles
- Excellent adhesion to masonry, concrete, wood, steel and most marine structural materials

PACKAGING AND YIELD
Five Star® Pile Jacket Epoxy Grout is a three-component system consisting of partially filled containers of resin and hardener, and polyethylene lined bags of sand or aggregate. Product yield is approximately 1.57 cubic feet (44.5 L) of plastic with 2.5 bags 125 lbs. (56.7 kg) of aggregate, or approximately 1.85 cubic feet (52.84 L) of plastic with 3 bags 150 lbs. (68.0 kg) of aggregate.

SHELF LIFE
Two years in original unopened packaging when stored in dry conditions; high relative humidity will reduce shelf life.

<table>
<thead>
<tr>
<th>TYPICAL PROPERTIES AT 70°F (21°C) WITH 125 LBS. OF AGGREGATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength, ASTM C 579 B*</td>
</tr>
<tr>
<td>1 Day</td>
</tr>
<tr>
<td>2,000 psi (13.8 MPa)</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td>8,500 psi (58.6 MPa)</td>
</tr>
<tr>
<td>28 Days</td>
</tr>
<tr>
<td>9,500 psi (65.5 MPa)</td>
</tr>
<tr>
<td>Tensile Strength, ASTM C 307</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td>2,000 psi (13.8 MPa)</td>
</tr>
<tr>
<td>Bond to Concrete, ASTM C 882</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td>2,200 psi (15.2 MPa)</td>
</tr>
<tr>
<td>Linear Shrinkage, ASTM C 531</td>
</tr>
<tr>
<td>0.0%</td>
</tr>
<tr>
<td>Water Absorption, ASTM C 413</td>
</tr>
<tr>
<td>0.0%</td>
</tr>
<tr>
<td>Flexural Strength, (ASTM C 580)</td>
</tr>
<tr>
<td>3,000 psi (20.7 MPa)</td>
</tr>
<tr>
<td>Bond Strength to Steel, (ASTM C 882)</td>
</tr>
<tr>
<td>2,000 psi (13.8 MPa)</td>
</tr>
<tr>
<td>Working Time at 70°F (21°C)</td>
</tr>
<tr>
<td>90 minutes</td>
</tr>
</tbody>
</table>

*Materials tested per ASTM C 579 B. Rate of loading 0.25 inches per minute.

Materials tested per ASTM C 579 B. Rate of loading 0.25 inches per minute. The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result. Test methods are modified where applicable.
PLACEMENT GUIDELINES

1. SURFACE PREPARATION: All surfaces to be in contact with Five Star® Pile Jacket Epoxy Grout LPL shall be free of marine growth, oil, grease, laitance, and other contaminants. Concrete must be clean, sound, and roughened to ensure a good bond.

2. MIXING: For optimum performance, all components should be conditioned between 65°F and 85°F (18°C and 29°C) prior to use. Pour all Component B (hardener) into pail containing Component A (resin). Mix thoroughly by hand with a paddle or with a slow speed drill and paddle mixer to avoid air entrapment. Pour mixed liquids into mortar mixer (stationary barrel with moving blades). While mixing, slowly add Component C (aggregate) and mix only until aggregate is completely wet. Add Component C (aggregate) immediately after mixing Component A (resin) and Component B (hardener). Do not mix more material than can be placed in 90 minutes.

3. METHODS OF PLACEMENT: Five Star® Pile Jacket Epoxy Grout LPL may be pumped or poured into place. For vertical flow applications simply pour or pump from the top of the opening, or pump into ports. For horizontal applications, pour or pump from one side to the other. A peristaltic pump is required for pumping applications.

4. POST PLACEMENT PROCEDURES: In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.

5. CLEAN UP: Use a solvent or water and strong detergent solution on tools and equipment before material hardens. Use power washer on pump and mixing equipment. Sand may be used as an abrasive to aid in cleaning.

NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY. For more detailed placement procedures, refer to Five Star® Design-A-Spec™ installation guidelines or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

CONSIDERATIONS

- Minimum temperature of substrate is 40°F (4°C) and rising.
- Do not add solvents to increase flowability.
- Minimum age of concrete must be 5 - 7 days, depending on curing and drying conditions.
- Do not seal slabs on grade with product. Five Star® Pile Jacket Epoxy Grout LPL is a vapor barrier.

CAUTION

Component A - Irritant • Component B - Corrosive

Product is a strong sensitizer. Use of safety goggles and chemical resistant gloves are recommended. Use of a NIOSH/MSHA organic vapor respirator is recommended if ventilation is inadequate. Avoid breathing vapor. Avoid skin contact. PRIOR TO USE, REFER TO SAFETY DATA SHEET.

FIRST AID

Eye Contact: Flush immediately with water for at least 15 minutes. Contact Physician immediately. Respiratory Problems: Remove person(s) to fresh air. Skin Contact: Remove any contaminated clothing. Remove epoxy immediately with a dry cloth or paper towel. Solvents should not be used as they carry irritant into the skin. Wash skin thoroughly with soap and water. Cured epoxy resins are innocuous.

For worldwide availability, additional product information and technical support, contact your local Five Star® distributor, local sales representative, or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

<table>
<thead>
<tr>
<th>SKU / PRODUCT CODE</th>
<th>DESCRIPTION</th>
<th>#UNITS/PALLET</th>
<th>UNIT SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>32180</td>
<td>Pile Jacket Epoxy Grout LPL System</td>
<td>36 (A) 36 (B) 60 (C)</td>
<td>Resin (A): 28.5 lb. (12.9 kg) Hardener (B): 8.0 lb. Sand Aggregate (C) 3 50 lb. (22.7 kg) bags</td>
</tr>
</tbody>
</table>

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.”
SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name(s): Five Star® Epoxy Adhesive LV / Component A Resin
Five Star® Pile Jacket Epoxy Grout HP / Component A Resin
Five Star® Pile Jacket Epoxy Grout LV / Component A Resin
Five Star® Pile Jacket Epoxy Grout LPL / Component A Resin

Synonyms: Epoxy Resin, Component A

Product Use: Construction and repair of marine structures

Restrictions on Use: To be used with specific Five Star® systems.

Manufacturer/Supplier Five Star Products, Inc.
60 Parrott Drive
Shelton, CT 06484 USA

Phone #: 203-336-7900

Emergency Phone #: CHEM-TEL 1-800-255-3924
(Outside the U.S. 1-813-248-0585)

SECTION 2: HAZARD(S) IDENTIFICATION-GHS INFORMATION

Classification: Skin Irritation, Category 2
Eye Irritation, Category 2A
Skin sensitization, Category 1
Acute aquatic toxicity, Category 2
Chronic aquatic toxicity, Category 2

Label Elements/Hazard Pictograms:

Signal Word: Warning

Hazard Statements: Causes skin irritation, H315
May cause an allergic skin reaction, H317
Caused serious eye irritation, H319
Toxic to aquatic life with long lasting effects, H411

Precautionary Statements/Prevention:
Avoid breathing dust/fume/gas/mist/vapors/spray, P261
Wash skin thoroughly after handling, P264
Contaminated work clothing should not be allowed out of the workplace, P272
Avoid release to the environment, P273
Wear protective gloves/eye protection/face protection, P280
Response:
If in eyes: Rinse cautiously with water for several minutes, P351. Remove contact lenses, if present and easy to do. Continue rinsing, P338, P305, P351 If eye irritation persists: Get medical attention/advice, P337, P313
If on skin (or hair): Wash with plenty of soap and water, P302, P352
If swallowed: Rinse mouth. Do NOT induce vomiting, P330, P331.
If skin irritation or rash occurs, P333: Get medical advice/attention, P313.
Take of contaminated clothing and wash before reuse, P362
Collect spillage, P391
Get medical advice/attention if you feel unwell, P314

Storage:
Keep container tightly closed and in a dry well-ventilated space.

Disposal:
Dispose of contents/container in accordance with applicable regional, national, and local laws and regulations.

Hazards Not Otherwise Classified:
Not applicable

Ingredients with Unknown Toxicity:
Not applicable

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Ingredient(s)</th>
<th>Common Name/Synonyms</th>
<th>CAS No.</th>
<th>% wt/wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphenol A Diglycidyl Ether Resin Mixture</td>
<td>n/a</td>
<td>25068-38-6</td>
<td>80-90</td>
</tr>
<tr>
<td>C8 and C10 Alkyl Glycidly Ethers</td>
<td>n/a</td>
<td>68609-96-1</td>
<td>10-20</td>
</tr>
</tbody>
</table>

SECTION 4: FIRST AID MEASURES

Inhalation:
If inhaled: Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Consult a physician.

Eye Contact:
If in eyes: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Consult a physician.

Skin Contact:
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower for at least 15 minutes. Immediately call a poison center or doctor if irritation develops. Wash contaminated clothing before reuse.
Ingestion: If swallowed: Rinse mouth. Call POISON CENTER for most current information. Do NOT induce vomiting. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible). First Aid responders should pay attention to self-protection and use recommended protective clothing (chemical resistant gloves, splash protection).

Note to Physicians: Symptoms may not appear immediately. Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

Flammability and Explosion Information: Not available

Sensitivity to Mechanical Impact: Not available

MEANS OF EXTINCTION

Suitable Extinguishing Media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media: Not available

Protection of Firefighters: Wear self-contained breathing apparatus for fire-fighting if necessary.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Emergency Procedures: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel. Eliminate all ignition sources.

Personal Precautions: Use personal protective equipment. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. When respirators are required, select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.

Environmental Precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods for Containment: Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

Other Information: See Section 13 for disposal considerations.
SECTION 7: HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Storage: Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>ACGIH</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphenol A Diglycidyl Ether Resin Mixture</td>
<td>25068-38-6</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>C8 and C10 Alkyl Glycidil Ethers</td>
<td>68609-96-1</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

PEL: Permissible Exposure Limit  TLV: Threshold Limit Value

Engineering Controls: Not normally required.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Face shield and safety glasses. Use equipment for eye protection that meets the standards referenced for OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment.

Hand Protection: Wear protective gloves. Rubber or polyethylene material is recommended. Consult manufacturer specifications for further information.

Skin and Body Protection: Wear protective clothing. Clothing with full length sleeves and pants should be worn.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices. Provide readily accessible eye wash stations and safety showers. Wash at end of shift and before eating, smoking, or using the toilet. Remove contaminated clothing and launder or discard.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>Clear light amber liquid.</td>
</tr>
<tr>
<td>Color:</td>
<td>Light amber.</td>
</tr>
<tr>
<td>Odor:</td>
<td>Semi Sweet</td>
</tr>
<tr>
<td>Odor Threshold:</td>
<td>N/A</td>
</tr>
<tr>
<td>Physical State:</td>
<td>Liquid</td>
</tr>
<tr>
<td>pH:</td>
<td>Not available</td>
</tr>
</tbody>
</table>
Melting Point / Freezing Point: Not available
Initial Boiling Point: Not available
Boiling Point: Not available
Flash Point: 93.4 °C, 200 °F Setaflash Closed Cup ASTM D 3828
Evaporation Rate: N/A
Flammability (solid, gas): N/A
Lower Flammability Limit: N/A
Upper Flammability Limit: N/A
Vapor Pressure: 1.33 mbar
Vapor Density: 1 [Air = 1]
Relative Density: 1.10
Solubility: Slightly
Partition Coefficient: n-Octanol/Water: N/A
Auto-ignition Temperature: Not available.
Decomposition Temperature: Not available
Viscosity: 1000 cps
Percent Volatile, wt.%: 0%
VOC Content, wt.%: 0%
Density: N/A
Coefficient of Water/Oil Distribution: N/A

SECTION 10: STABILITY AND REACTIVITY
Chemical Stability: Stable under normal conditions.
Hazardous decomposition byproducts: CO, CO₂, smoke, toxic vapors
Conditions to Avoid: Amine compounds under uncontrolled conditions.
Incompatible Materials: Strong oxidizing agents.

SECTION 11: TOXICOLOGICAL INFORMATION
Acute Toxicity:
Primary Irritant Effect On the Skin: Irritant to skin and mucous membranes.
Primary Irritant Effect On the Eye: Irritating effect.
Swallowing: Can cause abdominal irritation, nausea, vomiting, and diarrhea.

Additional Toxicological Information: This product has no carcinogens listed by IARC, NTP, NIOSH, OSHA, or ACGIH as of this date, greater or equal to 0.1%

SECTION 12: ECOLOGICAL INFORMATION

Toxicity: All work practices must be aimed at eliminating environmental contamination.

Aquatic Toxicity: This material is harmful to the environment.

Persistence and Degradability: The product is partially biodegradable. Significant residue remains.


Mobility in Soil: No further relevant information available

Ecotoxicological Effects: Toxic for fish. Due to mechanical actions of the product damages may occur. The declared action may be partly caused by lack of oxygen.

Ecotoxicological Effects Remark: No further relevant information available

Additional Ecological Information: No further relevant information available

General Notes: No further relevant information available

PBT Assessment: N/A

vPvB Assessment: N/A

Other Adverse Effects: No further relevant information available

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Recommendation: The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers and liners may retain some product residues. Vapor from some product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Processing, use or contamination may change the waste disposal requirements. Do not dispose of on land, in surface waters, or in storm drains. Waste should be recycled or disposed of in accordance with regulations. Large amounts should be collected for reuse or consigned to licensed hazardous waste haulers for disposal.
ALL DISPOSAL MUST BE IN ACCORDANCE WITH ALL FEDERAL, STATE, PROVINCIAL, AND LOCAL REGULATIONS. IF IN DOUBT, CONTACT PROPER AGENCIES.

**Uncleaned Packaging**

Empty containers may contain residue and may be dangerous. Do not attempt to refill or clean without proper instructions. Empty drums should be drained and stored safely for reconditioning or recycling.

**Recommendation:**

Disposal must be made according to official regulations.

### SECTION 14: TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>US DEPARTMENT of TRANSPORTATION (DOT)</th>
<th>NOT REGULATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name:</td>
<td></td>
</tr>
<tr>
<td>Class:</td>
<td>NONE</td>
</tr>
<tr>
<td>UN #:</td>
<td>NONE</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>NONE</td>
</tr>
</tbody>
</table>

**INTERNATIONAL AIR TRANSPORTATION**

Proper Shipping Name (ICAO/IATA):

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, NOS (BISPHENOL-A EPOXY RESIN), 9, PG III

<table>
<thead>
<tr>
<th>Class:</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN #:</td>
<td>3082</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>III</td>
</tr>
</tbody>
</table>

**WATER TRANSPORTATION**

Proper Shipping Name (IMO/IMDG):

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, NOS (BISPHENOL-A-EPOXY RESIN), 9, PG III

<table>
<thead>
<tr>
<th>Class:</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN#:</td>
<td>3082</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>III</td>
</tr>
<tr>
<td>Marine Pollutant:</td>
<td>Bisphenol-A EpOXY Resin</td>
</tr>
</tbody>
</table>

### SECTION 15: REGULATORY INFORMATION

**CHEMICAL INVENTORIES**

**US (TSCA):**

The components of this product are in compliance with the chemical notification requirements of TSCA.

**CANADA (DSL):**

The components of this product are in compliance with the chemical notification requirements of NSN Regulations under CEPA, 1999.

**FEDERAL REGULATIONS**

**CANADA:**

n/a
WHMIS Classification: n/a

UNITED STATES: This SDS has been prepared to meet the US OSHA Hazard Communication Standard, 29 CFR 1910.1200

SARA Title III: No components are listed.

STATE REGULATIONS

Massachusetts
US Massachusetts Commonwealth’s Right-to-Know Las (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

New Jersey
US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Pennsylvania
US Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

California
California Prop 65: This product does not contain chemicals known to the State of California to be Carcinogenic.

SECTION 16: OTHER INFORMATION

Disclaimer: The information contained in this document applies to the specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user’s responsibility to satisfy oneself as to the suitability and completeness of this information for one’s own particular use.
SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name(s): Five Star® Pile Jacket Epoxy Grout LV/Component B Hardener
Five Star® Pile Jacket Epoxy Grout LPL/Component B Hardener
Five Star® Epoxy Adhesive LV/Component B Hardener

Synonyms: Pile Jacket LPL Epoxy Hardener, Pile Jacket LV Epoxy Hardener, LV Adhesive Hardener

Product Use: Pile Jacket Epoxy Grout LV, Pile Jacket Epoxy Grout LPL, Epoxy Adhesive LV

Restrictions on Use: To be used with specific Five Star® systems.

Manufacturer/Supplier
Five Star Products, Inc.
60 Parrott Drive
Shelton, CT 06484

Phone #: 203-336-7900

Emergency Phone #: CHEM-TEL 1-800-255-3924
(Outside the U.S. 1-813-248-0585)

SECTION 2: HAZARD(S) IDENTIFICATION–GHS INFORMATION

Classification:
Acute Toxicity – Oral, Category 4
Acute Toxicity – Dermal, Category 3
Skin Corrosion – Category 1
Eye Damage – Category 1
Sensitization – Respiratory, Category 1
Sensitization – Skin, Category 1

Label Elements/Hazard Pictograms:

Signal Word: Danger

Hazard Statements:
Harmful if swallowed, H302
Toxic in contact with skin, H311
Causes severe skin burns and eye damage, H314
May cause respiratory irritation, H335
May cause an allergic skin reaction, H317

Precautionary Statements/Prevention:
Do not breathe dust, fume, gas, mist, vapors, or spray, P260
Wash thoroughly after handling, P264
Do not eat, drink or smoke when using this product, P270
Contaminated work clothing should not be allowed out of the workplace, P272
Wear protective gloves, protective clothing, eye protection and face protection, P280
Wear respiratory protection, P284

Response:

If swallowed: Rinse mouth. Do NOT induce vomiting, P330, P331.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower, P361, P353.
If inhaled: Remove person to fresh air and keep comfortable for breathing, P340.
If in eyes: Rinse cautiously with water for several minutes, P351. Remove contact lenses, if present and easy to do. Continue rinsing, P338.
Immediately call a poison center or doctor, P310.
If skin irritation or rash occurs, P333: Get medical advice/attention, P313.
If experiencing respiratory symptoms, P342: Call a poison center or doctor, P310. Wash contaminated clothing before reuse, P363.

Storage:
Store locked up.

Disposal:
Dispose of contents/container in accordance with applicable regional, national, and local laws and regulations.

Hazards Not Otherwise Classified:
Not applicable

Ingredients with Unknown Toxicity:
20-50% of this product mixture consists of ingredients of unknown acute toxicity.

<table>
<thead>
<tr>
<th>Hazardous Ingredient(s)</th>
<th>Common Name/Synonyms</th>
<th>CAS No.</th>
<th>% wt/wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aliphatic amine</td>
<td>Not applicable (N/A)</td>
<td>Trade Secret</td>
<td>30-50</td>
</tr>
<tr>
<td>Cycloaliphatic hydroxide</td>
<td>N/A</td>
<td>Trade Secret</td>
<td>15-35</td>
</tr>
<tr>
<td>Aliphatic amine</td>
<td>N/A</td>
<td>Trade Secret</td>
<td>15-30</td>
</tr>
<tr>
<td>Amine catalyst</td>
<td>N/A</td>
<td>Trade Secret</td>
<td>1-5</td>
</tr>
</tbody>
</table>

SECTION 4: FIRST AID MEASURES

Inhalation:
If inhaled: Remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center or doctor.
**Acute and delayed symptoms and effects:** May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause respiratory irritation. Signs/symptoms may include burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema.
Safety Data Sheet

Eye Contact: If in eyes: Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.

Acute and delayed symptoms and effects: Causes serious eye damage. Signs/symptoms may include cloudy appearance of the cornea, chemical burns, severe pain, tearing, ulcera
tions, significantly impaired vision or complete loss of vision.

Skin Contact: If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower for at least 15 minutes. Immediately call a poison center or doctor. Wash contaminated clothing before reuse.

Acute and delayed symptoms and effects: Toxic in contact with skin. May cause an allergic skin reaction. Causes severe skin burns. Signs/symptoms may include localized redness, swelling, itching, intense pain, and blistering, ulceration, and tissue destruction.

Ingestion: If swallowed: Rinse mouth. Do NOT induce vomiting. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

Acute and delayed symptoms and effects: Harmful if swallowed. Causes burns to nose, mouth, throat, and digestive tract. Signs/symptoms may include severe mouth, throat and abdominal pain, nausea, vomiting, and diarrhea, blood in the feces and/or vomitus may also be seen.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible). First Aid responders should pay attention to self-protection and use recommended protective clothing (chemical resistant gloves, splash protection).

Note to Physicians: Symptoms may not appear immediately. Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

Flammability and Explosion Information: Not flammable or combustible by OSHA/WHMIS criteria.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.

MEANS OF EXTINCTION

Suitable Extinguishing Media: Small Fire: Dry chemical, CO2 or water spray.

Large Fire: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire-control water for later disposal; do not scatter the material.

Unsuitable Extinguishing Media: Not available

Products of Combustion: Oxides of carbon, oxides of nitrogen, ammonia
Protection of Firefighters: TOXIC; inhalation, ingestion or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters’ protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Emergency Procedures: As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet). Stay upwind. Keep out of low areas. Ventilate enclosed areas. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

Personal Precautions: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Use personal protection recommended in Section 8.

Environmental Precautions: Prevent entry into waterways, sewers, basements or confined areas.

Methods for Containment: Stop leak if you can do it without risk.

Methods for Clean-Up: Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

Other Information: See Section 13 for disposal considerations.

SECTION 7: HANDLING AND STORAGE

Handling: Do not swallow. Do not breathe mist, vapors, or spray. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace. See Section 8 for information on Personal Protective Equipment.


SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>ACGIH</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aliphatic amine</td>
<td>Trade Secret</td>
<td>No TLV established.</td>
<td>No PEL established.</td>
</tr>
</tbody>
</table>
Cycloaliphatic hydroxide  |  Trade Secret  |  No TLV established.  |  No PEL established.  
Aliphatic amine  |  Trade Secret  |  No TLV established.  |  No PEL established.  
Amine catalyst  |  Trade Secret  |  No TLV established.  |  No PEL established.  

PEL: Permissible Exposure Limit  
TLV: Threshold Limit Value

**Engineering Controls:**  
Not normally required.

**PERSONAL ProtECTIVE EQUIPMENT (PPE)**

**Eye/Face Protection:**  
Wear chemical safety goggles and full face shield. Ensure that eyewash stations and safety showers are close to the workstation location. Use equipment for eye protection that meets the standards referenced for OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment.

**Hand Protection:**  
Wear protective gloves. Rubber or polyethylene material is recommended. Consult manufacturer specifications for further information.

**Skin and Body Protection:**  
Wear protective clothing. Clothing with full length sleeves and pants should be worn.

**Respiratory Protection:**  
Wear respiratory protection. If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator with organic vapor cartridge, or self-contained breathing apparatus must be sued when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

**General Hygiene Considerations:**  
Handle according to established industrial hygiene and safety practices.

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Light yellow</td>
</tr>
<tr>
<td>Odor</td>
<td>Slight ammoniacal</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>pH</td>
<td>Alkaline</td>
</tr>
<tr>
<td>Melting Point / Freezing Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Initial Boiling Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>&gt; 260°C (500°F)</td>
</tr>
<tr>
<td>Flash Point</td>
<td>124°C (255°F)</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
</tr>
</tbody>
</table>
Flammability (solid, gas): Not available
Lower Flammability Limit: Not available
Upper Flammability Limit: Not available
Vapor Pressure: Not available
Vapor Density: Not available
Relative Density: 1.01
Solubility: Partial
Partition Coefficient: n-Octanol/Water: Not available
Auto-ignition Temperature: Not available
Decomposition Temperature: Not available
Viscosity: 50-150 cps
Percent Volatile, wt.%: 0
VOC Content, wt.%: 0
Density: 1.01
Coefficient of Water/Oil Distribution: Not available

**SECTION 10: STABILITY AND REACTIVITY**

Chemical Stability: Stable under normal conditions.
Hazardous decomposition byproducts: Oxides of carbon, oxides of nitrogen, ammonia.
Conditions to Avoid: Can auto-ignite in air at approximately 572°F (300°C)
Incompatible Materials: Epoxy resins under uncontrolled conditions, acid, oxidizing material, halogenated, organic compounds.

**SECTION 11: TOXICOLOGICAL INFORMATION**

Acute Toxicity: LD50 oral 1,100 mg/kg(rat); LD50 dermal 1,550 mg/kg(rabbit)
Primary Irritant Effect On the Skin: Irritant to skin and mucous membranes.
Primary Irritant Effect On the Eye: Irritating effect.
Swallowing: Can cause abdominal irritation, nausea, vomiting, and diarrhea.
Additional Toxicological Information: This product has no carcinogens listed by IARC, NTP, NIOSH, OSHA, or ACGIH as of this date, greater or equal to 0.1%
SECTION 12: ECOLOGICAL INFORMATION

Toxicity: All work practices must be aimed at eliminating environmental contamination.

Aquatic Toxicity: Fresh water LC50 0.446 mg/l/4d Fathead minnow
Fresh water LC50 0.436 mg/l/4d Bluegill
Salt water LC50 0.458 mg/l/4d Sheepshead minnow

Persistence and Degradability: The product is partially biodegradable. Significant residue remains.

Bio-accumulative Potential: Not available.

Mobility in Soil: No further relevant information available

Ecotoxicological Effects Remark: No known significant effects or critical hazards

Additional Ecological Information: No further relevant information available

General Notes: No further relevant information available

PBT Assessment: Not available

vPvB Assessment: Not available

Other Adverse Effects: No further relevant information available

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Recommendation: The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Care should be taken when handling emptied containers that are not been cleaned or rinsed out. Empty containers and liners may retain some product residues. Vapor from some product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Processing, use or contamination may change the waste disposal requirements. Do not dispose of on land, in surface waters, or in storm drains. Waste should be recycled or disposed of in accordance with regulations. Large amounts should be collected for reuse or consigned to licensed hazardous waste haulers for disposal.

ALL DISPOSAL MUST BE IN ACCORDANCE WITH ALL FEDERAL, STATE, PROVINCIAL, AND LOCAL REGULATIONS. IF IN DOUBT, CONTACT PROPER AGENCIES.
### Uncleaned Packaging:
Empty containers may contain residue and may be dangerous. Do not attempt to refill or clean without proper instructions. Empty drums should be drained and stored safely for reconditioning or recycling.

### Recommendation:
Disposal must be made according to official regulations.

### SECTION 14: TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th><strong>US DEPARTMENT of TRANSPORTATION (DOT)</strong></th>
<th><strong>Proper Shipping Name:</strong> Amines, liquid, corrosive, nos(Aliphatic amines)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class:</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>UN #:</strong></td>
<td>2735</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>III</td>
</tr>
<tr>
<td><strong>Air Transport:</strong> ICAO-IATA/DGR (Cargo)**</td>
<td><strong>Proper Shipping Name:</strong> Amines, liquid, corrosive, nos(Aliphatic amines)</td>
</tr>
<tr>
<td><strong>Class:</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>UN #:</strong></td>
<td>2735</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>III</td>
</tr>
<tr>
<td><strong>Sea Transport:</strong> (IMDG-Code/GGVSee):</td>
<td><strong>Proper Shipping Name:</strong> Amines, liquid, corrosive, nos(Aliphatic amines)</td>
</tr>
<tr>
<td><strong>Class:</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>UN #:</strong></td>
<td>2735</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>III</td>
</tr>
<tr>
<td><strong>Marine Pollutant:</strong></td>
<td>Not listed.</td>
</tr>
</tbody>
</table>

### CANADA Transportation of Dangerous Goods (TDG)

<table>
<thead>
<tr>
<th><strong>Proper Shipping Name:</strong> Amines, liquid, corrosive, nos(Aliphatic amines)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class:</strong></td>
</tr>
<tr>
<td><strong>UN #:</strong></td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
</tr>
</tbody>
</table>

### SECTION 15: REGULATORY INFORMATION

#### CHEMICAL INVENTORIES

<table>
<thead>
<tr>
<th><strong>US (TSCA):</strong></th>
<th>The components of this product are in compliance with the chemical notification requirements of TSCA.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CANADA (DSL):</strong></td>
<td>The components of this product are in compliance with the chemical notification requirements of NSN Regulations under CEPA, 1999.</td>
</tr>
</tbody>
</table>
FEDERAL REGULATIONS

CANADA:  
n/a

WHMIS Classification:  
n/a

UNITED STATES:  
This SDS has been prepared to meet the US OSHA Hazard Communication Standard, 29 CFR 1910.1200

SARA Title III:  
No components are listed.

STATE REGULATIONS

Massachusetts:  
US Massachusetts Commonwealth’s Right-to-Know Las (Appendix A to 105 Code of Massachusetts Regulations Section 670.000).

Component:  
Aliphatic amine

CAS No.  
TS

RTK List:  
Listed

New Jersey:  
US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5).

Component:  
Aliphatic amine

CAS No.  
TS

RTK List:  
Listed

Pennsylvania:  

Component  
Aliphatic amine

CAS No.  
TS

RTK List:  
Listed

California  
California Prop 65:  
This product does not contain chemicals known to the State of California to be Carcinogenic.

SECTION 16: OTHER INFORMATION

HMIS (Hazardous Material Information System):  
<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Physical Hazard</th>
<th>Personal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>1</td>
<td>E</td>
</tr>
</tbody>
</table>

Disclaimer:  
This information is furnished without warranty of any kind, expressed or implied. Five Star Products, Inc. bases the information and recommendations in this document on data believed to be current and accurate.
SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name(s): Five Star® Pile Jacket Epoxy Grout LV / Component C Aggregate
Five Star® Pile Jacket Epoxy Grout LPL/Component C Aggregate
Five Star® Epoxy Chock EX / Component C Aggregate

Synonyms: Pile Jacket Silica Sand

Product Use: Aggregate for reactive polymer construction products. Designed for use with appropriate hardener and resin.

Restrictions on Use: N/A

Manufacturer/Supplier
Five Star Products, Inc.
60 Parrott Drive
Shelton, CT 06484 USA

Phone #: 203-336-7900

Emergency Phone #: CHEM-TEL 1-800-255-3924
(Outside the U.S. 1-813-248-0585)

SECTION 2: HAZARD(S) IDENTIFICATION-GHS INFORMATION

Classification:
Carcinogenicity – Category 1A
Specific Target Organ Toxicity (Single Exposure) – Cat 3
Specific Target Organ Toxicity (Repeated Exposure) – Cat 2

Label Elements/Hazard Pictograms:

Signal Word: Danger

Hazard Statements:
May cause respiratory irritation H335
May cause cancer by inhalation H350
Causes damage to organs through prolonged or repeat exposure H372

Precautionary Statements/Prevention:
Do not breathe dust, fume, gas, mist, vapors, or spray, P260.
Wash thoroughly after handling, P264.
Do not eat, drink or smoke when using this product, P270.
Obtain special instructions before use, P201.
Do not handle until all safety precautions have been read and understood, P202.
Wear protective gloves, protective clothing, eye protection and face protection, P280.
Use only outdoors or in a well-ventilated area, P271.

Response: If swallowed: Rinse mouth. Do NOT induce vomiting, P330, P331.
If inhaled: Remove person to fresh air and keep comfortable for breathing, P340.
Call a POISON CENTER/doctor if you feel unwell, P312.
Get medical advice and attention if you feel unwell, P314.
If in eyes: Rinse cautiously with water for several minutes, P351.
Remove contact lenses, if present and easy to do. Continue rinsing, P338.

Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed.

Disposal: Dispose of contents/container in accordance with applicable regional, national, and local laws and regulations.

Hazard Not Otherwise Classified: Not applicable

### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Ingredient(s)</th>
<th>Common Name/Synonyms</th>
<th>CAS No.</th>
<th>% wt/wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>Silicon Dioxide, Silica Sand, Crystalline Silica</td>
<td>14808-60-7</td>
<td>99-100</td>
</tr>
</tbody>
</table>

### SECTION 4: FIRST AID MEASURES

Inhalation: If inhaled: Remove person to fresh air and keep comfortable for breathing.
If experiencing respiratory symptoms call poison center or doctor.

Eye Contact: If in eyes: Immediately rinse with water for a prolonged period while holding the eyelids wide open. Seek medical attention if material is embedded in eye. If eye irritation persists: Get medical advice and attention.

Skin Contact: Rinse immediately with plenty of water. Gently wash with plenty of soap and water. Obtain medical attention if irritation persists.

Ingestion: If swallowed: Do not induce vomiting: seek medical advice immediately and show this container or label. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

General Advice: If medical advice is needed, have product container or label at hand. In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

Note to Physicians: Symptoms may not appear immediately. Treat symptomatically.
### SECTION 5: FIRE-FIGHTING MEASURES

| Flammability and Explosion Information: | Not flammable or combustible by OSHA/WHMIS criteria. |
| Sensitivity to Mechanical Impact: | This material is not sensitive to mechanical impact. |
| Sensitivity to Static Discharge: | This material is not sensitive to static discharge. |

**MEANS OF EXTINCTION**

| Suitable Extinguishing Media: | Small Fire: Dry chemical, CO2, or water spray. Large Fire: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire-control water for later disposal; do not scatter the material. |
| Unsuitable Extinguishing Media: | None known |
| Product of Combustion: | Non-combustible |
| Protection of Firefighters: | As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. |

### SECTION 6: ACCIDENTAL RELEASE MEASURES

| Personal Precautions: | Avoid inhalation of dust. Do not get into eyes, on skin, or clothing. |
| Environmental Precautions: | The environmental impact of this product has not been fully investigated. |
| Methods for Containment: | Cover powder spill with plastic sheet or tarp to minimize spreading. Collect this material into a disposal container by sucking or sweeping up. |
| Methods for Cleanup: | Pick up and transfer to properly labeled containers. |
| Other Information: | See Section 13 for disposal considerations. |

### SECTION 7: HANDLING AND STORAGE

| Handling: | Wear personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Do not breathe dust. Prevent contact with skin, eyes, and clothing. Wash thoroughly after handling. |
| Storage: | Keep containers tightly closed in a cool, dry, and well-ventilated place. Store locked up. |
SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>TWA: 0.025mg/m³ respirable fraction</td>
<td>TWA: 0.1mg/m³ (vacated)</td>
</tr>
</tbody>
</table>

PEL: Permissible Exposure Limit  TLV: Threshold Limit Value

Engineering Controls: Ensure adequate ventilation, especially in confined areas. Avoid dust protection.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/ Face Protection: Tightly fitting safety goggles
Hand Protection: Impervious gloves. Impervious clothing.
Skin and Body Protection: Impervious gloves. Impervious clothing. Handle in accordance with good industrial hygiene and safety practice. Always wash your hands immediately after handling this product, and once again before leaving the workplace. Wear suitable protective clothing. Wash contaminated clothing before reuse.
Respiratory Protection: If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Granular</td>
</tr>
<tr>
<td>Color</td>
<td>Gray, Tan</td>
</tr>
<tr>
<td>Odor</td>
<td>None</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>None</td>
</tr>
<tr>
<td>Physical State</td>
<td>Solid</td>
</tr>
<tr>
<td>pH</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Melting Point / Freezing Point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Initial Boiling Point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Flash Point: Not Applicable
Evaporation Rate: Not Applicable
Flammability (solid, gas): Not Applicable
Lower Flammability Limit: Not Applicable
Upper Flammability Limit: Not Applicable
Vapor Pressure: Not Applicable
Vapor Density: Not Applicable
Relative Density: 2.5-2.8
Solubility: Negligible
Partition Coefficient: n-Octanol/Water: Not Applicable
Auto-ignition Temperature: Not Applicable
Decomposition Temperature: >3,000°F (1649°C)
Viscosity: Not Applicable
Percent Volatile, wt.%: Not Applicable
VOC Content, wt.%: Not Applicable
Density: 2.5-2.8 g/cc
Coefficient of Water/Oil Distribution: Not Applicable

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability: Stable under recommended storage conditions.
Possibility of Hazardous Reactions: None under normal processing.
Conditions to Avoid: Exposure to water – product may harden on contact with water.
Incompatible Materials: Strong oxidizers.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Acute Toxicity: LD50 Oral: 500 mg/kg (Rat) estimated
Skin corrosion/irritation: Not classified
Serious眼 damage/irritation: Not classified
Respiratory or skin sensitization: Not classified
Germ cell mutagenicity: Not classified
Component information: Not classified
Carcinogenicity: May cause cancer (inhalation of respirable fraction); not anticipated as < 0.1% of product is respirable. If hardened material should be ground or cut, then respiratory issues should be considered.
Chemical Name: Quartz ACGIH: A2 – Suspected Human Carcinogen
IARC: Group 1 – Carcinogenic to humans OSHA: X-present
Delayed and immediate effects and also chronic effects from short and long term exposure.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity
Aquatic Toxicity: Not applicable
Persistence and Degradability: Not applicable
Bio-accumulative Potential: Not applicable
Mobility in Soil: No further relevant information available
Ecotoxical Effects Remark: Not applicable
Additional Ecological Information: Not applicable
General Notes: No ecological effects are known other than to occupy volume as fill.
PBT Assessment: Not applicable
vPvB Assessment: Not applicable
Other Adverse Effects: No further relevant information known

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Treatment Methods
Recommendation: This material as supplied is not a hazardous waste according to Federal regulations (40CFR261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered.
Uncleaned Packaging Recommendation: Disposal must be made according to official regulations. Do not re-use empty containers.
**SECTION 14: TRANSPORT INFORMATION**

**US DEPARTMENT of TRANSPORTATION (DOT)**
- **Proper Shipping Name:** Not regulated
- **Class:** N/A
- **UN #:** N/A
- **Packing Group:** N/A

**Air Transport: ICAO-IATA/DGR (Cargo)**
- **Proper Shipping Name:** Not regulated
- **Class:** N/A
- **UN #:** N/A
- **Packing Group:** N/A

**Sea Transport: (IMDG-Code/GGVSee):**
- **Proper Shipping Name:** Not regulated
- **Class:** N/A
- **UN #:** N/A
- **Packing Group:** N/A

**CANADA Transportation of Dangerous Goods (TDG)**
- **Proper Shipping Name:** Not regulated
- **Class:** N/A
- **UN #:** N/A
- **Packing Group:** N/A

**Other:** Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code.

**SECTION 15: REGULATORY INFORMATION**

**CHEMICAL INVENTORIES**

**US (TSCA):** The components of this product are in compliance with the chemical notification requirements of TSCA.

**CANADA (DSL):** The components of this product are in compliance with the chemical notification requirements of NSN Regulations under CEPA, 1999.

**U.S. FEDERAL REGULATIONS** Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the CFR, Part 372.
UNITED STATES:

This SDS has been prepared to meet the US OSHA Hazard Communication Standard, 29 CFR 1910.1200

SARA 311/312 Hazard Categories:

Acute health hazard – Yes
Chronic Health hazard – Yes
Fire Hazard – No
Sudden Release of Pressure – No
Reactive Hazard - No

US STATE Right to Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>NJ</th>
<th>MA</th>
<th>PA</th>
<th>IL</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

California
California Prop 65:
This product contains the following Proposition 65 chemicals.
Chemical Name: Quartz  CAS-No: 14808-60-7 CA Prop. 65: Carcinogen

SECTION 16: OTHER INFORMATION

HMIS (Hazardous Material Information System:)

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Physical Hazard</th>
<th>Personal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>E</td>
</tr>
</tbody>
</table>

Disclaimer:
This information is furnished without warranty of any kind, expressed or implied. Five Star Products, Inc. bases the information and recommendations in this document on data believed to be current and accurate.
Design-A-Spec™ Guidelines
FIVE STAR MARINE®
Pile Jacket Epoxy Grout LPL

Contents

| ▶ | PART A - GENERAL CONDITIONS |
| ▶ | PART B - MATERIAL SPECIFICATIONS |
| ▶ | PART C - PREPARATION |
| ▶ | PART D - APPLICATION |
| ▶ | PART E - FINISHING AND CURING |

This document is provided as a general guideline for consideration by contractors and engineers. While every reasonable effort has been made to ensure that this information is accurate and authoritative, Five Star Marine® does not warrant the accuracy or completeness of this information or for its appropriateness for any particular purpose. The user of this document remains solely responsible for the specification of all methods, materials and practices.
PART A - GENERAL CONDITIONS

1.01 SCOPE

The work covered by this document consists of furnishing all materials and performing all operations required for pile repair/encapsulation using moisture insensitive epoxy grout in conjunction with fiberglass jackets as formwork.

If it is determined that structural repairs to the pile are needed they must be performed in conjunction with the repairs described in this document. These repairs can include, but are not limited to, chipping out loose concrete, exposing rebar, cleaning rebar, replacing or adding rebar and filling the repaired area with grout.

1.02 QUALITY ASSURANCE

The manufacturer shall have a minimum 15 year history in the manufacture of epoxy grout systems. The manufacturer shall provide on site technical service at no cost to the engineer or contractor when sufficient advance notice is provided.

1.03 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered to the jobsite in their original, unopened packages, clearly labeled with the product identification, printed instructions and batch code.

B. Store and condition all components (resin, hardener and aggregate) between 60°F and 85°F (16°C and 29°C) for at least 24 hours prior to use. Refer to the product data sheet for more information.

C. For safe handling instructions, refer to the Material Safety Data Sheet.

1.04 PROJECT / SITE CONDITIONS

Refer to Part C – PREPARATION, ENVIRONMENTAL CONDITIONS, or contact the manufacturer directly for any physical or environmental limitations required by the product.
PART B - MATERIAL SPECIFICATIONS

2.01 MATERIALS

A. The pile encapsulation epoxy grout material shall be a 100% solids, premeasured, pre-packaged epoxy system containing thermosetting epoxy resins and inert fillers. The material shall be suitable for placement underwater via pouring or pumping. The manufacturer shall have at least 15 years experience in the manufacture of epoxy grout systems. The manufacturer shall offer technical services and provide a representative at the job site for product training prior to product installation with reasonable advance notice.

B. The pile repair/encapsulation material shall meet the following performance criteria at 70°F:

1. Compressive Strength, ASTM C579 B
   
<table>
<thead>
<tr>
<th>Days</th>
<th>Strength (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Day</td>
<td>2,000  (13.8MPa)</td>
</tr>
<tr>
<td>7 Days</td>
<td>8,500 (58.6MPa)</td>
</tr>
<tr>
<td>28 Days</td>
<td>9,500 (65.5MPa)</td>
</tr>
</tbody>
</table>

2. Tensile Strength, ASTM C307
   2,000 psi (13.8MPa)

3. Bond to Concrete, ASTM C882
   2,200 psi (15.2MPa)

4. Linear Shrinkage, ASTM C531
   0.0%

5. Water Absorption, ASTM C413
   0.0%

6. Working Time
   90 minutes

C. An acceptable product that meets this criteria is:

   **Five Star Marine® Pile Jacket Epoxy Grout LPL**

   As manufactured by Five Star Marine, Inc. Fairfield, CT 06825

2.02 AGGREGATE LOADING

   Five Star Marine® Pile Jacket Epoxy Grout LPL may be used with 3 or 2.5 bags of supplied aggregate. Do not use less than 2.5 bags of aggregate.

2.03 CLEARANCES

A. The grout shall be placed from ½ to 4 inches (12 mm to 100 mm) around piles when used with a jacket and standoff system.
PART C – PREPARATION

3.01 CONCRETE SURFACES

A. Completely remove all loose, delaminated and weak concrete, oil, grease, laitance, marine growth and other contaminants. Prepare concrete using high pressure water blasting or other suitable mechanical means to obtain sound, clean and roughened surfaces.

B. All cracks shall be brought to the attention of the engineer and a determination made of whether the cracks are subject to movement. The cracks shall be repaired as directed prior to installation of fiberglass jacket and epoxy grout.

C. For more detailed information, refer to the following publication: "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion", Guideline No. 03730, prepared by the Technical Guidelines Committee of ICRI, March 1995.

3.02 REINFORCEMENT

A. All exposed reinforcing steel that has lost bond with the concrete or has more than one-half of its circumference exposed should be undercut by at least 1/2 inch (12 mm).

![Diagram D: Reinforcement Profile Example](image)

B. If more than 25% of the diameter of a reinforcing bar has been deteriorated, the bar may require replacement or need to be spliced as directed by the engineer.

C. All reinforcement shall be rigidly secured and supported.
D. All exposed reinforcing steel shall be free of all loose scale, rust, oxidation and other contaminants. Blast steel to an SSPC – SP6 commercial finish or better. Exposed reinforcing steel may be sealed or primed if a delay occurs between surface preparation and epoxy grout placement.

3.03 JACKET PLACEMENT

A. Fiberglass jackets may be one or two piece and should include standoffs that maintain specified annular space. Spacers/standoffs may be pre-molded into jackets or applied at job site. Spacers can be made of wood, plastic or metal. When placing spacers at job site use a fast-setting epoxy adhesive suitable for exposure to water such as Five Star® RS Anchor Gel.

B. For pumping applications, secure suitable pump ports to jacket. Mount port approximately 12 inches from the bottom of the pile. Additional ports may be needed for jacket lengths over 5 feet. Where necessary, place an additional port approximately three feet above the first port and 180° opposite the first port. If additional ports are needed alternate the placement 180° from the previous port and three feet above.

C. Use a suitable sealing compound to fill the groove side of the jacket opening. Hold the jacket up right next to the pile. Pull open the jacket and slip it around the pile. Allow the tongue to slip into the groove. Position the jacket to cover the area desired. Press the jacket closed. Press tongue into groove as far as it will go. Use ratcheting straps to secure jacket.

D. Wooden braces, battens or strong backs, should be placed on the outside of the jacket to prevent bulging. Use 2 x 4’s or 2 x 6’s that are about the same length as the jacket and attach with screws to the middle of each jacket face. Place straps 12 to 18 inches apart vertically and around the braces to insure that the jacket is secure. When the jacket is in position and the straps tight use stainless steel self drilling/tapping screws to secure the tongue and groove joint. Locate screws so they go through both sides of the groove and the tongue. Use screws that are long enough to penetrate the jacket but not long enough to extend to the pile itself.

3.04 JACKET SEALING

A. The choice of bottom seal should be determined by environmental restrictions, owner preference or contractor experience. Typical bottom seals include closed foam strips, oakum and resin, nylon retainers and epoxy packing.
3.05 MIXING

Mortar Mixer (Stationary Barrel Mixer with Moving Paddles)

A. Provide an adequate number of mortar mixers in good operating condition for uninterrupted placement. Do not exceed one-half the maximum capacity of the mortar mixer. A concrete mixer (spinning barrel mixer) is not acceptable for mixing epoxy grout.

B. Pour all Component B (hardener) into the pail containing Component A (resin). Mix thoroughly for 2 minutes by hand with paddle or slow speed mixer to avoid air entrapment. Pour mixed liquids into the mortar mixer. While mixing, slowly Component C (aggregate) and mix until aggregate is completely wet. Add 2.5 to 3 bags Component C depending upon placement conditions and temperatures.

C. Do not mix more material than can be placed within the working time of the grout.

D. Place grout immediately after mixing.

PART D – APPLICATION

4.01 APPLICATION

Pumping

A. A peristaltic type pump is recommended for pumping epoxy grout. Peristaltic Pumps manufactured by Blastcrete (www.blastcrete.com) and Quikspray (www.quikspray.com) may be used to pump Five Star Marine® Pile Jacket Epoxy Grout LPL.

B. Prime pump and lines with a suitable primer that will not contaminate epoxy grout. Ensure material used for priming is discarded and not used for jacket filling.

C. Attach the pump hose to the bottom port and commence pumping. For tremie pumping, insert hose into jacket to bottom and commence pumping. Keep pump hose submerged in epoxy grout and slowly raise pump hose as jacket fills with epoxy grout.

D. When the grout in the jacket rises to the level of the next port stop the pump, remove the hose and close the port with a plug. Then attach the hose to the next higher port and continue pumping. Repeat this until the jacket is full of grout.

E. When the jacket is full, the top of the jacket can be topped off with additional grout placed by hand or by a later placement of suitable marine mastic such as Five Star Marine® Splash Zone.
F. Do not mix more material than can be placed within the working time of the grout.

G. All tools and equipment may be cleaned with high pressure water and a strong detergent prior to hardening. Sand may be used as an abrasive to aid clean up.

**Pouring**

A. Use a headbox or ramp at top of jacket opening to facilitate pouring of epoxy grout into jacket.

B. Mixing and pouring of epoxy grout should be a continuous process to minimize air entrapment. Headbox or ramp used for pouring may be moved or alternated from side to side to also help reduce air entrapment.

C. Continue pouring epoxy grout until jacket is full. Grout level may be topped off using additional material placed by hand or by a later placement of suitable marine mastic such as Five Star Marine® Splash Zone.

D. Do not mix more material than can be placed in the working time of the epoxy grout.

E. All tools and equipment may be cleaned with high pressure water and a strong detergent prior to hardening. Sand may be used as an abrasive to aid clean up.

**PART E – FINISHING AND CURING**

**5.01 FINISHING**

A. Prior to hardening, epoxy grout can be finished with a solvent wiped steel trowel. Maintaining a sufficient solvent coat is important as epoxy grout will adhere to a dry trowel.

B. Epoxy grouts cannot be trimmed after set except by mechanical means. Final level in the forms should be brought to the finished elevation before curing.

**5.02 CURING**

A. Protect the grout from temperatures below 40°F (4°C) for 24 hours or until required minimum compressive strength is achieved.
WARRANTY: “FIVE STAR MARINE, INC. (FSM) PRODUCTS ARE MANUFACTURED TO BE FREE OF MANUFACTURING DEFECTS AND TO MEET FSM’S CURRENT PUBLISHED PHYSICAL PROPERTIES WHEN APPLIED IN ACCORDANCE WITH FSM’S DIRECTIONS AND TESTED IN ACCORDANCE WITH ASTM AND FSM 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 FSM, FOR REPLACEMENT. THERE ARE NO OTHER WARRANTIES BY FSM OF ANY NATURE WHATSOEVER, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IN CONNECTION WITH THIS PRODUCT. FSM 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. FSM SHALL ALSO NOT BE RESPONSIBLE FOR USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT HELD BY OTHERS.”
Description
Five Star Marine® Pile Jacket Grout HP is a multi-purpose, three-component, 100% solids, moisture insensitive epoxy grout specifically designed to cure underwater. Five Star Marine® Pile Jacket Grout HP has excellent flowability, may be pumped or poured into place and exhibits outstanding physical properties when placed in wet or dry environments.

Uses
- Encapsulation material for concrete, steel and wood
- Corrosion protection for concrete, steel, and wood
- Pile repair and restoration

Benefits
- Excellent wet and dry physical properties
- Adjustable aggregate loading
- Moisture insensitive before, during, and after cure
- Excellent adhesion to masonry, concrete, wood, steel and most structural materials
- Pumpable

Packaging and Yield
Five Star Marine® Pile Jacket Grout HP is a three component system consisting of partially filled containers of resin and hardener, and polyethylene lined bags of aggregate and is available in a unit yielding approximately 1.75 cubic feet (49.6 liters) of hardened material.

Shelf Life
Two years in original unopened packaging when stored in dry conditions; high relative humidity will reduce shelf life.

<table>
<thead>
<tr>
<th><em>TYPICAL PROPERTIES AT 70°F (21°C)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compressive Strength</strong> (ASTM C 579)**</td>
</tr>
<tr>
<td>1 Day</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td>28 Days</td>
</tr>
<tr>
<td><strong>Tensile Strength</strong> (ASTM C 307)</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td><strong>Tensile Bond Strength</strong> to green concrete (ASTM C 1583)</td>
</tr>
<tr>
<td>28 Days</td>
</tr>
<tr>
<td><strong>Bond to Concrete</strong> (ASTM C 882)</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td><strong>Linear Shrinkage</strong> (ASTM C 531)</td>
</tr>
<tr>
<td><strong>Water Absorption</strong> (ASTM C 413)</td>
</tr>
<tr>
<td><strong>Working Time</strong> at 70°F (21°C)</td>
</tr>
</tbody>
</table>

Increase in Flexural Strength (ASTM C 78) 1/4 “ Layer, 5000 psi concrete

<table>
<thead>
<tr>
<th>3” x 3” x 12” Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Control</td>
</tr>
<tr>
<td>800 psi (5.5 MPa)</td>
</tr>
</tbody>
</table>

* The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown may result. Test methods are modified where applicable.

** Materials tested per ASTM C 579 B. Rate of loading 0.25 inches per minute.
Pile Jacket Grout HP

PLACEMENT GUIDELINES

1. **SURFACE PREPARATION:** All surfaces to be in contact with Five Star Marine® Pile Jacket Grout HP shall be free of marine growth, oil, grease, laitance, and other contaminants. Concrete must be clean, sound, and roughened to ensure a good bond. Exposed steel should be sandblasted and coated with an appropriate anti-corrosion coating.

2. **MIXING:** For optimum performance, all components should be conditioned to between 65°F and 85°F (18°C and 29°C). Pour all of Component A (resin) and all of Component B (hardener) into a mortar mixer (stationary barrel mixer with rotating internal paddles) and mix for approximately 2 1/2 minutes. Mix at slow speed to avoid entrapping air in liquids. Follow by adding Component C (aggregate), one bag at a time and mix until all aggregate is completely wetted with liquids. Add Component C (aggregate) immediately after mixing Component A (resin) and Component B (hardener). Do not mix more material than can be placed in 90 minutes.

3. **METHODS OF PLACEMENT:** Five Star Marine® Pile Jacket Grout HP may be pumped or poured into place. For vertical flow applications simply pour or pump from the top of the opening, or pump into ports. For horizontal applications, pour or pump from one side to the other. Contact the Five Star Marine Engineering and Technical Service Center at (800) 338-3145 for pump recommendations.

4. **Post Placement Procedures:** In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.

5. **Clean Up:** Use a solvent or water and strong detergent solution on tools and equipment before material hardens. Use power washer on pump and mixing equipment. Sand may be used as an abrasive to aid in cleaning.

**NOTE:** PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY. For more detailed placement procedures, refer to Design-A-Spec™ installation guidelines or you may call Five Star’s Engineering and Technical Service Center at (800) 243-2206.

CONSIDERATIONS

- Minimum application temperature of substrate is 40°F (4°C) and rising.
- Strength gain and flowability are adversely affected by lower temperatures.
- Do not thin with solvents.

**CAUTION**

Irritant, toxic, strong sensitizer. Contains epoxy resin and amine. This product may cause skin irritation. Do not inhale vapors. Provide adequate ventilation. Protect against contact with skin and eyes. Wear rubber gloves, long sleeve shirt, goggles with side shields. Prior to use, refer to Material Safety Data Sheet.

**FIRST AID**

**Eye Contact:** Flush immediately with water for at least 15 minutes. Contact Physician immediately. **Respiratory Problems:** Remove person(s) to fresh air. **Skin Contact:** Remove any contaminated clothing. Remove epoxy immediately with a dry cloth or paper. Solvents should not be used as they carry irritant into the skin. Wash skin thoroughly with soap and water. Cured epoxy resins are innocuous.

For worldwide availability, additional product information and technical support, contact your local sales representative, or you may call Five Star’s Engineering and Technical Service Center at (800) 243-2206.
# Safety Data Sheet

**SECTION 1: PRODUCT AND COMPANY IDENTIFICATION**

| **Product Name(s):** | Five Star® Pile Jacket Epoxy Grout / Component A Resin  
Five Star® Pile Jacket Epoxy Grout LPL / Component A Resin  
Five Star® Pile Jacket Epoxy Grout HP / Component A Resin |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Synonyms:</strong></td>
<td>Epoxy Resin, Component A</td>
</tr>
<tr>
<td><strong>Product Use:</strong></td>
<td>Construction and repair of marine structures</td>
</tr>
<tr>
<td><strong>Restrictions on Use:</strong></td>
<td>To be used with specific Five Star® systems.</td>
</tr>
</tbody>
</table>
| **Manufacturer/Supplier** | Five Star Products, Inc.  
750 Commerce Drive  
Fairfield, CT 06825 USA |
| **Phone #:**        | 203-336-7900 |
| **Emergency Phone #:** | CHEM-TEL 1-800-255-3924  
(Outside the U.S. 1-813-248-0585) |

**SECTION 2: HAZARD(S) IDENTIFICATION-GHS INFORMATION**

| **Classification:** | Skin Irritation, Category 2  
Eye Irritation, Category 2A  
Skin sensitization, Category 1  
Acute aquatic toxicity, Category 2  
Chronic aquatic toxicity, Category 2 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Label Elements/Hazard Pictograms:</strong></td>
<td>![Warning Pictogram] ![Aquatic Pictogram]</td>
</tr>
<tr>
<td><strong>Signal Word:</strong></td>
<td>Warning</td>
</tr>
</tbody>
</table>
| **Hazard Statements:** | Causes skin irritation, H315  
May cause an allergic skin reaction, H317  
Caused serious eye irritation, H319  
Toxic to aquatic life with long lasting effects, H411 |
| **Precautionary Statements/Prevention:** | Avoid breathing dust/fume/gas/mist/vapors/spray, P261  
Wash skin thoroughly after handling, P264  
Contaminated work clothing should not be allowed out of the workplace, P272  
Avoid release to the environment, P273  
Wear protective gloves/eye protection/face protection, P280 |
**Response:**
If in eyes: Rinse cautiously with water for several minutes, P351. Remove contact lenses, if present and easy to do. Continue rinsing, P338, P305, P351 If eye irritation persists: Get medical attention/advice, P337, P313
If on skin (or hair): Wash with plenty of soap and water, P302, P352
If swallowed: Rinse mouth. Do NOT induce vomiting, P330, P331.
If skin irritation or rash occurs, P333: Get medical advice/attention, P313.
Take of contaminated clothing and wash before reuse, P362
Collect spillate, P391
Get medical advice/attention if you feel unwell, P314

**Storage:**
Keep container tightly closed and in a dry well-ventilated space.

**Disposal:**
Dispose of contents/container in accordance with applicable regional, national, and local laws and regulations.

**Hazards Not Otherwise Classified:**
Not applicable

**Ingredients with Unknown Toxicity:**
Not applicable

### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Ingredient(s)</th>
<th>Common Name/Synonyms</th>
<th>CAS No.</th>
<th>% wt/wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphenol A Diglycidyl Ether Resin Mixture</td>
<td>n/a</td>
<td>25068-38-6</td>
<td>80-90</td>
</tr>
<tr>
<td>C8 and C10 Alkyl Glycidly Ethers</td>
<td>n/a</td>
<td>68609-96-1</td>
<td>10-20</td>
</tr>
</tbody>
</table>

### SECTION 4: FIRST AID MEASURES

**Inhalation:**
If inhaled: Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration.
Consult a physician.

**Eye Contact:**
If in eyes: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Consult a physician.

**Skin Contact:**
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower for at least 15 minutes. Immediately call a poison center or doctor if irritation develops. Wash contaminated clothing before reuse.
Ingestion: If swallowed: Rinse mouth. Call POISON CENTER for most current information. Do NOT induce vomiting. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible). First Aid responders should pay attention to self-protection and use recommended protective clothing (chemical resistant gloves, splash protection).

Note to Physicians: Symptoms may not appear immediately. Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

Flammability and Explosion Information: Not available

Sensitivity to Mechanical Impact: Not available

MEANS OF EXTINCTION

Suitable Extinguishing Media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media: Not available

Protection of Firefighters: Wear self-contained breathing apparatus for fire-fighting if necessary.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Emergency Procedures: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel. Eliminate all ignition sources.

Personal Precautions: Use personal protective equipment. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. When respirators are required, select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.

Environmental Precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods for Containment: Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

Other Information: See Section 13 for disposal considerations.
SECTION 7: HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Storage: Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>ACGIH</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphenol A Diglycidyl Ether Resin Mixture</td>
<td>25068-38-6</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>C8 and C10 Alkyl Glycidil Ethers</td>
<td>68609-96-1</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

PEL: Permissible Exposure Limit

Engineering Controls: Not normally required.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Face shield and safety glasses. Use equipment for eye protection that meets the standards referenced for OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment.

Hand Protection: Wear protective gloves. Rubber or polyethylene material is recommended. Consult manufacturer specifications for further information.

Skin and Body Protection: Wear protective clothing. Clothing with full length sleeves and pants should be worn.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices. Provide readily accessible eye wash stations and safety showers. Wash at end of shift and before eating, smoking, or using the toilet. Remove contaminated clothing and launder or discard.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear light amber liquid.</td>
</tr>
<tr>
<td>Color</td>
<td>Light amber.</td>
</tr>
<tr>
<td>Odor</td>
<td>Semi Sweet</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>N/A</td>
</tr>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>pH</td>
<td>Not available</td>
</tr>
</tbody>
</table>
Melting Point / Freezing Point: Not available
Initial Boiling Point: Not available
Boiling Point: Not available
Flash Point: 93.4 °C, 200 °F Setalflash Closed Cup ASTM D 3828
Evaporation Rate: N/A
Flammability (solid, gas): N/A
Lower Flammability Limit: N/A
Upper Flammability Limit: N/A
Vapor Pressure: 1.33 mbar
Vapor Density: 1 [Air = 1]
Relative Density: 1.10
Solubility: Slightly
Partition Coefficient: n-Octanol/Water: N/A
Auto-ignition Temperature: Not available.
Decomposition Temperature: Not available
Viscosity: 1000 cps
Percent Volatile, wt.\%: 0%
VOC Content, wt.\%: 0%
Density: N/A
Coefficient of Water/Oil Distribution: N/A

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions.
Hazardous decomposition byproducts: CO, CO₂, smoke, toxic vapors
Conditions to Avoid: Amine compounds under uncontrolled conditions.
Incompatible Materials: Strong oxidizing agents.

SECTION 11: TOXICOLOGICAL INFORMATION

Acute Toxicity:
Primary Irritant Effect On the Skin: Irritant to skin and mucous membranes.
Primary Irritant Effect On the Eye: Irritating effect.
Swallowing: Can cause abdominal irritation, nausea, vomiting, and diarrhea.

Additional Toxicological Information: This product has no carcinogens listed by IARC, NTP, NIOSH, OSHA, or ACGIH as of this date, greater or equal to 0.1%

SECTION 12: ECOLOGICAL INFORMATION

Toxicity: All work practices must be aimed at eliminating environmental contamination.

Aquatic Toxicity: This material is harmful to the environment.

Persistence and Degradability: The product is partially biodegradable. Significant residue remains.


Mobility in Soil: No further relevant information available

Ecotoxicological Effects: Toxic for fish. Due to mechanical actions of the product damages may occur. The declared action may be partly caused by lack of oxygen.

Remark: To be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers and liners may retain some product residues. Vapor from some product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Processing, use or contamination may change the waste disposal requirements. Do not dispose of on land, in surface waters, or in storm drains. Waste should be recycled or disposed of in accordance with regulations. Large amounts should be collected for reuse or consigned to licensed hazardous waste haulers for disposal.
ALL DISPOSAL MUST BE IN ACCORDANCE WITH ALL FEDERAL, STATE, PROVINCIAL, AND LOCAL REGULATIONS. IF IN DOUBT, CONTACT PROPER AGENCIES.

Uncleaned Packaging

Empty containers may contain residue and may be dangerous. Do not attempt to refill or clean without proper instructions. Empty drums should be drained and stored safely for reconditioning or recycling.

Recommendation:

Disposal must be made according to official regulations.

SECTION 14: TRANSPORT INFORMATION

US DEPARTMENT of TRANSPORTATION (DOT)
Proper Shipping Name: NOT REGULATED
Class: NONE
UN #: NONE
Packing Group: NONE

INTERNATIONAL AIR TRANSPORTATION Proper Shipping Name (ICAO/IATA):
UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, NOS (BISPHENOL-A EPICHLORHYDRIN RESIN), 9, PG III
Class: 9
UN #: 3082
Packing Group: III

WATER TRANSPORTATION
Proper Shipping Name (IMO/IMDG):
UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, NOS (BISPHENOL-A-EPOXY RESIN), 9, PG III
Class: 9
UN#: 3082
Packing Group: III
Marine Pollutant: Bisphenol-A Epichlorhydrin Resin

SECTION 15: REGULATORY INFORMATION

CHEMICAL INVENTORIES
US (TSCA):
The components of this product are in compliance with the chemical notification requirements of TSCA.

CANADA (DSL):
The components of this product are in compliance with the chemical notification requirements of NSN Regulations under CEPA, 1999.

FEDERAL REGULATIONS
CANADA: n/a
WHMIS Classification:  n/a

UNITED STATES:  This SDS has been prepared to meet the US OSHA Hazard Communication Standard, 29 CFR 1910.1200

SARA Title III:  No components are listed.

STATE REGULATIONS

<table>
<thead>
<tr>
<th>State</th>
<th>Regulations or Statutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts</td>
<td>US Massachusetts Commonwealth’s Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)</td>
</tr>
<tr>
<td>New Jersey</td>
<td>US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)</td>
</tr>
<tr>
<td>California</td>
<td>This product does not contain chemicals known to the State of California to be Carcinogenic.</td>
</tr>
</tbody>
</table>

SECTION 16: OTHER INFORMATION

Disclaimer: The information contained in this document applies to the specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user’s responsibility to satisfy oneself as to the suitability and completeness of this information for one’s own particular use.
SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name(s): Five Star® Pile Jacket Grout HP/Component B Hardener
Synonyms: Pile Jacket HP Hardener
Product Use: For use with Pile Jacket Epoxy Resin and Pile Jacket Epoxy Grout HP Aggregate
Restrictions on Use: To be used with specific Five Star® systems.
Manufacturer/Supplier
Five Star Products, Inc.
60 Parrot Drive
Shelton, CT 06484
Phone #: 203-336-7900
Emergency Phone #: CHEM-TEL 1-800-255-3924
(Outside the U.S. 1-813-248-0585)

SECTION 2: HAZARD(S) IDENTIFICATION-GHS INFORMATION

Classification:
Acute Toxicity – Oral, Category 4
Acute Toxicity – Dermal, Category 3
Skin Corrosion – Category 1
Eye Damage – Category 1
Flammable Liquids – Category 4
Sensitization – Respiratory, Category 1
Sensitization – Skin, Category 1

Label Elements/Hazard Pictograms:

Signal Word: Danger

Hazard Statements:
Harmful if swallowed, H302
Toxic in contact with skin, H311
Causes severe skin burns and eye damage, H314
May cause respiratory irritation, H335
May cause an allergic skin reaction, H317

Precautionary Statements/Prevention:
Do not breathe dust, fume, gas, mist, vapors, or spray, P260
Wash thoroughly after handling, P264
Do not eat, drink or smoke when using this product, P270
Contaminated work clothing should not be allowed out of the workplace, P272
Wear protective gloves, protective clothing, eye protection and face protection, P280
Wear respiratory protection, P284
Response: If swallowed: Rinse mouth. Do NOT induce vomiting, P330, P331.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower, P361, P353.
If inhaled: Remove person to fresh air and keep comfortable for breathing, P340.
If in eyes: Rinse cautiously with water for several minutes, P351. Remove contact lenses, if present and easy to do. Continue rinsing, P338.
Immediately call a poison center or doctor, P310.
If skin irritation or rash occurs, P333: Get medical advice/attention, P313.
If experiencing respiratory symptoms, P342: Call a poison center or doctor, P310. Wash contaminated clothing before reuse, P363.

Storage: Store locked up.

Disposal: Dispose of contents/container in accordance with applicable regional, national, and local laws and regulations.

Hazards Not Otherwise Classified: Not applicable

Ingredients with Unknown Toxicity: 70% of this product mixture consists of ingredients of unknown acute toxicity.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Ingredient(s)</th>
<th>Common Name/Synonyms</th>
<th>CAS No.</th>
<th>% wt/wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aromatic Alcohol</td>
<td>Not Applicable</td>
<td>Trade Secret</td>
<td>10-30</td>
</tr>
<tr>
<td>Aliphatic Amine</td>
<td>Not Applicable</td>
<td>Trade Secret</td>
<td>60-90</td>
</tr>
<tr>
<td>Amine Catalyst</td>
<td>Not Applicable</td>
<td>Trade Secret</td>
<td>0-15</td>
</tr>
</tbody>
</table>

SECTION 4: FIRST AID MEASURES

Inhalation: If inhaled: Remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center or doctor.

Acute and delayed symptoms and effects: May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause respiratory irritation. Signs/symptoms may include burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema.

Eye Contact: If in eyes: Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.
Acute and delayed symptoms and effects: Causes serious eye damage. Signs/symptoms may include cloudy appearance of the cornea, chemical burns, severe pain, tearing, ulcerations, significantly impaired vision or complete loss of vision.

Skin Contact:
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower for at least 15 minutes. Immediately call a poison center or doctor. Wash contaminated clothing before reuse.

Acute and delayed symptoms and effects: Toxic in contact with skin. May cause an allergic skin reaction. Causes severe skin burns. Signs/symptoms may include localized redness, swelling, itching, intense pain, and blistering, ulceration, and tissue destruction.

Ingestion:
If swallowed: Rinse mouth. Do NOT induce vomiting. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

Acute and delayed symptoms and effects: Harmful if swallowed. Causes burns to nose, mouth, throat, and digestive tract. Signs/symptoms may include severe mouth, throat and abdominal pain, nausea, vomiting, and diarrhea, blood in the feces and/or vomitus may also be seen.

General Advice:
In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible). First Aid responders should pay attention to self-protection and use recommended protective clothing (chemical resistant gloves, splash protection).

Note to Physicians: Symptoms may not appear immediately. Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

Flammability and Explosion Information: Flammable or combustible by OSHA/WHMIS criteria.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.

MEANS OF EXTINCTION

Suitable Extinguishing Media:
Small Fire: Dry chemical, CO2 or water spray.

Large Fire: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire-control water for later disposal; do not scatter the material.

Unsuitable Extinguishing Media: Not available

Products of Combustion: Oxides of carbon, oxides of nitrogen, ammonia

Protection of Firefighters: TOXIC; inhalation, ingestion or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of
contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters’ protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

**Emergency Procedures:**
As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet). Stay upwind. Keep out of low areas. Ventilate enclosed areas. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

**Personal Precautions:**
Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Use personal protection recommended in Section 8.

**Environmental Precautions:**
Prevent entry into waterways, sewers, basements or confined areas.

**Methods for Containment:**
Stop leak if you can do it without risk.

**Methods for Clean-Up:**
Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

**Other Information:**
See Section 13 for disposal considerations.

**SECTION 7: HANDLING AND STORAGE**

**Handling:**
Do not swallow. Do not breathe mist, vapors, or spray. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace. See Section 8 for information on Personal Protective Equipment.

**Storage:**
Store locked up. Store away from incompatible Materials. See Section 10 for information on Incompatible Materials. Keep out of the reach of children.

**SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>ACGIH</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aromatic Alcohol</td>
<td>Trade Secret</td>
<td>No TLV Established</td>
<td>No PEL Established</td>
</tr>
<tr>
<td>Aliphatic Amine</td>
<td>Trade Secret</td>
<td>No TLV Established</td>
<td>No PEL Established</td>
</tr>
</tbody>
</table>
PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Wear chemical safety goggles and full face shield. Ensure that eyewash stations and safety showers are close to the workstation location. Use equipment for eye protection that meets the standards referenced for OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment.

Hand Protection: Wear protective gloves. Rubber or polyethylene material is recommended. Consult manufacturer specifications for further information.

Skin and Body Protection: Wear protective clothing. Clothing with full length sleeves and pants should be worn.

Respiratory Protection: Wear respiratory protection. If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator with organic vapor cartridge, or self-contained breathing apparatus must be sued when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color:</td>
<td>Light yellow to amber</td>
</tr>
<tr>
<td>Odor:</td>
<td>Slight ammoniacal</td>
</tr>
<tr>
<td>Odor Threshold:</td>
<td>Not Available</td>
</tr>
<tr>
<td>Physical State:</td>
<td>Liquid</td>
</tr>
<tr>
<td>pH:</td>
<td>Not Applicable; Alkaline – 10% solution 10-12</td>
</tr>
<tr>
<td>Melting Point / Freezing Point:</td>
<td>Not Available</td>
</tr>
<tr>
<td>Initial Boiling Point:</td>
<td>Not Available</td>
</tr>
<tr>
<td>Boiling Point:</td>
<td>Not Available</td>
</tr>
<tr>
<td>Flash Point:</td>
<td>76°C (169°F) Closed Cup</td>
</tr>
<tr>
<td>Evaporation Rate:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Flammability (solid, gas):</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Lower Flammability Limit:</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
Upper Flammability Limit: Not Applicable
Vapor Pressure: Not Available
Vapor Density: Not Available
Relative Density: 1.01
Solubility: Partial
Partition Coefficient: n-Octanol/Water: Not Available
Auto-ignition Temperature: 300°C (572°F)
Decomposition Temperature: >150°C (>302°F)
Viscosity: 700-2000 cps
Percent Volatile, wt.%: 0
VOC Content, wt.%: 0
Density: 1.01 g/cc
Coefficient of Water/Oil Distribution: Not Available

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions.
Hazardous decomposition byproducts: Hazardous polymerization may occur.
Conditions to Avoid: Can auto-ignite in air at approximately 572°F (300°C)
Incompatible Materials: Epoxy resins under uncontrolled conditions, acid, oxidizing material, halogenated, organic compounds.

SECTION 11: TOXICOLOGICAL INFORMATION

Acute Toxicity: LD50 Oral >2000 mg/kg (rat)
                LD50 Dermal >2000 mg/kg (rabbit)

Primary Irritant Effect
On the Skin: Irritant to skin and mucous membranes.
Primary Irritant Effect
On the Eye: Irritating effect.
Swallowing: Can cause abdominal irritation, nausea, vomiting, and diarrhea.

Additional Toxicological Information: This product has no carcinogens listed by IARC, NTP, NIOSH, OSHA, or ACGIH as of this date, greater or equal to 0.1%
**SECTION 12: ECOLOGICAL INFORMATION**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toxicity:</strong></td>
<td>All work practices must be aimed at eliminating environmental contamination.</td>
</tr>
<tr>
<td><strong>Aquatic Toxicity:</strong></td>
<td>This material is harmful to the environment in unreacted form.</td>
</tr>
<tr>
<td><strong>Persistence and Degradability:</strong></td>
<td>The product is partially biodegradable. Significant residue remains.</td>
</tr>
<tr>
<td><strong>Bio-accumulative Potential:</strong></td>
<td>Does not accumulate in organisms.</td>
</tr>
<tr>
<td><strong>Mobility in Soil:</strong></td>
<td>No further relevant information available</td>
</tr>
<tr>
<td><strong>Ecotoxic Effects</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Remark:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Additional Ecological Information:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>General Notes:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PBT Assessment:</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>vPvB Assessment:</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Other Adverse Effects:</strong></td>
<td></td>
</tr>
</tbody>
</table>

**SECTION 13: DISPOSAL CONSIDERATIONS**

**Waste Treatment Methods**

**Recommendation:**

The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers and liners may retain some product residues. Vapor from some product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Processing, use or contamination may change the waste disposal requirements. Do not dispose of on land, in surface waters, or in storm drains. Waste should be recycled or disposed of in accordance with regulations. Large amounts should be collected for reuse or consigned to licensed hazardous waste haulers for disposal.

**ALL DISPOSAL MUST BE IN ACCORDANCE WITH ALL FEDERAL, STATE, PROVINCIAL, AND LOCAL REGULATIONS. IF IN DOUBT, CONTACT PROPER AGENCIES.**

**Uncleaned Packaging:**

Empty containers may contain residue and may be dangerous. Do not attempt to refill or clean without proper instructions. Empty drums should be drained and stored safely for reconditioning or recycling.
Recommendation: Disposal must be made according to official regulations.

SECTION 14: TRANSPORT INFORMATION

US DEPARTMENT of TRANSPORTATION (DOT)
Proper Shipping Name: Amines, liquid, corrosive, n.o.s. (aliphatic amines, aromatic amine)
Class: 8
UN #: UN2735
Packing Group: II

CANADA Transportation of Dangerous Goods (TDG)
Proper Shipping Name: Amines, liquid, corrosive, n.o.s. (aliphatic amines, aromatic amine)
Class: 8
UN #: UN2735
Packing Group: II

Air Transport (ICAO-IATA/DGR)
Proper Shipping Name: Amines, liquid, corrosive, N.O.S. (aliphatic amines, aromatic amine)
Class: 8
UN #: UN2735
Packing Group: II

Sea Transport (IMDG-Code/GGVSee)
Proper Shipping Name: Amines, liquid, corrosive, N.O.S. (aliphatic amines, aromatic amine)
UN #: UN2735
Class: 8
Packing Group: II
Marine Pollutant: Yes
Special Provision(s): None

SECTION 15: REGULATORY INFORMATION

CHEMICAL INVENTORIES

US (TSCA): The components of this product are in compliance with the chemical notification requirements of TSCA.

CANADA (DSL): The components of this product are in compliance with the chemical notification requirements of NSN Regulations under CEPA, 1999.
FEDERAL REGULATIONS

CANADA:
At least one component is not listed.

WHMIS Classification:
Class B-3 Combustible liquid (flash point 100°F – 200°F)
Class D-2B Material causing other toxic effects
Class E Corrosive Material

UNITED STATES:
This SDS has been prepared to meet the US OSHA Hazard Communication Standard, 29 CFR 1910.1200

SARA Title III:
No components are listed.

STATE REGULATIONS

US STATE Right to Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>NJ</th>
<th>MA</th>
<th>PA</th>
<th>IL</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aromatic Alcohol</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

California
California Prop 65:
This product does not contain chemicals known to the State of California to be Carcinogenic.

SECTION 16: OTHER INFORMATION

HMIS (Hazardous Material Information System):

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Reactivity</th>
<th>Personal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>0</td>
<td>B</td>
</tr>
</tbody>
</table>

Disclaimer:
This information is furnished without warranty of any kind, expressed or implied. Five Star Products, Inc. bases the information and recommendations in this document on data believed to be current and accurate.
SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name(s): Five Star® DP Epoxy Grout / Component C Aggregate
Five Star® DP Epoxy Grout PG / Component C Aggregate
Five Star® DP Epoxy Grout High Flow / Component C Aggregate
Five Star® Elastomeric Grout / Component C Aggregate
Five Star® Epoxy Grout N / Component C Aggregate
Five Star® Epoxy Grout Red N / Component C Aggregate
Five Star® Epoxy Novolac Grout / Component C Aggregate
Five Star Novolac Structural Concrete®/Component C Aggregate
Five Star® Pile Jacket Epoxy Grout HP/Component C Aggregate
Five Star® HP Epoxy Grout / Component C Aggregate
Five Star® RailForm™ HPG / Component C Aggregate
Five Star® Rapid Epoxy Grout /Component C Aggregate
Five Star® Rapid Surface Repair Easy Mix/Component C Aggregate
Five Star® SP Epoxy Grout / Component C Aggregate
Five Star® SP Epoxy Grout PG / Component C Aggregate

Synonyms: Aggregate, Component C

Product Use: Aggregate for reactive polymer construction products. Designed for use with appropriate hardener and resin.

Restrictions on Use: N/A

Manufacturer/Supplier
Five Star Products, Inc.
60 Parrott Drive
Shelton, CT 06484 USA

Phone #: 203-336-7900

Emergency Phone #: CHEM-TEL 1-800-255-3924
(Outside the U.S. 1-813-248-0585)

SECTION 2: HAZARD(S) IDENTIFICATION-GHS INFORMATION

Classification:
Eye Damage/Irritation – Category 1
Sensitization – Respiratory, Category 1
Carcinogenicity – Category 1A
Specific Target Organ Systemic Toxicity (Single Exposure) – Cat 3
Specific Target Organ Toxicity (Repeated Exposure) – Cat 2

Label Elements/Hazard Pictograms:

Signal Word: Warning
Safety Data Sheet

Date Revised: 3/3/2016
Supersedes: 2/1/2016

Hazard Statements:
- Harmful if swallowed H302
- May cause respiratory irritation H335
- May cause cancer by inhalation H350
- May cause damage to organs through prolonged or repeat exposure H373

Precautionary Statements/Prevention:
- Do not breathe dust, fume, gas, mist, vapors, or spray, P260.
- Wash thoroughly after handling, P264.
- Wear protective gloves, protective clothing, eye protection and face protection, P280.
- Wear respiratory protection, P284.

Response:
- If swallowed: Rinse mouth. Do NOT induce vomiting, P330, P331.
- If inhaled: Remove person to fresh air and keep comfortable for breathing, P340.
- If in eyes: Rinse cautiously with water for several minutes, P351. Remove contact lenses, if present and easy to do. Continue rinsing, P338.
- Immediately call a poison center or doctor, P310.
- If skin irritation or rash occurs, P333: Get medical advice/attention, P313.
- If experiencing respiratory symptoms, P342: Call a poison center or doctor, P310. Wash contaminated clothing before reuse, P363.

Storage:
- Store locked up.

Disposal:
- Dispose of contents/container in accordance with applicable regional, national, and local laws and regulations.

Hazards Not Otherwise Classified:
- Not applicable

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Ingredient(s)</th>
<th>Common Name/Synonyms</th>
<th>CAS No.</th>
<th>% wt/wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>Silicon Dioxide, Silica Sand, Crystalline Silica</td>
<td>14808-60-7</td>
<td>65-90</td>
</tr>
<tr>
<td>Amorphous Silica Mixture</td>
<td>n/a</td>
<td>TS</td>
<td>10-35</td>
</tr>
</tbody>
</table>

SECTION 4: FIRST AID MEASURES

Inhalation:
- If inhaled: Remove person to fresh air and keep comfortable for breathing.
- If experiencing respiratory symptoms call poison center or doctor.
Eye Contact: If in eyes: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Skin Contact: Wash skin thoroughly.

Ingestion: If swallowed: Rinse mouth. Do NOT induce vomiting. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

Note to Physicians: Symptoms may not appear immediately. Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

Flammability and Explosion Information: Not flammable or combustible by OSHA/WHMIS criteria.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.

Sensitivity to Static Discharge: This material is not sensitive to static discharge.

MEANS OF EXTINCTION

Suitable Extinguishing Media: Small Fire: Dry chemical, CO2, or water spray. Large Fire: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire-control water for later disposal; do not scatter the material.

Unsuitable Extinguishing Media: Not available

Product of Combustion: Non-combustible

Protection of Firefighters: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6: ACCIDENTAL RELEASE MEASURES


Personal Precautions: Avoid inhalation of dust. Do not get into eyes, on skin, or clothing.

Environmental Precautions: The environmental impact of this product has not been fully investigated.
Methods for Containment: Cover powder spill with plastic sheet or tarp to minimize spreading. Collect this material into a disposal container by sucking or sweeping up.

Methods for Cleanup: Pick up and transfer to properly labeled containers.

Other Information: See Section 13 for disposal considerations.

SECTION 7: HANDLING AND STORAGE

Handling: Wear personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Do not breathe dust. Prevent contact with skin, eyes, and clothing. Wash thoroughly after handling.

Storage: Keep containers tightly closed in a cool, dry, and well-ventilated place. Store locked up.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>TWA: 0.025mg/m³ respirable fraction</td>
<td>30/(%SiO2+2) mg/m³ TWA, Total Dust; 250/(%SiO2+2) mppcf TWA, respirable fraction; 10/(%SiO2+2) mg/m³ TWA, respirable TWA; 0.1 mg/m³ (vacated)</td>
</tr>
</tbody>
</table>

PEL: Permissible Exposure Limit  
TLV: Threshold Limit Value

Engineering Controls: Not normally required.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Tightly fitting safety goggles

Hand Protection: Impervious gloves. Impervious clothing.

Skin and Body Protection: Impervious gloves. Impervious clothing.

Respiratory Protection: If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices.
### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Granular Powder</td>
</tr>
<tr>
<td>Color</td>
<td>Gray, Tan, Pink</td>
</tr>
<tr>
<td>Odor</td>
<td>None</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>None</td>
</tr>
<tr>
<td>Physical State</td>
<td>Solid, powder</td>
</tr>
<tr>
<td>pH</td>
<td>1:1 W/O Water=12</td>
</tr>
<tr>
<td>Melting Point / Freezing Point</td>
<td>n/a</td>
</tr>
<tr>
<td>Initial Boiling Point</td>
<td>n/a</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>n/a</td>
</tr>
<tr>
<td>Flash Point</td>
<td>n/a</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>n/a</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>n/a</td>
</tr>
<tr>
<td>Lower Flammability Limit</td>
<td>n/a</td>
</tr>
<tr>
<td>Upper Flammability Limit</td>
<td>n/a</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>n/a</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>n/a</td>
</tr>
<tr>
<td>Relative Density</td>
<td>2.5-2.8</td>
</tr>
<tr>
<td>Solubility</td>
<td>Negligible</td>
</tr>
<tr>
<td>Partition Coefficient: n-Octanol/Water</td>
<td>n/a</td>
</tr>
<tr>
<td>Auto-ignition Temperature</td>
<td>n/a</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>n/a</td>
</tr>
<tr>
<td>Viscosity</td>
<td>n/a</td>
</tr>
<tr>
<td>Percent Volatile, wt.%</td>
<td>n/a</td>
</tr>
<tr>
<td>VOC Content, wt.%</td>
<td>n/a</td>
</tr>
<tr>
<td>Density</td>
<td>n/a</td>
</tr>
<tr>
<td>Coefficient of Water/Oil Distribution</td>
<td>n/a</td>
</tr>
</tbody>
</table>

### SECTION 10: STABILITY AND REACTIVITY

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Stability</td>
<td>Stable under recommended storage conditions.</td>
</tr>
<tr>
<td>Possibility of Hazardous Reactions</td>
<td>None under normal processing.</td>
</tr>
<tr>
<td>Conditions to Avoid</td>
<td>Exposure to water – product may harden on contact with water.</td>
</tr>
</tbody>
</table>
Incompatible Materials: Strong acids.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product information:

Inhalation: Irritating to respiratory system. Irritating to mucous membranes.

Eye contact: Risk of serious damage to eyes.

Skin contact: Irritating to skin. May cause allergic skin reaction.

Ingestion: Harmful if swallowed.

Component information:

Chemical Name: Quartz  
LD50 Oral: 500 mg/kg (Rat)  
ACGIH: A2 – Suspected Human Carcinogen

IARC: Group 1 – Carcinogenic to humans  
OSHA: X-present

Delayed and immediate effects and also chronic effects from short and long term exposure.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity:

Aquatic Toxicity: The environmental impact of this product has not been fully investigated.

Persistence and Degradability: No information available.

Bio-accumulative Potential: Does not accumulate in organisms

Mobility in Soil: No further relevant information available

Ecotoxical Effects Remark: No information available.

Additional Ecological Information: No information available.

General Notes: This statement was deduced from products with a similar structure or composition. Due to available data on eliminability/decomposition and bio-accumulation potential prolonged term damage of the environment cannot be excluded. Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system. Poisonous for fish and plankton in water bodies and toxic for aquatic organisms until alkaline pH is neutralized.

PBT Assessment: N/A

vPvB Assessment: N/A

Other Adverse Effects: No further relevant information available
SECTION 13: DISPOSAL CONSIDERATIONS

Waste Treatment Methods

**Recommendation:**
This material as supplied is not a hazardous waste according to Federal regulations (40CFR261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered.

**Uncleaned Packaging Recommendation:**
Disposal must be made according to official regulations. Do not re-use empty containers.

SECTION 14: TRANSPORT INFORMATION

**US DEPARTMENT of TRANSPORTATION (DOT)**

- **Proper Shipping Name:** Not regulated
- **Class:** None
- **UN #:** None
- **Packing Group:** None

**CANADA Transportation of Dangerous Goods (TDG)**

- **Proper Shipping Name:** Not regulated
- **Class:** None
- **UN #:** None
- **Packing Group:** None

**Air Transport (ICAO-IATA/DGR)**

- **Proper Shipping Name:** Not regulated
- **Class:** None
- **UN #:** None
- **Packing Group:** None

**Sea Transport (IMDG-Code/GGVSee)**

- **Proper Shipping Name:** Not regulated
- **UN #:** None
- **Class:** None
- **Packing Group:** None
- **Marine Pollutant:** None
- **Special Provision(s):** None
SECTION 15: REGULATORY INFORMATION

CHEMICAL INVENTORIES

US (TSCA): The components of this product are in compliance with the chemical notification requirements of TSCA.

CANADA (DSL): The components of this product are in compliance with the chemical notification requirements of NSN Regulations under CEPA, 1999.

U.S. FEDERAL REGULATIONS Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the CFR, Part 372.

UNITED STATES: This SDS has been prepared to meet the US OSHA Hazard Communication Standard, 29 CFR 1910.1200

SARA 311/312 Hazard Categories
Acute health hazard – Yes
Chronic Health hazard – Yes
Fire Hazard – No
Sudden Release of Pressure – No
Reactive Hazard - No

US STATE Right to Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>NJ</th>
<th>MA</th>
<th>PA</th>
<th>IL</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

California This product contains the following Proposition 65 chemicals.
California Prop 65: Chemical Name: Quartz  CAS-No: 14808-60-7 CA Prop. 65: Carcinogen

SECTION 16: OTHER INFORMATION

HMIS Rating: | Health | Flammability | Physical Hazard | Personal Protection |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td>E</td>
</tr>
</tbody>
</table>

Disclaimer: This information is furnished without warranty of any kind, expressed or implied. Five Star Products, Inc. bases the information and recommendations in this document on data believed to be current and accurate.
DESIGN A SPEC GUIDELINES
FIVE STAR PILE JACKET GROUT HP

CONTENTS

► PART A - GENERAL CONDITIONS
► PART B - MATERIAL SPECIFICATIONS
► PART C - PREPARATION
► PART D - APPLICATION
► PART E - FINISHING AND CURING

This document is provided as a general guideline for consideration by contractors and engineers. While every reasonable effort has been made to ensure that this information is accurate and authoritative, Five Star Marine does not warrant the accuracy or completeness of this information or for its appropriateness for any particular purpose. The user of this document remains solely responsible for the specification of all methods, materials and practices.
PART A - GENERAL CONDITIONS

1.01 SCOPE

The work covered by this document consists of furnishing all materials and performing all operations required for pile repair / encapsulation using fiberglass pile jackets and moisture insensitive epoxy grout.

If it is determined that structural repairs to the pile are needed they must be performed in conjunction with the repairs described in this document. These repairs can include, but are not limited to, chipping out loose concrete, exposing rebar, cleaning rebar, replacing or adding rebar and filling the repaired area with grout.

1.02 QUALITY ASSURANCE

The manufacturer shall be ISO 9001 certified and have a 15 year history of use in the manufacture of epoxy grout systems. The manufacturer shall provide on site technical service at no cost to the engineer or contractor when sufficient advance notice is provided.

1.03 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered to the jobsite in their original, unopened packages, clearly labeled with the product identification, printed instructions and batch code.

B. Store and condition the fiberglass jackets and pile jacket grout at 60°F to 80°F (16°C to 27°C) for at least 24 hours prior to use. Refer to the product data sheet for more information.

C. For handling instructions, refer to the Material Safety Data Sheet.

1.04 PROJECT / SITE CONDITIONS

A. Refer to Part C – PREPARATION, ENVIRONMENTAL CONDITIONS, or contact the manufacturer directly for any physical or environmental limitations required by the product.

1.05 MEASUREMENT AND PAYMENT

A. Measurement for pile repair / encapsulation shall be on a linear foot / cubic foot basis of material in place.

B. Payment for pile repair / encapsulation shall be at the unit price bid on a linear foot/cubic foot basis. This payment shall constitute full compensation for all labor, materials, tools, equipment and other items as necessary to complete the work bid. Progress payments may be made on the percentage of work satisfactorily completed during each payment period in accordance with the contract provisions.
PART B - MATERIAL SPECIFICATIONS

2.01 MATERIALS (EPOXY GROUT)

A. The pile encapsulation epoxy grout material shall be 100% solids, premeasured, prepackaged epoxy system containing thermosetting epoxy resins, expansive additives and inert fillers. The material shall be nonshrink and suitable for placement underwater via pouring or pumping. The manufacturer shall have at least 10 years experience in the manufacture of epoxy grout systems and be ISO 9001 certified. The manufacturer shall offer technical services and provide a representative at the job site for product training prior to product installation.

B. The pile repair / encapsulation material shall meet the following performance criteria:

1. Compressive Strength, 
   ASTM C 579 B
   psi (MPa)
   1 Day  2000 (13.8)
   7 Days 10,000 (69.0)
   28 Days 11,500 (79.3)

2. Tensile Strength, 
   ASTM C 307
   2300 (15.9)

3. Bond to Concrete, 
   ASTM C 882
   3500 (24.1)

4. Linear Shrinkage
   ASTM C 531
   0.00%

5. Water Absorption
   ASTM C 413
   0.0%

6. Working Time
   90 minutes

C. An acceptable product that meets this criteria is:

Five Star Pile Jacket Grout HP

As manufactured by Five Star Marine, Inc. Fairfield CT 06825

2.02 AGGREGATE REDUCTION

Do not reduce aggregate loading beyond manufacturer’s recommendations.

2.03 CLEARANCES

A. The grout shall be placed from ½ to 6 inches (12 mm to 150 mm) around piles when used with a jacket retainer system.
B. The maximum annular area of grout around piles shall be 6 inches.

2.01 MATERIALS (PILE JACKET)

A. The pile jacket shall consist of a fiberglass mat woven in a polyester resin matrix. Wall thickness of jacket shall be 1/8 inch unless otherwise specified. Jacket closures shall be tongue and groove. The manufacturer shall have at least 10 years experience in the manufacture of fiberglass jackets. The manufacturer shall offer technical services and provide a representative at the job site for product training prior to product installation.

B. The fiberglass jacket shall meet all the following typical performance criteria:

1. Flexural Strength ASTM D 790 40,000 psi (275.8 MPa)
2. Flexural Modulus ASTM D 790 1.4 x 10^6 psi (9,931 MPa)
3. Ultimate Tensile Strength ASTM D 638 21,000 psi (145 MPa)
4. Tensile Modulus ASTM D 638 1.7 x 10^6 psi (11,724 MPa)
5. Water Absorption ASTM D 570 0.09%
6. Barcol Hardness 50
7. UV Resistance ASTM G 153 No chipping, flaking or peeling
   500 hours

C. An acceptable product that meets this criteria is:

   **Five Star Marine Pile Form F**

   As manufactured by Five Star Marine, Fairfield CT 06825
Diagram A: Examples of pile jackets

Diagram B: Tongue and Grove Joint Detail
PART C – PREPARATION

3.01 CONCRETE SURFACES

A. Completely remove all loose, delaminated and weak concrete, oil, grease, laitance, marine growth and other contaminants. Prepare concrete using acceptable mechanical means and concrete cleaners and degreasers as necessary to obtain clean, sound and rough surfaces. Coarse aggregate shall be exposed.

B. All cracks shall be brought to the attention of the engineer and a determination made of whether the cracks are subject to movement. The cracks shall be repaired as directed prior to installation of fiberglass jacket and epoxy grout.

C. For more detailed information, refer to the following publication: "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion", Guideline No. 03730, prepared by the Technical Guidelines Committee of ICRI, March 1995.

3.02 REINFORCEMENT

A. All reinforcing steel that has lost bond with the concrete or has more than one-half of its circumference exposed shall be undercut by at least 3/4 inch (18 mm) or two times the maximum aggregate size.

B. If more than 20% of the diameter of a reinforcing bar has been deteriorated, the bar may require replacement or will need to be spliced as directed by the engineer.

C. All reinforcement shall be rigidly secured and supported.

D. All exposed reinforcing steel shall be free of all loose scale, rust, oxidation and other contaminants. Blast steel to an SSPC – SP6 commercial finish or better. Exposed
reinforcing steel may be sealed or primed if a delay occurs between surface preparation and epoxy grout placement.

3.03 JACKET PLACEMENT

A. One piece jackets are typically full circle and will fully cover the pile. Two piece jackets are typically used on square or H piles. Spacers / standoffs inside jackets are placed at regular intervals to provide the maximum support and maintain the annular space between the jacket and the pile. Spacers / standoffs may be pre-molded into jackets or applied at job site. Spacers can be made of wood, plastic or metal. When placing spacers, use a fast setting epoxy adhesive suitable for exposure to water such as Five Star RS Anchor Gel.

B. For pumping applications, secure suitable pump ports to jacket. Mount port approximately 12 inches from the bottom of the pile. Additional ports may be needed for jacket lengths over 5 feet. Where necessary, place a additional port approximately three feet above the first port and 180º opposite the first port. If additional ports are needed alternate the placement 180º from the previous port and three feet above.

C. Piles should be cleaned with a high pressure water jet blast to remove all loose material and marine growth.

A. Use a sealing compound to fill the groove side of the opening. Five Star RS Anchor Gel is an excellent rapid setting epoxy gel adhesive that can be used to seal the tongue and groove joint. RS Anchor Gel is packaged in a dual cartridge system with a static mixer tip. Insert the mixer tube into the groove and inject a generous amount of epoxy in the entire length of the groove. Hold the jacket up right next to the pile. Pull open the jacket and slip it around the pile. Allow the tongue to slip into the groove. Position the jacket to cover the area desired. Press the jacket closed and the tongue into the groove as far as it will go. Use ratcheting straps around the jacket to secure it.

B. Wooden braces, battens or strong backs, should be placed on the outside of the jacket to prevent bulging. Use 2 x 4 or 2 x 6 that is about the same length as the jacket and attach one with screws to the middle of each jacket face. Place straps 12 to 18 inches apart vertically and around the braces to insure that the jacket is secure. When the jacket is in position and the straps tight use stainless steel self drilling/tapping screws to secure the tongue and groove joint. Locate the screws so that they go through both sides of the groove and the tongue. Use screws that are long enough to penetrate the jacket but not long enough to extend to the pile itself. Place screws three to six inches apart for the entire length of the jacket.

3.04 JACKET SEALING

A. Pile jackets need a seal at the bottom of the jacket to prevent the grout from leaking out of the bottom of the jacket. The choice of bottom seal can be determined by environmental restrictions, owner preference or contractor experience. The most common types include closed foam strips, oakum and resin, nylon retainers and epoxy packing. Depending on the type used it will be put in place before or after the positioning of the jacket around the pile.
B. Foam strips should be placed around the interior bottom of the jacket before the jacket is placed around the pile. The foam should be of sufficient height and thickness to form a tight seal. Foam should be three to four times the thickness of the annular space and three to five inches in height. Be sure that the ends of the strips overlap when in place to prevent leaks. Secure the bottom seal with stainless steel strapping or nylon ratchet straps.

C. Oakum is placed after the jacket is in place and secured to the pile. Oakum can be used alone or with an expanding resin. The oakum alone or with the resin should be packed up into the jacket annular space to insure a full seal. The resin will expand upon contact with water and completely fill the annular space at the bottom of the jacket. Working time of the oakum-resin is about five minutes.

D. Jackets can also be sealed with an integral nylon sleeve. This sleeve is molded into the bottom of the jacket at the time of manufacture of the jacket. It has a water tight zipper closure and is attached to the pile below the jacket with stainless steel straps or nylon zip strapping.

3.05 MIXING  

Mortar Mixer (Stationary Barrel Mixer with Moving Paddles)  

A. Provide an adequate number of mortar mixers in good operating condition for uninterrupted placement. Do not exceed one-half the maximum capacity of the mortar mixer. A concrete mixer (spinning barrel mixer) is not recommended for mixing epoxy grout.

B. Pour all Component B (hardener) into the pail containing Component A (resin). Mix thoroughly for 2 minutes by hand with paddle or slow speed mixer to avoid air entrapment. Pour mixed liquids into the mortar mixer. While mixing, slowly Component C (aggregate) and mix until aggregate is completely wet.

C. Do not mix more material than can be placed within the working time of the grout.

D. Pour the mixed grout into a suitable wheelbarrow or carrier to transport it to the work site.

4.01 APPLICATION  

Pumping  

A. A peristaltic type pump is recommended for pumping epoxy grout. When using any other type of pump, consult epoxy grout manufacturer first to ensure the epoxy grout is pumpable with another type of pump.

B. Prime pump and lines with a suitable primer that will not contaminate epoxy grout. Ensure material used for priming is discarded and not used for jacket filling.
D. Attach the pump hose to the bottom port and commence pumping. For tremie pumping, insert hose into jacket to bottom and commence pumping. Keep pump hose submerged in epoxy grout and slowly raise pump hose as jacket fills with epoxy grout.

E. When the grout in the jacket rises to the level of the next port stop the pump, remove the hose and close the port with a plug. Then attach the hose to the next higher port and continue pumping. Repeat this until the jacket is full of grout.

F. When the jacket is full, the top of the jacket can be topped off with additional grout placed by hand or by a later placement of a suitable marine mastic such as Five Star Splash Zone.

G. Do not mix more material than can be placed within the working time of the grout.

H. All tools and equipment may be cleaned with high pressure water and a strong detergent prior to hardening. Sand may be used as an abrasive to aid clean up.

**Pouring**

A. Use a headbox or ramp at top of jacket opening to facilitate pouring of epoxy grout into jacket.

B. Mixing and pouring of epoxy grout should be a continuous process to minimize air entrapment. Headbox or ramp used for pouring may be moved or alternated from side to side to also help reduce air entrapment.

C. Continue pouring epoxy grout until jacket is full. Grout level may be topped off using additional material placed by hand or by a later placement of a suitable marine mastic such as Five Star Splash Zone.

D. Do not mix more material than can be placed in the working time of the epoxy grout.

E. All tools and equipment may be cleaned with high pressure water and a strong detergent prior to hardening. Sand may be used as an abrasive to aid clean up.
PART E – FINISHING AND CURING

5.01 FINISHING

A. Prior to hardening, epoxy grout can be finished with a solvent wiped steel trowel. Maintaining a sufficient solvent coat is important as epoxy grout will adhere to a dry trowel.

B. Epoxy grouts cannot be trimmed after set except by mechanical means. Final level in the forms should be brought to the finished elevation before curing.

5.02 CURING

A. Protect the grout from temperatures below 40°F (4°C) for 24 hours or until required minimum compressive strength is achieved.

Warranty

Five Star Marine warrants that at the time and place we make shipment, our materials will be of good quality and will conform to our published specifications in force on the date of acceptance of the order. THE FOREGOING WARRANTY SHALL BE EXCLUSIVE AND IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL OTHER WARRANTIES OTHERWISE ARISING BY OPERATION OF LAW, COURSE OF DEALING, CUSTOM OR TRADE OR OTHERWISE. As the exclusive remedy for breach of this Warranty, we will replace defective materials, provided, however, that the buyer examines the materials when received and promptly notify in writing of any defect before the materials are used or incorporated into a structure. Twelve (12) months after Five Star® Marine, Inc. has shipped the materials, all our Warranty and other duties with respect to the quality of the materials delivered shall conclusively be presumed to have been satisfied, all liability therefore terminates, and not acting for breach of any duties may thereafter commence. Five Star® Marine, Inc. shall in no event be liable for consequential damages. Unless otherwise agreed to in writing, no warranty is made with respect to materials not made by Five Star® Marine, Inc. We cannot warranty or in any way guarantee any particular method of use of application or the performance of materials under any particular condition. Neither this Warranty nor our liability may be extended or amended by our sales people, distributors or representatives or by any sales information or drawings.
PRODUCT DESCRIPTION

Five Star Structural Concrete® Underwater Hand Pack is a rapid strength gain, single component, permanent concrete repair material intended for underwater application by hand or trowel. This concrete repair material allows small volume hand placements with minimal underwater washout. Designed for placement in tidal zones and underwater, application thickness may range from one-half inch (13 mm) to several inches in a single installation. Five Star Structural Concrete® Underwater Hand Pack provides corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

ADVANTAGES

- Rapid set underwater placement
- Minimal washout
- Saltwater resistant
- Chloride and sulfate resistant
- High early strength
- Variable application thickness
- One component for reliability and ease of use
- Migrating corrosion inhibitor technology

USES

- Underwater repair of concrete tanks, dams and hydraulic structures
- Filling underwater concrete cavities and voids
- Underwater repair of concrete piles, piers, seawalls and marine structures

PACKAGING AND YIELD

Five Star Structural Concrete® Underwater Hand Pack is packaged in heavy-duty polyethylene lined bags or plastic pails and is available in 36 lb. (16.3 kg) units yielding approximately 0.35 cubic feet (9.9 liters) at maximum water.

SHELF LIFE

One year in original unopened packaging when stored in dry conditions; high relative humidity will reduce shelf life.

<table>
<thead>
<tr>
<th>TYPICAL PROPERTIES AT 70°F (21°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compressive Strength</strong>, ASTM C 109</td>
</tr>
<tr>
<td>3 Hours</td>
</tr>
<tr>
<td>1 Day</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td>28 Days</td>
</tr>
<tr>
<td><strong>Underwater Bond Strength</strong>, ASTM C 882</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td><strong>Length Change</strong>, ASTM C 157</td>
</tr>
<tr>
<td>28 Days Wet</td>
</tr>
<tr>
<td><strong>Working Time at 70°F (21°C)</strong></td>
</tr>
</tbody>
</table>

The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result. Test methods are modified where applicable.
PLACEMENT GUIDELINES

1. **SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete® Underwater Hand Pack shall be free of marine growth, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Presoak concrete surfaces in tidal zone areas. A perimeter edge and minimum depth of 1/2 inch (13 mm) should be provided for a durable repair. Featheredging is not desirable. Repair surfaces shall be between 45°F and 90°F (7°C and 32°C) at time of placement. For cold and hot weather placement refer to Five Star® Design-A-Spec™ or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

2. **MIXING:** Five Star Structural Concrete® Underwater Hand Pack is designed for small volume underwater repairs. Mix thoroughly with a drill and paddle mixer to a uniform consistency. Start by adding the minimum amount of potable water followed by repair material and mix for two to three minutes. Adjust consistency as necessary. Do not mix more material than can be placed in 10 minutes.

3. **PLACEMENT PROCEDURES:** Firmly work Five Star Structural Concrete® Underwater Hand Pack into concrete surface with a trowel or by hand, taking care not to leave air pockets. Application is from one side of the repair to the other, filling the repair to the desired level. For multiple lift application instructions, contact Five Star Products’ Engineering and Technical Service Center. Finish as necessary.

   SPECIAL CONDITIONS: For use in cold temperatures, Five Star Structural Concrete® Underwater Hand Pack must be maintained at a temperature of at least 45°F (7°C). Protect from freezing until a compressive strength of 1,000 psi (6.9 MPa) is obtained. In hot temperatures, Five Star Structural Concrete® Underwater Hand Pack should be kept as cool as possible, but not exceeding 90°F (32°C). Cold water should be used for mixing to help maintain sufficient working time. Five Star® Summerset® may also be used if necessary to provide more working time.

4. **POST-PLACEMENT PROCEDURES:** In tidal zones, Five Star Structural Concrete® Underwater Hand Pack shall be kept wet continuously for 30 minutes after hardening.

   **NOTE:** PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY. For more detailed placement procedures, refer to Five Star® Design-A-Spec™ installation guidelines or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

CONSIDERATIONS

- Never exceed the maximum water content stated on the package or add an amount that will cause segregation.
- Repair material shall be protected from freezing until it reaches a compressive strength of 1,000 psi (6.9 MPa).

CAUTION

Contains cementitious material and crystalline silica. International Agency for Research on Cancer has determined that there is sufficient evidence for the carcinogenicity of inhaled crystalline silica to humans. Take appropriate measures to avoid breathing dust. Avoid contact with eyes and contact with skin. In case of contact with eyes, immediately flush with plenty of water for at least 15 minutes. Immediately call a physician. Wash skin thoroughly after handling. Keep product out of reach of children. PRIOR TO USE, REFER TO SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star® distributor, local sales representative, or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

<table>
<thead>
<tr>
<th>SKU / PRODUCT CODE</th>
<th>DESCRIPTION</th>
<th>#UNITS/PALLET</th>
<th>UNIT SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>29215</td>
<td>Structural Concrete® Underwater Hand Pack</td>
<td>36</td>
<td>36 lb. (16.3 kg) pail</td>
</tr>
</tbody>
</table>

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.”

Specifications Subject to Change.
For most current version of datasheet, go to FiveStarProducts.com

© 2015 Five Star Products, Inc. | 11-20-2015
12392 Rev. B | American Owned & Operated
SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name(s): Five Star Structural Concrete® Underwater HP
Synonyms: SC UWHP (Hand Pack)
Product Use: High early strength, single component, permanent concrete repair material.
Restrictions on Use: N/A
Manufacturer/Supplier: Five Star Products, Inc.
750 Commerce Drive
Fairfield, CT 06825 USA
Phone #: 203-336-7900
Emergency Phone #: CHEM-TEL 1-800-255-3924
(Outside the U.S. 1-813-248-0585)

SECTION 2: HAZARD(S) IDENTIFICATION—GHS INFORMATION

Classification:
Acute Oral Toxicity – Category 4
Skin Corrosion/Irritation – Category 2
Acute Toxicity – Dermal, Category 2
Eye Damage/Irritation – Category 1
Sensitization – Respiratory, Category 1
Carcinogenicity – Category 1A
Specific Target Organ Systemic Toxicity (Single Exposure) – Cat 3
Specific Target Organ Toxicity (Repeated Exposure) – Cat 2

Label Elements/Hazard Pictograms:

Signal Word: Danger

Hazard Statements:
Harmful if swallowed H302
May cause skin irritation H317
Causes severe skin burns and eye damage H314
May cause respiratory irritation H335
May cause an allergic skin reaction H317
May cause cancer by inhalation H350
May cause damage to organs through prolonged or repeat exposure H373
Precautionary Statements/Prevention:
Do not breathe dust, fume, gas, mist, vapors, or spray, P260.
Wash thoroughly after handling, P264.
Do not eat, drink or smoke when using this product, P270.
Contaminated work clothing should not be allowed out of the workplace, P272.
Wear protective gloves, protective clothing, eye protection and face protection, P280.
Wear respiratory protection, P284.

Response:
If swallowed: Rinse mouth. Do NOT induce vomiting, P330, P331.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower, P361, P353.
If inhaled: Remove person to fresh air and keep comfortable for breathing, P340.
If in eyes: Rinse cautiously with water for several minutes, P351. Remove contact lenses, if present and easy to do. Continue rinsing, P338.
Immediately call a poison center or doctor, P310.
If skin irritation or rash occurs, P333: Get medical advice/attention, P313.
If experiencing respiratory symptoms, P342: Call a poison center or doctor, P310. Wash contaminated clothing before reuse, P363.

Storage:
Store locked up.

Disposal:
Dispose of contents/container in accordance with applicable regional, national, and local laws and regulations.

Hazards Not Otherwise Classified: Not applicable

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Ingredient(s)</th>
<th>Common Name/Synonyms</th>
<th>CAS No.</th>
<th>% wt/wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blended Hydraulic Cement</td>
<td>n/a</td>
<td>TS</td>
<td>70-90</td>
</tr>
<tr>
<td>Quartz</td>
<td>Silicon Dioxide, Silica Sand</td>
<td>14808-60-7</td>
<td>10-30</td>
</tr>
</tbody>
</table>

SECTION 4: FIRST AID MEASURES

Inhalation:
If inhaled: Remove person to fresh air and keep comfortable for breathing.
If experiencing respiratory symptoms call poison center or doctor.

Eye Contact:
If in eyes: Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.
Skin Contact: If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower for at least 15 minutes. Immediately call a poison center or doctor if irritation develops. Wash contaminated clothing before reuse.

Ingestion: If swallowed: Rinse mouth. Do NOT induce vomiting. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

Note to Physicians: Symptoms may not appear immediately. Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

Flammability and Explosion Information: Not flammable or combustible by OSHA/WHMIS criteria.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.

Sensitivity to Static Discharge: This material is sensitive to static discharge at temperatures at or above the flash point.

MEANS OF EXTINCTION

Suitable Extinguishing Media: Small Fire: Dry chemical, CO2, or water spray. Large Fire: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire-control water for later disposal; do not scatter the material.

Unsuitable Extinguishing Media: Not available.

Product of Combustion: Non-combustible

Protection of Firefighters: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
SECTION 6: ACCIDENTAL RELEASE MEASURES


Personal Precautions: Avoid inhalation of dust. Do not get into eyes, on skin, or clothing.

Environmental Precautions: The environmental impact of this product has not been fully investigated.

Methods for Containment: Cover powder spill with plastic sheet or tarp to minimize spreading. Collect this material into a disposal container by sucking or sweeping up.

Methods for Cleanup: Pick up and transfer to properly labeled containers.

Other Information: See Section 13 for disposal considerations.

SECTION 7: HANDLING AND STORAGE

Handling: Wear personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Do not breathe dust. Prevent contact with skin, eyes, and clothing. Wash thoroughly after handling.

Storage: Keep containers tightly closed in a cool, dry, and well-ventilated place. Store locked up.

SECTION 8: EXPOSURE CONTROLS/PERSOAL PROTECTION

Exposure Guidelines

| Component                     | CAS No.  | ACGIH TLV                                                                 | OSHA PEL                                                                 |
|                              |         |                                                                         |                                                                         |
| Blended Hydraulic Cement     | TS      | TWA: 1mg/m³ particulate matter containing no asbestos and <1% crystalline silica, respirable fraction | TWA: 15mg/m³ total dust TWA: 5mg/m³ respirable fraction (vacated) TWA: 10mg/m³ total dust (vacated) TWA: 5mg/m³ respirable fraction TWA: 50mppcf &lt;1% Crystalline silica |
| Quartz                       | 14808-60-7 | TWA: 0.025mg/m³ respirable fraction | 30/(%SiO2+2) mg/m³ TWA, Total Dust:250/(%SiO2+5) mppcf TWA, respirable fraction; 10/(%SiO2+2) mg/m³ TWA, respirable TWA: 0.1mg/m³ (vacated) |
PEL: Permissible Exposure Limit      TLV: Threshold Limit Value

Engineering Controls:       Not normally required.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection:       Tightly fitting safety goggles

Hand Protection:          Impervious gloves. Impervious clothing.

Skin and Body Protection:  Impervious gloves. Impervious clothing.

Respiratory Protection: If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>Solid powder</td>
</tr>
<tr>
<td>Color:</td>
<td>Gray, tan, brown</td>
</tr>
<tr>
<td>Odor:</td>
<td>Mild</td>
</tr>
<tr>
<td>Odor Threshold:</td>
<td>n/a</td>
</tr>
<tr>
<td>Physical State:</td>
<td>Solid, powder</td>
</tr>
<tr>
<td>pH:</td>
<td>Approximately 12 when mixed with water.</td>
</tr>
<tr>
<td>Melting Point / Freezing Point:</td>
<td>n/a</td>
</tr>
<tr>
<td>Initial Boiling Point:</td>
<td>n/a</td>
</tr>
<tr>
<td>Boiling Point:</td>
<td>n/a</td>
</tr>
<tr>
<td>Flash Point:</td>
<td>n/a</td>
</tr>
<tr>
<td>Evaporation Rate:</td>
<td>n/a</td>
</tr>
<tr>
<td>Flammability (solid, gas):</td>
<td>n/a</td>
</tr>
<tr>
<td>Lower Flammability Limit:</td>
<td>n/a</td>
</tr>
<tr>
<td>Upper Flammability Limit:</td>
<td>n/a</td>
</tr>
<tr>
<td>Vapor Pressure:</td>
<td>n/a</td>
</tr>
<tr>
<td>Vapor Density:</td>
<td>n/a</td>
</tr>
</tbody>
</table>
SECTION 10: STABILITY AND REACTIVITY

Chemical Stability: Stable under recommended storage conditions.
Possibility of Hazardous Reactions: None under normal processing.
Conditions to Avoid: Exposure to water – product may harden on contact with water. Manage dust formation during use.
Incompatible Materials: Strong acids.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on likely routes of exposure.
Product information:
Inhalation: Irritating to respiratory system. Irritating to mucous membranes.
Eye contact: Risk of serious damage to eyes.
Skin contact: Irritating to skin. May cause allergic skin reaction
Ingestion: Harmful if swallowed.
Component information:
Chemical Name: Quartz  
LD50 Oral: 500 mg/kg (Rat)  
ACGIH: A2 – Suspected Human Carcinogen
IARC: Group 1 – Carcinogenic to humans  
OSHA: X-present
Delayed and immediate effects and also chronic effects from short and long term exposure.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity:
Aquatic Toxicity: The environmental impact of this product has not been fully investigated.
Persistence and Degradability: No information available.
Bio-accumulative Potential: Does not accumulate in organisms

Mobility in Soil: No further relevant information available

Ecotoxicological Effects
Remark: No information available.

Additional Ecological Information
General Notes: This statement was deduced from products with a similar structure or composition. Due to available data on eliminability/decomposition and bio-accumulation potential prolonged term damage of the environment cannot be excluded. Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system. Also poisonous for fish and plankton in water bodies. Toxic for aquatic organisms.

PBT Assessment: N/A

vPvB Assessment: N/A

Other Adverse Effects: No further relevant information available

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Treatment Methods
Recommendation: May be disposed of in an unrestricted sanitary landfill.

Uncleaned Packaging
Recommendation: Disposal must be made according to official regulations. Do not re-use empty containers.

SECTION 14: TRANSPORT INFORMATION

US DEPARTMENT of TRANSPORTATION (DOT)
Proper Shipping Name: Not regulated.
Class: n/a
UN #: n/a
Packing Group: n/a

CANADA Transportation of Dangerous Goods (TDG)
Proper Shipping Name: Not regulated
Safety Data Sheet

Date Revised: 4/8/2015
Supersedes: n/a

Class: n/a
UN #: n/a
Packing Group: n/a

SECTION 15: REGULATORY INFORMATION

CHEMICAL INVENTORIES

US (TSCA): The components of this product are in compliance with the chemical notification requirements of TSCA.

CANADA (DSL): The components of this product are in compliance with the chemical notification requirements of NSN Regulations under CEPA, 1999.

U.S. FEDERAL REGULATIONS Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the CFR, Part 372.

UNITED STATES: This SDS has been prepared to meet the US OSHA Hazard Communication Standard, 29 CFR 1910.1200

SARA 311/312 Hazard Categories
Acute health hazard – Yes
Chronic Health hazard – Yes
Fire Hazard – No
Sudden Release of Pressure – No
Reactive Hazard - No

US STATE Right to Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>NJ</th>
<th>MA</th>
<th>PA</th>
<th>IL</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

California
California Prop 65: This product contains the following Proposition 65 chemicals.
Chemical Name: Quartz  CAS-No: 14808-60-7 CA Prop. 65: Carcinogen

SECTION 16: OTHER INFORMATION

Disclaimer: The information contained in this document applies to the specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user’s responsibility to satisfy oneself as to the suitability and completeness of this information for one’s own particular use.
PRODUCT DESCRIPTION

Five Star Structural Concrete® Underwater PG (pump grade) 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.

ADVANTAGES

- Pumpable
- Large volume placements
- Saltwater resistant
- High 6-hour strength
- Adjustable working time
- Course aggregate extension
- Variable application thickness
- Chloride and sulfate resistant
- Outstanding corrosion resistance for protection and rehabilitation

USES

- Large volume underwater concrete repairs
- Tanks, dams, marine and hydraulic structure repairs
- Filling underwater concrete cavities and voids

PACKAGING AND YIELD

Five Star Structural Concrete® Underwater PG is packaged in heavy-duty polyethylene lined bags or plastic pails and is available in 50 lb. (22.7 kg) units yielding approximately 0.42 cubic feet (11.9 liters) at maximum water.

SHELF LIFE

One year (packaged in bags) or two years (packaged in pails) in original unopened packaging when stored in dry conditions; high relative humidity will reduce shelf life.

<table>
<thead>
<tr>
<th>TYPICAL PROPERTIES AT 70°F (21°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength, ASTM C 109</td>
</tr>
<tr>
<td>6 Hours</td>
</tr>
<tr>
<td>1 Day</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td>28 Days</td>
</tr>
<tr>
<td>Underwater Bond Strength, ASTM C 882</td>
</tr>
<tr>
<td>1 Day</td>
</tr>
<tr>
<td>7 Days</td>
</tr>
<tr>
<td>Length Change, ASTM C 157</td>
</tr>
<tr>
<td>28 Days Wet</td>
</tr>
<tr>
<td>Thermal Coefficient of Expansion, ASTM C 531</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Chloride ion Permeability, ASTM C 1202</td>
</tr>
<tr>
<td>28 Days</td>
</tr>
<tr>
<td>Working Time at 70°F (21°C)</td>
</tr>
</tbody>
</table>

The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result. Test methods are modified where applicable.
**PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete® Underwater PG shall be free of marine growth, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Presoak concrete surfaces prior to application in tidal zones. A perimeter edge and minimum depth of one inch (25 mm) should be provided for a durable repair. Featheredging is not desirable. Repair surfaces shall be between 45°F and 90°F (7°C and 32°C) at time of placement. For cold and hot weather placement refer to Five Star Design-A-Spec™ or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

2. **MIXING:** Mix Five Star® Structural Concrete® Underwater PG thoroughly for approximately three to four minutes to a uniform consistency with a mortar mixer (stationary barrel with moving blades). A drill and paddle mixer is acceptable for single bag mixes. With the mixer running add approximately 80% of the pre-measured potable water (total water content is 3 to 4 quarts potable water per 50 lb. unit) to the mixer. Adjust consistency if necessary, but do not exceed maximum water content stated on the package or an amount that will cause segregation. Addition of coarse aggregate meeting ASTM C 33, may be required for large volume pours. Do not mix more material than can be placed in 20 minutes. Follow printed instructions on the package.

3. **PLACEMENT PROCEDURES:** Five Star Structural Concrete® Underwater PG is designed to be tremie poured or pumped in place underwater. When pumping, a positive displacement type pump is recommended. Consult pump manufacturer for specific pumping guidelines before proceeding with installation. Installation shall be continuous to prevent cold joints. In tidal zones, Five Star Structural Concrete® Underwater PG shall be kept wet for a minimum of 30 minutes.

**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Structural Concrete® Underwater PG must be maintained at a temperature of at least 45°F (7°C). Protect from freezing until a compressive strength of at least 1,000 psi (6.9 MPa) is obtained. In hot temperatures, Five Star Structural Concrete® Underwater PG should be kept as cool as possible, but not exceeding 90°F (32°C). Cold water should be used for mixing to help maintain sufficient working time. Summerset® may also be used if necessary to provide more working time.

**NOTE:** PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY. For more detailed placement procedures, refer to Five Star® Design-A-Spec™ installation guidelines or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

**CONSIDERATIONS**

- Never exceed the maximum water content stated on the package or add an amount that will cause segregation.
- Repair material shall be protected from freezing until it reaches a compressive strength of 1,000 psi (6.9 MPa).

**CAUTION**

Contains cementitious material and crystalline silica. International Agency for Research on Cancer has determined that there is sufficient evidence for the carcinogenicity of inhaled crystalline silica to humans. Take appropriate measures to avoid breathing dust. Avoid contact with eyes and contact with skin. In case of contact with eyes, immediately flush with plenty of water for at least 15 minutes. Immediately call a physician. Wash skin thoroughly after handling. Keep product out of reach of children. PRIOR TO USE, REFER TO SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star® distributor, local sales representative, or call Five Star Products’ Engineering and Technical Service Center at 1-800-243-2206.

---

**SKU / PRODUCT CODE** | **DESCRIPTION** | **#UNITS/PALLET** | **UNIT SIZE**
---|---|---|---
29230 | Structural Concrete® Underwater Pump Grade | 56 | 50 lb. (22.7 kg) bag

**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.”

Specifications Subject to Change.
For most current version of datasheet, go to FiveStarProducts.com

© 2015 Five Star Products, Inc. | 11-20-2015
12583 Rev. A | American Owned & Operated
SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name(s): Five Star Structural Concrete®
Five Star Structural Concrete® V/O
Five Star Structural Concrete® Gunite
Five Star Structural Concrete® UW PG
Five Star Structural Concrete® ES
Five Star® Instant Grout

Synonyms: SC, IG

Product Use: High early strength, single component, permanent concrete repair material.

Restrictions on Use: N/A

Manufacturer/Supplier: Five Star Products, Inc.
60 Parrott Drive
Shelton, CT 06484 USA

Phone #: 203-336-7900

Emergency Phone #: CHEM-TEL 1-800-255-3924
(Outside the U.S. 1-813-248-0585)

SECTION 2: HAZARD(S) IDENTIFICATION—GHS INFORMATION

Classification:
- Acute Oral Toxicity – Category 4
- Skin Corrosion/Irritation – Category 2
- Acute Toxicity – Dermal, Category 2
- Eye Damage/Irritation – Category 1
- Sensitization – Respiratory, Category 1
- Carcinogenicity – Category 1A
- Specific Target Organ Systemic Toxicity (Single Exposure) – Cat 3
- Specific Target Organ Toxicity (Repeated Exposure) – Cat 2

Label Elements/Hazard Pictograms:

Signal Word: Danger

Hazard Statements:
- Harmful if swallowed H302
- May cause skin irritation H317
- Causes severe skin burns and eye damage H314
- May cause respiratory irritation H335
- May cause an allergic skin reaction H317
May cause cancer by inhalation H350
May cause damage to organs through prolonged or repeat exposure H373

Precautionary Statements/Prevention:

Do not breathe dust, fume, gas, mist, vapors, or spray, P260.
Wash thoroughly after handling, P264.
Do not eat, drink or smoke when using this product, P270.
Contaminated work clothing should not be allowed out of the workplace, P272.
Wear protective gloves, protective clothing, eye protection and face protection, P280.
Wear respiratory protection, P284.

Response:

If swallowed: Rinse mouth. Do NOT induce vomiting, P330, P331.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower, P361, P353.
If inhaled: Remove person to fresh air and keep comfortable for breathing, P340.
If in eyes: Rinse cautiously with water for several minutes, P351. Remove contact lenses, if present and easy to do. Continue rinsing, P338.
Immediately call a poison center or doctor, P310.
If skin irritation or rash occurs, P333: Get medical advice/attention, P313.
If experiencing respiratory symptoms, P342: Call a poison center or doctor, P310. Wash contaminated clothing before reuse, P363.

Storage:

Store locked up.

Disposal:

Dispose of contents/container in accordance with applicable regional, national, and local laws and regulations.

Hazards Not Otherwise Classified: Not applicable

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Ingredient(s)</th>
<th>Common Name/Synonyms</th>
<th>CAS No.</th>
<th>% wt/wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td>Hydraulic cement</td>
<td>65997-15-1</td>
<td>30-60</td>
</tr>
<tr>
<td>Blended Hydraulic Cement</td>
<td>n/a</td>
<td>TS</td>
<td>30-60</td>
</tr>
<tr>
<td>Quartz</td>
<td>Silicon Dioxide, Silica Sand</td>
<td>14808-60-7</td>
<td>40-60</td>
</tr>
</tbody>
</table>

SECTION 4: FIRST AID MEASURES
Inhalation: If inhaled: Remove person to fresh air and keep comfortable for breathing.

Eye Contact: If experiencing respiratory symptoms call poison center or doctor.
If in eyes: Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.

Skin Contact: If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower for at least 15 minutes. Immediately call a poison center or doctor if irritation develops. Wash contaminated clothing before reuse.

Ingestion: If swallowed: Rinse mouth. DO NOT induce vomiting. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Never give anything by mouth to an unconscious person.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

Note to Physicians: Symptoms may not appear immediately. Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

Flammability and Explosion Information: Not flammable or combustible by OSHA/WHMIS criteria.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.

Sensitivity to Static Discharge: This material is sensitive to static discharge at temperatures at or above the flash point.

MEANS OF EXTINCTION

Suitable Extinguishing Media:
Small Fire: Dry chemical, CO2, or water spray.
Large Fire: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire-control water for later disposal; do not scatter the material.

Unsuitable Extinguishing Media: Not available

Product of Combustion: Non-combustible

Protection of Firefighters: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6: ACCIDENTAL RELEASE MEASURES


Personal Precautions: Avoid inhalation of dust. Do not get into eyes, on skin, or clothing.
Safety Data Sheet

Environmental Precautions: The environmental impact of this product has not been fully investigated.

Methods for Containment: Cover powder spill with plastic sheet or tarp to minimize spreading. Collect this material into a disposal container by sucking or sweeping up.

Methods for Cleanup: Pick up and transfer to properly labeled containers.

Other Information: See Section 13 for disposal considerations.

SECTION 7: HANDLING AND STORAGE

Handling: Wear personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Do not breathe dust. Prevent contact with skin, eyes, and clothing. Wash thoroughly after handling.

Storage: Keep containers tightly closed in a cool, dry, and well-ventilated place. Store locked up.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland cement</td>
<td>65997-15-1</td>
<td>TWA: 1mg/m³ particulate matter containing no asbestos and &lt;1% crystalline silica, respirable fraction</td>
<td>TWA: 15 mg/m³ total dust TWA: 5 mg/m³ respirable fraction (vacated) TWA: 10 mg/m³ total dust (vacated) TWA: 5 mg/m³ respirable fraction TWA: 50 mppcf &lt;1% Crystalline silica</td>
</tr>
<tr>
<td>Blended Hydraulic Cement</td>
<td>TS</td>
<td>TWA: 1mg/m³ particulate matter containing no asbestos and &lt;1% crystalline silica, respirable fraction</td>
<td>TWA: 15 mg/m³ total dust TWA: 5 mg/m³ respirable fraction (vacated) TWA: 10 mg/m³ total dust (vacated) TWA: 5 mg/m³ respirable fraction TWA: 50 mppcf &lt;1% Crystalline silica</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>TWA: 0.025mg/m³ respirable fraction</td>
<td>30/(%SiO2+2) mg/m³ TWA, Total Dust:250/(%SiO2+5) mppcf TWA, respirable fraction; 10/(%SiO2+2) mg/m³ TWA, respirable TWA: 0.1 mg/m³ (vacated)</td>
</tr>
</tbody>
</table>

PEL: Permissible Exposure Limit  TLV: Threshold Limit Value
Engineering Controls: Not normally required.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Tightly fitting safety goggles

Hand Protection: Impervious gloves. Impervious clothing.

Skin and Body Protection: Impervious gloves. Impervious clothing.

Respiratory Protection: If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>Solid powder</td>
</tr>
<tr>
<td>Color:</td>
<td>Gray, tan, brown</td>
</tr>
<tr>
<td>Odor:</td>
<td>Mild</td>
</tr>
<tr>
<td>Odor Threshold:</td>
<td>n/a</td>
</tr>
<tr>
<td>Physical State:</td>
<td>Solid, powder</td>
</tr>
<tr>
<td>pH:</td>
<td>Approximately 12 when mixed with water.</td>
</tr>
<tr>
<td>Melting Point / Freezing Point:</td>
<td>n/a</td>
</tr>
<tr>
<td>Initial Boiling Point:</td>
<td>n/a</td>
</tr>
<tr>
<td>Boiling Point:</td>
<td>n/a</td>
</tr>
<tr>
<td>Flash Point:</td>
<td>n/a</td>
</tr>
<tr>
<td>Evaporation Rate:</td>
<td>n/a</td>
</tr>
<tr>
<td>Flammability (solid, gas):</td>
<td>n/a</td>
</tr>
<tr>
<td>Lower Flammability Limit:</td>
<td>n/a</td>
</tr>
<tr>
<td>Upper Flammability Limit:</td>
<td>n/a</td>
</tr>
<tr>
<td>Vapor Pressure:</td>
<td>n/a</td>
</tr>
<tr>
<td>Vapor Density:</td>
<td>n/a</td>
</tr>
<tr>
<td>Relative Density:</td>
<td>n/a</td>
</tr>
</tbody>
</table>
SECTION 10: STABILITY AND REACTIVITY

Chemical Stability: Stable under recommended storage conditions.
Possibility of Hazardous Reactions: None under normal processing.
Conditions to Avoid: Exposure to water – product may harden on contact with water. Manage dust formation during use.
Incompatible Materials: Strong acids.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on likely routes of exposure.

Product information:
Inhalation: Irritating to respiratory system. Irritating to mucous membranes.
Eye contact: Risk of serious damage to eyes.
Skin contact: Irritating to skin. May cause allergic skin reaction
Ingestion: Harmful if swallowed.

Component information:
Chemical Name: Quartz  
LD50 Oral: 500 mg/kg (Rat)  
ACGIH: A2 – Suspected Human Carcinogen  
IARC: Group 1 – Carcinogenic to humans  
OSHA: X-present

Delayed and immediate effects and also chronic effects from short and long term exposure.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity:

Aquatic Toxicity: The environmental impact of this product has not been fully investigated.

Persistence and Degradability: No information available.

Bio-accumulative Potential: Does not accumulate in organisms
**Mobility in Soil:** No further relevant information available

**Ecotoxicological Effects**

**Remark:** No information available.

**Additional Ecological Information**

**General Notes:** This statement was deduced from products with a similar structure or composition. Due to available data on eliminability/decomposition and bio-accumulation potential prolonged term damage of the environment cannot be excluded. Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system. Also poisonous for fish and plankton in water bodies. Toxic for aquatic organisms.

**PBT Assessment:** N/A

**vPvB Assessment:** N/A

**Other Adverse Effects:** No further relevant information available

### SECTION 13: DISPOSAL CONSIDERATIONS

**Waste Treatment Methods:** May be disposed of in an unrestricted sanitary landfill.

**Recommendation:** This material as supplied is not a hazardous waste according to Federal regulations (40CFR261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered.

**Uncleaned Packaging**

**Recommendation:** Disposal must be made according to official regulations. Do not re-use empty containers.

### SECTION 14: TRANSPORT INFORMATION

**US DEPARTMENT of TRANSPORTATION (DOT)**

**Proper Shipping Name:** Not regulated.

**Class:** n/a

**UN #:** n/a

**Packing Group:** n/a

**CANADA Transportation of Dangerous Goods (TDG)**

**Proper Shipping Name:** Not regulated.

**Class:** n/a
SECTION 15: REGULATORY INFORMATION

CHEMICAL INVENTORIES

US (TSCA): The components of this product are in compliance with the chemical notification requirements of TSCA.

CANADA (DSL): The components of this product are in compliance with the chemical notification requirements of NSN Regulations under CEPA, 1999.

U.S. FEDERAL REGULATIONS Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the CFR, Part 372.

UNITED STATES: This SDS has been prepared to meet the US OSHA Hazard Communication Standard, 29 CFR 1910.1200

SARA 311/312 Hazard Categories

Acute health hazard – Yes
Chronic Health hazard – Yes
Fire Hazard – No
Sudden Release of Pressure – No
Reactive Hazard - No

US STATE Right to Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>NJ</th>
<th>MA</th>
<th>PA</th>
<th>IL</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Quartz</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

California
California Prop 65: This product contains the following Proposition 65 chemicals.

Chemical Name: Quartz  CAS-No: 14808-60-7 CA Prop. 65: Carcinogen

SECTION 16: OTHER INFORMATION

Disclaimer: This information is furnished without warranty of any kind, expressed or implied. Five Star Products, Inc. bases the information and recommendations in this document on data believed to be current and accurate.