



**FIVE STAR**

Specified by the World's Best™

August 2016 Edition No. 1

# Product Data Guide

- Cementitious Grouts
- Epoxy Grouts
- Chemical Grouts & Polyurethanes
- Concrete Repair & Overlays
- Infrastructure & Commercial Concrete Repair
- Specialty Concrete Repair
- Adhesives & Sealants
- Coatings & Waterproofing
- Technical & Product Bulletins



Advanced Technology From Advanced Thinking®



# FIVE STAR

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## About Us



**LOOK for this symbol on select Five Star® products.**



In addition to our standard versions, these products are also available in Nuclear Safety Application Ready versions that are compliant with ASME NQA-1 and U.S. Nuclear Regulatory Commission's 10 CFR 50 Appendix B and 10 CFR 21.



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A major global provider of industrial-grade products to the construction and marine industries since 1955, Five Star Products, Inc. has been family-owned and operated since it began as the Nash Babcock Engineering Company. As an engineering consulting firm, the company developed more than 100 patents worldwide, and in 1966, operating as the U.S. Grout Corporation, began to manufacture a line of precision, non-shrink, non-metallic grouts. In 1985, after 30 years of growth and an expanding international customer base, the company was renamed Five Star Products, Inc. and began manufacturing an array of precision grouting, waterproofing and concrete repair and rehabilitation products under the Five Star® brand name.

Five Star Products' high-performance cement and epoxy-based products for the industrial, infrastructure, commercial, and marine markets are used in some of the world's most challenging environments and applications. The Five Star® product line includes high-performance machinery grouts, concrete repair and restoration products, chemical resistant coatings, waterproofing, and pile and column repair products. Five Star Products operates seven manufacturing facilities, all of which adhere to a strict quality control system conforming to the ISO 9001-2008 standard.



## NUCLEAR SAFETY APPLICATION READY Products



### FIVE STAR® OFFERS 6 NUCLEAR SAFETY APPLICATION READY SOLUTIONS.

Compliant with ASME NQA-1 and the U.S. Nuclear Regulatory Commission's 10 CFR 50 Appendix B, Five Star Products' line of high-quality cementitious grouts, epoxy grouts and concrete repair products provide the right choice for your next nuclear project.

Since 1955, the dependable Five Star® brand of high-performance, non-metallic, non-shrink cement and epoxy-based solutions has been respected around the globe for industrial, infrastructure, commercial and marine applications.

**Specify Five Star® for your next nuclear construction or repair project.**

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# FIVE STAR

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## PRECISION NON-SHRINK Cementitious Grouts



### **FIVE STAR® GROUT**

Premier all-purpose non-metallic grout for supporting equipment requiring precision alignment.

### **FIVE STAR® HIGH-STRENGTH GROUT**

High compressive strength precision non-shrink grout



### **FIVE STAR® FLUID GROUT 100**

Premier fluid grout for supporting equipment requiring precision alignment

### **FIVE STAR® FLUID GROUT PT**

Precision non-shrink, non-metallic fluid grout for cables and tendons requiring corrosion protection

### **FIVE STAR® HTR GROUT**

High-temperature exposure grout

### **FIVE STAR® INSTANT GROUT**

Rapid strength gain grout for four-hour machinery startup and cold-weather grouting

### **FIVE STAR® SPECIAL GROUT 110**

Long distance pumpable grout

### **FIVE STAR® SPECIAL GROUT 120**

Salt-resistant grout for marine environments

### **FIVE STAR® SPECIAL GROUT 150**

Sulfate-resistant grout

### **FIVE STAR® SPECIAL GROUT 400**

Fluid, non-shrink grout for cables, tendons and tight clearances

### **FIVE STAR® SPECIAL GROUT 550**

High-temperature placement, non-shrink grout

**NOTES:**

[illegible]



# **FIVE STAR® GROUT**

High Performance Precision Non-Shrink Grout

## **PRODUCT DESCRIPTION**

Five Star® Grout is the industry's leading cement-based, nonmetallic, non-shrink grout for supporting machinery and equipment. It is formulated with Air Release technology that combines high performance with the greatest reliability. When tested in accordance with ASTM C 827, Five Star® Grout exhibits positive expansion. Five Star® Grout meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, and CRD-C 621-93 specifications for non-shrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

## **ADVANTAGES**

- Air release technology per ACI 351.1 R
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Provides placement versatility: pour, pump or dry pack
- 45 minute working time
- Permanent support for machinery requiring precision alignment
- Does not contain gas generating additives, such as aluminum powder
- Non-shrink from the time of placement

## **USES**

- Grouting of machinery and equipment to maintain precision alignment
- Non-shrink grouting of structural steel and precast concrete
- Grouting of anchors and dowels
- Support of tanks and vessels
- Available for Nuclear Safety Zone Applications<sup>1</sup>

## **PACKAGING AND YIELD**

Five Star® Grout is packaged in heavy-duty, polyethylene lined bags and is available in 50 lb. (22.7 kg) units yielding approximately 0.5 cubic feet (14.1 liters), or 100 lb (45.4 kg) units yielding approximately 1.0 cubic foot (28.3 liters) of hardened material at maximum water content.

## **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)		
Early Height Change, ASTM C 827	0.0 to 4.0%	
Hardened Height Change, ASTM C 1090	0.0 to 0.3%	
Effective Bearing Area	95%	
Bond Strength, ASTM C 882, 28 Days	2,000 psi (13.8 MPa)	
Pull-out Strength, Tension, #5 threaded bar, 7 Days	2,400 psi (16.6 MPa)	
Compressive Strength, ASTM C 942 (C109 Restrained)	Minimum Water psi (MPa)	Maximum Water psi (MPa)
1 Day	4,000 (27.6)	2,500 (17.3)
3 Days	5,500 (38.0)	3,500 (24.1)
7 Days	6,500 (44.9)	5,000 (34.5)
28 Days	8,000 (55.2)	6,500 (44.9)
Working Time at 70°F (21°C)	45 minutes	

*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.*

## PLACEMENT GUIDELINES

- SURFACE PREPARATION:** All surfaces in contact with Five Star® Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surfaces for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Products, Inc. Engineering and Technical Center for further information.
- MIXING:** Mix Five Star® Grout thoroughly for approximately four to five 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. For optimum performance, maintain grout at ambient temperatures between 40°F and 90°F (4°C and 32°C). Use heated or chilled water to help adjust working time. Mix Five Star® Grout with 7 - 11 quarts potable water per 100 lb. bag (3-1/2 to 5-1/2 quarts per 50 lb. bag). Do not exceed maximum recommended amount of mixing water as stated on the package or add an amount that will cause segregation. Working time is approximately 45 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
- PLACEMENT PROCEDURES:** Five Star® Grout may be dry packed, poured or pumped into place. Minimum placement thickness for Five Star® Grout is 1 inch (25 mm). For pours over 6 inches (150 mm) in depth Five Star® Grout should be extended with a clean, damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star Products, Inc. Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
- POST-PLACEMENT PROCEDURES:** Five Star® Grout shall be wet cured for a minimum of three days, or coated with an approved curing compound meeting the requirements of ASTM C 309 after a minimum 24 hour wet cure. In-service operation may begin immediately after the required grout strength has been reached.

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

## CONSIDERATIONS

- If temperatures of equipment and surfaces are not between 40°F and 90°F (4°C and 32°C) at time of placement, refer to Design-A-Spec™ for cold and hot weather grouting procedures, or call the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206.
- Never exceed the maximum water content as stated on the bag or add an amount that will cause segregation. Construction practices dictate concrete foundation should achieve its design strength before grouting.

## 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 MATERIAL SAFETY DATA SHEET.**

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

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	WEIGHT
25500	Five Star® Grout	56	50 lbs. (22.68 Kg)
25500N <sup>1</sup>	Five Star® Grout for Nuclear Safety Zone	56	50 lbs. (22.68 Kg)

<sup>1</sup>Compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs

**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](http://FiveStarProducts.com)

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# **HIGH STRENGTH GROUT**

High Strength Precision Non-Shrink Grout

## **PRODUCT DESCRIPTION**

Five Star® High Strength Grout is the industry's leading cement-based, non-metallic, non-shrink grout for supporting machinery and applications requiring precision alignment. It is formulated with Air Release technology that combines high performance with the greatest reliability. When tested in accordance with ASTM C 827, Five Star® High Strength Grout exhibits positive expansion and meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, and CRD-C 621-93 specifications for non-shrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

## **ADVANTAGES**

- Ultra-high 1, 7, and 28 day compressive strengths
- 95% effective bearing area (EBA)
- Can be poured, wet set or dry packed
- Permanent support for machinery requiring precision alignment
- Non-shrink from the time of placement

## **USES**

- Grouting of machinery and equipment under high loads
- Non-shrink grouting of structural steel and precast concrete
- Support of tanks and vessels
- Wind turbines
- Compressors and turbo equipment
- Grouting of anchors and dowels

## **PACKAGING AND YIELD**

Five Star® High Strength Grout is packaged in heavy-duty, 50 lb. (22.7 kg) polyethylene lined bags yielding approximately 0.40 cubic feet (11.3 liters) of hardened material at maximum water content.

## **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)		
	Flowable	Wet Set
<b>Early Height Change</b> , ASTM C 827	0.0 to 4.0%	0.0 to 4.0%
<b>Hardened Height Change</b> , ASTM C 1090	0.0 to 0.3%	0.0 to 0.3%
<b>Effective Bearing Area</b>	95%	95%
<b>Bond Strength</b> , ASTM C 882 / 28 Days	2,000 psi (13.8 MPa)	2,000 psi (13.8 MPa)
<b>Pull-out Strength</b> , Shear Bond with #5 deformed bar, 7 days	2,400 psi (16.6 MPa)	2,400 psi (16.6 MPa)
<b>Compressive Strength</b> , ASTM C 942 (C109 Restrained)		
1 Day	5,000 psi (34.5 MPa)	7,000 psi (48.3 MPa)
7 Days	11,000 psi (75.8 MPa)	12,000 psi (82.7 MPa)
28 Days	13,000 psi (89.6 MPa)	15,000 psi (103.4 MPa)
<b>Working Time</b> at 70°F (21°C)	30 minutes	30 minutes

*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 in contact with Five Star® High Strength Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and mechanically roughened to coarse aggregate exposure to ensure a good bond. Continuously soak concrete surfaces for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
- 2. FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact Five Star Products' Engineering and Technical Center for further information.
- 3. MIXING:** Mix Five Star® High Strength Grout thoroughly for approximately four to five minutes to a uniform consistency with a mortar mixer (stationary barrel mixer with moving blades). For optimum performance, maintain grout at ambient temperatures between 40°F and 90°F (4°C and 32°C). Use heated or chilled water to help adjust working time. Mix Five Star® High Strength Grout with 2¾ to 3¼ (2.6L to 3.1L) quarts potable water per 50 lb. bag. Working time is approximately 30 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout. Do not mix more grout than can be placed within 30 minutes.
- 4. METHODS OF PLACEMENT:** Five Star® High Strength Grout may be dry packed, wet set or poured into place. Minimum placement thickness for Five Star® High Strength Grout is one inch (25 mm). For pours over 6 inches (150 mm) in depth Five Star® High Strength Grout should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star® Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
- 5. POST-PLACEMENT PROCEDURES:** Five Star® High Strength Grout shall be wet cured for a minimum of three days, or coated with an approved curing compound meeting the requirements of ASTM C 309 after a minimum 24 hour wet cure. In-service operation may begin immediately after the required grout strength has been reached.

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

## CONSIDERATIONS

- At time of placement, if temperatures of equipment and surfaces are not between 40°F and 90°F (4°C and 32°C), refer to the Five Star® Design-A-Spec™ for cold and hot weather grouting procedures or call the Five Star Products' Engineering and Technical Service Center.
- Never exceed the maximum water content as stated on the bag or add an amount that will cause segregation.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.
- Cold temperatures will delay strength development.

## 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 MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
42000	High Strength Grout	50 lb. 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."

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## **FLUID GROUT 100**

High Performance Precision Non-Shrink Fluid Grout

### **PRODUCT DESCRIPTION**

Five Star® Fluid Grout 100 is the industry's leading cement-based, nonmetallic, non-shrink fluid grout for supporting machinery and equipment. It is formulated with Air Release technology that combines high performance with the greatest reliability. When tested in accordance with ASTM C 827, Five Star® Fluid Grout 100 exhibits positive expansion. Five Star® Fluid Grout 100 meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07 and CRD-C 621-93 specifications for non-shrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

### **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Placement within tight clearances down to 1/2 inch
- High 1, 7, 28 day strength
- Permanent support for machinery requiring precision alignment
- Does not contain gas generating additives, such as aluminum powder
- Non-shrink from the time of placement
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures

### **USES**

- Grouting clearances to 1/2 inch
- Grouting of anchors and dowels
- Grouting of machinery and equipment to maintain precision alignment
- Non-shrink grouting of structural steel and precast concrete
- Preplaced aggregate grouting
- Support of tanks and vessels
- Available for Nuclear Safety Zone Applications<sup>1</sup>

### **PACKAGING AND YIELD**

Five Star® Fluid Grout 100 is packaged in heavy-duty, polyethylene lined bags and is available in 55 lb. (25 kg) units yielding approximately 0.50 cubic foot (14.1 liters) of hardened material at maximum water content.

### **SHELF LIFE**

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

#### **TYPICAL PROPERTIES AT 70°F (21°C)**

<b>Early Height Change</b> , ASTM C 827	0.0 to 4.0%	
<b>Hardened Height Change</b> , ASTM C 1090	0.0 to 0.3%	
<b>Effective Bearing Area</b>	95%	
<b>Bond Strength</b> , ASTM C 882	2,000 psi (13.8 MPa)/28 days	
<b>Pull-out Strength</b> , Tension, 125 ksi 1" threaded bar	2,000 psi (13.8 MPa)/7 days	
<b>Compressive Strength</b> , ASTM C 942 (C109 Restrained)	Minimum Water <sup>2</sup>	Maximum Water <sup>3</sup>
1 Day	5,800 psi (40 MPa)	3,500 psi (24.2 MPa)
3 Days	7,500 psi (51.8 MPa)	6,000 psi (41.4 MPa)
7 Days	8,000 psi (55.2 MPa)	6,500 psi (44.9 MPa)
28 Days	10,000 psi (69.0 MPa)	8,000 psi (55.2 MPa)
<b>Working Time</b> at 70°F (21°C)	30 minutes	

<sup>2</sup> 100% - 125% flow on flow table (plastic consistency), CRD-C 621 (ASTM C 230, 5 drops in 3 seconds).

<sup>3</sup> 20 to 30 second flow (fluid consistency) by Corps of Engineers Flow Cone Method, CRD-C 611.

*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.*

## PLACEMENT GUIDELINES

- SURFACE PREPARATION:** All surfaces in contact with Five Star® Fluid Grout 100 shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surfaces for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Products, Inc. Engineering and Technical Center for further information.
- MIXING:** Mix Five Star® Fluid Grout 100 thoroughly for approximately four to five 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. For optimum performance, maintain grout at ambient temperatures between 40°F and 90°F (4°C and 32°C). Use heated or chilled water to help adjust working time. Five Star® Fluid Grout 100 may be mixed to a flowable or fluid consistency. Begin by mixing Five Star® Fluid Grout 100 with 4 quarts potable water per 55 lb. bag. Mix for approximately three minutes. Add additional water as required to adjust consistency and continue mixing for two minutes. If a fluid consistency is required, add additional water to achieve a flow of 20 - 30 seconds through flow cone per ASTM C 939. If more than 6 quarts of water (per 55 lb. bag) must be added to achieve a 20 - 30 second flow, contact the Five Star Products, Inc. Engineering and Technical Center. Working time is approximately 30 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
- METHODS OF PLACEMENT:** Five Star® Fluid Grout 100 may be poured or pumped into place. Minimum placement thickness is 1/2 inch (12 mm) when mixed to a fluid consistency. For pours over 6 inches (150 mm) in depth Five Star® Fluid Grout 100 should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star Products, Inc. Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
- POST-PLACEMENT PROCEDURES:** Five Star® Fluid Grout 100 shall be wet cured for a minimum of three days, or coated with an approved curing compound meeting the requirements of ASTM C 309 after a minimum 24 hour wet cure. In-service operation may begin immediately after the required grout strength has been reached.

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

## CONSIDERATIONS

- At time of placement, if temperatures of equipment and surfaces are not between 40°F and 90°F (4°C and 32°C), refer to Design-A-Spec™ for cold and hot weather grouting procedures or call the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206.
- Never exceed the maximum water content as stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## 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 MATERIAL SAFETY DATA SHEET.**

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

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	WEIGHT
25000	Fluid Grout 100	56	55 lbs. (24.95 Kg)
25000N <sup>1</sup>	Fluid Grout 100 for Nuclear Safety Zone	56	55 lbs. (24.95 Kg)

<sup>1</sup>Compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs

**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](http://FiveStarProducts.com)

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## **FLUID GROUT PT**

Precision Non-Shrink Cable Grout

### **PRODUCT DESCRIPTION**

**Five Star® Fluid Grout PT** is a cement-based, non-metallic, non-shrink, fluid grout specifically formulated for grouting of cables and tendons requiring corrosion protection. When tested in accordance with ASTM C 827, Five Star® Fluid Grout PT shows positive expansion. This product meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, CRD-C 621-93 specifications for non-shrink grout.

### **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Pumpable fluid grout for very tight clearances
- Non-bleeding
- Permanent filling of voids
- Extended working time
- Pumpable up to 2 hours at 90°F (32°C)
- Non-shrink from the time of placement
- Does not contain aluminum powder

### **USES**

- Provides corrosion protection of bridge cables
- Non-shrink grouting between precast panels, walls and beams
- Pressure placement into tendon ducts

### **PACKAGING AND YIELD**

Five Star® Fluid Grout PT is packaged in heavy-duty, polyethylene lined bags and is available in 50 lb. (22.7 kg) units yielding approximately 0.50 cubic feet (14.2 liters) of hardened material at maximum water content.

### **SHELF LIFE**

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

#### **TYPICAL PROPERTIES AT 70°F (21°C) <sup>(1)</sup>**

<b>Early Height Change, ASTM C 827</b>	Positive Expansion
<b>Hardened Height Change, ASTM C 1090</b>	
1 Day	> 0.0%
28 Days	< 0.2%
<b>Compressive Strength, ASTM C 942</b>	
1 Day	3,000 psi (24.1 MPa)
7 Days	7,000 psi (48.3 MPa)
28 Days	8,000 psi (58.6 MPa)
<b>Bleeding, ASTM C 940 (Modified), 4 Hours</b>	0.0%
<b>Gelman Filter, PTI, bleed water, 50 psi for 5 minutes</b>	0%
<b>Working Time at 90°F (32°C)</b>	2 hours

<sup>(1)</sup> Mixed using a high speed shear mixer (1500 rpm).

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.

## PLACEMENT GUIDELINES

1. **PREPARATION:** When Five Star® Fluid Grout PT is used for grouting of tendons and cables, all ducts shall be purged using oil free compressed air to remove water, debris and foreign material. All vents should be checked and the duct shall be pressure tested with air. All leaks shall be repaired before grouting can commence.
2. **MIXING:** Mix Five Star® Fluid Grout PT to a uniform consistency with a colloidal or high speed shear mixer. For optimum performance, condition between 40°F and 90°F (4°C and 32°C). Mix Five Star® Fluid Grout PT with approximately 6 quarts of potable water per 50 lb. bag. Mix to a flow of 11 - 20 seconds through a flow cone per ASTM C 939 modified to PTI requirements. Add more water if necessary but do not add more than 6 1/2 quarts (13.5 lb.) of water per 50 lb. bag. If more than 6 1/2 quarts of water (per 50 lb. bag) must be added to achieve a 11 - 20 second flow, contact Five Star Products' Engineering and Technical Service Center. Working time is approximately 2 hours at 90°F (32°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
3. **PLACEMENT PROCEDURES:** The grout should be injected from the first low point inlet. A pressure gauge should be placed near the inlet and the pressure should not exceed 150 psi (1 MPa). Under normal grouting operations the pressure should not exceed 75 psi (0.5 MPa). The placement should continue using a one-way flow. If the duct contains a high point, the adjacent downstream vent shall be closed first and the grout expelled at the high point vent until good grout consistency is present. If the inlet pressure exceeds 150 psi (1 MPa), the inlet shall be closed using a mechanical shut-off valve and the grouting shall be resumed at the last intermediate vent where grout has already been expelled. DO NOT resume the grouting operation on a vent where grout has not been expelled. Once the tendon is filled and sufficient grout has been vented, the outlet valve shall be closed and the tendon pressurized with 75 psi (0.5 MPa). Normal grouting operations should be completed in 30 minutes using a grouting speed between 16 - 49 feet/min (5 - 15 m/min).
4. **POST-PLACEMENT PROCEDURES:** After 24 hours the grout caps should be checked for voids. Partially filled caps are an indication of additional voids within the anchorage zone. All inlet and outlet grout tubes shall be removed and explored with a drill to verify that no void is present. If a void is found, the tendon shall be repaired using a submitted and approved repair procedure. All explorative openings shall be repaired with grout or other approved material as soon as possible. Vent openings through the roadway surface shall be recessed two inches and patched with an approved repair material.

**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

- At time of placement, if temperatures of equipment and surfaces are above 90°F (4°C and 32°C), refer to Five Star® Design-A-Spec™ for cold and hot weather grouting procedures or contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Substrate shall be free of frost and ice.
- Never exceed the maximum water content stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.
- Cement Based grout should attain a minimum compressive strength of 1,000 psi (6.9 MPa) before being exposed to freezing temperatures.

## CAUTION

Contains cementitious material. 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
25050	Fluid Grout PT	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](http://FiveStarProducts.com)

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# HTR GROUT

High Temperature Exposure Nonshrink Grout

## PRODUCT DESCRIPTION

Five Star® HTR Grout is a unique cement based grout for supporting equipment and structural base plates in high temperature environments. Five Star HTR Grout can be poured into place, gains strength rapidly and can be exposed to 1000°F (538°C) in 24 hours and up to 2400°F (1316°C) after a 7-day curing procedure. Five Star HTR Grout exhibits positive expansion when tested in accordance with ASTM C 827.

## ADVANTAGES

- Air release technology per ACI 351.1 R
- Thermal shock resistance
- High temperature resistance
- High 24 hour compressive strength

## USES

- Areas of high temperature exposure
- Thermal cycling up to 2400°F (1316°C)
- Rapid turnaround during shutdowns
- Coker, kiln and foundry applications

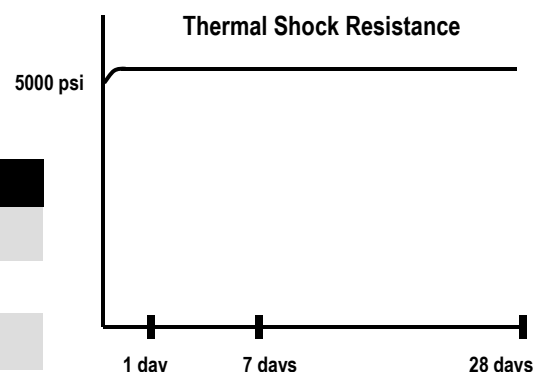
## PACKAGING AND YIELD

Five Star HTR Grout is packaged in heavy-duty polyethylene lined bags and is available in 50 lb (22.7 kg) units yielding approximately 0.42 cubic feet (11.9 liters) of hardened material at maximum water content.

## SHELF LIFE

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

TYPICAL PROPERTIES AT 70°F (21°C)	
Early Height Change, ASTM C 827	Positive Expansion
Compressive Strength, ASTM C 942 (C109 Restrained)	
1 Day	4000 psi (27.6 MPa)
7 Days	5500 psi (38.0 MPa)
28 Days	6500 psi (44.9 MPa)
Bond Strength, ASTM C 882, 7 Days	2500 psi (17.3 MPa)
Thermal Coefficient of Expansion, ASTM C 531	$5.0 \times 10^{-6}$ in/in/°F ( $9.0 \times 10^{-6}$ mm/mm/°C)
Working Time at 70°F (21°C)	20 minutes



# CYCLE	AGE	STRENGTH
1 1/2 cycles	2 days	5300 psi
5 1/2 cycles	7 days	5300 psi
20 1/2 cycles	28 days	5300 psi

Samples cured at 70°F (21°C) for 24 hours, then exposed to 1000°F (538°C) in 24 hour cycles

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.

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces in contact with Five Star® HTR Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surfaces for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact Five Star Engineering and Technical Service Center for further information.
3. **MIXING:** Mix Five Star HTR Grout thoroughly for four to five 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. For optimum performance, condition between 60°F and 80°F (16°C and 27°C). Mix Five Star HTR Grout with 3 to 3 1/2 quarts potable water per 50 lb. bag. Working time is approximately 20 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
4. **METHODS OF PLACEMENT:** Five Star HTR Grout may be poured into place. Minimum placement thickness for Five Star HTR Grout is one inch (25 mm). For pours over three inches in depth Five Star HTR Grout should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. NOTE: Coarse aggregate must be suitable for high temperature exposure. Refer to the Five Star Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
5. **POST-PLACEMENT PROCEDURES:** Five Star HTR Grout shall be wet cured for a minimum of 30 minutes. Approximately three hours after placement, material can be brought up to an operating temperature of 1000°F (538°C). For operating temperatures up to 2400°F (1316°C), wet cure for 3 days followed by dry cure for 4 days. Then slowly apply heat up to 2400°F (1316°C).

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

## **CONSIDERATIONS**

- If temperatures of equipment and surfaces are not between 40°F and 90°F (4°C and 32°C) at time of placement, refer to Design-A-Spec™ for cold and hot weather grouting procedures, or call the Five Star Engineering and Technical Service Center at (800) 243-2206.
- Substrate shall be free of frost and ice.
- Grout shall be protected from freezing until it reaches 1000 psi (6.9 MPa).
- Never exceed the maximum water content stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **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 MATERIAL SAFETY DATA SHEET.

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

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## **INSTANT GROUT**

Rapid Strength Gain Precision Nonshrink Grout

### **PRODUCT DESCRIPTION**

Five Star® Instant Grout is a rapid strength gain, nonmetallic, nonshrink grout for supporting machinery requiring precision alignment and quick turnaround. It is formulated with Air Release technology ideal for cold weather applications, while providing the greatest reliability. When tested in accordance with ASTM C 827, Five Star Instant Grout exhibits positive expansion. Five Star Instant Grout meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, and CRD-C 621-93 specifications for nonshrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

### **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Superior cold weather performance
- High four hour compressive strength
- Fast turnaround time
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Permanent support for machinery requiring precision alignment

### **USES**

- Low temperature placement
- Fast turnaround time
- Grouting of machinery base plates to maintain precision alignment
- Nonshrink grouting of structural steel and precast concrete
- Installation of anchors and dowels
- Support of tanks and vessels

### **PACKAGING AND YIELD**

Five Star Instant Grout is packaged in heavy-duty, polyethylene lined bags or plastic pails and is available in 55 lb (24.9 kg) units yielding approximately 0.44 cubic feet (12.5 liters) of hardened material at maximum water content.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
Early Height Change, ASTM C 827	0.0 to 4.0%
Hardened Height Change, ASTM C 1090	0.0 to 0.3%
Bond Strength, ASTM C 882 / 28 Days	2500 psi (17.3 MPa)
Effective Bearing Area	95%
Compressive Strength, ASTM C 942 (C 109 Restrained)	
4 Hours	4000 psi (27.6 MPa)
1 Day	5500 psi (38.0 MPa)
7 Days	6500 psi (44.9 MPa)
28 Days	7000 psi (48.3 MPa)
Working Time at 70°F (21°C)	10 minutes

*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.*

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces in contact with Five Star® Instant Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surfaces for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Engineering and Technical Service Center for further information.
3. **MIXING:** Mix Five Star Instant Grout thoroughly for approximately four to five 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. For optimum performance, condition between 60°F and 80°F (16°C and 27°C). Mix Five Star Instant Grout with 3 to 3 1/2 quarts potable water per 55 lb. bag. Working time is approximately 10 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
4. **METHODS OF PLACEMENT:** Five Star Instant Grout may be poured into place. Minimum placement thickness for Five Star Instant Grout is 1 inch (25 mm). For pours over 3 inches (75 mm) in depth Five Star Instant Grout should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
5. **POST-PLACEMENT PROCEDURES:** Five Star Instant Grout shall be wet cured for a minimum of two to eight hours depending on placement volume and depth. In-service operation may begin immediately after the required grout strength has been reached.

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

## **CONSIDERATIONS**

- At time of placement, if temperatures of equipment and surfaces are not between 35°F and 80°F (2°C and 27°C), refer to Design-A-Spec™ for extreme weather grouting procedures, or contact the Five Star Engineering and Technical Service Center at (800) 243-2206.
- Substrate shall be free of frost and ice.
- Grout shall be protected from freezing until it reaches 1000 psi (6.9 MPa).
- Never exceed the maximum water content as stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **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 MATERIAL SAFETY DATA SHEET.**

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## **SPECIAL GROUT 110**

Precision Nonshrink Grout for Long Distance Pumping

### **PRODUCT DESCRIPTION**

Five Star® Special Grout 110 is a cement-based, nonmetallic, nonshrink grout with long distance pumpability for supporting machinery requiring precision alignment. When tested in accordance with ASTM C 827, Five Star Special Grout 110 exhibits positive expansion. Five Star Special Grout 110 meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, and CRD-C 621-93 specifications for nonshrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

### **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Long distance pumping ability
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Permanent support for machinery requiring precision alignment
- Does not contain gas generating additives, such as aluminum powder
- Nonshrink from the time of placement

### **USES**

- Placement by pumping
- Grouting of machinery base plates to maintain precision alignment
- Nonshrink grouting of structural steel and pre-cast concrete
- Installation of anchors and dowels
- Support of tanks and vessels

### **PACKAGING AND YIELD**

Five Star Special Grout 110 is packaged in heavy-duty, polyethylene lined bags and is available in 50 lb (22.7 kg) units yielding approximately 0.45 cubic feet (12.7 liters), or 100 lb (45.4 kg) units yielding approximately 0.90 cubic feet (25.5 liters) of hardened material at maximum water content.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
Early Height Change, ASTM C 827	0.0 to 4.0%
Hardened Height Change, ASTM C 1090	0.0 to 0.3%
Effective Bearing Area	95%
Bond Strength, ASTM C 882 / 28 Days	2000 psi (13.8 MPa)
Compressive Strength, ASTM C 942 (C 109 Restrained)	
1 Day	2500 psi (17.3 MPa)
7 Days	5500 psi (38.0 MPa)
28 Days	7000 psi (48.3 MPa)
Working Time at 70°F (21°C)	45 minutes

*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.*

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces in contact with Five Star® Special Grout 110 shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surface for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Engineering and Technical Service Center for further information.
3. **MIXING:** Mix Five Star Special Grout 110 thoroughly for approximately four to five 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. For optimum performance, condition between 40°F and 90°F (4°C and 32°C). Mix Five Star Special Grout 110 with 7 to 11 quarts potable water per 100 lb. bag (3 1/2 to 5 1/2 quarts potable water per 50 lb. bag). Working time is approximately 45 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
4. **METHODS OF PLACEMENT:** Five Star Special Grout 110 may be poured or pumped into place. Minimum placement thickness for Five Star Special Grout 110 is one inch (25 mm). For pours over 6 inches (150 mm) in depth Five Star Special Grout 110 should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
5. **POST-PLACEMENT PROCEDURES:** Five Star Special Grout 110 shall be wet cured for a minimum of three days, or coated with an approved curing compound meeting the requirements of ASTM C 309 after a minimum 24 hour wet cure. In-service operation may begin immediately after the required grout strength has been reached.

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

## **CONSIDERATIONS**

- At time of placement, if temperatures of equipment and surfaces are above 90°F (4°C and 32°C), refer to *Design-A-Spec™* for cold and hot weather grouting procedures or contact the Five Star Engineering and Technical Service Center at (800) 243-2206 .
- Substrate shall be free of frost and ice.
- Grout shall be protected from freezing until it reaches 1000 psi (6.9 MPa).
- Never exceed the maximum water content stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **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 MATERIAL SAFETY DATA SHEET.**

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## **SPECIAL GROUT 120**

Salt Resistant Precision Nonshrink Grout

### **PRODUCT DESCRIPTION**

Five Star® Special Grout 120 is a seawater and salt resistant, cement-based, nonmetallic, nonshrink grout for applications requiring precision alignment. When tested in accordance with ASTM C 827, Five Star Special Grout 120 exhibits positive expansion. Five Star Special Grout 120 meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, and CRD-C 621-93 specifications for nonshrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

### **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Salt and seawater resistant
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Dry pack, pourable and pumpable
- Does not contain gas generating additives, such as aluminum powder
- Non-shrink from the time of placement

### **USES**

- Grouting areas subject to saltwater exposure
- Nonshrink grouting of machinery baseplates, structural steel and precast concrete in salt environments
- Installation of anchors and dowels
- Support of tanks and vessels
- Repair of concrete in confined areas

### **PACKAGING AND YIELD**

Five Star Special Grout 120 is packaged in heavy-duty, polyethylene lined bags and is available in 50 lb (22.7 kg) units yielding approximately 0.45 cubic feet (12.7 liters) of hardened material at maximum water content.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
Early Height Change, ASTM C 827	0.0 to 4.0%
Hardened Height Change, ASTM C 1090	0.0 to 0.3%
Effective Bearing Area	95%
Bond Strength, ASTM C 882 / 28 Days	2000 psi (13.8 MPa)
Compressive Strength, ASTM C 942 (C 109 Restrained)	
1 Day	2500 psi (17.3 MPa)
7 Days	5500 psi (38.0 MPa)
28 Days	7000 psi (48.3 MPa)
Working Time at 70°F (21°C)	45 minutes

*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.*

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces in contact with Five Star® Special Grout 120 shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surfaces for 8 - 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Engineering and Technical Service Center for further information.
3. **MIXING:** Mix Five Star Special Grout 120 thoroughly for approximately four to five 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. For optimum performance, condition between 40°F and 90°F (4°C and 32°C). Mix Five Star Special Grout 120 with 3 1/2 to 5 1/2 quarts potable water per 50 lb. bag. Working time is approximately 45 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
4. **METHODS OF PLACEMENT:** Five Star Special Grout 120 may be dry packed, poured or pumped into place. Minimum placement thickness for Special Grout 120 is one inch (25 mm). For pours over 6 inches (150 mm) in depth Five Star Special Grout 120 should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
5. **POST-PLACEMENT PROCEDURES:** Five Star Special Grout 120 shall be wet cured for a minimum of three days, or coated with an approved curing compound meeting the requirements of ASTM C 309 after a minimum 24 hour wet cure. In-service operation may begin immediately after the required grout strength has been reached.

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

## **CONSIDERATIONS**

- At time of placement, if temperatures of equipment and surfaces are above 90°F (4°C and 32°C), refer to Design-A-Spec™ for cold and hot weather grouting procedures or contact the Five Star Engineering and Technical Service Center at (800) 243-2206 .
- Substrate shall be free of frost and ice.
- Grout shall be protected from freezing until it reaches 1000 psi (6.9 MPa).
- Never exceed the maximum water content stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **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 MATERIAL SAFETY DATA SHEET.**

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

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

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## **SPECIAL GROUT 150**

Sulfate Resistant Precision Nonshrink Grout

### **PRODUCT DESCRIPTION**

Five Star® Special Grout 150 is a sulfate resistant, cement-based, nonmetallic, nonshrink grout for clarifiers and applications requiring sulfate resistance. When tested in accordance with ASTM C 827, Five Star Special Grout 150 exhibits positive expansion. Five Star Special Grout 150 meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, and CRD-C 621-93 specifications for nonshrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

### **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Sulfate resistance
- Moderate heat of hydration
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Permanent support for machinery requiring precision alignment
- Does not contain gas generating additives, such as aluminum powder
- Nonshrink from the time of placement

### **USES**

- Deep large volume pours
- Clarifiers
- Grouting of machinery baseplates to maintain precision alignment in areas of sulfate attack
- Nonshrink grouting of structural steel and precast concrete
- Installation of anchors and dowels
- Support of tanks and vessels
- Repair of concrete in confined areas

### **PACKAGING AND YIELD**

Five Star Special Grout 150 is packaged in heavy-duty, polyethylene lined bags and is available in 50 lb (22.7 kg) units yielding approximately 0.45 cubic feet (12.7 liters), or 100 lb (45.4 kg) units yielding approximately 0.90 cubic feet (25.5 liters) of hardened material at maximum water content.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
Early Height Change, ASTM C 827	0.0 to 4.0%
Hardened Height Change, ASTM C 1090	0.0 to 0.3%
Effective Bearing Area	95%
Bond Strength, ASTM C 882 / 28 Days	2000 psi (13.8 MPa)
Compressive Strength, ASTM C 942 (C 109 Restrained)	
1 Day	2500 psi (17.3 MPa)
7 Days	5500 psi (38.0 MPa)
28 Days	7000 psi (48.3 MPa)
Working Time at 70°F (21°C)	45 minutes

*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.*

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces in contact with Five Star® Special Grout 150 shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surface for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Engineering and Technical Service Center for further information.
3. **MIXING:** Mix Five Star Special Grout 150 thoroughly for approximately four to five 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. For optimum performance, condition between 40°F and 90°F (4°C and 32°C). Mix Five Star Special Grout 150 with 7 to 11 quarts potable water per 100 lb. bag (3 1/2 to 5 1/2 quarts potable water per 50 lb. bag). Working time is approximately 45 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
4. **METHODS OF PLACEMENT:** Five Star Special Grout 150 may be dry packed, poured or pumped into place. Minimum placement thickness for Five Star Special Grout 150 is one inch (25 mm). For pours over six inches (150 mm) in depth, Five Star Special Grout 150 should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
5. **POST-PLACEMENT PROCEDURES:** Five Star Special Grout 150 shall be wet cured for a minimum of three days, or coated with an approved curing compound meeting the requirements of ASTM C 309 after a minimum 24 hour wet cure. In-service operation may begin immediately after the required grout strength has been reached.

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

## **CONSIDERATIONS**

- At time of placement, if temperatures of equipment and surfaces are above 90°F (4°C and 32°C), refer to Design-A-Spec™ for cold and hot weather grouting procedures or contact the Five Star Engineering and Technical Service Center at (800) 243-2206 .
- Substrate shall be free of frost and ice.
- Grout shall be protected from freezing until it reaches 1000 psi (6.9 MPa).
- Never exceed the maximum water content stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **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 MATERIAL SAFETY DATA SHEET.**

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

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## **SPECIAL GROUT 400**

Fluid Precision Non-shrink Cable Grout

### **PRODUCT DESCRIPTION**

**Five Star® Special Grout 400** is a cement-based, nonmetallic, non-shrink, fluid grout specifically formulated for grouting of cables and tendons requiring corrosion protection. When tested in accordance with ASTM C 827, Five Star® Special Grout 400 shows positive expansion. Five Star® Special Grout 400 meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, CRD-C 621-93 specifications for non-shrink grout, and Post Tensioning Institute specifications for grouting post tensioned structures.

### **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Pumpable fluid grout for very tight clearances
- Non-bleeding
- Permanent filling of voids
- Extended working time
- Pumpable up to 2 hours at 90°F (32°C)
- Non-shrink from the time of placement
- Does not contain aluminum powder

### **USES**

- Provides corrosion protection of bridge cables
- Non-shrink grouting between precast panels, walls and beams
- Pressure placement into tendon ducts

### **PACKAGING AND YIELD**

Five Star® Special Grout 400 is packaged in heavy-duty, polyethylene lined bags and is available in 49 lb. (22.2 kg) units yielding approximately 0.50 cubic feet (14.1 liters) of hardened material at maximum water content.

### **SHELF LIFE**

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

#### **TYPICAL PROPERTIES AT 70°F (21°C) <sup>(1)</sup>**

<b>Early Height Change, ASTM C 827</b>	Positive Expansion
<b>Hardened Height Change, ASTM C 1090</b>	
1 Day	> 0.0%
28 Days	< 0.2%
<b>Compressive Strength, ASTM C 942</b>	
1 Day	3,500 psi (24.1 MPa)
7 Days	7,000 psi (48.3 MPa)
28 Days	8,500 psi (58.6 MPa)
<b>Bleeding, ASTM C 940 (Modified), 4 Hours</b>	0.0%
<b>Permeability, ASTM C 1202, 30V, 28 Days</b>	< 1,000 coulombs, very low
<b>Accelerated Corrosion Test</b>	> 2,500 hours
<b>Gelman Filter, PTI, bleed water, 100 psi (0.7 MPa) for 5 minutes</b>	0%
<b>Working Time at 90°F (32°C)</b>	2 hours

<sup>(1)</sup> Mixed using a high speed shear mixer (1,500 rpm).

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.

## PLACEMENT GUIDELINES

- 1. PREPARATION:** When Five Star® Special Grout 400 is used for grouting of tendons and cables, all ducts shall be purged using oil free compressed air to remove water, debris and foreign material. All vents should be checked and the duct shall be pressure tested with air. All leaks shall be repaired before grouting can commence.
- 2. MIXING:** Mix Five Star® Special Grout 400 to a uniform consistency with a colloidal or high speed shear mixer. For optimum performance, condition between 40°F and 90°F (4°C and 32°C). Mix Five Star® Special Grout 400 with approximately 6 quarts of potable water per 49 lb bag. Mix to a flow of 9 - 20 seconds through a flow cone per ASTM C 939 modified to PTI requirements. Add more water if necessary but do not add more than 6 1/2 quarts (13.5 lb.) of water per 49 lb. bag. If more than 6 1/2 quarts of water (per 49 lb. bag) must be added to achieve a 9 - 20 second flow, contact Five Star Products' Engineering and Technical Service Center. Working time is approximately 2 hours at 90°F (32°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
- 3. PLACEMENT PROCEDURES:** The grout should be injected from the first low point inlet. A pressure gauge should be placed near the inlet and the pressure should not exceed 150 psi. Under normal grouting operations the pressure should not exceed 75 psi. The placement should continue using a one-way flow. If the duct contains a high point, the adjacent downstream vent shall be closed first and the grout expelled at the high point vent until good grout consistency is present. If the inlet pressure exceeds 150 psi, the inlet shall be closed using a mechanical shut-off valve and the grouting shall be resumed at the last intermediate vent where grout has already been expelled. DO NOT resume the grouting operation on a vent where grout has not been expelled. Once the tendon is filled and sufficient grout has been vented, the outlet valve shall be closed and the tendon pressurized with 75 psi. Normal grouting operations should be completed in 30 minutes using a grouting speed between 16 - 49 feet/min (5 - 15 m/min). For more detailed placement procedures, go to [FiveStarProducts.com](http://FiveStarProducts.com) and select Design-A-Spec™ in product downloads.
- 4. POST-PLACEMENT PROCEDURES:** After 24 hours the grout caps should be checked for voids. Partially filled caps are an indication of additional voids within the anchorage zone. All inlet and outlet grout tubes shall be removed and explored with a drill to verify that no void is present. If a void is found, the tendon shall be repaired using a submitted and approved repair procedure. All explorative openings shall be repaired with grout or other approved material as soon as possible. Vent openings through the roadway surface shall be recessed two inches and patched with an approved repair material.

**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

- At time of placement, if temperatures of equipment and surfaces are above 90°F (4°C and 32°C), refer to Five Star® Design-A-Spec™ for cold and hot weather grouting procedures or contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Substrate shall be free of frost and ice.
- Grout shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Never exceed the maximum water content stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.
- Cement Based grout should attain a minimum compressive strength of 1,000 psi before being exposed to freezing temperatures.

## CAUTION

Contains cementitious material. 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 Center at 1-800-243-2206.

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	UNIT SIZE
27555	Special Grout 400	56	49 Lb. (22.2 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](http://FiveStarProducts.com)

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## **SPECIAL GROUT 550**

High Temperature Application Precision Nonshrink Grout

### **PRODUCT DESCRIPTION**

Five Star® Special Grout 550 is the first cement-based, non-shrink grout formulated for grouting at temperatures up to 115°F (46°C) with no ice or cold water. It is a high performing, versatile, hot weather precision grout. Five Star Special Grout 550 meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07 and CRD-C 621-93 specifications for non-shrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

### **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Precision nonshrink
- 95% effective bearing area is typically achieved following proper grouting procedures
- Long working time
- No ice or cold water required for placement temperatures up to 115°F (46°C)

### **USES**

- Grouting large, heavy operating equipment in extreme hot weather
- Grouting structural columns in extreme hot weather
- Grouting anchors in extreme hot weather
- Grouting precast and prestressed panels in extreme hot weather

### **PACKAGING AND YIELD**

Five Star Special Grout 550 is packaged in heavy-duty, polyethylene lined bags and is available in 100 lb (45.4 kg) units yielding approximately 0.90 cubic foot (25.5 liters) of hardened material at maximum water content.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
Early Height Change, ASTM C 827	0.0 to 4.0%
Hardened Height Change, ASTM C 1090	0.0 to 0.3%
Effective Bearing Area	95%
Bond Strength, ASTM C 882 / 28 Days	2000 psi (13.8 MPa)
Pull-out Strength, Shear Bond with #5 deformed bar, 7 days	2400 psi (16.6 MPa)
Compressive Strength, ASTM C 942 (C 109 Restrained)	
1 Day	2000 psi (13.8 MPa)
7 Days	5000 psi (34.5 MPa)
28 Days	6500 psi (44.9 MPa)
Working Time at 115°F (46°C)	45 minutes

*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.*

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces in contact with Five Star® Special Grout 550 shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surface for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Engineering and Technical Service Center for further information.
3. **MIXING:** Mix Five Star Special Grout 550 thoroughly for approximately four to five 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. For optimum performance, condition between 40°F and 90°F (4°C and 32°C). Mix Five Star Special Grout 550 with 7 to 11 quarts potable water per 100 lb. bag. Working time is approximately 45 minutes. Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
4. **METHODS OF PLACEMENT:** Five Star Special Grout 550 may be dry packed, poured or pumped into place. Minimum placement thickness for Five Star Special Grout 550 is one inch (25 mm). For pours over six inches (150 mm) in depth Five Star Special Grout 550 should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
5. **POST-PLACEMENT PROCEDURES:** Five Star Special Grout 550 shall be wet cured for a minimum of three days, or coated with an approved curing compound meeting the requirements of ASTM C 309 after a minimum 24 hour wet cure. In-service operation may begin immediately after the required grout strength has been reached.

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

## **CONSIDERATIONS**

- At time of placement, if temperatures of equipment and surfaces are above 90°F (4°C and 32°C), refer to Design-A-Spec™ for cold and hot weather grouting procedures or contact the Five Star Engineering and Technical Service Center at (800) 243-2206 .
- Substrate shall be free of frost and ice.
- Grout shall be protected from freezing until it reaches 1000 psi (6.9 MPa).
- Never exceed the maximum water content stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **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 MATERIAL SAFETY DATA SHEET.**

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

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# FIVE STAR

Specified by the World's Best™

## PRECISION NON-SHRINK Epoxy Grouts



### **FIVE STAR® DP EPOXY GROUT**

Deep pour (DP) low exotherm precision epoxy grout

### **FIVE STAR® DP EPOXY GROUT PG**

Low exotherm, pumpable precision epoxy grout



### **FIVE STAR® HP EPOXY GROUT**

High-performance (HP) expansive, non-shrink, epoxy grout system for equipment requiring precision alignment

### **FIVE STAR® SP EPOXY GROUT**

Superior performance, extremely high-compressive strength, non-shrink, ultra-low creep epoxy grout with outstanding EBA

### **FIVE STAR® ELASTOMERIC GROUT**

Flexible polymer grout with vibration and sound-dampening properties and exceptional electrical resistance

### **FIVE STAR® EPOXY CHOCK & EPOXY CHOCK EX**

High performance epoxy chock system for the critical alignment of heavy machinery, and a replacement for steel chocks

### **FIVE STAR® EPOXY NOVOLAC GROUT**

High chemical resistance grout designed for aggressive chemical environments

### **FIVE STAR® FLUID EPOXY**

High-performance, all-purpose fluid epoxy

### **FIVE STAR® MINEFORM™ BACKER GROUT**

High-strength epoxy grouting system for the mining industry that secures wear plates under crushers, grinding mills and related heavy machinery

### **FIVE STAR® RAPID EPOXY GROUT**

Rapid strength gain, fast turnaround epoxy grout

### **FIVE STAR® CRANE RAIL GROUT**

High-flow epoxy for low clearance and dynamic load applications

**NOTES:**

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## DP EPOXY GROUT

Dual-Purpose, Deep Pour Precision Grout  
Standard/High Flow

### PRODUCT DESCRIPTION

Five Star® DP Epoxy Grout is the only expansive, non-shrink, low exothermic epoxy system for machinery grouting. This versatile, dual purpose product is formulated for single, large volume placements and may be used as thin as 1/2 inch (13 mm) in depth. Five Star® DP Epoxy Grout is a three component, 100% solids, solvent-free system formulated to provide high-strength and superior creep resistance combined with the highest effective bearing area. Five Star® DP Epoxy Grout exhibits positive expansion when tested in accordance with ASTM C 827.

### ADVANTAGES

- Permanent support for machinery requiring precision alignment
- Low exothermal properties with early strength development
- Long working time
- Solvent-free clean up
- Adjustable flow for various conditions
- Expansive, non-shrink per ASTM C 827
- Superior creep resistance
- Chemically resistant
- 95% effective bearing area (EBA) when following proper grouting procedures
- Excellent adhesion to steel

### USES

- Large volume applications
- Foundation rebuilds and skid mounted equipment
- Precision alignment under dynamic load conditions
- Vibration dampening for rotating equipment
- Aggressive chemical environments
- Support of tanks, vessels and rotating equipment
- Installation of anchors and dowels
- Wind turbine baseplates
- Available for Nuclear Safety Zone Applications<sup>1</sup>

### PACKAGING AND YIELD

Five Star® DP Epoxy Grout is a three-component system consisting of resin, hardener and polyethylene lined bags of aggregate. Five Star® DP Epoxy Grout - Standard Flow includes five bags of aggregate for a unit yield of approximately 2.0 cubic feet (56.6 liters) of hardened material. When maximum flow is required, Five Star® DP Epoxy Grout - High Flow is available with four bags of aggregate for a unit yield of approximately 1.75 cubic feet (49.6 liters) of hardened material. Five Star® DP Epoxy Grout - High Flow is also available in a smaller unit size yielding approximately 0.44 cubic feet (12.5 liters) of hardened material.

### SHELF LIFE

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

#### TYPICAL PROPERTIES AT 70°F (21°C)

	DP Epoxy Grout (Standard)		DP Epoxy Grout (High Flow)	
<b>Clearances</b>	1 to 18 inches (25 - 457 mm)		1/2 to 9 inches (13 - 220 mm)	
<b>Height Change</b> , ASTM C 827, at 90°F (32°C)	Positive Expansion		Positive Expansion	
<b>Effective Bearing Area</b>	95%		95%	
<b>Creep</b> , ASTM C 1181, 1 year 400 psi (2.8 MPa) 140°F (60°C)	3.7 x 10 <sup>-3</sup> in/in (mm/mm)		4.3 x 10 <sup>-3</sup> in/in (mm/mm)	
<b>Tensile Strength</b> , ASTM C 307	2,100 psi (14.5 MPa)		2,000 psi (13.8 MPa)	
<b>Flexural Strength</b> , ASTM C 580	3,800 psi (26.2 MPa)		4,000 psi (27.6 MPa)	
<b>Coefficient of Expansion</b> , ASTM C 531	17 x 10 <sup>-6</sup> in/in/°F (30 x 10 <sup>-6</sup> mm/mm/°C)		18 x 10 <sup>-6</sup> in/in/°F (32 x 10 <sup>-6</sup> mm/mm/°C)	
<b>Bond to Concrete</b> , ASTM C 882	Concrete Failure		Concrete Failure	
<b>Working Time</b> at 70°F (21°C)	90 Minutes		60 Minutes	
<b>Compressive Strength</b> ASTM C 579 B*	<b>Standard Compressive Strength</b> psi (MPa)	<b>Standard Compressive Modulus</b> psi (MPa)	<b>High Flow Compressive Strength</b> psi (MPa)	<b>High Flow Compressive Modulus</b> psi (MPa)
1 Day	11,000 (75.9)	1.5 x 10 <sup>6</sup> (10.4 x 10 <sup>3</sup> )	9,000 (62.1)	1.4 x 10 <sup>6</sup> (9.7 x 10 <sup>3</sup> )
7 Days	14,000 (96.6)	2.0 x 10 <sup>6</sup> (13.8 x 10 <sup>3</sup> )	13,000 (89.7)	1.9 x 10 <sup>6</sup> (13.1 x 10 <sup>3</sup> )
Post-cured at 140°F (60°C)	15,500 (106.9)	2.2 x 10 <sup>6</sup> (15.2 x 10 <sup>3</sup> )	14,500 (100)	2.0 x 10 <sup>6</sup> (13.8 x 10 <sup>3</sup> )

*\*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

- SURFACE PREPARATION:** All surfaces to be in contact with Five Star® DP Epoxy Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. An SSPC-SP6 commercial finish on all metal surfaces will optimize bond development to steel.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be 1 to 2 inches (25 - 50 mm). Areas where bond is not desired must be treated with paste wax or polyethylene. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Products, Inc. Engineering and Technical Service Center for further information.
- MIXING:** For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°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). Working time is approximately 90 minutes (60 minutes High Flow) when temperatures are at 70°F (21°C).
- METHODS OF PLACEMENT:** Five Star® DP Epoxy Grout may be poured into place. All grout shall be placed from one side to the other, maintaining contact with the bottom of the baseplate at all times. When possible, use of a headbox is highly recommended (refer to the Five Star® Technical Bulletin "Head Box and Plunger" for guidelines). For clearances greater than eighteen inches (457 mm) and/or more than 100 cubic feet (2.8 cubic meters), call the Five Star Products, Inc. Engineering and Technical Service Center at 1-800-243-2206.
- POST-PLACEMENT PROCEDURES:** Final finishing should ensure material is flush with bottom edge of baseplate. Finishing of exposed surfaces is aided by using a solvent wiped trowel just before material becomes unworkable. In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.
- CLEAN UP:** All tools and equipment may be cleaned with a water and strong detergent solution before material hardens. Sand may be used as an abrasive. A suitable solvent is required for clean up of material after hardening.

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

## CONSIDERATIONS

- Flowability and strength gain are adversely affected by lower temperatures.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Design-A-Spec™.
- To obtain bond, concrete shall be visibly free of surface moisture.
- When clearances are outside the recommended range or when exceeding maximum placement volumes, contact the Five Star Products, Inc. Engineering and Technical Service Center.
- Do not add solvents to increase flowability.
- For continuous operating temperatures exceeding 180°F (82°C), contact the Five Star Products, Inc. Engineering and Technical Service Center.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	WEIGHT
33610	DP Epoxy Standard Grout	36 (4 pallets)	281 lbs. (127.46 Kg)
33155	DP Epoxy High-Flow Grout	36 (4 pallets)	231 lbs. (104.78 Kg)
33175	DP Epoxy High-Flow Grout (small unit)	24	55 lbs. <sup>2</sup> (24.95 Kg <sup>2</sup> )
33610N <sup>1</sup>	DP Epoxy Standard Grout for Nuclear Safety Zone	36 (4 pallets)	281 lbs. (127.46 Kg)
33155N <sup>1</sup>	DP Epoxy High-Flow Grout for Nuclear Safety Zone	36 (4 pallets)	231 lbs. (104.78 Kg)
33175N <sup>1</sup>	DP Epoxy High-Flow Grout (small unit) for Nuclear Safety Zone	24	55 lbs. <sup>2</sup> (24.95 Kg <sup>2</sup> )

<sup>1</sup>Compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs | <sup>2</sup>Uses standard aggregate

**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](http://FiveStarProducts.com)

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## **DP EPOXY GROUT PG**

Low Exothermic, Pumpable, Precision Epoxy Grout

### **PRODUCT DESCRIPTION**

Five Star® DP Epoxy Grout PG is the only pumpable, expansive, non-shrink, low exothermic epoxy grout for machinery grouting. This versatile, dual-purpose product is formulated for single, large volume placements and may be used as thin as ½ inch (13 mm) in depth. Five Star® DP Epoxy Grout PG is a three component, 100% solids, solvent-free system formulated to provide high strength and superior creep resistance combined with the highest effective bearing area. Five Star® DP Epoxy Grout PG exhibits positive expansion when tested in accordance with ASTM C 827.

### **ADVANTAGES**

- Pumpable
- Permanent support for machinery requiring precision alignment
- Low exothermic properties with early strength development
- Long working time
- Solvent-free clean up
- Expansive, non-shrink per ASTM C 827
- Superior creep resistance
- Chemically resistant
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Excellent adhesion to steel

### **USES**

- Large volume applications
- Foundation rebuilds and skid mounted equipment
- Precision alignment under dynamic load conditions
- Vibration dampening for rotating equipment
- Support of chemical tanks, vessels and rotating equipment
- Aggressive chemical environments
- Installation of anchors and dowels
- Operating temperatures up to 180°F (82°C)

### **PACKAGING AND YIELD**

Five Star® DP Epoxy Grout PG is a three component system consisting of partially filled containers of resin, hardener and four polyethylene lined bags of aggregate and is available in a unit yielding approximately 1.58 cubic feet (44.7 liters) of hardened material.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)		
Clearances	1/2 to 6 inches (13 - 150 mm)	
Height Change, ASTM C 827, at 90°F (32°C)	Positive Expansion	
Effective Bearing Area	95%	
Creep, ASTM C 1181, 1 year 400 psi (2.8 MPa) 140°F (60°C)	4.5 x 10 <sup>-3</sup> in/in (mm/mm)	
Tensile Strength, ASTM C 307	2,000 psi (13.8 MPa)	
Flexural Strength, ASTM C 580	5,000 psi (34.5 MPa)	
Coefficient of Expansion, ASTM C 531	22 x 10 <sup>-6</sup> in/in/°F (40 x 10 <sup>-6</sup> mm/mm/°C)	
Bond to Concrete, ASTM C 882	Concrete Failure	
Compressive Strength, ASTM C 579 B*	Compressive Strength psi (MPa)	Compressive Modulus psi (MPa)
1 Day	9,000 (62.1)	1.2 x 10 <sup>6</sup> (8.3 x 10 <sup>3</sup> )
7 Days	13,000 (89.7)	1.5 x 10 <sup>6</sup> (10.3 x 10 <sup>3</sup> )
Post-cured at 140°F (60°C)	14,500 (100)	1.7 x 10 <sup>6</sup> (11.7 x 10 <sup>3</sup> )
Working Time at 70°F (21°C)	75 minutes	

*\*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 in contact with Five Star® DP Epoxy Grout PG shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. An SSPC-SP6 commercial finish on all metal surfaces will optimize bond development to steel.
- 2. FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be 1 to 2 inches (25 - 50 mm). Areas where bond is not desired must be treated with paste wax or polyethylene. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Product, Inc. Engineering and Technical Service Center for further information.
- 3. MIXING:** For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°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). Working time is approximately 75 minutes when temperatures are at 70°F (21°C).
- 4. METHODS OF PLACEMENT:** Five Star® DP Epoxy Grout PG may be pumped or poured into place. All grout shall be placed from one side to the other, maintaining contact with the bottom of the baseplate at all times. When possible, use of a headbox is highly recommended (refer to the Five Star Technical Bulletin "Head Box and Plunger" for guidelines). For clearances greater than 6 inches (150 mm) or volumes more than 50 cubic feet (1.4 cubic meter), call the Five Star Products, Inc. Engineering and Technical Service Center at 1-800-243-2206. When pumping Five Star® DP Epoxy Grout PG, use of a peristaltic pump may produce best results.
- 5. POST-PLACEMENT PROCEDURES:** Final finishing should ensure material is flush with bottom edge of baseplate. Finishing of exposed surfaces is aided by using a solvent wiped trowel just before material becomes unworkable. In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.
- 6. CLEAN UP:** All tools and equipment may be cleaned with a water and strong detergent solution or suitable solvent before material hardens. Sand may be used as an abrasive.

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

## CONSIDERATIONS

- Flowability and strength gain are adversely affected by lower temperatures.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Design-A-Spec™.
- To obtain bond, concrete must be free of visible surface moisture.
- When clearances are outside the recommended range or when exceeding maximum placement volumes, contact the Five Star Products Engineering and Technical Service Center.
- Do not add solvents to increase flowability.
- For continuous operating temperatures exceeding 180°F (82°C), contact the Five Star Products' Engineering and Technical Service Center.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## 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, and goggles with side shields. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	WEIGHT
33630	DP Epoxy Grout PG	36	207 LBS. (93.89 KG)

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

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Specifications Subject to Change.



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# HP EPOXY GROUT

High Performance Precision Grout  
Standard/High Flow

## PRODUCT DESCRIPTION

Five Star® HP Epoxy Grout is a high-performance expansive, non-shrink, epoxy system for supporting equipment requiring precision alignment. Five Star® HP Epoxy Grout is a three component, 100% solids, solvent-free system formulated to exhibit high early strength combined with the highest creep resistance at elevated temperatures. Five Star® HP Epoxy Grout exhibits positive expansion when tested in accordance with ASTM C 827.

## ADVANTAGES

- Permanent support for machinery requiring precision alignment
- High early strength
- Start-up in 16 hours or less
- Solvent-free clean up
- Adjustable flow for various conditions
- Expansive, non-shrink per ASTM C 827
- Superior creep resistance
- Chemically resistant
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Excellent adhesion to steel

## USES

- High performance machinery grouting
- Crane rail grouting
- Precision alignment under dynamic load conditions
- Vibration dampening filler for rotating equipment
- Support of chemical tanks, vessels and rotating equipment
- Aggressive chemical environments
- Installation of anchors and dowels
- Wind turbine baseplates
- Available for Nuclear Safety Zone Applications<sup>1</sup>

## PACKAGING AND YIELD

Five Star® HP Epoxy Grout is a three-component system consisting of partially filled containers of resin, hardener and polyethylene lined bags of aggregate. Five Star® HP Epoxy Grout - Standard Flow includes five bags of aggregate for a unit yield of approximately 2.0 cubic feet (56.6 liters) of hardened material. When maximum flow is required, Five Star® HP Epoxy Grout - High Flow is available with four bags of aggregate for a unit yield of 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.

TYPICAL PROPERTIES AT 70°F (21°C)				
	HP Epoxy Grout (Standard)		HP Epoxy Grout (High Flow)	
Clearances	4 to 6 inches (100 - 150 mm)		1 to 4 inches (25 - 100 mm)	
Height Change, ASTM C 827, at 90°F (32°C)	Positive Expansion		Positive Expansion	
Effective Bearing Area	95%		95%	
Creep, ASTM C 1181, 1 year 400 psi (2.8 MPa) 140°F (60°C)	1.2 x 10 <sup>-3</sup> in/in (mm/mm)		2.0 x 10 <sup>-3</sup> in/in (mm/mm)	
Tensile Strength, ASTM C 307	2,400 psi (16.6 MPa)		2,000 psi (13.8 MPa)	
Flexural Strength, ASTM C 580	4,800 psi (33.1 MPa)		4,400 psi (30.4 MPa)	
Coefficient of Expansion, ASTM C 531	17 x 10 <sup>-6</sup> in/in/°F (30 x 10 <sup>-6</sup> mm/mm/°C)		18 x 10 <sup>-6</sup> in/in/°F (32 x 10 <sup>-6</sup> mm/mm/°C)	
Bond to Concrete, ASTM C 882	Concrete Failure		Concrete Failure	
Working Time at 70°F (21°C)	60 minutes		45 minutes	
Compressive Strength, ASTM C 579 B*	Standard Compressive Strength psi (MPa)	Standard Compressive Modulus psi (MPa)	High Flow Compressive Strength psi (MPa)	High Flow Compressive Modulus psi (MPa)
16 Hours	11,000 (75.9)	1.6 x 10 <sup>6</sup> (11.0 x 10 <sup>3</sup> )	10,000 (69.0)	1.5 x 10 <sup>6</sup> (10.4 x 10 <sup>3</sup> )
1 Day	15,000 (103.5)	2.0 x 10 <sup>6</sup> (13.8 x 10 <sup>3</sup> )	14,000 (96.6)	1.9 x 10 <sup>6</sup> (13.1 x 10 <sup>3</sup> )
7 Days	16,500 (113.9)	2.2 x 10 <sup>6</sup> (15.2 x 10 <sup>3</sup> )	16,000 (110.4)	2.1 x 10 <sup>6</sup> (14.5 x 10 <sup>3</sup> )
Post cured at 140°F (60°C)	17,500 (120.8)	2.5 x 10 <sup>6</sup> (17.2 x 10 <sup>3</sup> )	17,000 (117.3)	2.3 x 10 <sup>6</sup> (15.9 x 10 <sup>3</sup> )

\*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

- SURFACE PREPARATION:** All surfaces to be in contact with Five Star® HP Epoxy Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. An SSPC-SP6 commercial finish on all metal surfaces will optimize bond development to steel.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be 1 to 2 inches (25 - 50 mm). Areas where bond is not desired must be treated with paste wax or polyethylene. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Products, Inc. Engineering and Technical Service Center for further information.
- MIXING:** For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°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). Working time is approximately 60 minutes (45 minutes High Flow) when temperatures are at 70°F (21°C).
- METHODS OF PLACEMENT:** Five Star® HP Epoxy Grout may be poured into place. All grout shall be placed from one side to the other, maintaining contact with the bottom of the baseplate at all times. When possible, use of a headbox is highly recommended (refer to the Five Star® Technical Bulletin "Head Box and Plunger" for guidelines). For clearances greater than six inches (150 mm) or volumes more than 20 cubic feet (566 liters), use Five Star® DP Epoxy Grout or call the Five Star Products, Inc. Engineering and Technical Center at 1-800-243-2206.
- POST-PLACEMENT PROCEDURES:** Final finishing should ensure material is flush with bottom edge of baseplate. Finishing of exposed surfaces is aided by using a solvent wiped trowel just before material becomes unworkable. In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.
- CLEAN UP:** All tools and equipment may be cleaned with a water and strong detergent solution before material hardens. Sand may be used as an abrasive. A suitable solvent is required for clean up of material after hardening.

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

## CONSIDERATIONS

- Flowability and strength gain are adversely affected by lower temperatures.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Design-A-Spec™.
- To obtain bond, concrete shall be visibly free of surface moisture.
- When clearances are outside the recommended range or when exceeding maximum placement volumes, contact the Five Star Products, Inc. Engineering and Technical Service Center.
- Do not add solvents to increase flowability.
- For continuous operating temperatures exceeding 180°F (82°C), contact the Five Star Products, Inc. Engineering and Technical Service Center.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	WEIGHT
33100	HP Epoxy Standard Grout	36 (4 pallets)	281 lbs. (127.46 kg)
31600	HP Epoxy High Flow Grout	36 (4 pallets)	231 lbs. (104.78 kg)
33100N <sup>1</sup>	HP Epoxy Standard Grout for Nuclear Safety Zone	36 (4 pallets)	281 lbs. (127.46 kg)
31600N <sup>1</sup>	HP Epoxy High Flow Grout for Nuclear Safety Zone	36 (4 pallets)	231 lbs. (104.78 kg)

<sup>1</sup>Compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs

**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](http://FiveStarProducts.com)

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## **SP EPOXY GROUT**

Superior Performance, Precision Non-shrink Grout

### **PRODUCT DESCRIPTION**

Five Star® SP Epoxy Grout is the next generation in ultra-high performance epoxy grout. Five Star® SP Epoxy Grout has extremely high compressive strength, is expansive non-shrink, with ultra-low creep and outstanding Effective Bearing Area (EBA). Available both in standard and pump grade, Five Star® SP Epoxy Grout is a 100% solid epoxy grout system for high performance machinery and equipment.

### **ADVANTAGES**

- Ultra-high 1 day & 7 day strengths
- Very low creep
- Available in standard grade and pump grade
- Excellent chemical resistance
- 95% Effective Bearing Area (EBA)
- Expansive and non-shrink per ASTM C 827
- Simple soap and water clean-up

### **USES**

- Wind turbine bases and crane rails
- Compressors and turbo-machinery
- Presses and stamping machines
- Pumps and rotating equipment
- Skid-mounted equipment
- High dynamic load applications

### **PACKAGING**

Five Star® SP Epoxy Grout is a three component system consisting of partially filled containers of resin, hardener and polyethylene lined bags of aggregate. Five Star® SP Epoxy Grout is available in a unit yielding approx. 1.85 ft<sup>3</sup> (52.4 liters) for Standard Grade and 1.75 ft<sup>3</sup> (49.6 liters) for Pump Grade.

### **SHELF LIFE**

Two year shelf life if in original, unopened packaging when stored under dry conditions: high humidity storage space will reduce shelf life.

TYPICAL PROPERTIES AT 70°F (21°C)		
	Standard Grade	Pump Grade
Early Height Change, ASTM C 827	Positive Expansion	Positive Expansion
Effective Bearing Area (EBA)	95%	95%
Creep, ASTM C 1181, 1 Year 400 psi @ 140° F	0.5 x 10 <sup>-3</sup> in/in	1.0 x 10 <sup>-3</sup> in/in
Tensile Strength, ASTM C 307	2,000 psi (13.8 MPa)	2,300 psi (15.9 MPa)
Flexural Strength, ASTM C 580	5,000 psi (34.5 MPa)	5,500 psi (37.95 MPa)
Coefficient of Expansion, ASTM C 531	16 x 10 <sup>-6</sup> in/in/°F	17 x 10 <sup>-6</sup> in/in/°F
	(28.8 x 10 <sup>-6</sup> mm/mm/°C)	(30.6 x 10 <sup>-6</sup> mm/mm/°C)
Compressive Strength, ASTM C 579 B*		
1 Day	16,500 psi (113.8 MPa)	16,500 psi (113.8 MPa)
7 Day	17,500 psi (120.7 MPa)	17,500 psi (120.7 MPa)
28 Days	20,000 psi (138.0 MPa)	20,000 psi (138.0 MPa)
Post Cure	22,000 psi (151.7 MPa)	22,000 psi (151.7 MPa)
Working Time at 70° F (21° C)	30 Minutes	30 Minutes

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

\*ASTM C 579 load rate II (0.25 inches per minute).

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces to be in contact with Five Star® SP Epoxy Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. An SSPC-SP6 commercial finish on all metal surfaces will optimize bond development to steel.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be 1" to 2" (25 - 50 mm). Areas where bond is not desired must be treated with paste wax or polyethylene. Isolation joints should be incorporated into pours at 4' to 6' intervals. Contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 for further information.
3. **MIXING:** For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°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). Working time is approximately 30 minutes when temperatures are at 70°F (21°C).
4. **METHODS OF PLACEMENT:** Five Star® SP Epoxy Grout may be poured (standard grade) or pumped (pump grade) into place. All grout shall be placed from one side to the other, maintaining contact with the bottom of the base plate at all times. When possible, use of a head box is highly recommended (refer to the Five Star® Technical Bulletin "Head Box and Plunger" for guidelines). For pumping applications use a peristaltic pump. For clearances less than 1 inch (25 mm) or greater than 4 inches (100 mm), or volumes exceeding 12 ft<sup>3</sup> (339 liters), call the Five Star Products' Engineering and Technical Center at 1-800-243-2206.
5. **POST-PLACEMENT PROCEDURES:** Final finishing should ensure material is flush with bottom edge of base plate. Finishing of exposed surfaces is aided by using a solvent wiped trowel just before material becomes unworkable. In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.
6. **CLEAN UP:** All tools and equipment may be cleaned with a water and strong detergent solution before material hardens. Sand may be used as an abrasive. A suitable solvent is required for clean up of material after hardening.

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

## **CONSIDERATIONS**

- Flowability and strength gain are adversely affected by lower temperatures.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to *Design-A-Spec™*.
- To obtain bond, concrete shall be visibly free of surface moisture.
- Do not exceed recommended placement volumes or depths in a single pour. For installation assistance contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Do not add solvents to increase flowability.
- For continuous operating temperatures exceeding 250°F (120°C), contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **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 and appropriate respiratory protection in case of contact with eyes, flush repeatedly with water and contact a physician immediately. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

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# **ELASTOMERIC GROUT**

Elastomeric Polyurethane Grout

## **PRODUCT DESCRIPTION**

Five Star® Elastomeric Grout is specially designed for light rail transportation grouting. The three component system consists of a two component polymer and aggregate that imparts vibration and sound dampening properties combined with exceptional electrical resistance. This product is formulated for placements that require good flow and adhesion to both rail and concrete, while maintaining line and grade. Five Star Elastomeric Grout is a solvent-free system that provides rapid cure and superior chemical resistance to a variety of chemicals including oils, fuels, acids, caustics and solvents. Five Star Elastomeric Grout is DOT non-hazardous and is environmentally and applicator friendly.

## **ADVANTAGES**

- High electrical resistance
- Low exotherm with early cure
- Absorbs vibration and dramatically reduces noise caused by vibration
- Superior adhesion prevents water penetration
- Chemically resistant
- Strong adhesion to steel and concrete

## **USES**

- Light rail applications
- Railroad track rehabilitation
- Precision alignment under dynamic load conditions
- Vibration and noise dampening applications
- Flexible concrete patching
- Header repair compound
- Cast elastomers

## **PACKAGING AND YIELD**

Five Star Elastomeric Grout is a three component system consisting of partially filled containers of resin and hardener and one polyethylene lined bag of aggregate and is available in a unit yielding approximately 0.45 cubic feet (12.7 liters) of hardened material.

## **SHELF LIFE**

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

### **TYPICAL PROPERTIES AT 70°F (21°C)**

<b>Shore A Hardness</b> , ASTM D 2240	Neat = 70+/-10 Filled = 85+/-10
<b>Volume Resistivity</b> , ASTM D 257	> 1E12 Ohm-cm
<b>Tensile Properties</b> , ASTM D 638 Ultimate Tensile Strength (UTS)	450 psi
<b>Elongation</b>	200%
<b>Tear Resistance</b> , ASTM D 1004	200 lbs per inch
<b>Bond to Concrete</b> , ASTM C 882	No shear failure, deflection to concrete
<b>Bond to Steel</b> , ASTM C 882	No shear failure, deflection to steel
<b>Compression Modulus</b> , ASTM D 575B	7%
<b>Compression Set</b> , ASTM D 395	< 1% Incremental Set, third test
<b>Dynamic Deflection</b> , ASTM D 2231	No failure
<b>Fatigue Resistance</b> , Testing at 1.6E7 Cycles 20Hz, 5-250 psi	< 10 % Deflection
<b>Height Change</b> , ASTM C 827 at 90°F (32°C)	Positive Expansion
<b>Working Time</b> at 70°F (21°C)	30 minutes
<b>Tack Free Time</b> at 70°F (21°C)	3 hours
<b>Cure Time</b> at 70°F (21°C)	12 hours

*The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result.*

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces to be in contact with Five Star® Elastomeric Grout shall be free of oil, grease, laitance, and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. Areas where bond is not desired must be treated with paste wax or polyethylene.
2. **MIXING:** For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°C) for 24 hours prior to use. Pour all Component B (hardener) into pail containing Component A (resin). Mix thoroughly with a slow speed drill and paddle mixer to avoid air entrapment. 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). Working time is approximately 30 minutes when temperatures are at 70°F (21°C).
3. **METHODS OF PLACEMENT:** Five Star Elastomeric Grout may be poured into place. All grouting shall be placed from one side to the other, maintaining contact with the bottom of the substrate at all times.
4. **POST-PLACEMENT PROCEDURES:** Final finishing of exposed surfaces may be done before material becomes unworkable. In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.
5. **CLEAN UP:** All tools and equipment may be cleaned with a suitable solvent or a strong detergent solution before material hardens. Sand may be used as an abrasive.

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

## **CONSIDERATIONS**

- Flowability and strength gain are adversely affected by lower temperatures.
- For placement temperatures below 60°F (15.6°C) or above 80°F (26.7°C), contact the Five Star Products Engineering and Technical Service Center at (800) 243-2206.
- Polyurethane polymers and curatives are sensitive to heat and moisture. Avoid excessive conditions and protect area from wetness during cure.
- Do not add solvents to increase flowability.
- For continuous operating temperatures exceeding 120°F (48°C), contact the Five Star Products Engineering and Technical Service Center at (800) 243-2206.

## **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 MATERIAL SAFETY DATA SHEET.**

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

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# **EPOXY CHOCK & EPOXY CHOCK EX**

High Performance Epoxy Chock

## **PRODUCT DESCRIPTION**

Five Star® Epoxy Chock and Epoxy Chock EX are epoxy chocking systems specifically engineered for use under integral gas compressors, skid mounted equipment, turbines, generators, and other critically aligned machinery. Five Star Epoxy Chock is a two component, 100% solids, solvent free material providing excellent flowability and high compressive strength at elevated temperatures and loading conditions. Five Star® Epoxy Chock EX is a 3 Part, extended version that is also solvent free with excellent flowability and high compressive strength at elevated temperature and loading conditions. Both systems are economical replacement for steel chocks because it eliminates costly machining and provides virtually 100% contact to machinery base plates.

## **ADVANTAGES**

- Permanent support for machinery requiring precision alignment
- Chemically resistant
- Pourable two component system
- Eliminates costly machining

## **USES**

- Compressors
- Hot-running machinery
- Turbines and generators
- Replacement for steel chocks
- Motors and pumps

## **PACKAGING AND YIELD**

Five Star® Epoxy Chock is a two-component epoxy system consisting of partially filled containers of resin and hardener and is available in a 1.1 gallon unit yielding 0.15 ft<sup>3</sup> (260 in<sup>3</sup>, 4.3 L). Epoxy Chock Ex has a third component consisting of a 5 lb. pail of aggregate to extend the Epoxy Chock. The yield, with aggregate extension, is 310 in<sup>3</sup> (5.1L; 0.18 cu. ft.).

## **SHELF LIFE**

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

<b>TYPICAL PROPERTIES AT 70°F (21°C)</b>		
<b>Compressive Strength, ASTM C 579 B</b>	<b>Epoxy Chock</b>	<b>Epoxy Chock EX</b>
Post Cure @ 140°F (60°C)	20,500 psi (141.3 MPa)	20,500 psi (141.3 MPa)
<b>Compressive Strength, ASTM D 695</b>		
24 Hours	12,000 psi (82.7 MPa)	12,000 psi (82.7 MPa)
7 Days	14,000 psi (96.5 MPa)	14,000 psi (96.5 MPa)
Post Cure @ 140°F (60°C)	19,000 psi (130.9 MPa)	18,000 psi (124.1 MPa)
<b>Compressive Secant Modulus</b>	3.5 x 10 <sup>5</sup> psi (0.24 x 10 <sup>4</sup> MPa)	5.35 x 10 <sup>5</sup> psi (0.37 x 10 <sup>4</sup> MPa)
<b>Coefficient of Linear Thermal Expansion, ASTM C 531</b>		
32°F to 140°F (0°C to 60°C)	20.8 x 10 <sup>-6</sup> in/in/°F (37.4 x 10 <sup>-6</sup> mm/mm/°C)	16.0 x 10 <sup>-6</sup> in/in/°F (28.8 x 10 <sup>-6</sup> mm/mm/°C)
<b>Linear Shrinkage, ASTM C 531</b>	0.0002 in/in	0.0002 in/in
<b>Flexural Strength, ASTM C 580</b>	7,000 psi (48.3 MPa)	5,000 psi (34.5 MPa)
<b>Tensile Strength</b>	6,800 psi (46.9 MPa) ASTM D 638	2,300 psi (15.9 MPa) ASTM C 307
<b>Pot Life 70°F (21°C)</b>	30 Minutes	40 minutes
<b>Fire Resistance, ASTM D 635</b>	Self Extinguishing	Self Extinguishing
<b>Maximum Service Temperature</b>	230°F (110°C)	230°F (110°C)

*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.*

## PLACEMENT GUIDELINES

- SURFACE PREPARATION:** All surfaces to be in contact with Five Star® Epoxy Chock shall be free of oil, grease, and other contaminants. Steel surfaces with sharp edges or frets should be ground smooth prior to grout placement. Areas where bond is not desired should be thoroughly coated with a release agent, grease or wax. Seal all open areas with putty or similar material to contain grout and prevent unwanted leaks.
- FORMWORK:** Open celled foam or similar material should be installed on three sides of the chock area. The foam dam must fit firmly between the machinery bedplate and the foundation to provide a liquid-tight seal. Anchor bolts must be sprayed with a suitable release agent. Any jacking bolts that are located inside the chock area must also be treated with a suitable release agent. The entire chock area must be sprayed with release agent prior to installing the front dam. Check the chock area for any possible locations that could cause a leak and seal accordingly. Install a front dam made of steel angle iron or flat bar approximately 3/4 inch (18 mm) to 1 inch (25 mm) away from the machinery bedplate and high enough to allow the chocking material to be poured 1/2 inch (12 mm) above the bottom of the bedplate. Spray the inside of the front dam with release agent. Machinery must be in final alignment position prior to pouring Five Star® Epoxy Chock.
- MIXING:** For optimum performance, resin and hardener should be conditioned to between 70°F (21°C) and 80°F (27°C) for at least 12 hours before use. Premix Component A (resin) for approximately one minute. Pour Component B (hardener) into the Component A (resin) container and mix thoroughly for three to four minutes with a slow speed drill and paddle mixer at 200 rpm. Always keep the mixing blade completely submerged in the chocking material to minimize air entrapment. Be certain the mixing blade removes material completely around the sides and bottom of the resin can. This will ensure a uniform mix of the resin and hardener. Use oven-dried aggregate when extending Five Star® Epoxy Chock.
- POURING:** Always pour Five Star® Epoxy Chock from the lowest side of the chock area which will force air to escape through the open celled foam at the opposite corner. Continue to pour slowly until the entire chock area is filled and the chock overpour area is filled to a level approximately 1/2 inch (12 mm) above the bottom of the bedplate. NOTE: Do not scrape material from the sides of the container, use only material that flows freely from container. Be sure that all the chocks have hardened before leaving the area of the pour. For pour placements less than 1/2 inch (12 mm) or greater than 2 1/2 inches (63 mm) or 0.15 ft³ (260 in³, 4.3 L), contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- POST-PLACEMENT PROCEDURES:** Make sure the chocks have cured properly based on the following steel temperatures and curing times, then remove the front dam, release jacking bolts, tighten anchor bolts to recommended torque or tension.
- CLEAN UP:** All tools and equipment may be cleaned with a solvent such as MEK before material hardens. Sand may be used as an abrasive to aid in clean up.

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

## CONSIDERATIONS

- For pour placements less than 1/2 inch (12 mm) or greater than 2 1/2 inches (63 mm) or exceeding 0.15 ft³ (260 in³, 4.3 L), contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Flowability, cure times and strength gain are adversely affected by lower temperatures.

Steel Temperature	Cure Time
13°C to 15°C (55°F to 60°F)	48 hours
16°C to 18°C (61°F to 65°F)	36 hours
19°C to 21°C (66°F to 70°F)	24 hours
Above 23°C (Above 75°F)	18 hours

## 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. In case of contact with eyes, flush repeatedly with water and contact a physician.

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

SKU/PRODUCT CODE	DESCRIPTION	UNIT SIZE
91750	Five Star® Epoxy Chock	1.1 Gallon
91775	Five Star® Epoxy Chock EX	1.1 Gallon Pail with 5 lbs. of aggregate

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# EPOXY NOVOLAC GROUT

Highly Chemical Resistant Epoxy Grout

## PRODUCT DESCRIPTION

Five Star® Epoxy Novolac Grout is a three component, highly chemical resistant, 100% solids grout designed for industrial applications in aggressive chemical environments where exposure to concentrated acids, alkalis, corrosives or solvents can occur. Five Star® Epoxy Novolac Grout has excellent flowability, is highly chemical resistant, and exhibits positive expansion when tested in accordance with ASTM C 827.

## ADVANTAGES

- High chemical resistance
- 95% Effective Bearing Area (EBA)
- Exhibits positive expansion per ASTM C 827
- Excellent impact and wear resistance
- Expansive, nonshrink
- Superior bond to concrete or steel

## USES

- Grouting for machinery/pump baseplates
- High chemical resistance requirements
- Process equipment
- Secondary containment

## PACKAGING AND YIELD

Five Star® Epoxy Novolac Grout is a three component system consisting of premeasured containers of resin and hardener and four polyethylene lined bags of aggregate and is available in a unit yielding approximately 1.75 cubic feet (49.5 liters) of hardened material.

## SHELF LIFE

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

TYPICAL PROPERTIES AT 70°F (21°C)	
Height Change, ASTM C 827 at 90°F (32°C)	Positive Expansion
Effective Bearing Area	95%
Compressive Strength, ASTM C 579 B*	
1 Day	16,000 psi (110 MPa)
7 Days	17,000 psi (117 MPa)
Post cured at 140° F (60° C)	18,000 psi (124 MPa)
Bond Strength, ASTM C 882	
7 Days	2,500 psi (17.3 MPa)
Tensile Strength, ASTM C 307	2,300 psi (15.9 MPa)
Flexural Strength, ASTM C 580	6,000 psi (41.4 MPa)
Coefficient of Expansion, ASTM C 531	16 x 10 <sup>-6</sup> in/in/°F (29 x 10 <sup>-6</sup> mm/mm/°C)
Working Time at 70°F (21°C)	20 minutes

Chemical Resistance Chart* at 70°F (21°C)		
Solvents	Organics Acids (Conc.)	Bases / Alkalines (Conc.)
Acetaldehyde	Acetic (1-50%)	Ammonia (1-25%)
Acetone	Acid plating solutions	Ammonium Hydroxide (1-25%)
Acetonitrile	Adipic (1-25%)	Aniline
Acrylonitrile	Azotic (1-50%)	Barium Hydroxide (1-sat.)
Butyl acetate	Battery (1-98%)	Black Pulp Liquor
Cyclohexane	Chromic (1-30%)	Butyl Amine
Ethanol	Chlorohydric (1-37%)	Cadmium Cyanide Plating
Ethyl acetate	Dibasic (1-sat.)	Calcium Hydroxide (1-25%)
Ethyl alcohol	Ethanoic (1-50%)	Chromium Trioxide (1-25%)
Formaldehyde	Ethylic (1-50%)	Copper Cyanide Plating
Isopropyl Alcohol	Engravers (1-50%)	Dimethyl Aniline
Jet Fuel	Hydrochloric (1-37%)	Hydrogen Peroxide (1-30%)
Kerosene	Hydrofluoric (1-40%)	Green Pulp Liquor
Methyl Ethyl Ketone	Mattling (1-98%)	Soap solutions
Methanol	Nitric (1-50%)	Sodium Cyanide (1-15%)
Methyl Alcohol	Oil of vitriol (1-98%)	Sodium Hypochlorite (1-9%)
Rubbing Alcohol	Oleic	Sodium Hydroxide (1-50%)
Wood Alcohol	Phosphoric (1-85%)	Triethanolamine
1,1,1 Trichloroethane	Sulfuric (1-98%)	Triethylamine
Phenol	Vitriol (1-98%)	Potassium Hydroxide (1-sat)

\* NOTE: Many factors effect chemical resistance. Application design, service and exposure temperatures, and the type and amount of impurities in the chemical or in the environment are some important considerations. These test results are reported to serve as a guide to the applicability of the Novolac systems.

\*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

- SURFACE PREPARATION:** All surfaces to be in contact with Five Star® Epoxy Novolac Grout shall be free of dust, oil, grease, laitance curing compounds, and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. An SSPC-SP6 commercial finish on all metal surfaces will optimize bond development to steel.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be 1 to 2 inches (25 - 50 mm). Areas where bond is not desired must be treated with paste wax or polyethylene. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Products' Engineering and Technical Service Center for further information.
- MIXING:** For optimum performance, all components should be conditioned to 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 out. Working time is approximately 20 minutes when temperatures are at 70°F (21°C).
- METHODS OF PLACEMENT:** Five Star® Epoxy Novolac Grout may be poured into place. All grout shall be placed from one side to the other, maintaining contact with the bottom of the baseplate at all times. When possible, use of a headbox is highly recommended (refer to the Five Star® Technical Bulletin "Head Box and Plunger" for guidelines). For clearances less than 1/2 inch (13 mm) or greater than 6 inches (152 mm) call the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- POST-PLACEMENT PROCEDURES:** Final finishing should ensure material is flush with bottom edge of baseplate. Finishing of exposed surfaces is aided by using a solvent wiped trowel just before material becomes unworkable. In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.
- CLEAN UP:** All tools and equipment may be cleaned with a water and strong detergent solution before material hardens. Sand may be used as an abrasive. A suitable solvent is required for clean up of material after hardening.

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

## CONSIDERATIONS

- Flowability and strength gain are adversely affected by lower temperatures.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Design-A-Spec™.
- To obtain bond, concrete shall be visibly free of surface moisture.
- When clearances are outside the recommended range or when exceeding maximum placement volumes, contact Five Star Products' Engineering and Technical Service Center.
- Do not add solvents to increase flowability.
- For continuous operating temperatures exceeding 200°F (93°C), contact the Five Star Products' Engineering and Technical Service Center.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## CAUTION

FOR INDUSTRIAL USE ONLY. 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL 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	WEIGHT
34975	Five Star® Epoxy Novolac Grout	36 (packaged on 4 pallets)	227.5 lbs. (103.2 Kg)

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

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Specifications Subject to Change.

For most current version of datasheet, go to [FiveStarProducts.com](http://FiveStarProducts.com)

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## **FLUID EPOXY**

High Performance Fluid Epoxy

### **PRODUCT DESCRIPTION**

Five Star Fluid Epoxy is a two component, all-purpose, rapid cure fluid epoxy system. Five Star Fluid Epoxy is designed for adhesive grouting, anchoring, anchor bolts, setting of bolts and wedges, and small repairs to concrete.

### **ADVANTAGES**

- High early strength
- Fluid, self-leveling consistency
- Excellent adhesion to steel
- Good impact resistance
- Chemically resistant
- Convenient packaging

### **USES**

- Anchoring machines, baseplates and other equipment
- Repair of spalled and cracked concrete
- Installation of bolts, anchors and dowels
- Dynamic loads
- Skid resistant surfaces
- Operating temperatures up to 150°F (65°C)

### **PACKAGING AND YIELD**

Five Star Fluid Epoxy is a two component system consisting of a resin/aggregate preblend and hardener packaged separately inside a pail and is available in a unit yielding approximately 0.20 cubic feet (5.7 liters) of hardened material.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)		
Compressive Strength, ASTM C 579 A*	Compressive Strength	Compressive Secant Modulus
6 Hours	11000 psi (75.8 MPa)	3.5 x 10 <sup>5</sup> psi (2.4 x 10 <sup>3</sup> MPa)
1 Day	13000 psi (89.6 MPa)	4.3 x 10 <sup>5</sup> psi (2.9 x 10 <sup>3</sup> MPa)
7 Days	14000 psi (96.5 MPa)	4.8 x 10 <sup>5</sup> psi (3.3 x 10 <sup>3</sup> MPa)
Creep, ASTM C 1181, 1 year	10 x 10 <sup>-3</sup> in/in (mm/mm) at 140°F (60°C), 400 psi (2.8 MPa)	
Tensile Strength, ASTM C 307	2500 psi (17.2 MPa)	
Flexural Strength, ASTM C 580	6800 psi (46.9 MPa)	
Flexural Secant Modulus, ASTM C 580	1.0 x 10 <sup>6</sup> psi (6.9 x 10 <sup>3</sup> MPa)	
Coefficient of Expansion, ASTM C 531	32 x 10 <sup>-6</sup> in/in/°F (57.6 x 10 <sup>-6</sup> mm/mm/°C)	
Bond to Concrete, ASTM C 882	Concrete Failure	
Working Time at 70°F (21°C)	30 minutes	

\* Rate of loading 0.125 inches per minute. The data shown above reflect 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® Fluid Epoxy shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. An SSPC-SP6 commercial finish on all metal surfaces will optimize bond development to steel.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be 1 to 2 inches (25 - 50 mm). Areas where bond is not desired must be treated with paste wax or polyethylene. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Engineering and Technical Service Center for further information.
3. **MIXING:** For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°C) prior to use. Use mixing paddle and a slow speed drill for mixing. Pre-mix Component A (resin and aggregate preblend) until uniform color and consistency is observed. Pour all of Component B (hardener) into pail containing resin and aggregate blend and mix until a uniform color is achieved. Use immediately after mixing. Working time is approximately 30 minutes when temperatures are at 70°F (21°C).
4. **METHODS OF PLACEMENT:** Five Star Fluid Epoxy may be poured in place at a thickness of 1/8 inch (3 mm) to 1 ½ inches (38 mm). A self-leveling product, Five Star Fluid Epoxy needs little or no finishing.
5. **POST-PLACEMENT PROCEDURES:** In-service operation may begin immediately after minimum required strength and modulus have been achieved. Where a skid resistant surface is required, broadcast sand on fresh uncured epoxy surface. Sweeping away excess sand after epoxy cures leaves a skid resistant finish.
6. **CLEAN UP:** All tools and equipment may be cleaned with solvents or water and strong detergent solution or suitable solvent before material hardens. Sand may be used as an abrasive.

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

## **CONSIDERATIONS**

- Flowability and strength gain are adversely affected by lower temperatures.
- To obtain bond, concrete shall be visibly free of surface moisture.
- For placement temperatures below 50°F (10°C) or above 90°F (32°C) contact the Five Star Products Engineering and Technical Service Center at (800) 243-2206.
- For placements greater than 1 ½ inches (38 mm), or greater than 0.20 cubic feet (5.7 liters) contact the Five Star Products Engineering and Technical Service Center at (800) 243-2206.

## **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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.

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

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

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# MineForm® BACKER GROUT

## High Strength Epoxy Grouting System

### PRODUCT DESCRIPTION

**Five Star® MineForm® Backer Grout** is a two-component, 100% solids, epoxy grouting system specifically engineered for use in the demanding mining industry to secure wear plates under cone crushers, aggregate crushers, grinding mills and related heavy machinery. Five Star® MineForm® Backer Grout is formulated to provide high compressive and tensile strengths while bearing extreme repetitive dynamic loads.

### ADVANTAGES

- High impact resistance
- Excellent wear resistance
- High tensile strength
- High compressive strength
- Reduces down time; saves money
- Easy to mix and install—no special equipment needed

### USES

- Crushing and grinding machinery
- Backing of wear plates
- High vibratory applications
- Ideal for cone crushers, gyratory crushers, rotating mills, pulverizers, and other heavy equipment
- High bond to wear metals

### PACKAGING AND YIELD

Five Star® MineForm® Backer Grout is a two-component epoxy system consisting of partially filled containers of resin and hardener and is available in two sizes: a large kit yielding approximately 0.49 ft<sup>3</sup> (13.9L), and a small kit yielding approximately .20 ft<sup>3</sup> (5.7L) of hardened material.

### SHELF LIFE

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 579 B</b>	
Post Cure @ 140°F (60°C)	19,000 psi (131.0 MPa)
<b>Compressive Strength, ASTM D 695</b>	
1 Day	11,000 psi (75.84 MPa)
7 Days	14,000 psi (96.52 MPa)
Post Cure @ 140°F (60°C)	18,000 psi (124.10 MPa)
<b>Compressive Secant Modulus</b>	3.5 x 10 <sup>5</sup> psi (0.24 x 10 <sup>4</sup> MPa)
<b>Coefficient of Linear Thermal Expansion, ASTM C 531</b>	
32°F to 140°F (0°C to 60°C)	20.8 x 10 <sup>-6</sup> in/in/°F (37.4 x 10 <sup>-6</sup> mm/mm/°C)
<b>Shore D Hardness - Post Cure, ASTM D 2240</b>	87
<b>Flexural Strength, ASTM C 580</b>	7,000 psi (48.3 MPa)
<b>Tensile Strength, ASTM D 638</b>	6,800 psi (46.9 MPa)
<b>Pot Life 70°F (21°C)</b>	30 Minutes
<b>Fire Resistance, ASTM D 635</b>	Self Extinguishing
<b>Maximum Service Temperature</b>	230°F (110°C)

*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.*

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces to be in contact with Five Star® MineForm® Backer Grout shall be free of oil, grease, and other contaminants. Steel surfaces with sharp edges or frets should be ground smooth prior to grout placement. Seal all open areas with putty or similar material to contain grout and prevent unwanted leaks.
2. **MIXING:** For optimum performance, resin and hardener should be conditioned to between 70°F (21°C) and 80°F (27°C) for at least 12 hours before use. Premix Component A (resin) for approximately one minute. Pour Component B (hardener) into the Component A (resin) container and mix thoroughly for three to four minutes with a slow speed drill and paddle mixer at 200 rpm. Always keep the mixing blade completely submerged in the material to minimize air entrapment. Be certain the mixing blade removes material completely around the sides and bottom of the resin can. This will ensure a uniform mix of the resin and hardener.
3. **APPLICATION METHOD:** Place grout immediately after mixing. Pour from a single location and fill cavity. Use dam to direct the flow as necessary. Large volume pours may require placement in lifts. Allow previous lift to cool to 90°F before applying subsequent lifts. Placement should be continuous to prevent cold joints. Check for leaks during installation.
4. **CLEAN UP:** All tools and equipment may be cleaned with a solvent such as MEK before material hardens. Sand may be used as an abrasive to aid in clean up.

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

## **CONSIDERATIONS**

- Place mixed grout immediately after mixing.
- Higher temperatures increase strength development but reduce working time.
- Colder temperatures decrease strength development and reduce flowability.
- Large volume pours may require placement in lifts.

## **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. In case of contact with eyes, flush repeatedly with water and contact a physician.

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 (U.S.), or +1 203-336-7900 (outside the U.S.).

SKU/PRODUCT CODE	DESCRIPTION	WEIGHT
91175	Five Star® MineForm® Backer Grout	Large Kit: 56 Lbs. (25.4 Kg)
91125	Five Star® MineForm® Backer Grout	Small Kit: 23 Lbs. (10.43 Kg)

**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](http://FiveStarProducts.com)

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# **RAPID EPOXY GROUT**

## Fast Turnaround Precision Epoxy Grout

### **PRODUCT DESCRIPTION**

Five Star® Rapid Epoxy Grout is the only expansive, non-shrink, rapid strength gain epoxy grout designed for very fast turnaround precision grouting. It is a three component, 100% solids, solvent free system formulated with superior flowability. Five Star® Rapid Epoxy Grout exhibits positive expansion when tested in accordance with ASTM C 827.

### **ADVANTAGES**

- Permanent support for machinery requiring precision alignment
- High eight-hour strengths for fast turnaround
- High flow for tight clearances down to 1/2 inch
- Excellent creep resistance
- Expansive, non-shrink, ASTM C 827
- 95% Effective Bearing Area (EBA)
- Chemically resistant
- High temperature performance up to 250°F (121°C)
- Excellent adhesion to steel

### **USES**

- Grouting machine baseplates to maintain precision alignment under high impact and vibration down to 1/2 inch
- Fast turnarounds
- Operating temperatures up to 250°F (121°C)
- Aggressive chemical environments
- Installation of anchors and dowels
- Dynamic loads

### **PACKAGING AND YIELD**

Five Star® Rapid Epoxy Grout is a three component system consisting of resin, hardener and aggregate packaged separately in a pail and is available in a unit yielding approximately 0.50 cubic feet (14.2 liters) of hardened material.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)		
Compressive Strength, ASTM C 579 B*	Compressive Strength	Compressive Secant Modulus
8 Hours	8,000 psi (55.2 MPa)	$1.3 \times 10^6$ ( $0.9 \times 10^4$ MPa)
1 Day	14,000 psi (96.5 MPa)	$1.6 \times 10^6$ ( $1.1 \times 10^4$ MPa)
7 Days	15,000 psi (103.5 MPa)	$1.7 \times 10^6$ ( $1.2 \times 10^4$ MPa)
Tested at 180°F (82°C)	11,000 psi (75.9 MPa)	$1.2 \times 10^6$ ( $0.8 \times 10^4$ MPa)
Height Change at 90°F (32°C), ASTM C 827		Positive Expansion
Effective Bearing Area		95%
Creep, ASTM C 1181, 1 Year	$1.8 \times 10^{-3}$ in/in (mm/mm) at 140°F (60°C), 600 psi (4.1 MPa)	
Tensile Strength, ASTM C 307		2,400 psi (16.5 MPa)
Flexural Strength, ASTM C 580	Flexural Strength	Flexural Secant Modulus
7 Days	5,000 psi (34.5 MPa)	$2.0 \times 10^6$ ( $1.3 \times 10^4$ MPa)
Tested at 180°F (82°C)	4,000 psi (27.6 MPa)	$1.4 \times 10^6$ ( $0.9 \times 10^4$ MPa)
Coefficient of Expansion, ASTM C 531	$17 \times 10^{-6}$ in/in/°F ( $30 \times 10^{-6}$ mm/mm/°C)	
Bond to Concrete, ASTM C 882		Concrete Failure
Working Time at 70°F (21°C)		30 minutes

*\*Rate of loading 0.25 inches per minute. The data shown above reflect 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® Rapid Epoxy Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. An SSPCSP6 commercial finish on all metal surfaces will optimize bond development to steel.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be 1 to 2 inches (25 - 50 mm). Areas where bond is not desired must be treated with paste wax or polyethylene. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Products, Inc. Engineering and Technical Service Center for further information.
3. **MIXING:** For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°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. For large volume placements, 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). Working time is approximately 30 minutes when temperatures are at 70°F (21°C).
4. **METHODS OF PLACEMENT:** Five Star® Rapid Epoxy Grout may be poured into place. All grout shall be placed from one side to the other, maintaining contact with the bottom of the baseplate at all times. When possible, use of a headbox is highly recommended (refer to the Five Star® technical bulletin "Head Box and Plunger" for guidelines). For placement thicknesses of less than one-half inch (13 mm), or greater than three inches (75 mm), call the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206.
5. **POST-PLACEMENT PROCEDURES:** Final finishing should ensure material is flush with bottom edge of baseplate. Finishing of exposed surfaces is aided by using a solvent wiped trowel just before material becomes unworkable. In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.
6. **CLEAN UP:** All tools and equipment may be cleaned with a water and strong detergent solution or suitable solvent before material hardens. Sand may be used as an abrasive.

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

## **CONSIDERATIONS**

- Flowability and strength gain are adversely affected by lower temperatures.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Design-A-Spec™.
- To obtain bond, concrete shall be visibly free of surface moisture.
- For placements thinner than one-half inch (13 mm), greater than three inches (75 mm), or greater than 2½ cubic feet (70.8 liters), contact the Five Star Products Engineering and Technical Service Center at (800) 243-2206.
- Do not reduce aggregate loading or add solvents to increase flowability.
- For operating temperatures exceeding 250°F (121°C), contact the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star® distributor, local sales representative, or Five Star Product, Inc. Engineering and Technical Service Center at (800) 243-2206.

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

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# **CRANE RAIL GROUT**

High-Flow Epoxy for Low Clearance Applications

## **PRODUCT DESCRIPTION**

Five Star® Crane Rail Grout is a highly flowable, non-shrink, rapid strength gain, epoxy grout for tight clearance applications and dynamic loads. It is a three component, 100% solids epoxy system that exhibits positive expansion when tested in accordance with ASTM C 827 for precision grouting and alignment of crane rail. Five Star® Crane Rail Grout has excellent chemical resistance.

## **ADVANTAGES**

- High flow for tight clearances
- Excellent adhesion to steel
- 95% Effective Bearing Area
- Expansive, non-shrink
- Chemically resistant
- Rapid strength gain for fast turnaround

## **USES**

- Crane rail
- Railroad track rehabilitation
- Precision alignment under dynamic load conditions
- Tight clearance grouting of dynamic loads
- Transfer car runways
- Material handling tracks
- Light rail applications

## **PACKAGING AND YIELD**

Five Star® Crane Rail Grout is a three-component system consisting of partially filled containers of resin and hardener, and one 50 lb. polyethylene lined bag of aggregate. Unit yield is approximately 0.49 cubic feet (13.9 liters) of hardened material.

## **SHELF LIFE**

Two years in original unopened packaging when stored in dry conditions. High relative humidity will reduce shelf life.

TYPICAL PROPERTIES AT 70°F (21°C)	
Height Change, ASTM C 827, at 90°F (32°C)	Positive Expansion
Effective Bearing Area	95%
Compressive Strength, ASTM C 579 B*	
1 Day	13,000 psi (90 MPa)
7 Days	15,000 psi (103 MPa)
28 Days	16,000 psi (110 MPa)
Post Cure @ 140°F (60°C)	17,000 psi (117 MPa)
Tensile Strength, ASTM C 307	
7 Days	2,500 psi (17.2 MPa)
Bond to Concrete, ASTM C 882	
7 Days	3,000 psi (20.7 MPa)
Flexural Strength, ASTM C 580	5,500 psi (37.9 MPa)
Working Time at 70°F (21°C)	30 minutes

*\*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

- SURFACE PREPARATION:** All surfaces to be in contact with Five Star® Crane Rail Grout shall be roughened to a minimum CSP8 (Concrete Surface Profile) in accordance with ICRI Standard 310.2R and be free of oil, grease, laitance, and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. Areas where bond is not desired must be treated with paste wax or polyethylene.
- MIXING:** Mix via a mortar mixer or a drill and paddle for single unit mixes. For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°C) for 24 hours prior to use. Pour all Component B (hardener) into pail containing Component A (resin). Mix thoroughly with a slow speed drill and paddle mixer to avoid air entrapment. Transfer mixed liquids to mortar mixer or larger container suitable to hold mixed liquids and Component C (aggregate). 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). Working time is approximately 30 minutes when temperatures are at 70°F (21°C).
- METHODS OF PLACEMENT:** Five Star® Crane Rail Grout may be poured into place. All grouting shall be placed from one side to the other, maintaining contact with the bottom of the substrate at all times. A headbox is strongly recommended.
- POST-PLACEMENT PROCEDURES:** Final finishing of exposed surfaces may be done before material becomes unworkable. In-service operation may begin immediately after minimum required grout strength and modulus have been achieved.
- CLEAN UP:** All tools and equipment may be cleaned with a suitable solvent or a strong detergent solution before material hardens. Sand may be used as an abrasive.

**NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY.** For more detailed placement procedures call the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

## CONSIDERATIONS

- Flowability and strength gain are adversely affected by lower temperatures.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Design-A-Spec™.
- To obtain bond, concrete shall be visibly free of surface moisture.
- For placements thinner than 0.4 inch (10 mm) or greater than three inches (75 mm), contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Do not reduce aggregate loading or add solvents to increase flowability.
- For operating temperatures exceeding 180°F (82°C), contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. 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	WEIGHT
33195	Crane Rail Grout	36 (3 pallets)	Call

**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](http://FiveStarProducts.com)

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**FIVE STAR**

Specified by the World's Best™

# Chemical Grouts & Polyurethanes

## **CRACK REPAIR SLV**

Low viscosity polyurethane crack repair for horizontal surfaces; deep penetration into hairline cracks

## **POLY WATER CUT**

Hydrophobic polyurethane water cut-off grout to stop gushing water or water seepage in water bearing structures and sandy environments

## **POLYFLEX GEL**

Solvent-free polyurethane gel injection resin to seal active water and strong seepage in concrete or masonry water bearing structures

## **POLYFLEX SLV**

Low viscosity polyurethane injection resin for water stoppage in concrete and masonry structures, and sandy soils

**NOTES:**

[illegible]



## **Crack Repair SLV**

Low Viscosity Polyurethane Crack Repair  
for Horizontal Surfaces

### **PRODUCT DESCRIPTION**

**Five Star® Crack Repair SLV** is a very low viscosity, two-component hybrid polyurethane specifically engineered for use as an easy to apply, rapid curing concrete repair material. Its low viscosity offers deep penetration into hairline cracks for structural repair and the addition of aggregate allows for very fast turnaround spall and joint repairs.

### **ADVANTAGES**

- Very low viscosity
- Can be used in temperatures from 0°F to 115°F (-18°C to 46°C)
- Fast turnaround
- Traffic ready in 1 hour
- Self-leveling
- Solvent free / No VOC content

### **USES**

- Industrial floor repair
- Spall repair when mixed with aggregate
- Requires minimal downtime
- Fill hairline cracks
- Interior and exterior application with minimal color change
- Provides continuous surface for weight loading

### **PACKAGING**

Five Star® Crack Repair SLV is a two component, 1:1 system consisting of side by side A & B cartridges dispensed through a static mixing nozzle. It is available in a 21.2 oz. unit (627 ml) that yields approximately 38.25 in<sup>3</sup>.

### **SHELF LIFE**

One year shelf life if in original, unopened packaging when stored under dry conditions: Store Between 40°F and 90°F (4°C to 32°C).

TYPICAL PROPERTIES AT 77°F (25°C)	
<b>Compressive Strength, ASTM D 695</b>	
1 Hour	4,500 psi (31.0 MPa)
24 Hours	5,000 psi (34.4 MPa)
<b>Tensile Strength, ASTM D 638</b>	3,800 psi (26.2 MPa)
<b>Elongation, ASTM D 638</b>	16.7%
<b>Shore D Hardness, ASTM D 2240</b>	70
<b>Viscosity (mixed)</b>	60 cps
<b>Bond Strength, ASTM C 882</b>	1,800 psi (12.41 MPa)
<b>Gel Time (60 gm sample)</b>	2-3 Minutes
<b>Cure Time (shave &amp; reopen to traffic)</b>	1 Hour
<b>Volatile Organic Compounds</b>	0 lbs/gal (0 kg/l)
<b>Tack-Free Time</b>	12 minutes

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

## PLACEMENT GUIDELINES

1. **PREPARATION:** Prepare crack or spall prior to starting a cartridge. Substrate and environment must be completely dry without any presence of moisture. It is not necessary to open or widen a crack unless you suspect it is very deep and want to insert backer rod to control loss of product deep into the crack. The crack should be dry and clean from any grease, wax, oil or other contaminants. Use a wire brush to remove any loose concrete or dirt and then blow away or vacuum dust. Prepare spall with a dry diamond blade or tuck point blade may be used to prepare the spall and create a clean surface for bonding. A wire brush or twisted wire wheel may be used to remove any loose concrete or dirt. The edges must be a 90° angle to the surface to avoid a feathered edge. Using compressed air or vacuum, blow out or remove all dust, dirt, debris, oil and any other contaminate from the crack. Minimum spall depth should be ½" (12.7 mm).
2. **CARTRIDGE SET UP & USAGE:** Shake the cartridge vigorously for 10 seconds, then stand cartridge upright for at least 1 minute allowing any bubbles to rise to the top. Insert cartridge into dispenser and keep upright. Remove the plastic cap and plug from the top of the cartridge. **IMPORTANT:** Before attaching nozzle, balance the cartridge by slowly dispensing a small amount of material into a disposable container until both materials flow evenly from cartridge. Install flow control and mixing nozzle onto cartridge. Continue to point the nozzle straight up and slowly apply pressure to dispenser moving any bubbles and product up through the nozzle until it reaches the tip. Dispense this first full stroke of material into a disposable container. Schedule dispensing to consume an entire cartridge at one time with no interruption of flow. If you have any problems in dispensing product, replace the nozzle. The product may have begun to cure in the nozzle which will affect the mix ratio. Never transfer a nozzle to another cartridge.
3. **CLEAN UP:** All equipment should be cleaned as quickly as possible by rinsing with a solvent such as xylene, toluene, MEK or WD-40.

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

## CONSIDERATIONS

- Flowability and strength gain are adversely affected by lower temperatures.
- To obtain bond, concrete shall be visibly free of surface moisture.
- Do not exceed recommended placement volumes or depths in a single pour. For installation assistance contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Do not add solvents to increase flowability.
- For continuous operating temperatures exceeding 250°F (120°C), contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## CAUTION

Irritant, toxic, strong sensitizer. 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 and appropriate respiratory protection in case of contact with eyes, flush repeatedly with water and contact a physician immediately. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30792	Five Star® Crack Repair SLV	21.2 oz. (627 ml)

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

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# **Poly Water Cut**

Single Component Water Cut-Off Chemical Grout

## **PRODUCT DESCRIPTION**

**Five Star® Poly Water Cut** is a solvent-free single component hydrophobic polyurethane water cut-off grout, specifically engineered for use in concrete or water bearing structures in sandy environments to stop gushing water or water seepage. It is formulated to react with water and form a rigid polyurethane foam that molds to substrate and stabilizes surrounding soil.

## **ADVANTAGES**

- Adaptable cure time
- Rapid compressive strength gains
- Resistant to biological attack
- No shrinking or swelling
- Reacts with water to form rigid polyurethane foam
- Solvent and phthalate free system

## **USES**

- Stop water in rapid filling water bearing structures
- Injection resin for water cut-off in concrete and masonry
- Fill voids in cracks and joints
- Stabilize sand and soils
- Tunnel face securing
- Fill voids in rock fissures and gravel layers

## **PACKAGING**

Five Star® Poly Water Cut is packaged in a 5 gallon (19 L) metal pail. Yield is approximately 1.25 ft<sup>3</sup> (35.4 liters) per gallon.

## **SHELF LIFE**

One year shelf life if in original, unopened packaging when stored under dry conditions; high humidity storage space will reduce shelf life.

TYPICAL PROPERTIES AT 77°F (25°C)	
<b>Five Star® Poly Water Cut, Uncured</b>	
Appearance	Brown Liquid
Viscosity ASTM D 4878-98	150 ± 20 cps
Flashpoint ASTM D 1310-86	> 302°F (150°C)
Relative Density ASTM D 3505-96 (2000)	1.08 ± 0.005
<b>Five Star® Poly Water Cut Accelerator</b>	
Appearance	Clear-yellow Liquid
Viscosity ASTM D 4878-98	15 ± 5 cps
Flashpoint ASTM D 1310-86	> 302°F (150°C)
Relative Density ASTM D 3505-96 (2000)	0.995 ± 0.003
<b>Five Star® Poly Water Cut + Poly Water Cut Accelerator (2.5%), Cured</b>	
Compressive Strength (Confined) — 28 days ASTM 4219-93A	900 psi (6.2 MPa)
Tensile Strength ASTM D 1623-78	290 psi (2.0 MPa)
Density (Confined) ASTM D-3574	5.5 lbs/cu. ft. (2.5 kg/cu. ft.)
Water Absorption ASTM D-2824	< 1%

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

## PLACEMENT GUIDELINES

- MIXING:** Before using Five Star® Poly Water Cut shake well to make sure the mixture is homogeneous. Mix Five Star® Poly Water Cut and Five Star® Poly Water Cut Accelerator in the chosen ratio (from 2% to 10%) using the guide below.

	Temperature		
	41°F (5°C)	59°F (15°C)	77°F (25°C)
Accelerator	Cure Time in Minutes		
2%	6½	4½	3
4%	4½	3¼	2½
6%	3¼	2½	1¾
8%	2½	1¾	1¼
10%	1¾	1¼	1

- METHODS OF PLACEMENT:** Five Star® Poly Water Cut may be poured or pumped into place. Normal injection pumps can pump the mixture into an appropriate single-shot injection system. For special placement procedures, please call the Five Star Products' Engineering and Technical Center at 1-800-243-2206.
- CLEAN UP:** All tools and equipment may be cleaned with a non-volatile, non-corrosive, and non-flammable solvent cleaner and maintenance fluid (DIDP) suitable for use with polyurethanes before and after each pump use. It is recommended the cleaner be left in the pump between uses to keep the equipment moisture free.

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

## CONSIDERATIONS

- Reaction with water results in formation of a rigid polyurethane foam that forms with the substrate, a hydrophobic and chemically resistant conglomerate.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Five Star Products' Design-A-Spec™.
- For installation assistance contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Do not add solvents to increase flowability.

## CAUTION

Irritant, toxic, strong sensitizer. 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 and appropriate respiratory protection in case of contact with eyes, flush repeatedly with water and contact a physician immediately. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30795	Five Star® Poly Water Cut	5 Gal. (19 L) Metal Pail
30796	Five Star® Poly Water Cut Accelerator	1/2 Gal. (1.9 L) Jug

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

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# **PolyFlex Gel**

## Gel Forming Polyurethane Prepolymer

### **PRODUCT DESCRIPTION**

**Five Star® PolyFlex Gel** is a solvent-free injection resin used to remedy active water and strong water seepage in concrete or masonry water bearing structures. It is formulated to react with water to form a hydrophilic polyurethane foam that molds to substrate and stabilizes surrounding soil. It will continue to cure with water and swell into a rubber-like polyurethane foam. Consistency ranges from strong elastic rubber-like foams to stable gels containing up to 700% water.

### **ADVANTAGES**

- Just add water to activate
- Hydrophilic polymer
- Resistant against biological attack
- Solvent and phthalate free

### **USES**

- Flexible joints
- Economical soil stabilization
- Membrane grouting
- Seal moving cracks
- Permeation grouting
- Sewage pipe/manholes

### **PACKAGING**

Five Star® PolyFlex Gel is a single component injection resin that is packaged in a metal 5 gallon (19 L) pail that yields approximately 1.25 ft<sup>3</sup> (35.4L) per gallon.

### **SHELF LIFE**

One year shelf life if in original, unopened packaging when stored at 68°F (20°C). Once opened, containers should be utilized as soon as possible.

TYPICAL PROPERTIES AT 77°F (25°C)	
<b>Appearance</b>	Yellow Liquid
<b>Viscosity</b> ASTM D 4878-98	800 ± 50 cps
<b>Flashpoint T.O.C.</b> ASTM D 1310-86	> 302°F (150°C)
<b>Relative Density</b> ASTM D 3505-96(2000)	1.15

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

## PLACEMENT GUIDELINES

1. **MIXING:** Before using **Five Star® PolyFlex Gel** shake well to make sure the mixture is homogeneous.
2. **METHODS OF PLACEMENT:** Five Star® PolyFlex Gel may be poured or pumped into place. Normal injection pumps can pump the mixture into an appropriate single-shot injection system. For gel generating applications, two-component equipment is required. For special placement procedures, please call the Five Star Products' Engineering and Technical Center at 1-800-243-2206.

**Single Shot Injection Method:** Water amounts in the mixture from 200% up to 500% produce hydrophilic foams with decreasing strengths. The foam generated by this method tends to absorb water even after curing, causing swelling that ensures an important degree of added mechanical sealing.

**Two-Shot Injection Method:** Water amounts in the mixture from 500% up to 700% produce stable gelatinous masses within seconds.

3. **CLEAN UP:** All tools and equipment may be cleaned with a non-volatile, non-corrosive, and non-flammable solvent cleaner and maintenance fluid (DIDP) suitable for use with polyurethanes before and after each pump use. It is recommended the cleaner be left in the pump between uses to keep the equipment moisture free.

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

## CONSIDERATIONS

- Reaction with water results in formation of a dispersible and hydrophilic polymer.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Five Star Products' Design-A-Spec™.
- For installation assistance contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Do not add solvents to increase flowability.

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

## CAUTION

This product may cause skin and eye 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30799	Five Star® PolyFlex Gel	5 Gal. (19 L) Metal Pail

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

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## **PolyFlex SLV**

Polyurethane Injection Resin for Water Cut-Off

### **PRODUCT DESCRIPTION**

Five Star® PolyFlex SLV is a flexible, low viscosity, single component injection resin for water stoppage in concrete, masonry structures and sandy soils, even when strong seepages or gushing leaks are encountered. Its reaction with water results in the formation of flexible polyurethane which forms a hydrophobic and chemically-resistant barrier.

### **ADVANTAGES**

- Rapid seal formation
- Forms a hydrophobic and chemically resistant barrier
- Remains flexible without further shrinking or swelling
- Solvent and phthalate free
- Adaptable reaction time with use of accelerant
- Reacts with water
- Resistant to biological attack

### **USES**

- Sealing of moving or non-moving cracks
- Sewage pipes/manhole grouting and sealing
- Seal expansion joints
- Water and gas sealing

### **PACKAGING**

Five Star® PolyFlex SLV is a single component polyurethane packaged in a 5 gallon (19 L) metal pail. Yield is approximately 1.25 ft³ per gallon (53.2 liters).

### **SHELF LIFE**

One year shelf life if in original, unopened packaging when stored at 68°F. Once opened, product should be utilized as soon as possible.

TYPICAL PROPERTIES AT 77°F (25°C)	
<b>Five Star® PolyFlex SLV, Uncured</b>	
Appearance	Yellow Liquid
Viscosity ASTM D 4878-98	340 ± 20 cps
Flashpoint ASTM D 1310-86	> 302°F (150°C)
Relative Density ASTM D 3505-96(2000)	1.067 ± 0.005
<b>Five Star® PolyFlex SLV Accelerator</b>	
Appearance	Blue Liquid
Viscosity ASTM D 4878-98	12 ± 5 cps
Flashpoint ASTM D 1310-86	> 302°F (150°C)
Relative Density ASTM D 3505-96(2000)	0.995 ± 0.003
<b>Five Star® PolyFlex SLV + Five Star® PolyFlex SLV Accelerator, Cured</b>	
Hardness ASTM D 2240-00	69 Shore A
Tensile Strength ASTM D 3574-03	290 psi (2.0 MPa)

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

## PLACEMENT GUIDELINES

- MIXING:** Before using **Five Star® PolyFlex SLV** shake well to make sure the mixture is homogeneous. Mix Five Star® PolyFlex SLV and Five Star® PolyFlex SLV Accelerator in the chosen ratio (from 2% to 10%) using the guide below.

	Temperature	
	59°F (15°C)	68°F (20°C)
Accelerator	Cure Time in Minutes	
2%	6¼	6
4%	4	3¾
6%	3	2½
8%	2¼	2
10%	1¾	1½

- METHODS OF PLACEMENT:** Five Star® PolyFlex SLV may be poured or pumped into place. Normal injection pumps can pump the mixture into an appropriate single-shot injection system. For special placement procedures, please call the Five Star Products' Engineering and Technical Center at 1-800-243-2206.
- CLEAN UP:** All tools and equipment may be cleaned with a non-volatile, non-corrosive, and non-flammable solvent cleaner and maintenance fluid (DIDP) suitable for use with polyurethanes before and after each pump use. It is recommended the cleaner be left in the pump between uses to keep the equipment moisture free.

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

## CONSIDERATIONS

- Reaction with water results in formation of a flexible polyurethane foam that forms a hydrophobic and chemically resistant barrier.
- For placement temperatures below 55°F (13°C) or above 90°F (32°C), refer to Five Star Products' Design-A-Spec™.
- For installation assistance contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Do not add solvents to increase flowability.

## CAUTION

This product may cause skin and eye 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30797	Five Star® PolyFlex SLV	5 Gal. (19 L) Metal Pail
30798	Five Star® PolyFlex SLV Accelerator	1/2 Gal. (1.9 L) Jug

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# FIVE STAR

Specified by the World's Best™

## Concrete Repair & Overlays

### **FIVE STAR® MP EPOXY PATCH**

Multi-purpose, high strength, non-shrink, epoxy patching mortar

### **FIVE STAR® NOVOLAC STRUCTURAL CONCRETE**

Highly chemical resistant epoxy repair material with excellent impact and wear resistance



### **FIVE STAR STRUCTURAL CONCRETE®**

Fast, permanent repair material with high early strength gain for overlays, horizontal repairs and formed vertical surfaces



### **FIVE STAR STRUCTURAL CONCRETE® V/O**

Fast, permanent repair material for vertical and overhead surfaces

### **FIVE STAR STRUCTURAL CONCRETE® ES**

Permanent repair material with a long working time and six-hour strength gain for overlays, horizontal repairs and formed vertical surfaces

### **FIVE STAR STRUCTURAL CONCRETE® GUNITE**

High early strength, dry process shotcrete repair material

### **FIVE STAR STRUCTURAL CONCRETE® GUNITE S300**

High strength, dry process shotcrete repair material

### **FIVE STAR STRUCTURAL CONCRETE® GUNITE WP**

High strength, wet process shotcrete repair material

### **FIVE STAR STRUCTURAL CONCRETE® GUNITE WP-FS**

Fine sand, wet process, shotcrete applied, permanent concrete repair material

### **FIVE STAR STRUCTURAL CONCRETE® S300**

Permanent repair material with a long working time for overlays, large volume repairs and foundation upgrades

### **FIVE STAR® SUMMERSET**

Extended working time additive

**NOTES:**

[illegible]



## **MP EPOXY PATCH**

Multi-Purpose, High-Strength, Non-Shrink,  
Epoxy Patching Mortar

### **PRODUCT DESCRIPTION**

Five Star® MP Epoxy Patch is a three-component, 100% solids, multi-purpose, high-strength, non-shrink epoxy patching mortar for the repair of floors, decks, trenches and ramps. Five Star® MP Epoxy Patch is specifically engineered to provide superior patching while demonstrating similar physical characteristics to the concrete substrate.

### **ADVANTAGES**

- Chemically bonds to concrete
- Excellent workability— withstands freeze / thaw cycles
- High tensile, compressive and early strengths
- Semi-rigid for shock absorption
- User-friendly
- Low modulus
- Compatible with Type III epoxy overlays
- Provides textured bonding profile

### **USES**

- Concrete repair on industrial floors, bridge and parking decks, columns, and structural beams
- Repair of spalled areas
- Quick maintenance and repair in plants and manufacturing facilities

### **PACKAGING AND YIELD**

Five Star® MP Epoxy Patch is a three-component system packaged in pre-measured containers and is available in a unit yielding of approximately 0.5 cubic feet (14.1 liters).

### **SHELF LIFE**

Two years in original unopened packaging when stored in dry conditions; high relative humidity will reduce shelf life. Store in dry conditions between 40°F and 95°F (5°C and 35°C).

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 579</b>	
1 Day	6,000 psi (41.3 MPa)
7 Days	6,500 psi (44.9 MPa)
<b>Tensile Strength, ASTM C 307</b>	1,300 psi (8.9 MPa)
<b>Bond Strength, ASTM C 882</b>	1,800 psi (12.4 MPa)
<b>Flexural Yield Strength, ASTM D 790</b>	2,500 psi (17.2 MPa)
<b>Shrinkage, ASTM C 883</b>	Pass
<b>Thermal Compatibility, ASTM C 884</b>	Pass
<b>Working Time at 70°F (21°C)</b>	25 minutes

*\*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:** Minimum substrate temperature should be 40°F (5°C) at time of placement. Concrete must be clean, sound, roughened, and completely dry to ensure a good bond. A perimeter edge and minimum depth of ½ inch should be provided for a durable repair. All exposed reinforcing steel should be blasted to an oxidation free condition removing all contaminants. Vacuum or blow out repair area with oil free compressed air prior to placement to remove all dust and loose particles.
2. **MIXING:** For optimum performance, all components of the Five Star® MP Epoxy Patch should be conditioned to between 65°F and 85°F (18°C and 29°C) prior to use. Pre-mix each liquid component thoroughly. Pour Components A (resin) and B (hardener) into pail and mix thoroughly for 3 minutes with a slow speed drill and paddle mixer (300 rpm) until material is of uniform consistency. Keep mixer at bottom of pail to avoid introducing air. Slowly add Component C (aggregate) to mixed liquid components. Mix thoroughly until all aggregate is wet. Working (gel) time is approximately 25 minutes when temperatures are at 70°F (21°C).
3. **METHODS OF PLACEMENT:** Prime patch area with mixed Components A and B with brush or roller. Immediately pour Five Star® MP Epoxy Patch into repair area. Float or trowel to desired level. For more detailed placement instructions call the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206.
4. **CLEAN UP:** Equipment — Uncured material can be removed with a suitable solvent. Cured material can only be removed mechanically. Material — Collect with absorbent material. Flush area with water. Dispose of in accordance with local, state, and federal disposal regulations.

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

## **CONSIDERATIONS**

- Minimum substrate temperature is 40°F (5°C).
- Minimum age of hardened concrete for bonding should be between 5 and 7 days.

## **CAUTION**

Component A is an irritant, and toxic. Component B is corrosive. This product causes skin irritation and is a strong sensitizer. Do not inhale vapors. Provide adequate ventilation. Protect against contact with skin and eyes. Wear rubber gloves, long sleeve shirt, goggles with side shields. Use of a NIOSH/MSHA organic vapor respirator is recommended if ventilation is inadequate. In case of contact with eyes, flush with water for at least 15 minutes and contact a physician immediately. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

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# NOVOLAC STRUCTURAL CONCRETE®

Highly Chemical Resistant Permanent Repair Material

## PRODUCT DESCRIPTION

Five Star Novolac Structural Concrete® is a three component, 100% solids, highly chemical resistant epoxy repair material for the construction or repair of curbs, trenches, floors and pads. Five Star Novolac Structural Concrete® is designed for aggressive chemical environments that may be exposed to concentrated acids, alkalis, corrosives or solvents.

## ADVANTAGES

- High chemical resistance
- Excellent impact and wear resistance
- Versatile application
- Excellent bond strength

## USES

- Horizontal concrete repairs
- Setting mortar for acid resistant brick and tile
- Concrete pads
- Formed vertical repairs
- Precast trenches
- Flooring surfaces

## PACKAGING AND YIELD

Five Star Epoxy Novolac Structural Concrete® is a three component system consisting of premeasured containers of resin and hardener and one polyethylene lined bag of aggregate and is available in a unit yielding approximately 0.44 cubic feet (12.5 liters) for coverage of approximately 10.5 sq. feet at 1/2 inch thickness, or 5.3 sq. feet at 1 inch thickness.

## SHELF LIFE

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 579</b>	
24 Hours	16,000 psi (110 MPa)
7 Days	17,000 psi (117 MPa)
Post cured at 140° F (60° C)	18,000 psi (124 MPa)
<b>Tensile Strength, ASTM C 307</b>	2,100 psi (14.5 MPa)
<b>Bond Strength, ASTM C 882</b>	Concrete Failure
<b>Flexural Strength, ASTM C 580</b>	6,000 psi (38.7 Mpa)
<b>Coefficient of Expansion, ASTM C 531</b>	15 x 10 <sup>-6</sup> in/in/°F (29 x 10 <sup>-6</sup> mm/mm/°C)
<b>Working Time at 70°F (21°C)</b>	20 minutes

Chemical Resistance Chart* at 70°F (21°C)		
Solvents	Organics Acids (Conc.)	Bases / Alkalines (Conc.)
Acetaldehyde	Acetic (1-50%)	Ammonia (1-25%)
Acetone	Acid plating solutions	Ammonium Hydroxide (1-25%)
Acetonitrile	Adipic (1-25%)	Aniline
Acrylonitrile	Azotic (1-50%)	Barium Hydroxide (1-sat.)
Butyl acetate	Battery (1-98%)	Black Pulp Liquor
Cyclohexane	Chromic (1-30%)	Butyl Amine
Ethanol	Chlorohydric (1-37%)	Cadmium Cyanide Plating
Ethyl acetate	Dibasic (1-sat.)	Calcium Hydroxide (1-25%)
Ethyl alcohol	Ethanoic (1-50%)	Chromium Trioxide (1-25%)
Formaldehyde	Ethylic (1-50%)	Copper Cyanide Plating
Isopropyl Alcohol	Engravers (1-50%)	Dimethyl Aniline
Jet Fuel	Hydrochloric (1-37%)	Hydrogen Peroxide (1-30%)
Kerosene	Hydrofluoric (1-40%)	Green Pulp Liquor
Methyl Ethyl Ketone	Mattling (1-98%)	Soap solutions
Methanol	Nitric (1-50%)	Sodium Cyanide (1-15%)
Methyl Alcohol	Oil of vitriol (1-98%)	Sodium Hypochlorite (1-9%)
Rubbing Alcohol	Oleic	Sodium Hydroxide (1-50%)
Wood Alcohol	Phosphoric (1-85%)	Triethanolamine
1,1,1 Trichloroethane	Sulfuric (1-98%)	Triethylamine
Phenol	Vitriol (1-98%)	Potassium Hydroxide (1-sat)

\* NOTE: Many factors effect chemical resistance. Application design, service and exposure temperatures, and the type and amount of impurities in the chemical or in the environment are some important considerations. These test results are reported to serve as a guide to the applicability of the Novolac systems.

\*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

- SURFACE PREPARATION:** All surfaces to be in contact with Five Star Novolac Structural Concrete® shall be free of dust, oil, grease, laitance, curing compounds, and other contaminants. Concrete must be clean, sound, dry and roughened to ensure a good bond. An SSPC-SP6 commercial finish on all metal surfaces will optimize bond development to steel.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during placement. Areas where bond is not desired must be treated with paste wax or polyethylene. Isolation joints may be necessary depending on pour dimensions. Contact Five Star Products' Engineering and Technical Service Center for further information.
- MIXING:** For optimum performance, all components should be conditioned to between 70°F and 80°F (21°C and 27°C). 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. While mixing, slowly add Component C (aggregate) and mix only until aggregate is completely wet out. Working time is approximately 20 minutes when temperatures are at 70°F (21°C).
- METHODS OF PLACEMENT:** Five Star Novolac Structural Concrete® may be poured into place. When possible, place Five Star Novolac Structural Concrete® full depth from one side to the other. Placement should be continuous to prevent cold joints between pours. Finish as necessary. For placement thicknesses greater than six inches (152 mm), call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- POST PLACEMENT PROCEDURES:** For load bearing applications, in-service operation may begin immediately after required strength is achieved.
- CLEAN UP:** All tools and equipment may be cleaned with a water and strong detergent solution before material hardens. Sand may be used as an abrasive. A suitable solvent is required for clean up of material after hardening.

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

## CONSIDERATIONS

- Minimum application temperature of substrate is 40°F (4°C) and rising. Low temperatures adversely affect flowability and strength gain.
- Do not thin with solvents.
- Minimum age of concrete must be 21 to 28 days, depending on curing and drying conditions prior to application.
- Cold temperatures lengthen cure time, hot temperatures decrease cure time.
- Maximum operating temperature is 200°F (93°C).

## CAUTION

FOR INDUSTRIAL USE ONLY. 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL 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	WEIGHT
34900	Five Star Novolac Structural Concrete®	24	56.3 lbs. (25.5 Kg)

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## **STRUCTURAL CONCRETE®**

Fast, High Early Strength Permanent Repair

### **PRODUCT DESCRIPTION**

Five Star Structural Concrete® is a high early strength, single component, permanent concrete repair material. Containing migrating corrosion inhibitors, Five Star Structural Concrete® produces a repair which is dimensionally stable, develops an integral bond to existing concrete, and restores structural integrity within hours of placement. Application thickness can range from 1/4 inch to 12 inches (6 mm to 300 mm) in a single pour. Five Star Structural Concrete® provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability. Moisture sensitive coatings can be applied in 8 to 24 hours.

### **ADVANTAGES**

- Single component for reliability and ease of use
- High three-hour strengths
- Very low chloride ion permeability
- Fast turnaround times with high 3-hour strengths
- High bond strength
- Coarse aggregate extension
- Very low shrinkage
- Excellent freeze/thaw resistance
- One product for thin and thick placements
- Outstanding corrosion resistance for protection and rehabilitation

### **USES**

- Repair of concrete structures
- Rapid machinery foundation rebuilds
- Fast repairs for coatings
- Concrete floor repairs and overlays
- Construction joint repair
- Marine and hydraulic structure repairs
- Repair of tanks, sumps and curbs
- Available for Nuclear Safety Zone Applications¹

### **PACKAGING AND YIELD**

Five Star Structural Concrete® 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, or 0.60 cubic feet (17.0 liters) with a 60% extension using 3/8" pea gravel.

### **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.

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
3 Hours	2,500 psi (17.2 MPa)
1 Day	5,000 psi (34.5 MPa)
7 Days	7,000 psi (48.3 MPa)
28 Days	8,000 psi (55.2 MPa)
<b>Bond Strength, ASTM C 882</b>	
1 Day	2,000 psi (13.8 MPa)
7 Days	2,500 psi (17.3 MPa)
<b>Length Change, ASTM C 157</b>	
28 Days Wet	+ 0.05%
28 Days Dry	- 0.09%
<b>Freeze/Thaw Resistance, ASTM C 666A</b>	
Relative Durability Modulus	95%
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Very Low ( <1,000 Coulombs)
<b>Working Time at 70°F (21°C)</b>	15 minutes

*\*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

- SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete® shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water, or use Five Star® Bonding Adhesive. Surfaces shall be conditioned to between 35°F and 90°F (2°C and 32°C) at time of placement.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during placement. Areas where bond is not desired must be treated with form oil, paste wax or similar material. Joints may be necessary depending on pour dimensions. Any existing joints within the repair area should be maintained. Contact the Five Star Products, Inc. Engineering and Technical Service Center for further information.
- MIXING:** Mix Five Star Structural Concrete® 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 2 1/2 to 3 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, should be used for pours greater than 2 inches (50 mm) in depth. Working time is approximately 15 minutes at 70°F (21°C). Follow printed instructions on the package.
- PLACEMENT PROCEDURES:** Whenever possible, place Five Star Structural Concrete® full depth from one side of the repair to the other. To ensure optimal bond development, firmly work material into substrate. Placement should be continuous to prevent cold joints between pours. Finish as necessary.  
**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Structural Concrete® must be maintained at a temperature of at least 35°F (2°C). Protect from freezing until a compressive strength of at least 1,000 psi (6.9 MPa) is obtained. Faster strength gain will occur when the Five Star Structural Concrete® and mixing water have been conditioned to a higher temperature prior to placement. In hot temperatures, Five Star Structural Concrete® should be kept as cool as possible, but not exceeding 90°F (32°C). Ice cold water should be used for mixing to help maintain sufficient working time. Summerset® may also be used to provide more working time if necessary.
- POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete® shall be continuously wet cured for one to four hours, depending on the volume and depth of the placement. Wet curing shall begin as soon as material reaches final set (surface changes from dark to light).

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

## CONSIDERATIONS

- Temperature of surfaces must be between 35°F and 90°F (2°C and 32°C) at time of placement. For cold and hot weather placement, refer to Design-A-Spec™.
- For placements thicker than two inches (50 mm) and a volume exceeding two cubic feet (56.5 liters), contact the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206 for aggregate extension guidelines.

## 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 MATERIAL SAFETY DATA SHEET.**

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

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	WEIGHT
29100	Five Star Structural Concrete®	56	50 lbs. Bag (22.68 Kg)
29000	Five Star Structural Concrete®	36	53 lbs. Pail (24.04 Kg)
29100N <sup>1</sup>	Five Star Structural Concrete® for Nuclear Safety Zone	56	50 lbs. Bag (22.98 Kg)
29000N <sup>1</sup>	Five Star Structural Concrete® for Nuclear Safety Zone	36	53 lbs. Pail (24.04 Kg)

<sup>1</sup>Compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs

**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](http://FiveStarProducts.com)

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# **STRUCTURAL CONCRETE® V/O**

Vertical/Overhead Permanent Repair

## **PRODUCT DESCRIPTION**

Five Star Structural Concrete® V/O is a high strength, rapid setting, one component, permanent concrete repair material for vertical and overhead structural repairs. Five Star Structural Concrete® V/O produces a repair which is dimensionally stable, develops an integral bond to existing concrete, and restores structural integrity within hours of placement. Five Star Structural Concrete® V/O provides increased corrosion protection to steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability. Moisture sensitive coatings can be applied in 8 to 24 hours.

## **ADVANTAGES**

- Can be troweled vertically or overhead
- Very low chloride ion permeability
- High 3-hour strength gains
- Can be coated in 8 to 24 hours
- One product for thin and thick placement
- Excellent freeze/thaw resistance
- Outstanding corrosion resistance for protection and rehabilitation

## **USES**

- Rapid repair of load bearing walls, ceilings and other structural members
- Rapid repairs during shutdown
- Marine and hydraulic structure repairs
- Available for Nuclear Safety Zone Applications<sup>1</sup>

## **PACKAGING AND YIELD**

Five Star Structural Concrete® V/O is packaged in heavy-duty polyethylene lined bags or plastic pails and is available in 50 lb. (22.7 kg) units yielding approximately 0.44 cubic feet (12.5 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.

### **TYPICAL PROPERTIES AT 70°F (21°C)**

#### **Compressive Strength, ASTM C 109**

3 Hours	2,500 psi (17.2 MPa)
1 Day	3,500 psi (24.2 MPa)
7 Days	4,000 psi (27.6 MPa)
28 Days	5,000 psi (34.5 MPa)

#### **Bond Strength, ASTM C 882**

1 Days	1,500 psi (10.4 MPa)
7 Days	2,200 psi (15.2 MPa)

#### **Length Change, ASTM C 157**

28 Days Wet	+ 0.04%
28 Days Dry	- 0.13%

#### **Freeze/Thaw Resistance, ASTM C 666A**

Relative Durability Modulus	95%
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#### **Chloride Ion Permeability, ASTM C 1202**

28 Days	Very Low (<1,000 Coulombs)
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#### **Working Time at 70°F (21°C)**

15 minutes

*\*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

- SURFACE PREPARATION:** All concrete surfaces in contact with Five Star Structural Concrete® V/O shall be free of oil, grease, laitance, and other contaminants. All concrete surfaces must be clean, sound and rough to ensure a good bond. Mechanically roughen concrete surfaces in accordance with ICRI Technical Guideline 03732 to a minimum concrete surface profile roughness (CSP) 6 or greater. Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water. Surfaces shall be conditioned to between 40°F and 90°F (5°C and 32°C) at time of placement.
- MIXING:** Mix Five Star Structural Concrete® V/O 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. Mix Five Star Structural Concrete® V/O with 3 to 4 quarts potable water per 50 lb. unit. Working time is approximately 15 minutes at 70°F (21°C). Follow printed instructions on the package. Start by adding the minimum amount of pre-measured water to mixer and, after mixing for three to four minutes, adjust consistency as required to achieve non-sag consistency.
- PLACEMENT PROCEDURES:** Firmly work a small amount of Five Star Structural Concrete® V/O into concrete surface with a trowel, 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 applications, contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206. Finish as necessary.
- POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete® V/O shall be kept continuously wet for at least 30 minutes after final set. Protect from freezing until a compressive strength of at least 1,000 psi (6.9 MPa) is reached.

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

## CONSIDERATIONS

- Never exceed the maximum water content stated on the package.
- Temperature of materials, equipment and surfaces must be between 40°F and 90°F (5°C and 32°C) at time of placement. For cold and hot weather placement, consult the Five Star® Design-A-Spec™ installation guidelines.
- Substrate shall be free of frost and ice.

## CAUTION

Contains cementitious material and crystalline silica. The 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 MATERIAL SAFETY DATA SHEET.**

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

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	WEIGHT
29600	Structural Concrete® V/O	56	50 lbs. (22.68 Kg)
29500	Structural Concrete® V/O	36	53 lbs. (24.04 Kg)
29600N <sup>1</sup>	Structural Concrete® V/O for Nuclear Safety Zone	56	50 lbs. (22.68 Kg)
29500N <sup>1</sup>	Structural Concrete® V/O for Nuclear Safety Zone	36	53 lbs. (24.04 Kg)

<sup>1</sup>Compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs

**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](http://FiveStarProducts.com)

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# STRUCTURAL CONCRETE® ES

Fast, High Early Strength, Extended Working Time Permanent Repair

## PRODUCT DESCRIPTION

Five Star Structural Concrete® ES is a high early strength, single component, permanent concrete repair material which provides a 45-minute working time. The extended set facilitates deep/large volume pours up to six cubic yards in a single lift. Five Star Structural Concrete® ES produces a repair which is dimensionally stable, develops an integral bond to existing concrete, and restores structural integrity within hours of placement. Five Star Structural Concrete® ES provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

## ADVANTAGES

- 45 minute working time
- One component
- Deep, large volume pours up to six cubic yards
- High six-hour strengths
- Coarse aggregate extension up to 80%
- Excellent freeze/thaw resistance
- Provides permanent concrete and equipment/machinery foundation repair
- Facilitates equipment rebuilds in under 24 hours
- Pumpable
- High bond strength
- Outstanding corrosion resistance for protection and rehabilitation

## USES

- Deep, large volume repair of concrete structures and machinery foundations
- Concrete floor toppings and overlays
- Hot weather concrete repair
- Heavy industrial repairs and retrofits

## PACKAGING AND YIELD

Five Star Structural Concrete® ES 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, or 0.60 cubic feet (17.0 liters) with a 60% extension using 3/8" pea gravel. Five Star Structural Concrete® ES is also available in 3,000 lb. (1,360 kg) bulk bags.

## 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.

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
6 Hours	3,000 psi (20.7 MPa)
1 Day	4,500 psi (31.0 MPa)
7 Days	6,000 psi (41.4 MPa)
<b>Bond Strength, ASTM C 882</b>	
1 Day	2,000 psi (13.8 MPa)
7 Days	2,500 psi (17.3 MPa)
<b>Length Change, extended with pea gravel, ASTM C 157</b>	
28 Days Wet	+0.03%
28 Days Dry	-0.05%
<b>Thermal Coefficient of Expansion, ASTM C 531</b>	
5.0 x 10 <sup>-6</sup> in/in/°F (9.0 x 10 <sup>-6</sup> mm/mm/°C)	
<b>Scaling Resistance, ASTM C 672</b>	
50 cycles	0
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Very Low ( <1,000 Coulombs)
<b>Working Time at 70°F (21°C)</b>	45 minutes

*\*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

- SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete® ES shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Mechanically roughen concrete surfaces in accordance with ICRI Technical Guideline 03732 to a minimum concrete surface profile roughness (CSP) 6 or greater. Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water, or use Five Star® Bonding Adhesive. Surfaces shall be conditioned to between 35°F and 90°F (2°C and 32°C) at time of placement.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during placement. Areas where bond is not desired must be treated with form oil, paste wax or similar material. Joints may be necessary depending on pour dimensions. Any existing joints within the repair area should be maintained. Contact the Five Star Products' Engineering and Technical Service Center for further information.
- MIXING:** Wet down mortar mixer (stationary barrel with moving blades) before using and drain excess water. 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 2½ to 3 quarts potable water per 50 lb. unit) to the mixer. While mixing, slowly add Five Star Structural Concrete® ES and mix to a uniform consistency for three to four minutes. 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 should be used for pours greater than 2 inches (50 mm) in depth; add coarse aggregate before final water adjustment. Do not mix more material than can be placed within 45 minutes. For larger quantities, a ready-mix concrete truck may be used.
- PLACEMENT PROCEDURES:** Whenever possible, place Five Star Structural Concrete® ES full depth from one side of the repair to the other. To ensure optimal bond development, firmly work material into substrate. Placement should be continuous to prevent cold joints between pours. Finish as necessary. For pumping procedures, contact the Five Star Products' Engineering and Technical Service Center.  
**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Structural Concrete® ES must be maintained at a temperature of at least 35°F (2°C). Protect from freezing until a compressive strength of at least 1,000 psi (6.9 MPa) is obtained. Faster strength gain will occur when the Five Star Structural Concrete® ES, mixing water and coarse aggregate have been conditioned to a higher temperature prior to placement. In high temperatures, Five Star Structural Concrete® ES should be kept as cool as possible, but not exceeding 90°F (32°C). Ice cold water should be used for mixing to help maintain sufficient working time.
- POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete® ES shall be kept continuously wet for 4 to 24 hours, depending on the volume, depth and placement temperature. Wet curing shall begin as soon as material reaches final set.

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

## CONSIDERATIONS

- Never exceed the maximum water content as stated on the package or add an amount that will cause segregation.
- Temperature of surfaces must be between 35°F and 90°F (2°C and 32°C) at time of placement. For cold and hot weather placement, refer to Design-A-Spec™.
- For pours exceeding six cubic yards, contact the Five Star Products' Engineering and Technical Service Center.
- When capping Five Star Structural Concrete® ES with either cement or epoxy grout, surface temperature shall have cooled down to 90°F (32°C) prior to grout placement.
- For ready-mix truck mixing guidelines, contact the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

## 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 MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
29400	Structural Concrete® ES	50 lb. Bag
29300	Structural Concrete® ES	50 lb. Pail

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

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# **STRUCTURAL CONCRETE® GUNITE**

Fast Turnaround, Dry Process Shotcrete Repair

## **PRODUCT DESCRIPTION**

Five Star Structural Concrete® Gunite is a dry process shotcrete applied, high early strength permanent concrete repair material. Containing migrating corrosion inhibitor technology, Five Star Structural Concrete® Gunite produces a repair which is dimensionally stable, develops an integral bond to the existing concrete, and restores structural integrity within hours of placement. Moisture sensitive coatings can be applied in 8 to 24 hours.

## **ADVANTAGES**

- Single component
- High three hour strengths
- Vertical and overhead repairs
- Excellent resistance to sulfates
- Cold weather installation
- Excellent freeze/thaw resistance
- High bond strength
- Very low chloride ion permeability
- Application thickness down to 1/4 inch (6 mm)
- Can be coated in 8 to 24 hours
- Outstanding corrosion resistance for protection and rehabilitation

## **USES**

- Rapid repair of load bearing walls, ceilings and other structural members
- Rapid repairs during shutdown
- Rapid structural repair for industrial plants
- Marine and hydraulic structure repairs
- Cold weather repair

## **PACKAGING AND YIELD**

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

## **SHELF LIFE**

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

### **TYPICAL PROPERTIES AT 70°F (21°C)**

#### **Compressive Strength, ASTM C 109**

3 Hours	2,500 psi (17.3 MPa)
1 Day	4,000 psi (27.6 MPa)
28 Days	6,000 psi (41.4 MPa)

#### **Compressive Strength, ASTM C 42 in accordance with ACI 506R-90**

3 Days	5,000 psi (34.5 MPa)
7 Days	5,800 psi (40.0 MPa)
28 Days	7,000 psi (48.3 MPa)

#### **Bond Strength, ASTM C 882**

1 Day	2,000 psi (13.8 MPa)
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#### **Linear Length Change, ASTM C 157**

28 Days Wet	+0.03%
28 Days Dry	-0.05%

#### **Thermal Coefficient of Expansion, ASTM C 531**

5.0 x 10<sup>-6</sup> in/in/°F (9.0 x 10<sup>-6</sup> mm/mm/°C)

#### **Chloride Ion Permeability, ASTM C 1202**

28 Days	Very Low ( <1000 Coulombs)
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#### **Working Time at 70°F (21°C)**

10 minutes

*\*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 concrete surfaces in contact with Five Star Structural Concrete® Gunitite shall be free of oil, grease, laitance, and other contaminants. Concrete must be clean, sound and rough to ensure a good bond. Mechanically roughen concrete surfaces in accordance with ICRI Technical Guideline 03732 to a minimum concrete surface profile roughness (CSP 6 or greater). Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Soak concrete surfaces prior to application with liberal quantities of potable water leaving the concrete saturated and free of standing water. Surfaces shall be conditioned to between 35°F and 90°F (2°C and 32°C) at time of placement.
2. **MIXING:** The mixing equipment should be capable of maintaining continuous placement and equipped with a screen to avoid plug-ups.  
DRY MIX PROCESS: Pre-dampen Five Star Structural Concrete® Gunitite either in a mortar mixer prior to placement into gun or with a pre-hydration water ring. Avoid over dampening material. Do not pre-dampen more material than can be placed within ten minutes. Adjust consistency at nozzle.
3. **METHODS OF PLACEMENT:** Apply Five Star Structural Concrete® Gunitite to full design thickness whenever possible. Overhead placement is applied in layers thick enough to prevent sagging. Direct nozzle perpendicular to surface and rotate in a series of circular patterns, filling all inside corners first. Five Star Structural Concrete® Gunitite should emerge from the nozzle in a uniform, uninterrupted flow. Finish to desired texture with screed, float, trowel, or brush. For more detailed application procedures, refer to ACI 506R-90, Guide to Shotcrete Report.
4. **POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete® Gunitite shall be kept continuously wet for one to four hours, depending on the volume and depth of the placement. Wet curing shall begin as soon as the material has reached final set.

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

## CONSIDERATIONS

- Temperature of materials, equipment and surfaces must be between 35°F and 90°F (2°C and 32°C) at time of placement. For cold and hot weather procedures, refer to Design-A-Spec™.
- Never exceed the maximum water content as stated on the package.
- Minimum application thickness is 1/4 inch (6 mm). For larger applications and thicknesses greater than three inches (75 mm), contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Substrate shall be free of frost and ice.
- Repair material shall be protected from freezing until a compressive strength of at least 1,000 psi (6.9 MPa) is reached.

## 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 MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
29200	Structural Concrete® Gunitite	50 lb. Bag

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**FIVE STAR**

# **STRUCTURAL CONCRETE® GUNITE S300**

**High Strength Dry Process Shotcrete Repair**

## **PRODUCT DESCRIPTION**

**Five Star Structural Concrete® Gunitite S300** is a dry process shotcrete applied, high strength, permanent concrete repair material. Five Star Structural Concrete® Gunitite S300 may be used from 1/4 inch (6 mm) to deep/full depth applications and provides a long finishing time. Five Star Structural Concrete® Gunitite S300 provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

## **ADVANTAGES**

- Available in 3,000 Lb. bulk bag packaging for large volume applications
- Long finishing time
- High bond strength
- Low rebound
- Versatile - 1/4 inch (6 mm) to full depth applications
- High one and 28 day strengths
- Very low chloride ion permeability
- Excellent freeze/thaw resistance
- Outstanding corrosion resistance for protection and rehabilitation

## **USES**

- Vertical and overhead repairs
- Repair of load bearing walls, ceilings and other structural members
- Structural repair for industrial plants
- Marine and hydraulic structure repair
- Sulfur pits

## **PACKAGING AND YIELD**

Five Star Structural Concrete® Gunitite S300 is packaged in heavy-duty polyethylene lined bags and is available in 50 Lb. (22.7 Kg) units yielding approximately 0.39 cubic feet (11.0 liters) at maximum water. Five Star Structural Concrete® Gunitite S300 is also available in 3,000 Lb. (1,360 Kg) bulk sacks for large volume applications.

## **SHELF LIFE**

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

### **TYPICAL PROPERTIES AT 70°F (21°C)**

#### **Compressive Strength, ASTM C 109**

1 Day	3,500 psi (24.2 MPa)
28 Days	8,000 psi (55.2 MPa)

#### **Compressive Strength, ASTM C 42 in accordance with ACI 506R-90**

3 Days	5,900 psi (40.7 MPa)
7 Days	7,400 psi (51.1 MPa)
28 Days	8,500 psi (58.7 MPa)

#### **Bond Strength, ASTM C 882**

7 Days	2,000 psi (13.8 MPa)
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#### **Thermal Coefficient of Expansion, ASTM C 531**

5.0 x 10<sup>-6</sup> in/in/°F (9.0 x 10<sup>-6</sup> mm/mm/°C)

#### **Chloride Ion Permeability, ASTM C 1202**

28 Days	Very Low ( <1,000 Coulombs)
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#### **Working Time at 70°F (21°C)**

60 minutes

*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.*

## PLACEMENT GUIDELINES

- SURFACE PREPARATION:** All surfaces in contact with Five Star Structural Concrete® Gunitite S300 shall be free of oil, grease, laitance, and other contaminants. Concrete must be clean, sound and rough to ensure a good bond. Mechanically roughen concrete surfaces in accordance with ICRI Technical Guideline 03732 to a minimum concrete surface profile roughness (CSP 6 or greater). Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water. Surfaces shall be conditioned to between 45°F and 90°F (7°C and 32°C) at the time of placement.
- MIXING:** The mixing equipment should be capable of maintaining placement continuously.  
DRY MIX PROCESS: Predampen Five Star Structural Concrete Gunitite® S300 in a mortar mixer (stationary barrel with moving blades) prior to placement into gun or with a prehydration water ring equipped with a screen to avoid plug-ups. Avoid over dampening material. Do not dampen more material than can be placed within 60 minutes. Adjust consistency at nozzle.
- METHODS OF PLACEMENT:** Apply Five Star Structural Concrete® Gunitite S300 to full design thickness whenever possible. Overhead placement is applied in layers just thick enough to prevent sagging. Direct nozzle perpendicular to surface and rotate in a series of circular patterns, filling inside corners first. Five Star Structural Concrete Gunitite® S300 should emerge from the nozzle in a uniform, uninterrupted flow. Finish to desired texture with screed, float, trowel, or brush. For more detailed application and curing procedures, refer to ACI 506R-90, Guide to Shotcrete Report.
- POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete® Gunitite S300 shall be coated with an approved curing compound meeting the water retention properties of ASTM C 309 immediately after finishing. Protect from excessive evaporation prior to set.

**NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY.** For more detailed placement procedures, refer to the 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 as stated on the package.
- For cold and hot weather placement, refer to Design-A-Spec™ or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Repair material shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Placement shall be continuous to avoid cold joints.

## 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
28816	Structural Concrete® Gunitite S300	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](http://FiveStarProducts.com)

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**FIVE STAR**

# **STRUCTURAL CONCRETE® GUNITE WP**

High Strength Wet Process Shotcrete Repair

## **PRODUCT DESCRIPTION**

Five Star Structural Concrete® Gunite WP is a wet process shotcrete applied, permanent concrete repair material, may be used from 1/4 inch (6 mm) to full depth applications and provides a long finishing time. Five Star Structural Concrete® Gunite WP provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

## **ADVANTAGES**

- Large volume applications
- Long finishing time
- Pneumatically applied
- Low rebound
- Versatile 1/4 inch (6 mm) to full depth applications
- Very low chloride ion permeability
- Excellent freeze/thaw resistance
- Available in 3,000 lb. bulk bag packaging for large volume applications
- Outstanding corrosion resistance for protection and rehabilitation

## **USES**

- Vertical and overhead repairs
- Repair of load bearing walls, ceilings and other structural members
- Structural repair for industrial plants
- Marine and hydraulic structure repair

## **PACKAGING AND YIELD**

Five Star Structural Concrete® Gunite WP is packaged in heavy-duty polyethylene lined bags and is available in 50 lb. (22.7 kg) units yielding approximately 0.39 cubic feet (11.0 liters) at maximum water. Five Star Structural Concrete® Gunite WP is also available in 3,000 lb (1,360 kg) bulk sacks for large volume applications.

## **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
1 Day	3,000 psi (20.7 MPa)
28 Days	8,000 psi (55.2 MPa)
<b>Compressive Strength, ASTM C 42 in accordance with ACI 506R-05</b>	
3 Days	6,000 psi (41.4 MPa)
7 Days	7,500 psi (51.8 MPa)
28 Days	8,500 psi (58.7 MPa)
<b>Bond Strength, ASTM C 882</b>	
7 Days	2,000 psi (13.8 MPa)
<b>Thermal Coefficient of Expansion, ASTM C 531</b>	5.0 x 10 <sup>-6</sup> in/in/°F (9.0 x 10 <sup>-6</sup> mm/mm/°C)
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Very Low ( <1,000 Coulombs)
<b>Working Time at 70°F (21°C)</b>	30 minutes

*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.*

## PLACEMENT GUIDELINES

- SURFACE PREPARATION:** All surfaces in contact with Five Star Structural Concrete® Gunite WP shall be free of oil, grease, laitance, and other contaminants. Concrete must be clean, sound and rough to ensure a good bond. Mechanically roughen concrete surfaces in accordance with ICRI Technical guideline 03732 to a minimum concrete surface profile roughness (CSP) 6 or greater. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Feather edging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water. Surfaces shall be conditioned to between 45°F and 90°F (7°C and 32°C) at the time of placement.
- MIXING:** Wet down mortar mixer (stationary barrel with moving blades) before using and drain any excess water. A drill and paddle mixer is acceptable for single bag mixes. Add the minimum amount of premeasured potable water (2¼ quarts per 50 lb. unit) as stated on product packaging to mixer. While mixing, slowly add Five Star Structural Concrete® Gunite WP and mix to a uniform consistency for three to four minutes. To achieve desired consistency for wet process application, add remaining water as necessary. Do not exceed maximum water content as stated on product packaging or add an amount that will cause segregation. Mix thoroughly for approximately five minutes. Do not mix more material than can be placed within 30 minutes. Do not retemper the mix by adding additional water.
- METHODS OF PLACEMENT:** Apply Five Star Structural Concrete® Gunite WP to full design thickness whenever possible. Repair material is applied in layers just thick enough to prevent sagging. Direct nozzle perpendicular to surface and rotate in a series of circular patterns, filling inside corners first. Five Star Structural Concrete® Gunite WP should emerge from the nozzle in a uniform, uninterrupted flow. Finish to desired texture with screed, float, trowel, or brush. To obtain optimum results, repair shall be installed to full depth without allowing intermediate lifts to harden. Where placement depth and patch geometry require installation in lifts, subsequent lifts may be placed after repair material has reached initial set. Applied material shall be given a raked finish to ensure proper adhesion between lifts. Repair material must be kept continuously wet from time of hardening until installation of succeeding lifts. For more detailed application and curing procedures, refer to ACI 506R-05, Guide to Shotcrete Report.  
  
**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Structural Concrete® Gunite WP 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. Faster strength gain will occur when the Five Star Structural Concrete® Gunite WP and mixing water have been conditioned to a higher temperature prior to placement. In high temperatures, Five Star Structural Concrete® Gunite WP should be kept as cool as possible, but not exceeding 90°F (32°C). Ice cold water should be used for mixing to help maintain sufficient working time.
- POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete® Gunite WP shall be coated with an approved curing compound meeting the water retention properties of ASTM C 309 immediately after finishing. Protect from excessive evaporation prior to set.

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

## CONSIDERATIONS

- Never exceed the maximum water content as stated on the package or mix to a consistency which will cause segregation.
- Temperature of surfaces must be between 45°F and 90°F (7°C and 32°C) at time of placement. For cold and hot weather placement, call the Five Star Products' Engineering and Technical Center at 1-800-243-2206.
- Repair material shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Placement shall be continuous to avoid cold joints.

## 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 MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
29426	Five Star Structural Concrete® Gunite WP	50 lb. 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."

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Specifications Subject to Change.



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**FIVE STAR**

# STRUCTURAL CONCRETE® GUNITE WP/FS

Fiber Reinforced, High Strength Gunitite Repair

## **PRODUCT DESCRIPTION**

Five Star Structural Concrete® Gunitite WP/FS is a wet process shotcrete applied, permanent concrete repair product. It is a high-strength, one component, enhanced hydraulic cement repair material. Five Star Structural Concrete® Gunitite WP/FS may be used from 1/4 inch (6 mm) to full-depth applications and provides a long finishing time. Five Star Structural Concrete® Gunitite WP/FS provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and low chloride ion permeability.

## **ADVANTAGES**

- Large volume applications
- Long finishing time
- Pneumatically applied
- Low chloride ion permeability
- Very low rebound
- Versatile 1/4 inch (6 mm) to full depth applications
- Fiber reinforced for crack resistance
- Outstanding corrosion resistance for protection and rehabilitation

## **USES**

- Vertical and overhead repairs
- Repair of load bearing walls, ceilings and other structural members
- Structural repair for industrial plants
- Tight or confined space repair

## **PACKAGING AND YIELD**

Five Star® Structural Concrete Gunitite WP/FS is packaged in heavy-duty polyethylene lined bags and is available in 50 lb. (22.7 kg) units yielding approximately 0.39 cubic feet (11.0 liters) at maximum water.

## **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
1 Day	3,500 psi (24.2 MPa)
28 Days	8,000 psi (55.2 MPa)
<b>Compressive Strength, ASTM C 42 in accordance with ACI 506R-90</b>	
3 Days	6,000 psi (41.4 MPa)
7 Days	7,500 psi (51.8 MPa)
28 Days	8,500 psi (58.7 MPa)
<b>Bond Strength, ASTM C 882</b>	
7 Days	2,000 psi (13.8 MPa)
<b>Thermal Coefficient of Expansion, ASTM C 531</b>	5.0 x 10 <sup>-6</sup> in/in/°F (9.0 x 10 <sup>-6</sup> mm/mm/°C)
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Low
<b>Working Time at 70°F (21°C)</b>	30 minutes

*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.*

## PLACEMENT GUIDELINES

- SURFACE PREPARATION:** All surfaces in contact with Five Star Structural Concrete® Gunitite WP/FS shall be free of oil, grease, laitance, and other contaminants. Concrete must be clean, sound and rough to ensure a good bond. Mechanically roughen concrete surfaces in accordance with ICRI Technical Guideline 03732 to a minimum concrete surface profile roughness (CSP) 6 or greater. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water. Surfaces shall be conditioned to between 45°F and 90°F (7°C and 32°C) at the time of placement.
- MIXING:** Wet down mortar mixer (stationary barrel with moving blades) before using and drain any excess water. Add the minimum amount of premeasured potable water as stated on product packaging to mixer. While mixing, slowly add Five Star Structural Concrete® Gunitite WP/FS and mix to a uniform consistency for three to four minutes. To achieve desired consistency for wet process application, add remaining water as necessary. Do not exceed maximum water content as stated on product packaging or add an amount that will cause segregation. Mix thoroughly for approximately five minutes. Do not mix more material than can be placed within 30 minutes. Do not retemper the mix by adding additional water.
- METHODS OF PLACEMENT:** Apply Five Star Structural Concrete® Gunitite WP/FS to full design thickness whenever possible. Repair material is applied in layers just thick enough to prevent sagging. Direct nozzle perpendicular to surface and rotate in a series of circular patterns, filling inside corners first. Five Star Structural Concrete® Gunitite WP/FS should emerge from the nozzle in a uniform, uninterrupted flow. Finish to desired texture with screed, float, trowel, or brush. To obtain optimum results, repair shall be installed to full depth without allowing intermediate lifts to harden. Where placement depth and patch geometry require installation in lifts, subsequent lifts may be placed after repair material has reached initial set. Applied material shall be given a raked finish to ensure proper adhesion between lifts. Repair material must be kept continuously wet from time of hardening until installation of succeeding lifts. For more detailed application and curing procedures, refer to ACI 506R-90, Guide to Shotcrete Report.  
**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Structural Concrete® Gunitite WP/FS 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. Faster strength gain will occur when the Five Star Structural Concrete® Gunitite WP/FS and mixing water have been conditioned to a higher temperature prior to placement. In high temperatures, Five Star Structural Concrete® Gunitite WP/FS should be kept as cool as possible, but not exceeding 90°F (32°C). Ice cold water should be used for mixing to help maintain sufficient working time.
- POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete® Gunitite WP/FS shall be coated with an approved curing compound meeting the water retention properties of ASTM C 309 immediately after finishing. Protect from excessive evaporation prior to set.

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

## CONSIDERATIONS

- Never exceed the maximum water content as stated on the package or mix to a consistency which will cause segregation.
- Temperature of surfaces must be between 45°F and 90°F (7°C and 32°C) at time of placement. For cold and hot weather placement, call the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Repair material shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Placement shall be continuous to avoid cold joints.

## 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 MATERIAL SAFETY DATA SHEET.

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
29427	Structural Concrete® Gunitite WP/FS	50 lb. 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."

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# **STRUCTURAL CONCRETE® S300**

Long Working Time, Permanent Repair

## **PRODUCT DESCRIPTION**

Five Star Structural Concrete® S300 is a normal setting, one component, enhanced hydraulic cement mortar used for pourable and pumpable repairs of concrete structures. Five Star Structural Concrete® S300 may be extended with coarse aggregate for large volume repairs and foundation upgrades. Five Star Structural Concrete® S300 provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

## **ADVANTAGES**

- Large volume repairs
- 60 minute working time
- Very low chloride ion permeability
- Pumpable
- Available in 3,000 Lb. (1,360 Kg) bulk bag packaging
- Coarse aggregate extension up to 100%
- One-day turnaround
- Outstanding corrosion resistance for protection and rehabilitation

## **USES**

- Repair of concrete structures
- Industrial floors, slabs and overlays
- Equipment foundations
- Repair of tanks, sumps and curbs
- Ready-mix concrete truck batching
- Structural fortifications

## **PACKAGING AND YIELD**

Five Star Structural Concrete® S300 is packaged in heavy-duty polyethylene lined bags and is available in 50 lb. (22.7 kg) units yielding approximately 0.40 cubic feet (11.3 liters) at maximum water, or 0.60 cubic feet (17.0 liters) with a 70% extension using 3/8" pea gravel. Five Star Structural Concrete® S300 is also available in 3,000 Lb. (1,360 Kg) bulk bags.

## **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
1 Day	3,000 psi (20.7 MPa)
3 Days	5,000 psi (34.2 MPa)
7 Days	6,500 psi (44.8 MPa)
28 Days	8,000 psi (55.2 MPa)
<b>Bond Strength, ASTM C 882</b>	
7 Days	2,300 psi (15.9 MPa)
<b>Time of Set, ASTM C 266</b>	
Initial Set	5 Hours (approximately)
Final Set	6 Hours (approximately)
<b>Linear Length Change, ASTM C 157</b>	
28 Days Wet	+0.03%
28 Days Dry	-0.05%
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Very Low (<1,000 Coulombs)
<b>Working Time at 70°F (21°C)</b>	60 minutes

*\*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

- SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete® S300 shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Mechanically roughen concrete surfaces in accordance with ICRI Technical Guideline 03732 to a minimum concrete surface profile roughness (CSP) 6 or greater. Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of one inch (25 mm) should be provided for a durable repair. Feather edging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water, or use Five Star® Bonding Adhesive. Surfaces shall be conditioned to between 40°F and 90°F (5°C and 32°C) at the time of placement.
- FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during placement. Areas where bond is not desired must be treated with form oil, paste wax or similar material. Joints may be necessary depending on pour dimensions. Any existing joints within the repair area should be maintained. Contact the Five Star Products' Engineering and Technical Service Center for further information.
- MIXING:** Wet down mortar mixer (stationary barrel with moving blades) before using and drain excess water. 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 2¼ to 3 quarts potable water per 50 lb. unit) to the mixer. While mixing, slowly add Five Star Structural Concrete® S300 and mix to a uniform consistency for three to four minutes. Adjust consistency if necessary, but do not exceed maximum water content stated on the package or an amount that will cause segregation. Add clean, damp course aggregate meeting ASTM C 33 before final water adjustment. Do not mix more material than can be placed within 60 minutes.
- PLACEMENT PROCEDURES:** Whenever possible, place Five Star Structural Concrete® S300 full depth from one side of the repair to the other. To ensure optimal bond development, firmly work material into substrate. Placement should be continuous to prevent cold joints between pours. Finish as necessary.

**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Structural Concrete® S300 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. Faster strength gain will occur when the Five Star Structural Concrete® S300 and mixing water have been conditioned to a higher temperature prior to placement. In hot temperatures, Five Star Structural Concrete® S300 should be kept as cool as possible, but not exceeding 90°F (32°C).

- POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete® S300 shall be protected from moisture loss until initial set, then immediately coated with an approved curing compound meeting water retention properties of ASTM C 309 or continuously wet cured for a minimum of three days. In-service operation may begin immediately after the required strength has been reached.

**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.

- Never exceed the maximum recommended amount of mixing water as stated on the package or add an amount that will cause segregation.
- Under high evaporative conditions, an evaporation retarder or water fogging must be used prior to curing.
- For ready-mix truck mixing guidelines, contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

## CONSIDERATIONS

**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
28810	Structural Concrete® S300	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."

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## **FIVE STAR SUMMERSET®**

Extended Working Time Additive

### **PRODUCT DESCRIPTION**

Summerset® is an additive which extends the working time and retards the set of certain Five Star® rapid setting hydraulic cement products. Summerset should be used when working in hot weather or placing a large amount of material at one time to provide ample working time to place and finish the material.

For use only with specific Five Star rapid setting products which call for Summerset by name such as Five Star Structural Concrete®, Five Star® Instant Grout, and Five Star® Highway Patch.

### **INSTRUCTIONS**

The working time and set time of certain Five Star rapid setting products may be extended by adding Summerset to the mixing water, thoroughly mixing into water, and then adding the dry material. Total dispersion of Summerset in the mixing water will result in a consistent working time and set time for the entire batch. Do not add Summerset to the dry material. Each tube of Summerset will extend the working time by approximately 30% - 40% percent. A general guide for the use of Summerset is for every 10°F (6°C intervals) above 70°F (21°C), one tube per unit of material should be used. That is, use one tube if Five Star Product, water, and air temperature are at 80°F (27°C). Use two tubes if material, water and air are at 90°F (32°C). Up to 3 tubes per unit may be added.

**Remember:** Summerset extends the set time and thus slows down the rate of early strength gain. Summerset does not reduce the ultimate compressive strength or compromise other properties.

### **CAUTION**

Summerset contains an organic acid which will cause irritation. Avoid contact with eyes and prolonged contact with skin. Immediately flush with plenty of water for at least 15 minutes. Call physician. Wash skin thoroughly after handling. Keep product out of reach of children.

**PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

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

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**NOTES:**

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# FIVE STAR

Specified by the World's Best™

## INFRASTRUCTURE & COMMERCIAL Concrete Repair

### **FIVE STAR CENTRI-CAST® BASALT LINER**

Reinforcement wrap for epoxy, concrete and concrete-reinforced structures; protection against chemical and corrosive environments

### **FIVE STAR CENTRI-CAST® ONE-PASS WP**

High-strength wet process repair mortar for use with single-pass spray equipment. 1/4" to 4" depth.

### **FIVE STAR CENTRI-CAST® PIPE PREP**

High-strength repair concrete for the preparation of damaged culvert and storm pipe bases before full repairs are made; use with Five Star Centri-Cast® Systems

### **FIVE STAR CENTRI-CAST® PIPE REPAIR MORTAR & CENTRI-CAST® PIPE REPAIR MORTAR WITH MICROBAN® TECHNOLOGY**

Fiber-reinforced, centrifugally cast, high-performance cementitious mortar designed for the renewal of underground pipes without disturbing the pipe. Infused w/Microban® Technology version extends the useful life of mortar by inhibiting deterioration caused by mildew.

### **FIVE STAR CENTRI-CAST® PIPE REPAIR MORTAR HS & CENTRICAST® PIPE REPAIR MORTAR HS WITH MICROBAN® TECHNOLOGY**

High strength, fiber-reinforced, centrifugally cast, high-performance cementitious mortar designed for the renewal of underground pipes without disturbing the pipe. Infused w/Microban® Technology version extends the useful life of mortar by inhibiting deterioration caused by mildew.

### **FIVE STAR CENTRI-CAST® WATER STOP**

Fast-setting hydraulic cement that stops active leaks or flowing water in new or existing concrete, mortar, brick or any surface to which cementitious products can bond

### **FIVE STAR® HIGHWAY PATCH**

Fast-setting repair mortar for horizontal repairs of concrete in pavements and bridge decks

### **FIVE STAR® HIGHWAY PATCH FR**

Fiber-reinforced, fast-setting, high strength, cement-based repair mortar designed for transportation applications



# FIVE STAR

Specified by the World's Best™

## INFRASTRUCTURE & COMMERCIAL Concrete Repair

### **FIVE STAR® HIGHWAY PATCH WINTER**

Fast-setting repair mortar for horizontal repairs of concrete in pavements and bridge decks in cold-weather conditions

### **FIVE STAR® RAPID SURFACE REPAIR EASY MIX**

Self-leveling, low viscosity liquid polymer for quick surface repair of roads and bridges. Durable, long-lasting and traffic ready in as little as 30 minutes.

### **FIVE STAR® RAPID SURFACE REPAIR EPOXYFIX™**

Repair and rehabilitate concrete and asphaltic concrete pavements. Within minutes of placement, durable, long-lasting repairs are able to handle vibration, heavy traffic, and thermal movement.

### **FIVE STAR® RAPID SURFACE REPAIR PF-60**

Rapid setting low viscosity polymer for the repair and rehabilitation of concrete and asphaltic concrete pavements. Long-lasting repairs handle vibration, heavy traffic and thermal movement.

### **FIVE STAR® RAPID SURFACE REPAIR POLYFIX™**

Polyurethane concrete and asphaltic concrete surface repair. Make repairs, resurface pavements, and apply protective coating year round - hot or cold.

### **FIVE STAR® RAPID SURFACE REPAIR R-60**

Rapid setting ultra low viscosity concrete healer and penetrating crack sealer. Reduces freeze-thaw spalling in concrete pavements and protects from further chemical attack.



## **Centri-Cast® Basalt Liner**

### Concrete & Epoxy Reinforcement Wrap

#### **PRODUCT DESCRIPTION**

**Five Star Centri-Cast® Basalt Liner** is a reinforcement wrap for concrete and epoxy. A woven grid mesh made from continuous basalt fiber, this product features an alkali resistant styrene-butadiene resin coating designed for use with cementitious and epoxy materials. Applications include everywhere concrete or epoxy are installed. The natural properties of basalt make it ideal for applications where chemical and corrosive environments devour most other products.

#### **ADVANTAGES**

- Completely waterproof
- High strength
- Easy-to-apply
- High bond strength

#### **USES**

- Reinforcement for epoxy, concrete and concrete-reinforced structures

#### **PACKAGING AND YIELD**

**Five Star Centri-Cast® Basalt Liner** is packaged in rolls that are 3.28 ft. (1m) wide by 164 ft. (50m) long. One roll covers 538.2 square feet (50 square meters).

#### **SHELF LIFE**

1 year in original unopened container when stored in clean, dry area at 70°F (21°C).

TYPICAL PROPERTIES AT 70°F (21°C)	
Usage	Open Air or Underwater
Mesh Window Size	1" square (25 mm x 25 mm)
Surface Density (weight) g/ft <sup>2</sup> (g/m <sup>2</sup> )	260 = 0.053 lb/ft <sup>2</sup> (0.5732 lb/m <sup>2</sup> )
Tensile Load, kN/m	Warp >50. Actual test = 50.8 Weft >50. Actual test = 56.4 <b>(Min. 3.43, Actual 3.48-3.87 kips/ft)</b>
Elongation % before break	Warp < 3.0, Actual test = 1.5% Weft < 3.0, Actual test = 1.5%

*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.*

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
12090	Five Star Centri-Cast® Basalt Liner	Roll

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**NOTES:**

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## **Centri-Cast® One-Pass™ WP**

High Strength Wet Process Repair Mortar

### **PRODUCT DESCRIPTION**

**Five Star Centri-Cast® One-Pass™ WP** is a high strength, spray applied, permanent concrete repair mortar designed for use with single pass spray equipment. This product may be used from 1/4 inch (6 mm) to deep/full depth applications and provides a long finishing time.

### **ADVANTAGES**

- Versatile - 1/4 inch (6 mm) to 4" depths in a single pass
- High bond strength
- Low rebound
- High 1- and 28-day strengths
- Low chloride ion permeability
- Excellent freeze/thaw resistance

### **USES**

- Trenchless repair of underground pipes
- Pipe rehabilitation, repair and protection
- New pipe corrosion protection

### **PACKAGING AND YIELD**

Five Star Centri-Cast® One-Pass™ WP is packaged in heavy-duty polyethylene lined bags and is available in 50 lb. (22.7 kg) units yielding approximately 0.42 cubic feet (11.9 liters) at maximum water. It is also available in 3,000 lb. (1,360 kg) bulk sacks for large volume applications.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
1 Day	3,000 psi (20.7 MPa)
7 Days	6,000 psi (41.4 MPa)
28 Days	8,000 psi (55.2 MPa)
<b>Modulus of Elasticity, ASTM C 496</b>	3.6 x 10 <sup>6</sup> psi (24,281 MPa)
<b>Bond Strength, ASTM C 882</b>	
7 Days	2,000 psi (13.8 MPa)
<b>Thermal Coefficient of Expansion, ASTM C 531</b>	5.5 x 10 <sup>-6</sup> in/in/°F (9.0 x 10 <sup>-6</sup> mm/mm/°C)
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Low ( <1,000 Coulombs)
<b>Working Time at 70°F (21°C)</b>	30 minutes
<b>Freeze-Thaw Resistance, ASTM C 666A</b> Relative Durability Factor at 300 cycles	> 95%

*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.*

## PLACEMENT GUIDELINES

1. **SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Centri-Cast® One-Pass™ WP shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Metal surfaces should be blasted with high pressure water to remove all contaminants and debris.
2. **MIXING:** Mix Five Star Centri-Cast® One-Pass™ WP thoroughly for approximately three to four minutes to a uniform consistency with a mortar mixer (stationary barrel with moving blades). With the mixer running add approximately 80% of the pre-measured potable water (total water content is 2½ to 3 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. Working time is approximately 30 minutes at 70°F (21°C). Follow printed instructions on the package.
3. **PLACEMENT PROCEDURES:** Place Five Star Centri-Cast® One-Pass™ WP at full depth or apply skim coat followed by full depth application.

**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Centri-Cast® One-Pass™ WP must be maintained at a temperature of at least 35°F (2°C). Protect from freezing until a compressive strength of at least 1,000 psi (6.9 MPa) is obtained. Faster strength gain will occur when the Five Star Centri-Cast® One-Pass™ WP and mixing water have been conditioned to a higher temperature prior to placement. In hot temperatures, product should be kept as cool as possible, but not exceeding 90°F (32°C). Ice cold water should be used for mixing to help maintain sufficient working time. Five Star® Sumerset® may also be used to provide more working time if necessary.

**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

- Temperature of surfaces must be between 35°F and 90°F (2°C and 32°C) at time of placement. For cold and hot weather placement, refer to Five Star® Design-A-Spec™.
- Placement thickness should be determined by an appropriate engineer via proper engineering calculations.

## 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
12600	Five Star Centri-Cast® One-Pass™ WP	56	50 lb. Bag
Call Customer Service	Five Star Centri-Cast® One-Pass™ WP	Call Customer Service	3,000 lb. Bulk Sack

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## **Centri-Cast® Pipe Prep**

High Strength Repair Concrete

### **PRODUCT DESCRIPTION**

**Five Star Centri-Cast® Pipe Prep** is a specially designed concrete mix for the repair of damaged culvert and storm pipe bases in preparation for use of the Five Star Centri-Cast® systems. Pumpable through standard equipment, Five Star Centri-Cast® Pipe Prep provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology.

### **ADVANTAGES**

- Large volume applications
- Air entrainment
- Low drying shrinkage
- Outstanding corrosion resistance

### **USES**

- Preparation of damaged culvert and storm pipe inverts being repaired

### **PACKAGING AND YIELD**

**Five Star Centri-Cast® Pipe Prep** is packaged in heavy-duty polyethylene lined bags and is available in 50 lb. (22.7 kg) units yielding approximately 0.39 cubic feet (11.0 liters) at maximum water.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
Target Air Content, ASTM C 231 (B Meter)	5.5 to 7.5
Compressive Strength, ASTM C 39	
1 Day	2,000 psi (14 MPa)
7 Days	5,000 psi (34 MPa)
28 Days	6,000 psi (41 MPa)
Length Change, ASTM C 157	
Dry - 28 days	-0.04%
Wet - 28 days	+0.02%
Modulus of Elasticity, ASTM C 469	3.0 x 10 <sup>6</sup> psi (20.7 GPa)

*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.*

## PLACEMENT GUIDELINES

- 1. PREPARATION:** Completely remove or mitigate all obstructions that may hinder proper installation of product prior to commencing work. Ensure all active water flow is diverted or stopped prior to commencing work. Completely remove all loose, delaminated and weak materials including dirt and debris from work area. Prepare pipe surfaces using high pressure water blasting to thoroughly remove all contaminants and bond-inhibiting materials. Severely corroded pipe sections may need replacement. Metal surfaces may be blasted to a near-white finish; concrete surfaces should be mechanically prepared to an ICRI Concrete Surface Profile (CSP) of 6 or greater. Metal surfaces may require treating with a corrosion inhibitor after mechanical surface prep if they will not be repaired immediately.
- 2. MIXING:** Mix via concrete or mortar mixer. A drill and paddle mixer is acceptable for single bag mixes. Start by adding 2 to 2¼ quarts (1.9 to 2.3 liters) water to mixer followed by Five Star Centri-Cast® Pipe Prep. Mix for 3 minutes and check consistency. Add remaining water, if necessary, and continue mixing for 1 to 2 minutes. Do not mix more material than can be placed in 30 minutes.
- 3. METHODS OF PLACEMENT:** Pour or pump Five Star Centri-Cast® Pipe Prep into place. When pumping, ensure pump is designed to pump concrete or mortars containing coarse aggregate. Install product at full depth along entire length of area being repaired. Level and screed as necessary.  
**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Centri-Cast® Pipe Prep 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. Faster strength gain will occur when the Five Star Centri-Cast® Pipe Prep and mixing water have been conditioned to a higher temperature prior to placement. In high temperatures, Five Star Centri-Cast® Pipe Prep should be kept as cool as possible, but not exceeding 90°F (32°C). Ice cold water should be used for mixing to help maintain sufficient working time.

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

## CONSIDERATIONS

- Never exceed the maximum water content as stated on the package or mix to a consistency which will cause segregation.
- Temperature of surfaces must be between 45°F and 90°F (7°C and 32°C) at time of placement. For cold and hot weather placement, call the Five Star Products' Engineering and Technical Center at 1-800-243-2206.
- Repair material shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Placement shall be continuous to avoid cold joints.

## 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 MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
12500	Five Star Centri-Cast® Pipe Prep	50 Lb. 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."

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# Centri-Cast® Pipe Repair Mortar

Also Available with Microban® Technology

Centrifugally Cast, Fiber-Reinforced Pipe Repair Mortar

## PRODUCT DESCRIPTION

Five Star Centri-Cast® Pipe Repair Mortar and Five Star Centri-Cast® Pipe Repair Mortar w/Microban® Technology are high-performance cementitious mortars designed for the trenchless renewal of underground pipes without disturbing the pipe. Both are a single component, fiber-reinforced hydraulic repair material. Five Star Centri-Cast® Pipe Repair Mortars provide sealing, rehabilitation and corrosion protection of existing underground metal and concrete pipes and is a quick and economical pipe repair solution that creates a dense and highly impermeable repair coating. For added protection, Five Star Centri-Cast® Pipe Repair Mortar w/Microban® Technology is infused with an antimicrobial agent to guard against the growth of mold and mildew.

## ADVANTAGES

- Large volume applications
- Centrifugally cast in place
- Low chloride ion permeability
- Versatile ¼ inch (6 mm) to 1 inch (25 mm) single pass applications
- Fiber reinforced for crack resistance and strength
- Infused w/Microban® Technology extends the useful life of mortar by inhibiting deterioration caused by mildew.

## USES

- Trenchless repair of underground pipes
- Pipe rehabilitation, repair and protection
- New pipe corrosion protection

## PACKAGING AND YIELD

Five Star Centri-Cast® Pipe Repair Mortar and Five Star Centri-Cast® Pipe Repair Mortar w/Microban® Technology are packaged in 50 lb. (22.7 kg) heavy-duty polyethylene lined bags yielding approximately 0.45 cubic feet (12.7 liters) of hardened material at maximum water content. Bulk bags are available upon request.

## SHELF LIFE

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109*</b>	
1 Day	3,000 psi (20.7 MPa)
7 Days	6,000 psi (41.4 MPa)
28 Days	8,000 psi (55.2 MPa)
<b>Bond Strength, ASTM C 882</b>	
28 Days	2,000 psi (13.8 MPa)
<b>Flexural Strength, ASTM C 348</b>	
	1,300 psi (9.0 MPa)
<b>Thermal Coefficient of Expansion, ASTM C 531</b>	
	$5.5 \times 10^{-6}$ in/in/°F
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Very Low
<b>Modulus of Elasticity, ASTM C 469</b>	
	$3.6 \times 10^6$ psi
<b>Drying Shrinkage, ASTM C 157</b>	
28 Days Wet	+0.05%
28 Days Dry	-0.15%
<b>Working Time at 70°F (21°C)</b>	
	30 minutes

\* Compressive Strength test specimens cast 20 minutes after initial mixing to replicate typical pumping, mixing and spray application on job site.

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.



## PLACEMENT GUIDELINES

- PREPARATION:** Prepare all interior pipe surfaces with a high pressure water-blast to remove all laitance, loose material and oxidation, then flush all material from pipe. Rusted portions of corrugated steel pipe should be removed and replaced as necessary. Plug active leaks and fill voids; use either Five Star Centri-Cast®, Five Star Structural Concrete® or Five Star Structural Concrete® V/O for invert/base replacement. Metal surfaces should be blasted clean using high-pressure water blast equipment. Concrete surfaces should be mechanically prepared to an ICRI Concrete Surface Profile (CSP) of 6 or greater. Metal surfaces may require treating with a corrosion inhibitor after any mechanical surface prep if they will not be repaired immediately.
- MIXING: WATER CONTENT: MINIMUM is 2.50 quarts (2.37 L). MAXIMUM is 3.25 quarts (3.07 L).** Prewet mortar mixer and pump lines with water. With mixer running, start by adding 2.50 quarts of clean 50°F to 70°F (10°C to 21°C) water per 50 lbs. of Five Star Centri-Cast® Pipe Repair Mortar to mixer. If mixing multiple bags, add all but last bag to mixer and allow material to mix 30 seconds before adding last bag. Adjust water as necessary after last bag is added. Typically, 2.50 to 3.25 quarts per 50 lb. bag of Five Star Centri-Cast® Pipe Repair Mortar is suggested. Up to 3.25 quarts per 50 lb. bag for hotter temperatures or longer pump distances. Total mix time is 3 minutes after last bag is added to mixer. Working time is approximately 30 minutes. Do not retemper the mix by adding more water.
- EQUIPMENT:** Standard mortar mixers, compressors and pumps are applicable. A high-speed rotating applicator device is required. Please contact Five Star Products' Engineering and Technical Center at 1-800-243-2206 for equipment recommendations and detailed installation instructions.
- APPLICATION:** Position the spin cast applicator within the center of the pipe and commence pumping the mixed mortar to the spin caster. As the mortar begins to be centrifugally cast evenly around the interior, retrieve the applicator head at the best speed for applying the thickness that has been specified. If flows are interrupted for any reason, simply arrest the retrieval of the applicator head until flows are restored. The retrieval speed can be varied to create different thicknesses as the condition may dictate to provide sufficient strengths. Thickness may be verified at any point. If additional thickness is desired at any location, place the rotating applicator at that location and recommence pumping and retrieval until that area is thickened. The pressure application from the centrifugal casting of the mortar produces a finely textured surface that requires no additional troweling or finishing.
- PLACEMENT:** Keep pump lines cool by spraying with cold water when temperatures are 90°F (32°C) or higher. Transfer mixed Five Star Centri-Cast® Pipe Repair Mortar from mixer to pump and immediately start next mix. Spray using spin-caster equipment with compressed air valve wide open. Apply in suitable thickness of 1/4 to 1 inch in single pass. Allow material to set and stiffen before applying subsequent pass.

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

## CONSIDERATIONS

- Never exceed the maximum water content as stated on the package or mix to a consistency which will cause segregation.
- Temperature of surfaces must be between 45°F and 90°F (7°C and 32°C) at time of placement. For cold and hot weather placement, call the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Repair mortar shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Product sets slower in cooler temperatures and faster in hotter temperatures.

## 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 MATERIAL SAFETY DATA SHEET.

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
12100	Five Star Centri-Cast® Pipe Repair Mortar	50 lb. Bag
12150	Five Star Centri-Cast® Pipe Repair Mortar w/Microban® Technology	50 lb. Bag
Call Customer Service	Five Star Centri-Cast® Pipe Repair Mortar	Bulk 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."

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# Centri-Cast® Pipe Repair Mortar HS

Also Available with Microban® Technology

High Strength, Centrifugally Cast, Fiber-Reinforced Pipe Repair Mortar

## PRODUCT DESCRIPTION

Five Star Centri-Cast® Pipe Repair Mortar HS and Five Star Centri-Cast® Pipe Repair Mortar HS w/Microban® Technology are high-performance cementitious mortars designed for the trenchless renewal of underground pipes without disturbing the pipe. Both are high strength, single component, fiber-reinforced hydraulic repair materials. Five Star Centri-Cast® Pipe Repair Mortar HS products provide sealing, rehabilitation and corrosion protection of existing underground metal and concrete pipes and is a quick and economical pipe repair solution that creates a dense and highly impermeable repair coating. For added protection, Five Star Centri-Cast® Pipe Repair Mortar HS w/Microban® Technology is infused with an antimicrobial agent to guard against the growth of mold and mildew.

## ADVANTAGES

- Large volume applications
- Centrifugally cast in place
- Low chloride ion permeability
- Versatile ¼ inch (6 mm) to 1 inch (25 mm) single pass applications
- Fiber reinforced for crack resistance and strength
- Infused w/Microban® Technology extends the useful life of mortar by inhibiting deterioration caused by mildew

## USES

- Trenchless repair of underground pipes
- Pipe rehabilitation, repair and protection
- New pipe corrosion protection

## PACKAGING AND YIELD

Five Star Centri-Cast® Pipe Repair Mortar HS and Five Star Centri-Cast® Pipe Repair Mortar HS w/ Microban® Technology are packaged in 50 lb. (22.7 kg) heavy-duty polyethylene lined bags yielding approximately 0.45 cubic feet (12.7 liters) of hardened material at maximum water content. Bulk bags are available upon request.

## SHELF LIFE

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

### TYPICAL PROPERTIES AT 70°F (21°C)

#### Compressive Strength, ASTM C 109

1 Day	5,000 psi (34.5 MPa)
7 Days	9,000 psi (62.1 MPa)
28 Days	11,500 psi (79.3 MPa)

#### Bond Strength, ASTM C 882

28 Days	Concrete Failure
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#### Flexural Strength, ASTM C 293

1,500 psi (10.3 MPa)

#### Thermal Coefficient of Expansion, ASTM C 531

$5.5 \times 10^{-6}$  in/in/°F

#### Chloride Ion Permeability, ASTM C 1202

28 Days	Very Low
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#### Modulus of Elasticity, ASTM C 469

28 Days	$3.5 \times 10^6$ psi
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#### Drying Shrinkage, ASTM C 157

28 Days Wet	+0.05%
28 Days Dry	-0.12%

#### Working Time at 70°F (21°C)

30 minutes

\* Compressive Strength test specimens cast 20 minutes after initial mixing to replicate typical pumping, mixing and spray application on job site.

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.



## PLACEMENT GUIDELINES

- PREPARATION:** Prepare all interior pipe surfaces with a high pressure water-blast to remove all laitance, loose material and oxidation, then flush all material from pipe. Rusted portions of corrugated steel pipe should be removed and replaced as necessary. Plug active leaks and fill voids; use either Five Star Centri-Cast®, Five Star Structural Concrete® or Five Star Structural Concrete® V/O for invert/base replacement. Metal surfaces should be blasted clean using high-pressure water blast equipment. Concrete surfaces should be mechanically prepared to an ICRI Concrete Surface Profile (CSP) of 6 or greater. Metal surfaces may require treating with a corrosion inhibitor after any mechanical surface prep if they will not be repaired immediately.
- MIXING: WATER CONTENT: MINIMUM is 3.25 quarts (3.07 L). MAXIMUM is 4.0 quarts (3.78 L).** Prewet mortar mixer and pump lines with water. With mixer running, start by adding 3.25 quarts of clean 50°F to 70°F (10°C to 21°C) water per 50 lbs. of Five Star Centri-Cast® Pipe Repair Mortar HS to mixer. If mixing multiple bags, add all but last bag to mixer and allow material to mix 30 seconds before adding last bag. Adjust water as necessary after last bag is added. Up to 4.0 quarts per 50 lb. bag for hotter temperatures or longer pump distances. Total mix time is 3 minutes after last bag is added to mixer. Working time is approximately 30 minutes. Do not retemper the mix by adding more water.
- EQUIPMENT:** Standard mortar mixers, compressors and pumps are applicable. A high-speed rotating applicator device is required. Please contact Five Star Products' Engineering and Technical Center at 1-800-243-2206 for equipment recommendations and detailed installation instructions.
- APPLICATION:** Position the spin cast applicator within the center of the pipe and commence pumping the mixed mortar to the spin caster. As the mortar begins to be centrifugally cast evenly around the interior, retrieve the applicator head at the best speed for applying the thickness that has been specified. If flows are interrupted for any reason, simply arrest the retrieval of the applicator head until flows are restored. The retrieval speed can be varied to create different thicknesses as the condition may dictate to provide sufficient strengths. Thickness may be verified at any point. If additional thickness is desired at any location, place the rotating applicator at that location and recommence pumping and retrieval until that area is thickened. The pressure application from the centrifugal casting of the mortar produces a finely textured surface that requires no additional troweling or finishing.
- PLACEMENT:** Keep pump lines cool by spraying with cold water when temperatures are 90°F (32°C) or higher. Transfer mixed Five Star Centri-Cast® Pipe Repair Mortar HS from mixer to pump and immediately start next mix. Spray using spin-caster equipment with compressed air valve wide open. Apply in suitable thickness of 1/4 to 1 inch in single pass. Allow material to set and stiffen before applying subsequent pass.

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

## CONSIDERATIONS

- Never exceed the maximum water content as stated on the package or mix to a consistency which will cause segregation.
- Temperature of surfaces must be between 45°F and 90°F (7°C and 32°C) at time of placement. For cold and hot weather placement, call the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Repair mortar shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Product sets slower in cooler temperatures and faster in hotter temperatures.

## 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 MATERIAL SAFETY DATA SHEET.

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
12200	Five Star Centri-Cast® Pipe Repair Mortar HS	50 lb. Bag
12250	Five Star Centri-Cast® Pipe Repair Mortar HS w/Microban® Technology	50 lb. Bag
Call Customer Service	Five Star Centri-Cast® Pipe Repair Mortar HS	Bulk 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."

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## **Centri-Cast® WATER STOP**

Fast-Setting Hydraulic Cement

### **PRODUCT DESCRIPTION**

**Five Star Centri-Cast® Water Stop** is a fast-setting hydraulic cement that stops active leaks in concrete. Easy to apply, **Five Star Centri-Cast® Water Stop** is high-bond and high-strength and is resistant to oil, gas, salt water, and sulphates. This product is recommended for active leaks or flowing water and can be applied on new or existing concrete, mortar, brick, or any other surface to which cementitious products can bond.

### **ADVANTAGES**

- Completely Waterproof
- Rapid Setting & Permanent
- Single Component
- Easy-to-Apply
- Oil, Gas, Saltwater, and Sulfate Resistant
- High Bond Strength

### **USES**

- Plugging water leaks/seepage in concrete, stone, or other surfaces to which cementitious products can bond
- Crack filler material for active leaks

### **PACKAGING AND YIELD**

**Five Star Centri-Cast® Water Stop** is packaged in an 10 lb. pail yielding about 145 in<sup>3</sup> (2.4 liters).

### **SHELF LIFE**

One year in original unopened container when stored in clean, dry area at 70°F (21°C).

TYPICAL PROPERTIES AT 70°F (21°C)	
Usage	Open Air or Underwater
Working Time at 70°F (21°C)	3 - 5 minutes
Initial Set Time at 70°F (21°C) ASTM C 109	3 - 5 minutes
Final Set Time at 70°F (21°C) ASTM C 109	5 - 10 minutes
Compressive Strength, ASTM C 109	
3 Hours	1,500 psi (10.3 MPa)
1 Day	2,500 psi (17.2 MPa)
28 Days	4,000 psi (27.5 MPa)

*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 Centri-Cast® Water Stop** shall be sound and free of oil, grease, laitance, and other contaminants. Open cracks or holes by cutting back to a minimum depth of 1 inch (25 mm) to sound material. Cut back to a square or dovetail joint, do not use a "V" cut. Remove all contaminated and loose material. Pre-soak surface with clean water prior to placement.
2. **MIXING:** Condition **Five Star Centri-Cast® Water Stop** to 70°F (21°C). Mix with warm, clean water to a stiff consistency that can be formed into a ball without crumbling and retains its shape when squeezed. When working conditions are under 40°F (4°C), **Five Star Centri-Cast® Water Stop** will have a slower set than normal. For hot weather working conditions, it is recommended that cool or iced water be used to slow set to the desired rate. Do not mix more **Five Star Centri-Cast® Water Stop** than can be placed in 3 minutes.
3. **PLACEMENT PROCEDURES:** With gloved hand, form a plug and force into the crack or hole with maximum pressure.
4. **POST-PLACEMENT PROCEDURES:** For cracks or holes with considerable water pressure, use temporary bracing or framework to hold **Five Star Centri-Cast® Water Stop** until material fully reaches set and can withstand water pressure.

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

## 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.

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
12300	Five Star Centri-Cast® Water Stop	10 Lb. Pail

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

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## **HIGHWAY PATCH**

Fast Traffic Area Repair

### **PRODUCT DESCRIPTION**

Five Star® Highway Patch is a one component, fast setting hydraulic cement material ideal for horizontal repairs of concrete in traffic areas. Five Star® Highway Patch provides resistance to oil, grease, gasoline, salts and other chemicals found in the transportation environment.

### **ADVANTAGES**

- High early strength
- One component/ease of use
- Open to traffic in two hours
- Freeze/thaw resistance
- Resistant to salts
- Cold weather installation
- Coarse aggregate extension

### **USES**

- Highways and bridges
- Parking decks and ramps
- Airport runways and taxiways
- Expansion joint rebuild
- Dowel bar retrofit
- Cold weather repairs

### **PACKAGING AND YIELD**

Five Star® Highway Patch is packaged in heavy-duty polyethylene lined bags each weighing 50 lb. (22.7 kg) yielding approximately 0.39 cubic feet (11.3 liters) and approximately 0.66 cubic feet (16.9 liters) with an 80% coarse aggregate extension. Also available in 3,000 lb. (1,363 kg) bulk bags.

### **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
2 Hours	2,000 psi (13.8 MPa)
3 Hours	3,500 psi (24.1 MPa)
1 Day	5,000 psi (34.5 MPa)
7 Days	7,000 psi (48.3 MPa)
<b>Bond Strength, ASTM C 882</b>	
1 Day	1,500 psi (10.4 MPa)
7 Days	2,000 psi (13.8 MPa)
<b>Length Change, ASTM C 157</b>	
28 Days Wet	+ 0.05%
28 Days Dry	- 0.05%
<b>Freeze/Thaw Resistance, ASTM C 666A</b>	
Relative Durability Factor	90%
<b>Flexural Strength, ASTM C 78</b>	
3 Hours	400 psi
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Very Low (<1,000 Coulombs)
<b>Working Time at 70°F (21°C)</b>	10 minutes

*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

- SURFACE PREPARATION:** All horizontal and vertical surfaces in contact with Five Star® Highway Patch shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Remove all oxidation from exposed reinforcing steel and for additional protection, coat reinforcing steel with Five Star® AC Coat. A perimeter edge and minimum depth of one inch (25 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water or use Five Star® Bonding Adhesive. Surfaces shall be conditioned to between 35°F and 90°F (2°C and 32°C) at time of placement.
- MIXING:** Mix Five Star® Highway Patch thoroughly for approximately four to five minutes to a uniform consistency with a mortar mixer (stationary barrel with moving blades) or a drill and paddle mixer. Mix Five Star® Highway Patch with 2-1/2 to 3 quarts potable water per 50 lb. bag. Adjust consistency if necessary, but do not exceed maximum water content stated on the package or an amount that will cause segregation. Do not mix more material than can be placed in 10 minutes. Addition of coarse aggregate, meeting ASTM C 33, should be used for pours greater than 2 inches (50 mm) in depth. Always add mixing water first to mixer followed by repair material.
- PLACEMENT PROCEDURES:** When bonding adhesive is not used, firmly work Five Star® Highway Patch into substrate and place full depth from one side of the repair to the other. Where this is not practical, placement must be continuous to prevent cold joints between pours. Finish as necessary.  
**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star® Highway Patch must be maintained at a temperature of at least 35°F (2°C) until a compressive strength of at least 1,000 psi (6.9 MPa) is obtained. Faster strength gain will occur when the Five Star® Highway Patch and mixing water have been conditioned to a higher temperature prior to placement. In hot temperatures, Five Star® Highway Patch should be kept as cool as possible, but not exceeding 90°F (32°C). Chilled water should be used for mixing to help maintain sufficient working time.
- POST-PLACEMENT PROCEDURES:** Five Star® Highway Patch shall be immediately coated with an approved curing compound meeting the water retention properties of ASTM C 309. In-service operation may begin immediately after the required strength has been reached.

**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 as stated on the package or an amount that will cause segregation.
- Temperature of surfaces must be between 35°F and 90°F (2°C and 32°C) at time of placement. For cold and hot weather placement, call the Five Star Products' Engineering and Technical Service Center.
- Repair material shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Placement shall be continuous to avoid cold joints.

## CAUTION

Irritant, toxic, strong sensitizer. 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 MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
40000	Five Star® Highway Patch	50 lb. Bag

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# **HIGHWAY PATCH FR**

Fiber Reinforced, Fast Traffic Area Repair

## **PRODUCT DESCRIPTION**

Five Star® Highway Patch FR is a one component, fiber-reinforced, fast-setting, high strength, cement-based repair mortar designed for transportation applications where high early strength gain is needed to reduce down time. Five Star® Highway Patch FR combines a unique chemistry requiring **no wet cure or curing compounds** along with fiber reinforcement for excellent crack resistance and long-term durability.

## **ADVANTAGES**

- High early strength
- One component for ease of use
- Open to traffic in three hours
- Freeze/thaw resistance
- No Wet Cure or Curing Compounds Required
- Resistant to salts
- Coarse aggregate extension

## **USES**

- Highways and bridges
- Parking decks and ramps
- Airport runways and taxiways
- Warehouse floors
- Sidewalks
- Cold weather repairs

## **PACKAGING AND YIELD**

Five Star® Highway Patch FR is packaged in heavy-duty polyethylene lined bags each weighing 50 lb. (22.7 kg) yielding approximately 0.39 cubic feet (11.0 liters) and approximately 0.60 cubic feet (17.0 liters) with a 60% coarse aggregate extension.

## **SHELF LIFE**

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
3 Hours	3,000 psi (20.7 MPa)
1 Day	5,000 psi (34.5 MPa)
7 Days	6,500 psi (44.8 MPa)
28 Days	7,500 psi (51.7 MPa)
<b>Bond Strength, ASTM C 882</b>	
1 Day	1,500 psi (10.4 MPa)
7 Days	2,000 psi (13.8 MPa)
<b>Length Change, ASTM C 157</b>	
28 Days Wet	+ 0.05%
28 Days Dry	- 0.05%
<b>Freeze/Thaw Resistance, ASTM C 666A</b>	
Relative Durability Factor	90% +
<b>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Low
<b>Working Time at 70°F (21°C)</b>	15 minutes

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

- SURFACE PREPARATION:** All horizontal and vertical surfaces in contact with Five Star® Highway Patch FR shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. An ICRI Concrete Surface Profile of 6 or greater shall be achieved. Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of one inch (25 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water or use Five Star® Bonding Adhesive. Surfaces shall be conditioned to between 40°F and 90°F (4°C and 32°C) at time of placement.
- MIXING:** Pre-wet mortar mixer, empty excess water. Add minimum amount of premeasured potable water to mixer: 2½ to 2¾ quarts (2.4-2.6L) per 50 lb. bag. Slowly add Five Star® Highway Patch FR and mix thoroughly for approximately 3 to 4 minutes to a uniform consistency with a mortar mixer (stationary barrel with moving blades) or a drill and paddle mixer. Adjust consistency if necessary, but do not exceed maximum water content stated on the package or an amount that will cause segregation. Do not mix more material than can be placed in 10 minutes. Do not retemper the mix by adding additional water. Addition of coarse aggregate, meeting ASTM C 33, should be used for pours greater than 2 inches (50 mm) in depth. Always add mixing water first to mixer followed by repair material.
- PLACEMENT PROCEDURES:** Firmly work Five Star® Highway Patch FR into substrate. Placement must be continuous to prevent cold joints between pours. Finish as necessary.  
**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star® Highway Patch FR must be maintained at a temperature of at least 40°F (4°C) until a compressive strength of at least 1,000 psi (6.9 MPa) is obtained. Faster strength gain will occur when Five Star® Highway Patch FR and mixing water have been conditioned to a higher temperature prior to placement. In hot temperatures, Five Star® Highway Patch FR should be kept as cool as possible, but not exceeding 90°F (32°C). Chilled water should be used for mixing to help maintain sufficient working time.
- POST-PLACEMENT PROCEDURES:** No wet cure or curing compound is required. In-service operation may begin immediately after the required strength has been reached.

**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 as stated on the package or an amount that will cause segregation.
- Temperature of surfaces must be between 40°F and 90°F (4°C and 32°C) at time of placement. For cold and hot weather placement, call the Five Star Products' Engineering and Technical Service Center.
- Repair material shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Placement shall be continuous to avoid cold joints.

## CAUTION

Irritant, toxic, strong sensitizer. 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
40005	Five Star® Highway Patch FR	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](http://FiveStarProducts.com)

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# FIVE STAR

## FIVE STAR® HIGHWAY PATCH WINTER

Fast Traffic Area Repair for Cold Weather

### PRODUCT DESCRIPTION

Five Star Highway Patch Winter is a one component, fast setting hydraulic cement material ideal for horizontal repairs of concrete in traffic areas for cold weather conditions. Five Star Highway Patch Winter provides resistance to oil, grease, gasoline, salts and other chemicals found in the transportation environment.

### ADVANTAGES

- High early strength
- One component/ease of use
- Open to traffic in three hours
- Freeze/thaw resistance
- Adjustable working time
- Resistant to salts
- Cold weather installation
- Coarse aggregate extension

### USES

- Highways and bridges
- Parking decks and ramps
- Airport runways and taxiways
- Expansion joint rebuild
- Dowel bar retrofit
- Cold weather repairs

### TECHNICAL SUPPORT

Five Star Products maintains the industry's foremost Engineering and Technical Support Group:

- Over 30 years of experience in concrete repair
- Technical Center staffed with experienced engineers available for consultation
- Design-A-Spec™ for engineering specification assistance
- Experienced representatives for field service
- Corporate research laboratory available to customize products for unique applications

### PACKAGING AND YIELD

Five Star Highway Patch Winter is packaged in heavy-duty polyethylene lined bags each weighing 50 lb (22.7 kg) yielding approximately 0.40 cubic feet (11.3 liters) and approximately 0.60 cubic feet (16.9 liters) with an 70% coarse aggregate extension. Also available in 3,000 lb bulk bags.

### SHELF LIFE

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

### TYPICAL PROPERTIES AT 40°F (4°C)

Compressive Strength, ASTM C 109	
3 Hours	3,000 psi (20.6 MPa)
1 Day	5,000 psi (34.5 MPa)
7 Days	7,000 psi (48.3 MPa)
Bond Strength, ASTM C 882	
1 Day	1,500 psi (10.4 MPa)
7 Days	2,000 psi (13.8 MPa)
Length Change, ASTM C 157	
28 Days Wet	+0.03%
28 Days Dry	-0.05%
Time of Set, ASTM C 266	
Initial	20 - 30 minutes
Final	30 - 45 minutes
Freeze/Thaw Resistance, ASTM C 666A	
Relative Durability Factor	> 90%
Chloride Ion Permeability, ASTM C 1202	
28 Days	Very Low ( < 1,000 Coulombs)

## PLACEMENT GUIDELINES

1. **SURFACE PREPARATION:** All surfaces in contact with Five Star Highway Patch Winter shall be free of oil, grease, laitance, and other contaminants. Concrete must be clean, sound and rough to ensure a good bond. Remove all oxidation from exposed reinforcing steel and for additional protection coat reinforcing steel with Five Star® AC Coat. A perimeter edge and minimum depth of one inch (25 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water or use Five Star® Bonding Adhesive. Surfaces shall be conditioned to between 35°F and 75°F (2°C and 24°C) at the time of placement.
2. **MIXING:** Mix Five Star Highway Patch Winter thoroughly for approximately three to five minutes with a mortar mixer or drill and paddle mixer. Adjust consistency if necessary, but do not exceed maximum water content stated on the package or an amount that will cause segregation. Do not mix more material than can be placed in 10 minutes. Addition of coarse aggregate, meeting ASTM C 33, should be used for pours greater than two inches (50 mm) in depth.
3. **PLACEMENT PROCEDURES:** When bonding adhesive is not used, firmly work Five Star Highway Patch Winter into substrate and place full depth from one side of the repair to the other. Where this is not practical, placement must be continuous to prevent cold joints between pours. Finish as necessary.  
**SPECIAL CONDITIONS:** For temperatures above 60°F (16°C) use standard Five Star Highway Patch. Protect from freezing until a compressive strength of at least 1,000 psi (6.9 MPa) is obtained. Faster strength gain will occur when the Five Star Highway Patch and mixing water have been conditioned to a higher temperature prior to placement. In warmer temperatures, chilled water or Summerset® may be used if necessary to provide more working time.
4. **POST-PLACEMENT PROCEDURES:** Five Star Highway Patch Winter shall be protected until initial set, then immediately coat with an approved curing compound meeting water retention properties of ASTM C 309 or wet cure for a minimum of three days. In-service operation may begin immediately after the required strength has been reached.  
**NOTE:** PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY. For more detailed placement procedures, refer to DESIGN-A-SPEC™, or call the Five Star Products Engineering and Technical Center at 800-243-2206.

## LIMITATIONS

- Never exceed the maximum water content stated on the package or an amount that will cause segregation.
- Temperature of surfaces must be between 35°F and 75°F (2°C and 24°C) at time of placement. For extreme temperatures, call the Five Star Products Engineering and Technical Center.
- Substrate shall be free of frost and ice.
- Repair material shall be protected from freezing until it reaches 1,000 psi (6.9 MPa).
- Placement shall be continuous to avoid cold joints.

## CAUTION

Contains cementitious material and crystalline silica. International Agency for Research on Cancer has evaluated 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 MATERIAL SAFETY DATA SHEET.

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, EXPRESSED 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."

For worldwide availability, additional product information and technical support, contact your local Five Star distributor, local sales representative, or you may call Five Star's Engineering and Technical Center at 800-243-2206.

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# Rapid Surface Repair Easy Mix

Fast Turnaround Surface Repair for Roads & Bridges

## PRODUCT DESCRIPTION

**Five Star® Rapid Surface Repair Easy Mix** is a self-leveling, low viscosity, two-part liquid polyurethane-hybrid polymer. When supplemented with its proprietary blended aggregate, this product is used to repair and rehabilitate concrete and asphaltic concrete pavements. The enhanced polymer is high performance, rapid setting, and can be used to make an impact and traffic resistant polymer concrete that can be used at temperatures down to 0°F (-18°C). Within minutes of placement, durable, long-lasting repairs are able to handle vibration, heavy traffic, and thermal movement.

## ADVANTAGES

- No priming required to bond to concrete, asphalt, steel or wood
- Waterproof, chemically resistant membrane protects substrates from freeze-thaw spalling
- Use neat or with aggregate
- Stops further corrosion of reinforcing steel
- Traffic ready in as little as 30 minutes\* (Standard version); 2 hours\* (LPL version)
- Very low odor
- Make repairs year round — can be used in temperatures down to 0°F (-18°C)

## USES

- Expansion joint and bridge header reconstruction
- Control joint filler
- Repair cracks, potholes, spalls
- Resurface runways, walkways, floors, and parking lots

## PACKAGING AND YIELD

Five Star® Rapid Surface Repair Easy Mix is packaged in either .64 gal. (2.42 L) kits containing .32 gal. (1.21 L) "A" & .32 gal. (1.21 L) "B" and 50 lbs. of aggregate yielding approximately .41 ft<sup>3</sup> (.011 m<sup>3</sup>) per kit, or in 55 gal. (208.2 L) "A" & 55 gal. (208.2 L) "B" drums and 50 lb. bags of aggregate yielding 70.4 ft<sup>3</sup> (2.0 m<sup>3</sup>).

## SHELF LIFE

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

*\*Traffic time dependent upon air and substrate temperature.*

TYPICAL PROPERTIES AT 77°F (25°C)		
	Standard Version	LPL Version
Mix Ratio by Volume	(1) Part A : (1) Part B	(1) Part A : (1) Part B
Viscosity @ 77°F—mixed	60 cps	60 cps
Gel Time, Neat	2 to 3 minutes	3 to 6 minutes
Working time with Aggregate	Approx. 5 minutes	Approx. 10 minutes
Cured		
Color	Dark Grey	Dark Grey
Cure Time (reopen to traffic)	30 minutes	2 hours
Hardness, Durometer D, ASTM D-2240	70	70
Tensile Strength, ASTM D-638	3,000 psi (20.7 MPa)	3,000 psi (20.7 MPa)
Compressive Strength, ASTM C-579B		
1 hour   2 hours	2,000 psi (13.8 MPa)	1,000 psi (6.9 MPa)
1 day	6,000 psi (41.3 MPa)	4,000 psi (27.6 MPa)
7 days	7,000 psi (48.2 MPa)	6,000 psi (41.3 MPa)
28 days	8,000 psi (55.1 MPa)	7,000 psi (48.2 MPa)
Elongation, ASTM D-638	15%	15%
Bond Strength, ASTM C-882	2,000 psi (13.8 MPa)	2,000 psi (13.8 MPa)

*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.*

## PLACEMENT GUIDELINES

### SURFACE PREPARATION

1. Prepare concrete surfaces to a minimum CSP-4 (Concrete Surface Profile per ICRI Technical Standard 03732. Ensure surfaces are clean, sound and rough prior to repair.
2. For overlays, cut keyway channel (groove) using concrete saw equipped with dry cut diamond blade around perimeter of area to be resurfaced. Keyway channel (groove) depth shall be a minimum of 1/2 inch (12.7 mm). Surfaces adjacent to a vertical plane (such as curbs, walls, tanks, etc.) shall have keyway channels cut approximately 4 – 6 inches (101.6 - 152.3 mm) back from vertical plane towards the interior of area to be resurfaced. Keyway channel shall be 1/2 inch (12.7 mm) deep by 1/2 inch (12.7 mm) wide.
3. For overlays, chip 2 inch (50.8 mm) wide taper back from interior edge of keyway channel at all termination edges (i.e., drains, doors, etc.). Using bush hammer or chipping gun equipped with a 1 – 2 inch (25.4 - 50.8 mm) wide spade blade, chip a 2 inch (50.8 mm) wide taper back from edge of interior keyway channel (groove) inward towards the area being resurfaced. Taper shall match depth of keyway channel at its deepest point, which is the edge of the keyway, and taper out to 0 inches at its most shallow point, 2 inches (50.8 mm) towards the interior of the area to be resurfaced.
4. For crack filling, route out as necessary to a maximum 1/2 inch wide by 1/2 inch deep.
5. Vacuum dust and dirt from all surfaces.
6. Surfaces must be completely dry and free of moisture prior to installation.

**MIXING INSTRUCTIONS:** Mix ratio is 1:1 by volume. Mix a small sample and test prior to actual placement. Larger mix volumes can generate significant exotherm. Mix Components A & B thoroughly with drill and paddle for 30 seconds then add aggregate. Continue mixing for 30 seconds until aggregate is completely wetted.

**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.

**CLEAN-UP:** Clean tools immediately after use with xylene or MEK.

### CONSIDERATIONS

- Product should be stored at 50–80°F (10–27°C).
- Product may be installed between 0–100°F (-18–37°C). For temperatures above or below these limits please consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Keep material out of sun or hot areas prior to applying, as this may cause working time to be diminished and could cause poor appearance and/or adhesion.

### CAUTION

This product may cause skin and eye 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. 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	UNIT SIZE
30928	Five Star® Rapid Surface Repair Easy Mix Kit (Standard)	.64 gallons (A & B) 50 lb. Aggregate
30968	Five Star® Rapid Surface Repair Easy Mix Kit (LPL)	.64 gallons (A & B) 50 lb. Aggregate
30931	Five Star® Rapid Surface Repair Easy Mix Drums (Standard)	110 total gallons (A & B) Aggregate not included
CALL	Five Star® Rapid Surface Repair Easy Mix Drums (LPL)	110 total gallons (A & B) Aggregate not included
30929	Five Star® Rapid Surface Repair Aggregate	50 lb. Bag

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# **Rapid Surface Repair EpoxyFix™**

Repair to Concrete and Asphaltic Infrastructure

## **PRODUCT DESCRIPTION**

Five Star® Rapid Surface Repair EpoxyFix™ is a unique, low viscosity, two-part liquid, epoxy-hybrid polymer. When supplemented with aggregates, this product is used to repair and rehabilitate concrete and asphaltic concrete pavements. The enhanced polymer is high performance, rapid setting, has a high tolerance for moisture, and can be used to make a resilient polymer concrete. Within minutes of placement, durable, long-lasting repairs are able to handle vibration, heavy traffic, and thermal movement.

## **ADVANTAGES**

- High moisture tolerance
- Superior bond strength
- No priming required to bond to concrete, asphalt or steel
- Traffic ready in as little as 40-50 minutes<sup>1</sup> at 70°F (21°C)
- Use any clean, locally sourced stone (does not need to be kiln-dried)
- Penetrates deeply for single and multiple lift repairs
- No toxic fumes during application.
- Make repairs, resurface pavements and apply protective coating year round — hot or cold.

## **USES**

- Expansion joint and bridge header reconstruction
- Control joint filler
- Spall and pothole repairs
- Surface repairs on roads, bridges, runways, industrial floors, parking lots
- General concrete patching where flexibility is required

## **PACKAGING AND YIELD**

Five Star® Rapid Surface Repair EpoxyFix™ comes packaged in:

- 10 gal. (37.9 L) kits: 5 gal. (18.9 L) "A" & 5 gal. (18.9 L) "B"
- 100 gal. (379.0 L) kits: 50 gal. (189.0 L) "A" & 50 (189.0 L) gal. "B"

Approximate yield of 25 square feet per gallon at 1/16 inch (1.6 mm)

## **SHELF LIFE**

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

<sup>1</sup>Traffic time dependent upon air and substrate temperature and depth of application.

TYPICAL PROPERTIES AT 70°F (21°C)	
Mix Ratio	(1) Part A : (1) Part B
Viscosity @ 73°F	Part A: 800 cps / Part B: 500 cps
Specific Gravity	Part A: 1.15 / Part B: 1.08
<b>Cured</b>	
Color	Clear to Amber/Assumes Color of Aggregate
Specific Gravity, ASTM D-792	1.08 g/cc
Hardness, Durometer D, ASTM D-2240	55 +/- 5
Tensile Strength, ASTM D-412	800 psi (5.5 MPa)
Compressive Strength, ASTM C-579B <sup>2</sup>	2,800 psi (19.3 MPa)
Elongation at Break, ASTM D-638	160% Minimum
Bond Strength, ASTM C-882	Concrete Failure

<sup>2</sup>With commercially available dried 3/8" crushed stone.

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.

## PLACEMENT GUIDELINES

### SURFACE PREPARATION

1. Prepare concrete surfaces to a minimum Concrete Surface Profile (CSP) 4 to 5 in accordance with ICRI Technical Standard 03732 (International Concrete Repair Institute) guidelines. As an alternative, roughen concrete surfaces to coarse aggregate exposure. Blow out all repair areas thoroughly with oil free compressed air, removing all dust, debris and bond inhibiting substances. Vertical saw-cut surfaces should be sandblasted.
2. All surfaces should be visibly dry prior to placement. Surfaces may be damp but best adhesion is to dry surfaces, use a torch or heat gun to dry excessively wet areas.
3. For optimum performance, liquid components should be conditioned to between 70-90°F (21-32°C) prior to use.
4. Fill or mitigate all substrate cracks prior to repair material replacement.
5. All repair geometries shall be squared up and have neat, clean edges.

**MIXING:** NOTE: Mix ratio is 1:1 by volume. Material may be mixed through a self-dispensing injection unit such as pleural component dispensing/mixing equipment. For machine installed product refer to your operator's manual and/or consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 for specifics.

**HAND MIX INSTRUCTIONS:** Five Star® Rapid Surface Repair EpoxyFix™ may also be used for small repairs. Measure exactly equal amounts by volume of components A & B. Mix together for 1 to 2 minutes depending on volume and temperature. Remember, as material quantities increase, heat generated by the product increases and the pot life of mixed product will decrease respectively.

### APPLICATION

1. Repair areas should have aggregate pre-placed at thicknesses up to 4 inches per lift for large areas and up to 12 inches for small areas.
2. Immediately pour mixed liquids through pre-placed aggregate. Placement must be continuous to prevent cold joints. Continue pouring liquids through aggregate until liquids can be seen puddling on top surfaces of aggregate and aggregate no longer accepts liquids. For multiple lifts, pre-place additional aggregate immediately, spread and level and continue pouring liquids through the next layer of aggregate. Repeat as necessary depending upon thickness of repair.
3. A topping sand or similar may be broadcast on top for skid resistant surfaces. Remove excess once material hardens.

**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 the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

**CLEAN-UP:** Clean tools immediately after use with xylene or MEK.

### CONSIDERATIONS

- Product should be stored at 40–110°F (4–43°C), and conditioned to a minimum of 70°F prior to installation.
- Product may be installed between 40–110°F (4–43°C). For temperatures above or below these limits please consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Minimum substrate temperature 40°F (4°C) and rising with conditioned materials.
- Colder temps will reduce strength gain and time to traffic.
- Keep material out of sun or hot areas prior to applying, as this may cause working time to be diminished and could cause poor appearance and/or adhesion.

### CAUTION

This product may cause skin and eye 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. 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 you may call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30936	Five Star® Rapid Surface Repair EpoxyFix™ Kit (Part A & B)	10 Gallons
30939	Five Star® Rapid Surface Repair EpoxyFix™ (Part A & B)	100 Gallons
Call	Five Star® Crushed Stone Aggregate	50 lb. Bag

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## **Five Star® PF-60**

### **Rapid Surface Repair**

#### **PRODUCT DESCRIPTION**

Five Star® PF-60 is a unique, low viscosity, two-part liquid, polyurethane-hybrid polymer. When supplemented with aggregates, this product is used to repair and rehabilitate concrete and asphaltic concrete pavements. The enhanced polymer is high performance, rapid setting, and can be used to make a resilient polymer concrete. Within minutes of placement, durable, long-lasting repairs are able to handle vibration, heavy traffic, and thermal movement.

This product is also available in a Moisture Scavenging version (Five Star® PF-60 MS) to improve set in high moisture cure environments.

#### **ADVANTAGES**

- No priming required to bond to concrete, asphalt, steel or wood
- Waterproof, chemically resistant membrane protects substrates from freeze-thaw spalling. Stops further corrosion of reinforcing steel
- Liquid becomes solid (cures) in as little as 60 seconds. Traffic Ready in as little as 10 minutes\*.
- No toxic fumes during application. Low odor.
- Make repairs, resurface pavements, and apply protective coating year round - hot or cold.

#### **USES**

- Expansion joint and bridge header reconstruction
- Control joint filler
- Repair cracks, potholes, spalls
- Resurface walkways, floors & bridge deck overlays

#### **PACKAGING AND YIELD**

Five Star® PF-60 is packaged in:

- 10 gal. (37.9 L) kits: 5 gal. (18.9 L) "A" & 5 gal. (18.9 L) "B"
- 30 gal. (113.5 L) kits: 15 gal. (56.7 L) "A" & 15 gal. (56.7 L) "B"
- 108 gal. (408.8 L) kits: 54 gal. (204.4 L) "A" & 54 (204.4 L) gal. "B"

Approximate yield of 25 square feet per gallon at 1/16 inch (1.6 mm)

#### **SHELF LIFE**

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

*\*10-minute traffic ready for catalyzed machine applied version. Traffic time dependent upon air and substrate temperature.*

TYPICAL PROPERTIES AT 70°F (21°C)	
Mix Ratio	(1) Part A : (1) Part B
Viscosity @ 73°F	Part A: 80 cps / Part B: 100 cps
Specific Gravity	Part A: 1.07 / Part B: 0.95
<b>Cured</b>	
Color	Black
Specific Gravity, ASTM D-792	1.08
Hardness, Durometer D, ASTM D-2240	60
Tensile Strength, ASTM D-412	2,000 psi
Compressive Strength, ASTM C-39	1,500 psi
Elongation at Break, ASTM D-412	160%
Bond Strength, ASTM C-882	760 psi

*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.*

## PLACEMENT GUIDELINES

### SURFACE PREPARATION

1. Prepare surface to a minimum CSP-4 (Concrete Surface Profile per ICRI Technical Standard 03732) profile by removing all surface contaminants, including sealers, oils, or other bond inhibiting substances via chipping or similar mechanical method.
2. For overlays, cut keyway channel (groove) using concrete saw equipped with dry cut diamond blade around perimeter of area to be resurfaced. Keyway channel (groove) depth shall be a minimum of ½ inch (12.7 mm). Surfaces adjacent to a vertical plane (such as curbs, walls, tanks, etc.) shall have keyway channels cut approximately 4 – 6 inches (101.6 - 152.3 mm) back from vertical plane towards the interior of area to be resurfaced. Keyway channel shall be ½ inch (12.7 mm) deep by ½ inch (12.7 mm) wide.
3. For overlays, chip 2 inch (50.8 mm) wide taper back from interior edge of keyway channel at all termination edges (ie: drains, doors etc.). Using bush hammer or chipping gun equipped with a 1 – 2 inch (24.4 - 50.8 mm) wide spade blade, chip a 2 inch (50.8 mm) wide taper back from edge of interior keyway channel (groove) inward towards the area being resurfaced. Taper shall match depth of keyway channel at its deepest point, which is the edge of the keyway, and taper out to 0 inches at its most shallow point, 2 inches (50.8 mm) towards the interior of the area to be resurfaced.
4. Route out all cracks to a minimum of ½ inch (12.7 mm) wide by ½ inch (12.7 mm) deep, using concrete saw equipped with dry cut crack chasing blade. Scarify vertical saw cut surfaces.
5. Vacuum surface free of all dust and dirt.
6. Surfaces must be completely dry and free of moisture prior to installation.

**MIXING:** NOTE: Mix ratio is 1:1 by volume. For machine applied (FastCat) product refer to your FastCat operators manual and consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 for specifics.

**HAND MIX INSTRUCTIONS:** Mix a small sample before working on your specific project so you will know what to expect as to what product looks like while setting and curing. Mix a small amount of material for a test. Remember, as material quantities increase, heat generated by the product increases and the potlife of mixed product will decrease respectively.

**SPECIAL CONDITIONS:** For use in cold temperatures, use Fast-Start Catalyst. Contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 for catalyst dosing information.

**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 the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

**CLEAN-UP:** Clean tools immediately after use with xylene or MEK.

### CONSIDERATIONS

- Product should be stored at 50–80°F (10–27°C).
- Product may be installed between 20–100°F (-6–37°C). For temperatures above or below these limits please consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Keep material out of sun or hot areas prior to applying, as this may cause working time to be diminished and could cause poor appearance and/or adhesion.

### CAUTION

This product may cause skin and eye 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL**

### SAFETY DATA SHEET.

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30912	Five Star® PF-60 KIT (PART A & B)	10 gallons
30916	Five Star® PF-60 MS KIT (PART A & B)	10 gallons
30911	Five Star® PF-60 KIT (PART A & B)	30 gallons
30915	Five Star® PF-60 MS KIT (PART A & B)	30 gallons
30850	Five Star® PF-60 KIT (PART A & B)	108 gallons
30849	Five Star® PF-60 MS KIT (PART A & B)	108 gallons
30846	Fast-Start Catalyst	4 oz.

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

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## **Rapid Surface Repair PolyFix™**

Polyurethane Concrete and Asphaltic  
Concrete Surface Repair

### **PRODUCT DESCRIPTION**

Five Star® Rapid Surface Repair PolyFix™ is a unique, low viscosity, two-part liquid, polyurethane-hybrid polymer. When supplemented with aggregates, this product is used to repair and rehabilitate concrete and asphaltic concrete pavements. The enhanced polymer is high performance, rapid setting, and can be used to make a resilient polymer concrete. Within minutes of placement, durable, long-lasting repairs are able to handle vibration, heavy traffic, and thermal movement.

### **ADVANTAGES**

- No priming required to bond to concrete, asphalt, steel or wood
- Waterproof, chemically resistant membrane protects substrates from freeze-thaw spalling
- Stops further corrosion of reinforcing steel
- Liquid becomes solid (cures) in as little as 2 minutes. Traffic Ready in as little as 10 minutes\*.
- No toxic fumes during application. Low odor.
- Make repairs, resurface pavements, and apply protective coating year round - hot or cold.

### **USES**

- Expansion joint and bridge header reconstruction
- Control joint filler
- Repair cracks, potholes, spalls
- Resurface walkways, floors & bridge deck overlays

### **PACKAGING AND YIELD**

Five Star® Rapid Surface Repair PolyFix™ comes packaged in:

- 10 gal. (37.9 L) kits: 5 gal. (18.9 L) "A" & 5 gal. (18.9 L) "B"
- 108 gal. (408.8 L) kits: 54 gal. (204.4 L) "A" & 54 (204.4 L) gal. "B"

Approximate yield of 25 square feet per gallon at 1/16 inch (1.6 mm)

### **SHELF LIFE**

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

*\*10-minute traffic ready for catalyzed machine applied version. Traffic time dependent upon air and substrate temperature.*

TYPICAL PROPERTIES AT 77°F (25°C)	
Mix Ratio	(1) Part A : (1) Part B
Viscosity, ASTM C-881	Part A: 60 cps / Part B: 60 cps
Cured	Color: Black
Hardness, Durometer D, ASTM D-2240	60 ± 5
Compressive Strength, ASTM C 39 (w/aggregate)	1,500 psi (10.34 MPa)
Tensile Strength, ASTM D 638	1,400 psi (9.65 MPa)
Tensile Elongation, ASTM D-638	160% Minimum
Bond Strength, ASTM C-882	760 psi (5.24 MPa)

*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.*

## PLACEMENT GUIDELINES

### SURFACE PREPARATION

1. Prepare surface to a minimum CSP-4 (Concrete Surface Profile per ICRI Technical Standard 03732) profile by removing all surface contaminants, including sealers, oils, or other bond inhibiting substances via chipping or similar mechanical method.
2. For overlays, cut keyway channel (groove) using concrete saw equipped with dry cut diamond blade around perimeter of area to be resurfaced. Keyway channel (groove) depth shall be a minimum of ½ inch (12.7 mm). Surfaces adjacent to a vertical plane (such as curbs, walls, tanks, etc.) shall have keyway channels cut approximately 4 – 6 inches (101.6 - 152.3 mm) back from vertical plane towards the interior of area to be resurfaced. Keyway channel shall be ½ inch (12.7 mm) deep by ½ inch (12.7 mm) wide.
3. For overlays, chip 2 inch (50.8 mm) wide taper back from interior edge of keyway channel at all termination edges (ie: drains, doors etc.). Using bush hammer or chipping gun equipped with a 1 – 2 inch (24.4 - 50.8 mm) wide spade blade, chip a 2 inch (50.8 mm) wide taper back from edge of interior keyway channel (groove) inward towards the area being resurfaced. Taper shall match depth of keyway channel at its deepest point, which is the edge of the keyway, and taper out to 0 inches at its most shallow point, 2 inches (50.8 mm) towards the interior of the area to be resurfaced.
4. Route out all cracks to a minimum of ½ inch (12.7 mm) wide by ½ inch (12.7 mm) deep, using concrete saw equipped with dry cut crack chasing blade. Scarify vertical saw cut surfaces.
5. Vacuum surface free of all dust and dirt.
6. Surfaces must be completely dry and free of moisture prior to installation.

**MIXING:** NOTE: Mix ratio is 1:1 by volume. For machine applied (Fast-Cat) product refer to your Fast-Cat operators manual and consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 for specifics.

**HAND MIX INSTRUCTIONS:** Mix a small sample before working on your specific project so you will know what to expect as to what product looks like while setting and curing. Mix a small amount of material for a test. Remember, as material quantities increase, heat generated by the product increases and the potlife of mixed product will decrease respectively.

**SPECIAL CONDITIONS:** For use in cold temperatures, use Five Star® PolyFlex™ Catalyst. Contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 for catalyst dosing information.

**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 the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

**CLEAN-UP:** Clean tools immediately after use with xylene or MEK.

### CONSIDERATIONS

- Product should be stored at 50 to 80°F (10 to 27°C).
- Product may be installed between 40°F and rising to 100°F (4.4° to 37°C). For temperatures above or below these limits please consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Keep material out of sun or hot areas prior to applying, as this may cause working time to be diminished and could cause poor appearance and/or adhesion.

### CAUTION

This product may cause skin and eye 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. 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 you may call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30945	Five Star® Rapid Surface Repair PolyFix™ Kit (Part A & B)	10 gallons
30942	Five Star® Rapid Surface Repair PolyFix™ (Part A & B)	108 gallons
Call	Five Star® Rapid Surface Repair PolyFix™ Catalyst	1.5 oz.
Call	Five Star® Crushed Stone Aggregate	50 lb. 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."

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## **Five Star® R-60**

### **Rapid Surface Repair**

#### **PRODUCT DESCRIPTION**

Five Star® R-60 is an ultra low viscosity concrete healer and penetrating crack sealer. This unique polyurethane-hybrid polymer restores concrete strength by penetrating deep into concrete pavements and re-bonding cracks. Five Star® R-60 seals concrete to reduce freeze-thaw spalling, as well as protect from further chemical attack and is traffic ready in as little as 10 minutes.

This product is also available in a Moisture Scavenging version (Five Star® R-60 MS) to improve set in high moisture cure environments.

#### **ADVANTAGES**

- No priming required to bond to concrete, asphalt, steel or wood
- Penetrates, seals cracks, and protects substrates from freeze-thaw spalling. Stops further corrosion of reinforcing steel.
- Solidifies in as little as 2-5 minutes, penetrating narrowest cracks. Traffic Ready in as little as 10 minutes\*.
- No toxic fumes during application.
- Make repairs, resurface pavements, and apply protective coating year round - hot or cold.

#### **USES**

- Repair cracks, potholes, spalls
- Deck sealer/crack healer on PCC pavement
- Primer for epoxies and urethane resurfacers
- Creates non-skid and traction surfaces
- Anchoring adhesive

#### **PACKAGING AND YIELD**

Five Star® R-60 is packaged in:

- 10 gal. (37.9 L) kits: 5 gal. (18.9 L) "A" & 5 gal. (18.9 L) "B"
- 30 gal. (113.5 L) kits: 15 gal. (56.7 L) "A" & 15 gal. (56.7 L) "B"
- 108 gal. (408.8 L) kits: 54 gal. (204.4 L) "A" & 54 (204.4 L) gal. "B"

Yield 7.4 gallons per cubic foot used neat. Yield per gallon increases proportionally with aggregate use.

#### **SHELF LIFE**

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

*\*10-minute traffic ready for catalyzed machine applied version. Traffic time dependent upon air and substrate temperature.*

TYPICAL PROPERTIES AT 70°F (21°C)	
Mix Ratio	(1) Part A : (1) Part B
Viscosity @ 73°F	Part A: 12 cps / Part B: 16 cps
Specific Gravity	Part A: 1.11 / Part B: 1.03
<b>Cured</b>	
Color	Black
Specific Gravity, ASTM D-792	1.06
Hardness, Durometer D, ASTM D-2240	65
Tensile Strength, ASTM D-412	4,500 psi
Compressive Strength, ASTM C-39	3,000 psi
Elongation at Break, ASTM D-412	<10%
Bond Strength, ASTM C-882	1,500 psi

*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.*

## PLACEMENT GUIDELINES

### SURFACE PREPARATION

1. Prepare surface to a minimum CSP-4 (Concrete Surface Profile per ICRI Technical Standard 03732) profile by removing all surface contaminants, including sealers, oils, or other bond inhibiting substances via chipping or similar mechanical method.
2. For overlays, cut keyway channel (groove) using concrete saw equipped with dry cut diamond blade around perimeter of area to be resurfaced. Keyway channel (groove) depth shall be a minimum of ½ inch (12.7 mm) depth. Surfaces adjacent to a vertical plane (such as curbs, walls, tanks, etc.) shall have keyway channels cut approximately 4 – 6 inches (101.6 - 152.3 mm) back from vertical plane towards the interior of area to be resurfaced. Keyway channel shall be ½ inch (12.7 mm) deep by ½ inch (12.7 mm) wide.
3. For overlays, chip 2 inch (50.8 mm) wide taper back from interior edge of keyway channel at all termination edges (ie: drains, doors etc.). Using bush hammer or chipping gun equipped with a 1 – 2 inch (25.4 - 50.8 mm) wide spade blade, chip a 2 inch (50.8 mm) wide taper back from edge of interior keyway channel (groove) inward towards the area being resurfaced. Taper shall match depth of keyway channel at its deepest point, which is the edge of the keyway, and taper out to 0 inches at its most shallow point, 2 inches (50.8 mm) towards the interior of the area to be resurfaced.
4. Route out all cracks to a minimum of ½ inch (12.7 mm) wide by ½ inch (12.7 mm) deep, using concrete saw equipped with dry cut crack chasing blade. Scarify vertical saw cut surfaces.
5. Vacuum surface free of all dust and dirt.
6. Surfaces must be completely dry and free of moisture prior to installation.

**MIXING:** NOTE: Mix ratio is 1:1 by volume. For machine applied (FastCat) product refer to your FastCat operators manual and consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 for specifics.

**HAND MIX INSTRUCTIONS:** Mix a small sample before working on your specific project so you will know what to expect as to what product looks like while setting and curing. Mix a small amount of material for a test. Remember, as material quantities increase, heat generated by the product increases and the potlife of mixed product will decrease respectively.

**SPECIAL CONDITIONS:** For use in cold temperatures, use Fast-Start Catalyst. Contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 for catalyst dosing information.

**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 the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

**CLEAN-UP:** Clean tools immediately after use with xylene or MEK.

### CONSIDERATIONS

- Product should be stored at 50–80°F (10–27°C).
- Product may be installed between 20–100°F (-6–37°C). For temperatures above or below these limits please consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Keep material out of sun or hot areas prior to applying, as this may cause working time to be diminished and could cause poor appearance and/or adhesion.

### CAUTION

This product may cause skin and eye 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30914	Five Star® R-60 KIT (PART A & B)	10 gallons
30918	Five Star® R-60 MS KIT (PART A & B)	10 gallons
30913	Five Star® R-60 KIT (PART A & B)	30 gallons
30917	Five Star® R-60 MS KIT (PART A & B)	30 gallons
30853	Five Star® R-60 KIT (PART A & B)	108 gallons
30848	Five Star® R-60 MS KIT (PART A & B)	108 gallons
30846	Fast-Start Catalyst	4 oz.

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

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**FIVE STAR**

Specified by the World's Best™

## **SPECIALTY** **Concrete Repair**

### **FIVE STAR® STRUCTURAL CONCRETE® UNDERWATER HANDPACK**

Hand applied, rapid strength, permanent underwater concrete repair material; use in tidal zones and underwater

### **FIVE STAR® STRUCTURAL CONCRETE® HTR**

High early strength, high-temperature exposure concrete repair material; can be pumped or poured into place

### **FIVE STAR® STRUCTURAL CONCRETE® HTR SHOTCRETE**

Rapid strength, high temperature exposure concrete repair material; dry process shotcrete application

**NOTES:**

[illegible]



## **STRUCTURAL CONCRETE®** **UNDERWATER HAND PACK**

Hand Applied, Rapid Strength Underwater Repair

### **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.

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
3 Hours	3,000 psi (20.7 MPa)
1 Day	4,000 psi (27.6 MPa)
7 Days	5,000 psi (34.5 MPa)
28 Days	5,500 psi (37.9 MPa)
<b>Underwater Bond Strength, ASTM C 882</b>	
7 Days	1,150 psi (7.9 MPa)
<b>Length Change, ASTM C 157</b>	
28 Days Wet	+0.02%
<b>Working Time at 70°F (21°C)</b>	10 minutes

*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

- 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 Design-A-Spec™ or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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.
- 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.
- 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 Design-A-Spec™ installation guidelines or call the 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 the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
29220	Five Star Structural Concrete® Underwater Hand Pack	36 lb. Pail

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

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# STRUCTURAL CONCRETE HTR

## High Early Strength Repair For High Temperature Exposure

### PRODUCT DESCRIPTION

Five Star Structural Concrete HTR is a unique high temperature resistant concrete repair material which can be pumped or poured into place. Five Star Structural Concrete HTR gains strength rapidly and can be exposed to 1000°F (538°C) in six hours and up to 2400°F (1316°C) after a 7-day curing procedure.

### ADVANTAGES

- Thermal shock resistant
- High temperature resistance
- Coarse aggregate extension up to 100%
- Resistant to sulfates
- High early strengths
- Excellent freeze/thaw resistance

### USES

- Areas of high temperature exposure
- Thermal cycling up to 2400°F (1316°C)
- Rapid repairs during shutdowns
- Coker, kiln and foundry repairs

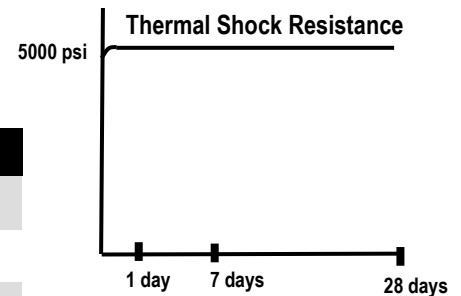
### PACKAGING AND YIELD

Five Star Structural Concrete HTR is packaged in heavy-duty polyethylene lined bags and is available in 50 lb (22.7 kg) units yielding approximately 0.40 cubic feet (11.3 liters) at maximum water.

### SHELF LIFE

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

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Compressive Strength, ASTM C 109</b>	
6 Hours	2500 psi (17.3 MPa)
1 Day	4500 psi (31.1 MPa)
7 Days	5500 psi (38.0 MPa)
28 Days	7000 psi (48.3 MPa)
<b>Bond Strength, ASTM C 882</b>	
1 Day	1500 psi (10.4 MPa)
7 Days	2500 psi (17.3 MPa)
<b>Thermal Coefficient of Expansion, ASTM C 531</b>	
5.0 x 10 <sup>-6</sup> in/in/°F (9.0 x 10 <sup>-6</sup> mm/mm/°C)	
<b>Working Time at 70°F (21°C)</b>	30 minutes



# CYCLE	AGE	STRENGTH
3 hour cycle	9 hours	5000 psi
1 1/2 cycles	1 day	5300 psi
5 1/2 cycles	7 days	5300 psi
20 1/2 cycles	28 days	5300 psi

Samples cured at 70°F (21°C) for 6 hours, then exposed to 1000°F (538°C) in 24 hour cycles

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.

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All horizontal and vertical surfaces in contact with Five Star Structural Concrete HTR shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Remove all oxidation from exposed reinforcing steel and for additional protection coat reinforcing steel with Five Star® AC Coat. A perimeter edge and minimum depth of two inches (50 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water. Surfaces shall be conditioned to between 40°F and 90°F (4°C and 32°C) at time of placement.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during placement. Areas where bond is not desired must be treated with form oil, paste wax or similar material. Joints may be necessary depending on pour dimensions. Any existing joints within the repair area should be maintained. Contact the Five Star Engineering and Technical Service Center for further information.
3. **MIXING:** Mix Five Star Structural Concrete HTR thoroughly for four to five 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. For optimum performance, condition between 60°F and 80°F (16°C and 27°C). Mix Five Star Structural Concrete HTR with 1 3/4 to 2 1/4 quarts potable water per 50 lb. unit. 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, should be used for large volume pours. Working time is approximately 30 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by repair material.
4. **PLACEMENT PROCEDURES:** Whenever possible, place Five Star Structural Concrete HTR full depth from one side of the repair to the other. To ensure optimal bond development, firmly work material into substrate. Placement should be continuous to prevent cold joints between pours. For pours over 3 inches (50 mm) in depth and detailed information regarding pumping, contact the Five Star Engineering and Technical Service Center at (800) 243-2206. Finish as necessary.
5. **POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete HTR shall be kept wet for a minimum of one to four hours immediately after hardening depending on the volume and depth of the placement. Wet curing shall begin as soon as the material is thumb-print hard. Approximately six hours after placement, material can be brought up to an operating temperature of 1000°F (538°C). For operating temperatures up to 2400°F (1316°C), wet cure for 3 days followed by dry cure for 4 days. Then slowly apply heat up to 2400°F (1316°C).

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

## **CONSIDERATIONS**

- Never exceed the maximum water content as stated on the package or add an amount that will cause segregation.
- If temperatures of equipment and surfaces are not between 40°F and 90°F (4°C and 32°C) at time of placement, refer to Design-A-Spec™, or call the Five Star Engineering and Technical Service Center at (800) 243-2206.
- For placements thinner than two inches (50 mm) or greater than four inches (102 mm), and a volume exceeding two cubic feet (56.6 liters), call the Five Star Engineering and Technical Service Center at (800) 243-2206.

## **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 MATERIAL SAFETY DATA SHEET.**

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

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**FIVE STAR**

## **STRUCTURAL CONCRETE HTR SHOTCRETE**

Rapid Strength, Dry Process for High Temperature Exposure

### **PRODUCT DESCRIPTION**

Five Star Structural Concrete® HTR Shotcrete is a unique high temperature resistant concrete repair material which is applied by dry process shotcrete. Five Star Structural Concrete HTR Shotcrete gains strength rapidly and can be exposed to 1000°F (538°C) in three hours and up to 2400°F (1316°C) after a 7-day curing procedure.

### **ADVANTAGES**

- Thermal shock resistant
- High temperature resistance
- Rapid strength gain
- Resistant to sulfates
- Dry process shotcrete application
- Excellent freeze/thaw resistance

### **USES**

- Areas of high temperature exposure
- Thermal cycling up to 2400°F (1316°C)
- Rapid repairs during shutdowns
- Coker, kiln and foundry repairs

### **PACKAGING AND YIELD**

Five Star Structural Concrete HTR Shotcrete is packaged in heavy-duty polyethylene lined bags and is available in 50 lb (22.7 kg) units yielding approximately 0.39 cubic feet (11.0 liters) at maximum water.

### **SHELF LIFE**

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

#### **TYPICAL PROPERTIES AT 70°F (21°C)**

##### **Compressive Strength, ASTM C 109**

3 Hours 2500 psi (17.3 Mpa)

1 Day 4500 psi (31.1 MPa)

28 Days 7000 psi (48.3 MPa)

##### **Compressive Strength, ASTM C 42 in accordance with ACI 506R-90**

3 Days 5000 psi (34.5 Mpa)

7 Days 5700 psi (39.3 MPa)

28 Days 7000 psi (48.3 MPa)

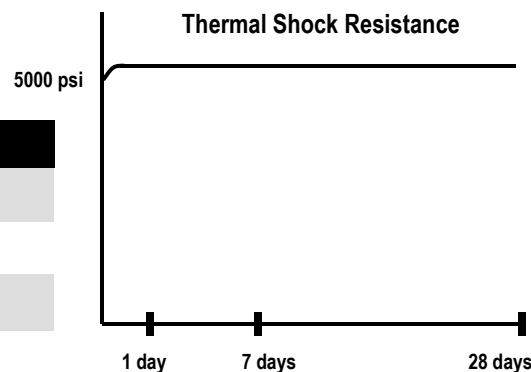
##### **Bond Strength, ASTM C 882**

1 Day 1500 psi (10.4 MPa)

7 Days 2500 psi (17.3 MPa)

**Thermal Coefficient of Expansion, ASTM C 531** 5.0 x 10<sup>-6</sup> in/in/°F (9.0 x 10<sup>-6</sup> mm/mm/°C)

**Working Time at 70°F (21°C)** 20 minutes



# CYCLE	AGE	STRENGTH
3 hour cycle	6 hours	5000 psi
1 1/2 cycles	1 day	5300 psi
5 1/2 cycles	7 days	5300 psi
20 1/2 cycles	28 days	5300 psi

Samples cured at 70°F (21°C) for 3 hours, then exposed to 1000°F (538°C) in 24 hour cycles

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.

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete HTR Shotcrete shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Remove all oxidation from exposed reinforcing steel and for additional protection coat reinforcing steel with Five Star® AC Coat. A perimeter edge and minimum depth of two inches (50 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water. Surfaces shall be conditioned to between 40°F and 90°F (4°C and 32°C) at time of placement.
2. **MIXING:** The mixing equipment should be capable of maintaining continuous placement and equipped with a screen to avoid plug-ups.  
**DRY MIX PROCESS:** Pre-dampen Five Star Structural Concrete HTR Shotcrete either in a mortar mixer (stationary barrel with moving blades) prior to placement into gun or with a pre-hydration water ring equipped with a screen to avoid plug-ups. Avoid over dampening material. Do not pre-dampen more material than can be placed within 20 minutes. Adjust consistency at nozzle.
3. **METHODS OF PLACEMENT:** Apply Five Star Structural Concrete HTR Shotcrete to full design thickness whenever possible. Overhead placement is applied in layers just thick enough to prevent sagging. Direct nozzle perpendicular to surface and rotate in a series of circular patterns, filling all inside corners first. Five Star Structural Concrete HTR Shotcrete should emerge from the nozzle in a uniform, uninterrupted flow. Finish to desired texture with screed, float, trowel, or brush. For more detailed application procedures, refer to ACI 506R-90, Guide to Shotcrete Report.
4. **POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete HTR Shotcrete shall be kept wet for a minimum of 30 minutes, depending on the volume and depth of the placement. Wet curing shall begin as soon as the material is thumb-print hard. Approximately three hours after placement, material can be brought up to an operating temperature of 1000°F (538°C). For operating temperatures up to 2400°F (1316°C), wet cure for 3 days followed by dry cure for 4 days. Then slowly apply heat up to 2400°F (1316°C).

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

## **CONSIDERATIONS**

- Never exceed the maximum water content as stated on the package.
- If temperatures of equipment and surfaces are not between 40°F and 90°F (4°C and 32°C) at time of placement, refer to Design-A-Spec™, or call the Five Star Engineering and Technical Service Center at (800) 243-2206.
- For placements thinner than two inches (50 mm) or greater than four inches (102 mm), call the Five Star Engineering and Technical Service Center at (800) 243-2206.

## **CAUTION**

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# FIVE STAR

Specified by the World's Best™

# Adhesives & Sealants

## **FIVE STAR® BONDING ADHESIVE**

Multi-purpose epoxy adhesive for bonding fresh concrete to hardened concrete or steel

## **FIVE STAR® EPOXY ADHESIVE LV**

Low-viscosity, moisture insensitive, epoxy system used for filling cracks and voids up to 1/4 inch (6 mm)

## **FIVE STAR® SEGMENTAL BRIDGE ADHESIVE & SEGMENTAL BRIDGE ADHESIVE LT**

Used in the installation or repair of segmental bridges and structures  
Two versions available for varying temperatures: SBA for 60-120°F (16-49°C) and SBA LT for 20-80°F (-7 - 27°C).

## **FIVE STAR® EPOXY PRIMER**

Low viscosity epoxy baseplate primer for steel and concrete corrosion protection; can be brush, roller or spray applied

## **FIVE STAR CENTRI-CAST® JOINT FILLER**

Solvent-free adhesive and void filler for use on multiple substrates. Fills voids and gaps of up to 3/4". Also for use with the Five Star Centri-Cast® industrial pipe repair system.

## **FIVE STAR® CONTROL JOINT SEALER**

Semi-rigid, moisture insensitive, self-leveling epoxy joint filler and sealer for filling horizontal control joints

## **FIVE STAR® PRESSURE PORT CRACK REPAIR SYSTEM**

Complete epoxy crack injection concrete repair kit; structural repair for horizontal, vertical and overhead cracks up to 1/4 inch

**NOTES:**

[illegible]



## **BONDING ADHESIVE**

Multi-Purpose Epoxy Adhesive

### **PRODUCT DESCRIPTION**

Five Star® Bonding Adhesive is a multi-purpose, two component, 100% solids, moisture insensitive structural epoxy adhesive. Five Star® Bonding Adhesive is excellent for bonding fresh concrete or repair materials to cured concrete, steel, and as a coating for corrosion protection of steel. Five Star® Bonding Adhesive meets ASTM C 881 Type I, II, IV and V, Grade 2, Classes B and C; and also meets USDA specifications for use in food processing areas.

### **ADVANTAGES**

- High strength bonding adhesive
- Moisture insensitive before, during and after cure
- Excellent adhesion to masonry, concrete, wood, steel and most structural materials
- Convenient 1:1 mixing ratio
- Low odor
- Easy to use

### **USES**

- Bonding fresh concrete to hardened concrete or steel
- Corrosion protection for steel
- Structural adhesive
- Gravity fill cracks in horizontal concrete and masonry

### **PACKAGING AND YIELD**

Five Star® Bonding Adhesive is available in a one gallon (3.7 liters) unit yielding a coverage rate of approximately 80 square feet at 20 mil thickness.

### **SHELF LIFE**

Two years in original unopened packaging when stored in dry conditions at 45°F to 90°F (5°C to 35°C).

TYPICAL PROPERTIES AT 70°F (21°C)	
Color	Gray
Viscosity, ASTM D 2393	6,000 cps
Tensile Properties, ASTM D 638	
Tensile Strength	7,000 psi (48.3 MPa)
% Elongation at Break	3.8%
Water Absorption, ASTM D 570	0.10%
Heat Deflection Temperature, ASTM D 648	125°F (52°C)
Bond Strength, ASTM C 882, Grade 2	
2 Day	4,300 psi (29.6 MPa)
14 Day	5,200 psi (35.8 MPa)
Compressive Properties, ASTM D 695	
Compressive Strength	10,000 psi (68.9 MPa)
Compressive Modulus	2.3 x 10 <sup>5</sup> (1,580 MPa)
Gel Time, ASTM C 881	25 minutes

*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.*

## PLACEMENT GUIDELINES

- SURFACE PREPARATION:** Surface must be clean and sound. For best results, surfaces should be dry. Remove dust, laitance, grease, curing compounds, impregnations and waxes. Concrete may be sandblasted or prepared by other approved mechanical means. Steel should be sandblasted to an SSPC-SP6 commercial finish.
- MIXING:** For best results, material should be preconditioned to between 65°F and 85°F (18°C and 29°C). Pre-mix each component thoroughly. Place one part by volume of Component A and one part by volume of Component B into a clean pail. Mix thoroughly for three minutes with a low speed drill (400-600 rpm) to avoid air entrapment. Do not mix more material than can be placed in 25 minutes at 70°F (21°C).
- METHODS OF PLACEMENT:**

**To bond fresh concrete or repair material to hardened concrete:** Five Star® Bonding Adhesive may be sprayed, brushed or rolled, approximately 80 sq. ft. per gallon. Place fresh concrete or repair material while Five Star® Bonding Adhesive is still tacky which can range from one to four hours depending on job site conditions. If coating becomes glossy and loses tackiness, remove any surface contaminants then recoat with additional Five Star® Bonding Adhesive and proceed.

**Gravity Fill:** Pour over V-notched cracks on horizontal surfaces. Continue placement until cracks are completely filled. Prior to filling, seal underside of cracks with Five Star® RS Anchor Gel or Five Star® Injection Gel where required.

**Epoxy Mortar:** Add 1.5 parts oven dried sand to 1 part mixed Five Star® Bonding Adhesive. Mix until uniform consistency is achieved and apply into repair area.

**Corrosion protection for steel:** Clean steel to an SSPC-SP6 commercial finish. Spray or brush Five Star® Bonding Adhesive on steel to a 20 mil thickness, leaving no voids, pinholes or uncoated areas. Allow to cure. Where bond to steel is required, reapply prior to concrete placement. **Complete placement of concrete while Five Star® Bonding Adhesive is still tacky.**
- CLEAN-UP:** Use an appropriate solvent to clean uncured material. Cured material can only be removed mechanically.

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

## CONSIDERATIONS

- Minimum application temperature of substrate is 40°F (4°C) and rising. Low temperatures adversely affect flowability and strength gain.
- Do not thin with solvents.
- Minimum age of concrete must be 21 to 28 days, depending on curing and drying conditions prior to application.
- For cracks over 1/2 inch (13 mm), consult Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Cold temperatures increase gel and open time, hot temperatures decrease gel and open time.
- Maximum operating temperature is 200°F (93°C).
- Material is a vapor area after cure.

## 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. PRIOR TO USE, REFER TO MATERIAL 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	WEIGHT
30806	Bonding Adhesive	60	11 lb. (4.99 Kg)

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Specifications Subject to Change.

For most current version of datasheet, go to [FiveStarProducts.com](http://FiveStarProducts.com)

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## **EPOXY ADHESIVE LV**

Low-Viscosity Epoxy Adhesive

### **PRODUCT DESCRIPTION**

**Five Star® Epoxy Adhesive LV** is a two component, 100% solids, moisture insensitive, structural epoxy adhesive used in filling cracks and voids up to 1/4 inch (6 mm). Five Star® Epoxy Adhesive LV is a low-viscosity epoxy system that can be pressure injected or gravity fed. When mixed with a dried sand, it may also be used as an epoxy mortar.

### **ADVANTAGES**

- Low viscosity ensures deep penetration
- Moisture insensitive
- Very high strength
- Excellent adhesion to masonry, concrete, wood, steel and most structural material
- High modulus structural adhesive

### **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

### **PACKAGING AND YIELD**

Five Star® Epoxy Adhesive LV is available in a one-gallon (3.7 liter) unit yielding approximately 231 cubic inches of material.

### **SHELF LIFE**

Two years in original unopened packaging when stored in dry conditions at 45°F - 90°F (5°C - 35°C). High relative humidity will reduce shelf life.

TYPICAL PROPERTIES AT 70°F (21°C)			
Color	Clear/Amber		
Viscosity, ASTM D 2393	400 CPS		
Flexural Strength, ASTM D 790	9,600 psi (62.2 MPa)		
Bond Strength, ASTM C 882			
2 Day Cure	Concrete Failure		
14 Day Cure	Concrete Failure		
Shrinkage, ASTM D 2566	0.07%		
Heat Deflection Temperature, ASTM D 648	122°F (50°C)		
Compressive Properties, ASTM D 695	1 Day	7 Days	28 Days
Compressive Strength	11,600 psi (80 MPa)	16,300 psi (112.4 MPa)	18,300 psi (126.2 MPa)
Compressive Modulus	2.1 x 10 <sup>5</sup> psi (1,400 MPa)	3.8 x 10 <sup>5</sup> psi (2,600 MPa)	4.2 x 10 <sup>5</sup> psi (2,900 MPa)
Gel Time, ASTM C 881	30 minutes		

*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:** Surface must be clean and sound. For best results surfaces should be dry. Blow out all surfaces with oil free compressed air to remove dust, debris or other contaminants.
2. **MIXING:** Five Star® Epoxy Adhesive LV should be preconditioned to between 65°F and 85°F (18°C and 29°C) before using. Pre-mix each component thoroughly. Place two parts by volume of Component A and one part by volume of Component B into a clean pail. Mix thoroughly for three minutes with a low speed drill (400 to 600 rpm). Do not mix more material than can be placed in 30 minutes at 70°F (21°C).

**To prepare an epoxy mortar,** slowly add four to five parts by loose volume oven-dried aggregate to one part of the mixed Five Star® Epoxy Adhesive LV and mix until aggregate is uniformly wetted.

3. **METHODS OF PLACEMENT:**

**Gravity Fill:** Pour over V-notched cracks on horizontal surfaces. Continue placement until cracks are completely filled. Prior to filling, seal underside of cracks with Five Star® RS Anchor Gel or Five Star® Injection Gel where required.

**Pressure Injection:** Use automated equipment. Set appropriate injection ports. Seal ports and cracks with Five Star® RS Anchor Gel or Five Star® Injection Gel. When the epoxy adhesive seal has cured, inject Five Star® Epoxy Adhesive LV with steady pressure until crack is filled.

**For an Epoxy Mortar:** Prime prepared surface with neat Five Star® Epoxy Adhesive LV. Place prepared epoxy mortar before primer becomes tack-free. Place epoxy mortar using trowel. Compact and level with steel trowel. Finish as necessary.

4. **CLEAN UP:** Use an appropriate solvent to clean uncured material. Cured material can only be removed mechanically.

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

## CONSIDERATIONS

- Minimum application temperature of substrate is 40°F (4°C) and rising. Low temperatures adversely affect flowability and strength gain.
- Cold temperatures lengthen gel time; hot temperatures decrease gel time.
- Do not thin with solvents.
- Do not inject moving or leaking cracks.
- Minimum age of concrete must be 21 to 28 days, depending on curing and drying conditions prior to application.
- For cracks over 1/4 inch (6 mm), call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Material is a vapor barrier after cure.

## 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
30811	Epoxy Adhesive LV	1 Gallon Can

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

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# SEGMENTAL BRIDGE ADHESIVES

Sealing & Bonding Systems  
for Precast Concrete Segments

## DESCRIPTION

**Five Star® Segmental Bridge Adhesive** and **Five Star® Segmental Bridge Adhesive LT** are 100% solids, two-component structural epoxy compounds used in the installation or repair of segmental bridges and structures. Two versions are available for varying temperature ranges: Segmental Bridge Adhesive for 60-120°F (16-49°C), and Segmental Bridge Adhesive LT for 20-80°F (-7 - 27°C). The non-abrasive gels have low-creep characteristics and enhanced tensile strength. Both conform to the current ASTM C-881, Types I, IV, VI and VII, Grade-3, Class-B/C, AASHTO M-235 specifications.

## USES

- Bonding precast concrete segments
- Bonding steel plates to concrete
- Fasten bolts into walls
- Gap & crack filling

## BENEFITS

- Easy 1 to 1 mix ratio
- V.O.C. compliant, 100% solids
- Excellent adhesion to concrete and steel
- Easy manual mixing and trowel application
- Good solvent and chemical resistance
- Excellent abrasion and impact resistance

## PACKAGING & YIELD

Five Star® Segmental Bridge Adhesive and Five Star® Segmental Bridge Adhesive LT come packaged in kits made up of two one-gallon containers (7.6 liters). Coverage is approximately 26 ft² (2.42m²) at 1/8" (0.32cm) thickness per kit.

## SHELF LIFE

Two years in original unopened packaging when stored in dry conditions at 40°F - 90°F (4°C - 32°C).

Typical Properties at 70°F (21°C)					
Resin			Epoxy Polyamide		
Solids by Volume			100%		
Mixing Ratio: A:B by volume			1:1		
Elongation, D 638			1.64%		
Cure Time			Dry to Touch (Approx. 2 hours)		
Color			Grey		
Slant Shear Strength, ASTM C882 — 2 days			4,500 psi (31.0 MPa) - Concrete to concrete		
			4,200 psi (28.9 MPa) - Concrete to steel		
			3,400 psi (23.4 MPa) - SSD to SSD concrete		
Gel Time					
Segmental Bridge Adhesive			Segmental Bridge Adhesive LT		
60°F (15°C)	100°F (38°C)	120°F (49°C)	20°F (-7°C)	40°F (4°C)	80°F (27°C)
60 mins	45 mins	30 mins	90 mins	45 mins	30 mins
Compressive Strength, ASTM D 695					
Temperature Range: 60-120°F (15 - 49°C)			Temperature Range: 20-80°F (-7 - 27°C)		
@ 90°F (32°C)			@ 40°F (4°C)		
1 day	3 days	7 days	1 day	3 days	7 days
8,000 psi (55.2 MPa)	8,700 psi (60.0 MPa)	9,000 psi (62.1 MPa)	3,500 psi (24.1 MPa)	4,000 psi (27.6 MPa)	4,250 psi (29.3 MPa)

The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result.

## PLACEMENT GUIDELINES FOR SEGMENTAL BRIDGE ADHESIVES

1. **SURFACE PREPARATION:** Concrete surfaces should be a minimum of 28 days old and may be dry or damp, but free of standing water. Surfaces must be clean, sound and free of any dirt, laitance or other bond inhibiting contaminants. High-pressure water blasting or abrasive blasting of surfaces is recommended. A concrete surface profile (CSP) of 3 to 4 in accordance with ICRI Technical Guideline 03732 should be achieved. A steel surface profile of SSPC-SP-6 should be achieved. Blow prepared surfaces clean.
2. **MIXING INSTRUCTIONS:** Material should be preconditioned to between 45°F and 85°F (7°C and 30°C) before using. Premix each component thoroughly. Proportion equal parts by volume of Component A and Component B into a clean pail. Stir or mix thoroughly for three minutes by hand with a low speed drill (400 to 600 rpm) until uniform in color. Avoid entrapping air. Mix only a quantity that can be placed within a 30-minute working time.
3. **METHOD OF PLACEMENT:** Apply neat to the prepared substrate, working into substrate for positive adhesion. Apply 1/8" (3 mm) to one face, or 1/16" (1.5 mm) thickness to both faces, dependent on project requirements. Secure elements firmly until adhesive has cured.
4. **CLEAN-UP:** Paint thinner, acetone or similar solvent may be used for clean up of tools and equipment. Cured material can only be removed mechanically.

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

## CONSIDERATIONS

- Minimum application temperature of substrate is 20°F (-7°C) and rising, but must be frost free when using Segmental Bridge Adhesive LT.
- 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Wash thoroughly after handling. Do not take internally. Keep product out of reach of children. Keep container closed when not in use. **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
34645	Five Star® Segmental Bridge Adhesive	50	2 One-Gallon Containers
34640	Five Star® Segmental Bridge Adhesive LT	50	2 One-Gallon Containers

**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](http://FiveStarProducts.com)

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### **PRODUCT DESCRIPTION**

**Five Star® Epoxy Primer** is a two component, 100% solids, low viscosity epoxy primer designed for steel and concrete corrosion protection. It is formulated to be brush, roller or spray applied in industrial applications to provide a protective coating and barrier against corrosion and provides excellent adhesion to steel and concrete while maintaining a strong bond with epoxy grouts.

### **ADVANTAGES**

- Excellent moisture tolerance
- 100% solids provides greater coverage on first coat
- Low VOC
- Tough abrasion and impact resistance
- Excellent adhesion to steel, concrete and Five Star® Epoxy Grouts
- Fast cure response

### **USES**

- Pump bases
- Rotating equipment
- Induced draft fans
- Compressors

### **PACKAGING AND YIELD**

**Five Star® Epoxy Primer** is a two-component 3:1 ratio epoxy primer offered in A & B pails to form a single 1-gallon unit when combined. Approximate yield is 530 ft² (49.2 m²) @ 3 mils DFT.

### **SHELF LIFE**

Two years in original unopened packaging when stored in dry conditions at 45°F - 90°F (5°C - 35°C). High relative humidity reduces shelf life.

TYPICAL PROPERTIES AT 70°F (21°C)				
Color		Clear		
Gel Time		50°F (10°C)	70°F (21°C)	90°F (32°C)
		40 minutes	30 minutes	20 minutes
Adhesion (7) Days  ASTM D 4541				
DFT	A36 Steel/DP Grout	A36 Steel/HP Grout	A36 Steel/SP Grout	Concrete
3-5 mils	950 psi (6.5 MPa)	1,150 psi (7.9 MPa)	1,350 psi (9.3 MPa)	550 psi (3.8 MPa)
5-8 mils	1,250 psi (8.6 MPa)	1,300 psi (9.0 MPa)	1,450 psi (10.0 MPa)	650 psi (4.5 MPa)
Hardness (7) Days on A 36 Steel				
DFT	Shore D Harness , ASTM D 2240		Pencil Hardness, ASTM D 3363	
3-5 mils	70-75 durometer		2H-3H	
5-8 mils	78-86 durometer		4H-5H	
Dry Time @ 3-5 mils	Touch—5 Hrs	Handle—6 Hrs	Hard—10 Hrs	Grout—18Hrs

*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:** Surface must be clean, dry and free from any other substance or contaminants. For best results surfaces should be prepared to an SSPC-SP5 or better profile.
2. **MIXING:** **Five Star® Epoxy Primer** should be preconditioned to between 65°F and 85°F (18°C and 29°C) before using. Pour contents of Component B into Component A and stir. Mix complete unit in the proportions supplied. DO NOT THIN. Once it has been mixed, note the working pot life of the material.
3. **APPLICATION:** Use only a lint free roller with 1/2" or 1/4" nap. NOTE: Material may be applied using airless spray equipment. Consult Five Star Products' Engineering and Technical Service Center first.
4. **CLEAN UP:** Flush and clean all equipment immediately after use with xylene or MEK. Cured material can only be removed mechanically.

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

## **CONSIDERATIONS**

- Minimum application temperature of substrate is 40°F (4°C) and rising.
- Low temperatures adversely affect flowability and strength gain.
- Cold temperatures lengthen gel time; hot temperatures decrease gel time.
- Do not thin with solvents.
- If primer has aged longer than 90 days then some form of abrasive measures to the surface of the primer are recommended before grouting.

## **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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

SKU / PRODUCT CODE	DESCRIPTION	UNIT SIZE
34600	Five Star® Epoxy Primer	1 Gallon

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

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## **Centri-Cast® Joint Filler**

Concrete Joint and Seam Filler

### **PRODUCT DESCRIPTION**

**Five Star Centri-Cast® Joint Filler** is a one component, 100% solids, solvent-free adhesive and void filler for use on multiple substrates. This product can be used to fill voids or gaps of up to 3/4" and is perfect as a sealer/adhesive for use with the Five Star Centri-Cast® industrial pipe repair system.

### **ADVANTAGES**

- Fills gaps up to 3/4"
- Superior shore hardness
- Remains flexible and suitable for use where shock, vibration, shrinking or swelling are concerns.
- Environmentally friendly—solvent free, isocyanate free and low VOC
- Tack free in < 30 minutes for increased productivity
- Non-sag for ease of placement

### **USES**

- Fill and repair voids in multiple substrates
- Seal industrial pipe voids prior to application of repair mortar
- Part of the complete Five Star Centri-Cast® industrial pipe repair system

### **PACKAGING**

Five Star Centri-Cast® Joint Filler is packaged in 20 oz. sausage tubes for use in manual or pneumatic guns.

### **SHELF LIFE**

One year from manufacture date in original unopened packaging when stored in dry conditions below 80°F (27°C).

*Note: Due to the wide variety of substrates, preparation methods, application methods and environments, always test a small area of substrate to verify desired results.*

TYPICAL PROPERTIES AT 70°F (21°C)	
<b>Cured Properties at 21 Days</b>	
Tensile Bond (Fiberglass)	175 psi (1.20 MPa)
Hardness, Shore A, ASTM D 2240	60
Tensile Strength, ASTM D 412	260 psi (1.8 MPa)
Elongation, ASTM D 412	250%
Peel Strength, ASTM D 1004	60 lbs/in (1,056 kg/m)
<b>Uncured Properties</b>	
Cure Rate	1/4" - 16 hours
VOC Content	< 30g/liter

*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:** Surfaces must be clean, sound, and free of any growth, dirt, oxidation, rust or other bond inhibiting contaminants. High-pressure water blasting or abrasive blasting of surfaces is recommended. Coat areas as soon as possible after surface preparation to minimize corrosion to newly prepared surfaces.
2. **Placement:** Place cartridge in appropriate sausage gun with applicable tip to achieve desired bead of material. Dispense following application gun's instructions. Five Star Centri-Cast® Joint Filler should be applied at a surface temperature of at least 40°F (5°C) or higher.
3. **Clean-up:** Mineral Spirits, Denatured Alcohol, or VM&P solvent may be used for clean up of tools and equipment.

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

## Caution:

Irritant, toxic, strong sensitizer. 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Wash thoroughly after handling. Do not take internally. Keep product out of reach of children. Keep container closed when not in use. **PRIOR TO USE, REFER TO SAFETY DATA SHEET.**

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

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	WEIGHT
30844	Five Star Centri-Cast® Joint Filler	45	12—20 oz. Tubes

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

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# **CONTROL JOINT SEALER**

Flexible Epoxy Joint Sealer

## **PRODUCT DESCRIPTION**

Five Star Control Joint Sealer is a semi-rigid, moisture insensitive, self-leveling epoxy joint filler and sealer for filling horizontal control joints. It meets ASTM C881 Grade 2, Classes B & C and complies with USDA specifications for use in food processing areas.

## **ADVANTAGES**

- Low modulus
- Impact resistant
- Convenient 1:1 mixing ratio
- Moisture insensitive
- Pourable, self-leveling
- Bonds to steel

## **USES**

- Filling and sealing horizontal non-moving saw cut control joints and random cracks

## **PACKAGING AND YIELD**

Five Star Control Joint Sealer is available in a 600 ml (22 fl. oz.) cartridges yielding approximately 37 cubic inches, or a 1 gallon (3.7 liters) unit yielding approximately 230 cubic inches.

## **SHELF LIFE**

One year in original unopened container. Store in dry conditions between 40°F and 90°F (4°C and 32°C).

TYPICAL PROPERTIES AT 70°F (21°C)	
Mix Ratio, by Volume	1:1
Modulus of Elasticity, ASTM D-695	2600 psi (17.9 MPa)
Tensile Strength, ASTM D-638	730 psi (5.0 MPa)
% Elongation at Break, ASTM D-638	65% to 75%
Absorption, ASTM D-570	0.32%
Shrinkage, ASTM C-883	Pass
Shore "D" Hardness, ASTM D-2240	
24 hours	55 - 75
Shore "A" Hardness, ASTM D-2240	
24 hours	85 - 95
Thermal Compatibility, ASTM C-884	Pass
Gel Time at 70°F (21°C)	20 minutes

*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.*

## **PLACEMENT GUIDELINES**

1. **SURFACE PREPARATION:** All surfaces to be in contact with Five Star Control Joint Sealer shall be free of oil, grease, laitance and other contaminants. For best results surfaces should be dry. Concrete should be sandblasted and must be clean, sound, dry to ensure a good bond. Steel should be sandblasted to optimize bond development. Blow out all surfaces with oil-free compressed air.
2. **MIXING:** Material should be preconditioned to between 70°F and 80°F (21°C and 26°C) before using. Pre-mix each component thoroughly. Place one part by volume of Component A and one part by volume of Component B into a clean pail. Mix thoroughly for three minutes with low-speed drill (400-600 rpm) until uniformly blended. Mix only the quantity that can be used within 20 minutes at 70°F (21°C).
3. **METHODS OF PLACEMENT:** Five Star Control Joint Sealer may be poured into place. Pour Five Star Control Joint Sealer into joints or cracks or use low pressure application equipment to pour into place. For gunning placement instructions call the Five Star Engineering and Technical Service Center at (800) 243-2206.
4. **CLEAN UP:** Use an appropriate solvent to clean uncured material. Cured material can only be removed mechanically.

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

## **CONSIDERATIONS**

- Minimum substrate temperature is 40°F (4°C).
- For best results placement temperatures should be between 65°F and 85°F (18°C and 29°C).
- Do not thin. Solvents will prevent proper curing.
- Minimum age of new concrete should be between 21 and 28 days.
- Do not seal cracks under hydrostatic pressure.
- Do not use in moving cracks or expansion joints.
- Five Star Control Joint Sealer is a vapor barrier after cure.

## **CAUTION**

Component A is an Irritant, and toxic. Component B is corrosive. This product causes skin irritation and is a strong sensitizer. Do not inhale vapors. Provide adequate ventilation. Protect against contact with skin and eyes. Wear rubber gloves, long sleeve shirt, goggles with side shields. Use of a NIOSH/MSHA organic vapor respirator is recommended if ventilation is inadequate. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

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

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# **Pressure Port Crack Repair System**

## **Complete Epoxy Crack Injection Kit**

### **PRODUCT DESCRIPTION**

**Five Star® Pressure Port Crack Repair System** is a multiple component system engineered to provide structural repairs to horizontal, vertical and overhead cracks or voids in concrete up to 1/4 inch (6 mm). The complete system consists of Five Star® Crack Injection Resin, Five Star® Epoxy Capping Material and patented injection ports for easy installation without requiring additional special equipment.

### **ADVANTAGES**

- Low viscosity ensures deep penetration into hairline cracks
- Moisture insensitive; can be used in damp applications
- Cures to 100% solids
- All inclusive, easy-to-use kit
- 100% solvent free system; No VOC content

### **USES**

- Pressure injection of cracks in structural concrete, masonry, wood and other substrates up to 1/4 inch (6 mm) wide
- Vertical and horizontal cracks

### **PACKAGING AND YIELD**

Five Star® Pressure Port Crack Repair System is available as a complete kit containing: (3) 16 oz. cartridges of Five Star® Crack Injection Resin, (2) 16 oz. jars of Five Star® Epoxy Capping Material (A & B), (25) Pressure Ports, and (3) static mixing nozzles. Approximate yield of crack repair material is 24 LF (7.32 M).

### **SHELF LIFE**

Two years in original unopened packaging when stored in dry conditions at 50°F - 90°F (10°C - 35°C). High humidity will reduce shelf life.

#### **FIVE STAR® CRACK INJECTION RESIN TYPICAL PROPERTIES AT 75°F (24°C)**

<b>Color</b> (Part A/Part B/Mixed)	Clear/Amber/Amber	
<b>Viscosity</b> , ASTM D 2393	400 CPS	
<b>Gel Time</b>	20 Minutes	
<b>Tack Free Time</b> (30 mil thin film)	4-5 Hours	
<b>Compressive Yield Strength</b> , ASTM D 695	10,200 psi (70.3 MPa)	
<b>Compressive Modulus</b> , ASTM D 695	202,430 psi (1395.7 MPa)	
<b>Shrinkage</b> , ASTM D 2566 (Linear Co-efficient cm/cm)	0.002 %	
<b>Heat Deflection Temperature</b> , ASTM D 648	134°F (57°C)	
<b>Bond Strength</b> , ASTM C 882	2 Days: 1,250 psi (8.6 MPa)	14 Days: 1,680 psi (11.6 MPa)
<b>Tensile Strength</b> , ASTM D 638 (7 days)	7,220 psi (49.8 MPa)	
<b>Tensile Elongation</b> , ASTM D 638 (7 days)	1.8 %	

#### **FIVE STAR® EPOXY CAPPING MATERIAL TYPICAL PROPERTIES AT 75°F (24°C)**

<b>Color</b> (Part A/Part B/Mixed)	White/Dark Gray/Concrete Gray	
<b>Gel Time</b>	8 Minutes	
<b>Working Time</b>	20 Minutes	
<b>Initial Cure</b>	2 Hours	
<b>Compressive Yield Strength</b> , ASTM D 695 (7 Day)	8,000 psi (55.2 MPa)	
<b>Bond Strength</b> , ASTM C 882	2 Days: 1,250 psi (8.6 MPa)	14 Days: 1,680 psi (11.6 MPa)

*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. **TOOLS NEEDED:** Five Star® Crack Injection Resin requires the use of an adjustable double-barrel caulking gun.
2. **SURFACE PREPARATION:** Surface must be clean, sound and completely dry. Blow out all surfaces with oil free compressed air to remove dust, debris or other contaminants. New concrete must be a minimum of 28 days old.
3. **MIXING: Five Star® Epoxy Capping Material** — Mix Components A & B in a 1:1 ratio as needed. Mix until a uniform gray color is achieved. **Five Star® Crack Injection Resin** — Requires no hand mixing. Affix static mixing tip to cartridge. Dispense into a cup until both components mix and are dispensed in a uniform manner. (Dispensed mix ratio is 2:1)
4. **METHODS OF PLACEMENT:** Mark every 8 to 10 inches along crack for port installation. Begin by sealing the crack with the properly mixed Five Star® Epoxy Capping Material 1-2 inches wide along the entire crack. Seal the entire crack and ensure no air pockets remain in capping material. Uniformly apply capping material to the bottom of the port perimeter, ensuring port is not covered in capping material. Center the port over the crack face in each gap and firmly attach. The innermost circle on the base of the port is designed to prevent the capping paste from blocking the injection passageway. The port is properly attached when Five Star® Epoxy Capping Material extrudes out of relief slots. Seal any pin holes or voids between ports and the substrate being injected. Shake the injection resin for 10 seconds, apply the static nozzle and inject the first port— start from the bottom of the crack and work your way upward. Insert nozzle directly over port tip. The surgical tube will expand as it fills with resin. Continue injecting Five Star® Crack Injection Resin into the port until the latex portion of the port expands to a volume of 40cc (about the size of a golf ball). Carefully remove the nozzle from the port being sure to grasp the port firmly while removing tubing. Attach the nozzle to the second port and begin injection until the surgical tubing expands and is filled. Continue to fill remaining ports in the same fashion. If the port does not expand, continue to inject more resin to ensure that all voids are filled. Allow 12 hours for complete cure of material. Knock the ports off with a sharp tool and hammer. Finish with grinder if desired.
5. **CLEAN UP:** Tools may be cleaned with solvents such as Xylene, Toluene, MEK or WD-40 prior to hardening. Cured material can only be removed mechanically.

**NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY.** For more detailed placement instructions, please call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

## CONSIDERATIONS

- Application temperature of substrate and ambient air temperature is between 40°F and 100°F (4°C and 38°C). Low temperatures adversely affect flowability and strength gain.
- Cold temperatures lengthen gel time; hot temperatures decrease gel time.
- Temperature and application thickness will impact cure time of the capping material.
- Do not apply to moving or leaking cracks.
- Minimum age of concrete must be 21 to 28 days, depending on curing and drying conditions prior to application.
- For cracks over 1/4 inch (6 mm), call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Material is a vapor barrier after cure.

## 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. 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
30793	Five Star® Pressure Port Crack Repair System	72 (36 cases)	19 lb. (8.61 kg) (2 Complete Systems/Case)

**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](http://FiveStarProducts.com)

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**FIVE STAR**

Specified by the World's Best™

# Coatings & Waterproofing

## **FIVE STAR CENTRI-CAST® COAL TAR EPOXY**

Protective coating for concrete, steel, aluminum and wood structures exposed to corrosive environments including salt and fresh water

## **FIVE STAR® EPOXY NOVOLAC COATING**

Highly chemical resistant epoxy coating for horizontal applications

## **FIVE STAR® EPOXY NOVOLAC COATING NON-SAG**

Highly chemical resistant epoxy coating for vertical applications

## **FIVE STAR® EPOXY NOVOLAC WATERBORNE PRIMER**

Highly chemical resistant primer/sealer

## **FIVE STAR® WATERPROOFING**

High performance, cementitious waterproofing coating for concrete and masonry surfaces

**NOTES:**

[illegible]



# **Centri-Cast® Coal Tar** **Epoxy Coal Tar Protective Coating**

## **DESCRIPTION**

**Five Star Centri-Cast® Coal Tar** is a versatile two-component epoxy coal tar coating designed for protection of concrete, steel, aluminum, and wood structures exposed to corrosive environments including salt and fresh water. This coating offers excellent abrasion resistance.

## **USES**

Five Star Centri-Cast® Coal Tar is recommended for coating sheet piling, pipes, storage and treatment tanks, offshore platforms and related marine and non-marine applications. Do not use for potable water service.

## **BENEFITS**

- No chipping, peeling or flaking
- Excellent adhesion to concrete, steel and wood
- Flexible
- Can be applied underwater
- Good solvent and chemical resistance
- Excellent abrasion and impact resistance

## **PACKAGING & YIELD**

Five Star Centri-Cast® Coal Tar is a two-component system consisting of premeasured containers of resin and hardener and is available as a 5-gallon unit yielding coverage of approximately 120 ft<sup>2</sup> (11.15 m<sup>2</sup>)/gallon at 10.5 mil wet thickness. Overspray, substrate profile, placement technique and temperature will influence coverage and yield.

## **SHELF LIFE**

One year in original unopened packaging when stored in dry conditions at 50°F - 90°F (10°C - 35°C). Do not expose container to temperatures greater than 135°F (57°C).

Typical Properties of 70°F (21°C)	
Weight Solids	77± 2%
Mixing Ratio: A:B by volume	4:1
VOC Values	1.98 lb/gallon (A+B)
Wet Temperature Resistance	120°F (48°C)
Dry Temperature Resistance	140°F (60°C)
Cure Time (@ 77°F / @ 25°C)	Touch: 8-10 hours Recoat: 16-20 hours Full cure: 6 days
Color	Black Gloss

*The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result.*

## Placement Guidelines

**Surface Preparation:** All surfaces must be clean, dry and free from oil, grease and other contaminants.

1. **Concrete:** Concrete surfaces must be free from curing compounds, salts, marine growth, and other contaminants. For best results, sandblast concrete surfaces to obtain a clean, sound and rough surface. Concrete should be clean and dry before coating.
2. **Steel:** Steel surfaces should be sand blasted to a near white metal condition (SSPC-SP10).
3. **Wood:** All coatings should be removed. Wood should be rough sanded.
4. **Aluminum:** Surface should be sandblasted or sanded.

**Mixing Instructions:** Mix separately, then combine and power mix for a minimum of two minutes. Stir thoroughly, making sure no pigment remains on bottom of the can and consistency is uniform. Do not mix partial kits. Mixing ratio is 4:1 (A:B). Pot life at 80°F (26°C) is 2 hours; at 100°F (37°C) pot life is 1 hour.

**Clean-up:** Immediately after use, flush and clean all tools and equipment with xylene or similar solvent.

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

## Considerations

- Minimum application temperature of substrate is 50°F (10°C) and above.
- Do not use for potable water service.
- Do not thin with solvents.
- When applied under water or brought in contact with water before cure, the product will develop a soft exterior layer. This exterior film facilitates further hardening of the material beneath.

## Caution

Contains chemical ingredients which are considered to be hazardous. Read container label warnings and Material Safety Data Sheet for important health and safety information prior to the use of this product. Do not take internally. **Keep out of the reach of children. PRIOR TO USE, REFER TO SAFETY DATA SHEET.**

For worldwide availability, additional product information and technical support, contact your 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
30830	Five Star Centri-Cast® Coal Tar Epoxy	24	5-Gallon Unit

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Specifications Subject to Change.

For most current version of datasheet, go to [FiveStarProducts.com](http://FiveStarProducts.com)

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# EPOXY NOVOLAC COATING

Highly Chemical Resistant Epoxy Coating  
Horizontal Applications

## PRODUCT DESCRIPTION

Five Star® Epoxy Novolac Coating is a two component, 100% solids, highly chemical resistant epoxy coating for horizontal applications. Five Star Epoxy Novolac Coating has excellent flowability and is highly effective for both steel and concrete applications.

## ADVANTAGES

- High chemical resistance
- Resistant to chipping or cracking
- Increased wear resistance when broadcast with a dried silica sand
- Low permeability
- Low odor

## USES

- Horizontal applications
- Secondary containment surfaces
- Industrial floors

## PACKAGING AND YIELD

Five Star Epoxy Novolac Coating is a two component system consisting of premeasured containers of resin and hardener and is available as a 2.5 gallon unit yielding coverage of approximately 200 sq. feet at 20 mil thickness.

## SHELF LIFE

Two years in original unopened packaging when stored at normal ambient temperatures.

### TYPICAL PROPERTIES AT 70°F (21°C)

Color	Concrete Gray
Film Thickness	20 mils
Pot Life at 70°F (21°C)	20 minutes
Hardness, ASTM D 2240 Shore D	75
Tensile Strength, ASTM D 638	7200 psi (49.6 MPa)
Compressive Strength, ASTM D 695	
7 Days	10000 psi (70.0 MPa)
In-Service Time, (allow 3-5 days for maximum cure)	48 - 72 hours

### Chemical Resistance Chart\* at 70°F (21°C)

Solvents	Organics Acids (Conc.)	Bases / Alkalines (Conc.)
Acetaldehyde	Acetic (1-50%)	Ammonia (1-25%)
Acetone	Acid plating solutions	Ammonium Hydroxide (1-25%)
Acetonitrile	Adipic (1-25%)	Aniline
Acrylonitrile	Azotic (1-50%)	Barium Hydroxide (1-sat.)
Butyl acetate	Battery (1-98%)	Black Pulp Liquor
Cyclohexane	Chromic (1-30%)	Butyl Amine
Ethanol	Chlorohydric (1-37%)	Cadmium Cyanide Plating
Ethyl acetate	Dibasic (1-sat.)	Calcium Hydroxide (1-25%)
Ethyl alcohol	Ethanoic (1-50%)	Chromium Trioxide (1-25%)
Formaldehyde	Ethylic (1-50%)	Copper Cyanide Plating
Isopropyl Alcohol	Engravers (1-50%)	Dimethyl Aniline
Jet Fuel	Hydrochloric (1-37%)	Hydrogen Peroxide (1-30%)
Kerosene	Hydrofluoric (1-40%)	Green Pulp Liquor
Methyl Ethyl Ketone	Mattling (1-98%)	Soap solutions
Methanol	Nitric (1-50%)	Sodium Cyanide (1-15%)
Methyl Alcohol	Oil of vitriol (1-98%)	Sodium Hypochlorite (1-9%)
Rubbing Alcohol	Oleic	Sodium Hydroxide (1-50%)
Wood Alcohol	Phosphoric (1-85%)	Triethanolamine
1,1,1 Trichloroethane	Sulfuric (1-98%)	Triethylamine
Phenol	Vitriol (1-98%)	Potassium Hydroxide (1-sat)

\* NOTE: Many factors effect chemical resistance. Application design, service and exposure temperatures, and the type and amount of impurities in the chemical or in the environment are some important considerations. These test results are reported to serve as a guide to the applicability of the Novolac systems.

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:** Surfaces should be clean, sound, and rough. Remove dust, laitance, grease, curing compounds, impregnations and waxes. Concrete should be sandblasted or prepared by other acceptable mechanical means. Steel should be sandblasted to an SSPC-SP6 commercial finish.
2. **MIXING:** For optimum performance, all components should be conditioned to between 65°F and 85°F (18°C and 29°C). Premix both Component A (resin) and Component B (hardener) thoroughly before mixing. Place all of Component A and Component B into a suitable container. Component A and Component B are mixed in a 1.5:1.0 ratio by volume. Mix Component A and Component B with a slow speed mixer for no more than 3 minutes. Avoid air entrapment. Place mixed material immediately. Mix only that amount of material that can be placed within 20 minutes.
3. **METHODS OF PLACEMENT:** Five Star® Epoxy Novolac Coating may be applied using a squeegee, roller or brush. Apply material in even coats. Allow coating to self-level over area being applied. For multiple coat applications or to achieve a skid-resistant surface, contact the Five Star Engineering and Technical Service Center at (800) 243-2206.
4. **POST PLACEMENT PROCEDURES:** In-service operation may begin after a 48 - 72 hour cure time.
5. **CLEAN UP:** Tools with fresh material may be cleaned with MEK, Xylene or a solution of water and strong detergent.

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

## **CONSIDERATIONS**

- Minimum application temperature of substrate is 40°F (4°C) and rising. Low temperatures adversely affect flowability and strength gain.
- Do not thin with solvents.
- Minimum age of concrete must be 21 to 28 days, depending on curing and drying conditions prior to application. Use Five Star Waterborne Primer in conjunction with Five Star Epoxy Novolac Coating for concrete that is 3 - 5 days old.
- Cold temperatures lengthen cure time, hot temperatures decrease cure time.
- Maximum operating temperature is 200°F (93°C).

## **CAUTION**

FOR INDUSTRIAL USE ONLY. 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

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# EPOXY NOVOLAC COATING NON-SAG

Highly Chemical Resistant Epoxy Coating  
Vertical Applications

## PRODUCT DESCRIPTION

Five Star® Epoxy Novolac Coating Non-Sag is a two component, 100% solids, highly chemical resistant epoxy coating for vertical applications which is highly effective on both steel and concrete.

## ADVANTAGES

- High chemical resistance
- Resistant to chipping or cracking

- Low permeability
- Low odor

## USES

- Vertical applications
- Secondary containment surfaces

- Coatings for concrete tanks
- Concrete and steel surfaces

## PACKAGING AND YIELD

Five Star Epoxy Novolac Coating Non-Sag is a two component system consisting of premeasured containers of resin and hardener and is available as a 2.5 gallon unit yielding coverage of approximately 200 sq. feet at 20 mil thickness.

## SHELF LIFE

Two years in original unopened packaging when stored at normal ambient temperatures.

### TYPICAL PROPERTIES AT 70°F (21°C)

Color	Concrete Gray
Film Thickness	20 mils
Pot Life at 70°F (21°C)	20 minutes
Hardness, ASTM D 2240 Shore D	75
Tensile Strength, ASTM D 638	7200 psi (49.6 MPa)
Compressive Strength, ASTM D 695	
7 Days	10000 psi (70.0 MPa)
In-Service Time, (allow 3-5 days for maximum cure)	72 hours

### Chemical Resistance Chart\* at 70°F (21°C)

Solvents	Organics Acids (Conc.)	Bases / Alkalines (Conc.)
Acetaldehyde	Acetic (1-50%)	Ammonia (1-25%)
Acetone	Acid plating solutions	Ammonium Hydroxide (1-25%)
Acetonitrile	Adipic (1-25%)	Aniline
Acrylonitrile	Azotic (1-50%)	Barium Hydroxide (1-sat.)
Butyl acetate	Battery (1-98%)	Black Pulp Liquor
Cyclohexane	Chromic (1-30%)	Butyl Amine
Ethanol	Chlorohydric (1-37%)	Cadmium Cyanide Plating
Ethyl acetate	Dibasic (1-sat.)	Calcium Hydroxide (1-25%)
Ethyl alcohol	Ethanoic (1-50%)	Chromium Trioxide (1-25%)
Formaldehyde	Ethylic (1-50%)	Copper Cyanide Plating
Isopropyl Alcohol	Engravers (1-50%)	Dimethyl Aniline
Jet Fuel	Hydrochloric (1-37%)	Hydrogen Peroxide (1-30%)
Kerosene	Hydrofluoric (1-40%)	Green Pulp Liquor
Methyl Ethyl Ketone	Mattling (1-98%)	Soap solutions
Methanol	Nitric (1-50%)	Sodium Cyanide (1-15%)
Methyl Alcohol	Oil of vitriol (1-98%)	Sodium Hypochlorite (1-9%)
Rubbing Alcohol	Oleic	Sodium Hydroxide (1-50%)
Wood Alcohol	Phosphoric (1-85%)	Triethanolamine
1,1,1 Trichloroethane	Sulfuric (1-98%)	Triethylamine
Phenol	Vitriol (1-98%)	Potassium Hydroxide (1-sat)

\* NOTE: Many factors effect chemical resistance. Application design, service and exposure temperatures, and the type and amount of impurities in the chemical or in the environment are some important considerations. These test results are reported to serve as a guide to the applicability of the Novolac systems.

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:** Surfaces should be clean and sound. Remove dust, laitance, grease, curing compounds, impregnations and waxes. Concrete should be sandblasted or prepared by other acceptable mechanical means. Steel should be sandblasted to an SSPC-SP6 commercial finish.
2. **MIXING:** For optimum performance, all components should be conditioned to between 65°F and 85°F (18°C and 29°C). Premix both Component A (resin) and Component B (hardener) thoroughly before mixing. Place all of Component A and Component B into a suitable container. Component A and Component B are mixed in a 1.5:1.0 ratio by volume. Mix Component A and Component B with a slow speed mixer for no more than 3 minutes. Avoid air entrapment. Place mixed material immediately. Mix only that amount of material that can be placed within 20 minutes.
3. **METHODS OF PLACEMENT:** Five Star® Epoxy Novolac Coating Non-Sag may be applied using a squeegee, roller or brush. Apply material in even coats.
4. **POST PLACEMENT PROCEDURES:** In-service operation may begin after a 72 hour cure time.
5. **CLEAN UP:** Tools with fresh material may be cleaned with MEK, Xylene or a solution of water and strong detergent.

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

## **CONSIDERATIONS**

- Minimum application temperature of substrate is 40°F (4°C) and rising. Low temperatures adversely affect flowability and strength gain.
- Do not thin with solvents.
- Minimum age of concrete must be 21 to 28 days, depending on curing and drying conditions prior to application. Use Five Star Waterborne Primer in conjunction with Five Star Epoxy Novolac Coating Non-Sag for concrete that is 3 - 5 days old.
- Cold temperatures lengthen cure time, hot temperatures decrease cure time.
- Maximum operating temperature is 200°F (93°C).

## **CAUTION**

FOR INDUSTRIAL USE ONLY. 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

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# EPOXY NOVOLAC WATERBORNE PRIMER

## PRODUCT DESCRIPTION

Five Star® Epoxy Novolac Waterborne Primer is a two component, highly chemical resistant epoxy primer/sealer for use over green or new concrete. Five Star Epoxy Novolac Waterborne Primer has excellent adhesion, a rapid drying time and is highly chemical resistant. Contains no volatile organic compounds (VOCs).

## ADVANTAGES

- High chemical resistance
- May be brushed, sprayed, or roller-applied
- Easy clean-up (soap and water)
- Rapid drying
- Excellent penetration of concrete
- Low odor

## USES

- Primer/sealer for coating of new concrete
- High chemical resistance

## PACKAGING AND YIELD

Five Star Epoxy Novolac Waterborne Primer is available in a 1 gallon (3.7 liter) unit yielding coverage of approximately 130 - 140 ft<sup>2</sup> (12.1 - 13.0 m<sup>2</sup>) when applied at 3 mil thickness, depending on surface roughness.

## SHELF LIFE

Two years in original unopened packaging when stored in dry conditions at normal ambient temperatures. Protect from freezing.

TYPICAL PROPERTIES AT 70°F (21°C)	
Color	Light green
Solids by volume	
A Component	100%
B Component	42%
Viscosity at 77°F (23°C), ASTM D 445-83	400 - 1000 cp
Pot Life	30 minutes
Coating Time (allow 3-5 hours for maximum cure)	6 hours
Volatile Organic Compounds	0

*\*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:** Surface must be clean and sound. Remove dust, laitance, grease, curing compounds, impregnations and waxes. Concrete may be sandblasted or prepared by similar mechanical means.
2. **MIXING:** Pour all of Component B into Component A and mix thoroughly for 2 - 3 minutes. For smaller amounts, mix two parts (by volume) of Component B to one part Component A. Do not mix more material than can be applied within pot life of material, 30 minutes at 70°F (21°C).
3. **METHODS OF PLACEMENT:** Primer may be applied with a brush, roller or squeegee. If concrete surface is particularly dry and hot, lightly dampen the concrete. Remove any puddled water. Apply material in even coats and allow to dry thoroughly (generally one to six hours depending on humidity and temperature) before applying any additional coatings. Maximum recommended thickness is five mils if top coating.
4. **POST PLACEMENT PROCEDURES:** Epoxy Novolac coatings may be applied after surface is hard and dry to the touch.
5. **CLEAN UP:** Clean tools with water and strong detergent solution.

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

## **CONSIDERATIONS**

- Cold temperatures lengthen cure time, hot temperatures decrease cure time.
- Maximum exposure temperature is 200°F (93°C).
- Use of solvents to thin the primer is not recommended.
- Avoid applying in high humidity conditions.

## **CAUTION**

FOR INDUSTRIAL USE ONLY. Irritant, toxic, strong sensitizer. Contains epoxy resin. 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. In case of contact with eyes, flush repeatedly with water and contact a physician. Areas of skin contact should be promptly washed with soap and water. Do not take internally. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET.**

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

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## **PRODUCT DESCRIPTION**

Five Star® Waterproofing is a polymer-modified cementitious waterproofing material that creates a rigid barrier which resists very high water pressures in both positive and negative side applications. This high performance coating is self-curing for greater reliability and has excellent resistance to the penetration of chloride ions. Five Star® Waterproofing is applied in one coat by trowel, or in a multi-coat brush application.

## **ADVANTAGES**

- Effective on negative and positive side
- Excellent resistance to chloride ion penetration
- Self-curing
- Trowel or brush applied

## **USES**

- Concrete and masonry surfaces
- Vertical and horizontal applications
- Base for moisture-sensitive coatings
- Elevator/escalator pits
- Foundations
- Manholes
- Vaults
- Tanks

## **PACKAGING AND YIELD**

Five Star® Waterproofing is a two-component system consisting of 50 lbs (22.7 kg) of dry material and a one-half gallon (1.9 liter) plastic container of Five Star® Waterproofing Liquid packaged in a plastic pail and is available in a unit yielding coverage of approximately 42 square feet (3.9 sq m) when troweled to a 1/8 inch (3 mm) thickness, or when brushed in two coats at 1/16 inch (1.5 mm) each coat. No allowance has been made for surface roughness, irregularities, waste, or spillage.

## **SHELF LIFE**

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

<b>TYPICAL PROPERTIES AT 70°F (21°C) AT 1/8 INCH THICKNESS</b>	
<b>Compressive Strength, ASTM C 109</b>	
4 Hours	3,000 psi (20.7 MPa)
28 Days	7,000 psi (48.3 MPa)
<b>Bond Strength, ASTM C 882</b>	
7 Days	2,400 psi (16.5 MPa)
<b>Permeability, CRD-C 48, 1/8 inch (3 mm) thickness</b>	
Negative Side	$7.16 \times 10^{-13}$ cm/sec
Positive Side	$7.96 \times 10^{-14}$ cm/sec
<b>Chloride Ion Permeability, ASTM C 1202, 1/8 inch (3 mm) thickness</b>	
28 Days	Very Low (<1,000 Coulombs)
<b>Working Time at 70°F (21°C)</b>	20 minutes

*\*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

- SURFACE PREPARATION:** All surfaces must be clean, structurally sound, free of oil, grease, laitance, loose materials and other contaminants. Sand blast or high pressure water blast concrete surfaces to a medium sandpaper profile or rougher. Soak surfaces thoroughly with liberal quantities of potable water, leaving surface damp but free of excess water. Surfaces must be between 45°F and 90°F (7°C and 32°C) at time of application.
- MIXING:** Condition materials to between 45°F and 80°F (7°C and 27°C). Thoroughly mix Five Star® Waterproofing with a mortar mixer (stationary barrel with moving blades) or a drill and paddle mixer using all the Five Star® Waterproofing Liquid provided and only enough water to reach desired consistency. Never exceed the maximum allowable mixing water as stated on the container or add an amount that will cause segregation. Do not mix more material than can be applied in 20 minutes.
- METHODS OF PLACEMENT:** Brush Application: Apply a minimum of two thick brush coats at approximately 1/16 inch (1.5 mm) each coat. Total application thickness should be a minimum of 1/8 inch (3 mm) with no pinholes or voids. Allow Five Star® Waterproofing to completely harden (four to eight hours) before applying next coat. Thoroughly dampen hardened waterproofing before applying additional coats. Trowel Application: Apply in a single application at 1/8 inch (3 mm) thick. Apply firmly to promote bond development.
- POST-PLACEMENT PROCEDURES:** Five Star® Waterproofing is a self-curing product under normal field conditions. Five Star® Waterproofing must be protected from freezing, rain, hydrostatic pressure, and traffic until it reaches its normal 24-hour strength.
- CLEAN UP:** All tools and equipment may be cleaned with water before material hardens.

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

## CONSIDERATIONS

- Not for use over moving cracks
- Never exceed the maximum water content as stated on the package or add an amount that will cause segregation.
- Substrate must be saturated but free of excess surface water at time of application. Surface should appear dull, not glossy.
- Temperature of substrate must be between 45°F and 90°F (7°C and 32°C) at time of installation.
- For applications thicker than 1/8 inch (3 mm), call the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Do not store below 45°F (7°C). Protect from freezing.

## 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 you may call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	UNIT WEIGHT
10100	Five Star® Waterproofing	36	57 LBS (25.85 Kg)

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Specifications Subject to Change.

For most current version of datasheet, go to [FiveStarProducts.com](http://FiveStarProducts.com)

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## TECHNICAL & PRODUCT Bulletins

### **TECHNICAL BULLETIN 101**

Cementitious Grout - Cold Weather

### **TECHNICAL BULLETIN 102**

Cementitious Grout - Hot Weather

### **TECHNICAL BULLETIN 103**

Epoxy Grouting - Cold Weather

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### **TECHNICAL BULLETIN 105**

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Testing Cementitious Grout

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Testing Epoxy Grout

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HP & DP Epoxy Grouts - Improved Color

### **TECHNICAL BULLETIN 112**

Epoxy Grout Placement Considerations

### **TECHNICAL BULLETIN 113**

Mixing Five Star® Grout in Ready Mix Trucks

### **TECHNICAL BULLETIN 114**

Universal Low Dust Epoxy Aggregate  
Epoxy Liquid Modifications

**NOTES:**

[illegible]



## TECHNICAL BULLETIN 101

### Cementitious Grouting - Cold Weather

#### CEMENTITIOUS GROUTING - COLD WEATHER

Cold temperatures delay set time and strength development of cementitious grout. Cementitious grout, like concrete, must be allowed to attain a “green strength” before being subjected to freezing temperatures. The following guidelines may help compensate for cold temperature placement.

- A. Materials should be preconditioned/stored as necessary so that the mixed grout is between 40°F and 80°F (4°C and 27°C). Due to the mass of palletized (bagged) material, up to 72 hours of preconditioning may be required. Store grout in an indoor or a tarped and heated area when required.
- B. All surfaces in contact with grout should be preconditioned and maintained at a temperature between 35°F and 90°F (2°C and 32°C) for 8 - 24 hours. Presoaking concrete with hot water (90°F/32°C) may aid in raising concrete surface temperatures. Mixing grout with warm or hot water should also be considered. Ensure water used for presoaking does not freeze on concrete surfaces.
- C. Heating shall be accomplished by indirect exposure - do not blow heat directly onto newly placed grout surfaces. Heated enclosures should be windproof and weatherproof as much as possible. Combustion heaters must be vented and shall not be permitted to heat and dry the concrete locally. Caution: Exhaust gases may contaminate or cause carbonation within the enclosed environment.
- D. Grout temperature shall be maintained above 35°F (2°C) until the grout reaches a minimum compressive strength of 1000 psi (6.9 MPa). Depending upon grout mix temperature and grout thickness, this may take upwards of 48 hours. For Five Star® Instant Grout, this time period is usually only 4 hours when air temperatures are at 35°F (2°).
- E. Gradually reduce temperature of grout to ambient temperature to avoid thermal shock.

#### REFERENCE:

**ACI 306R-88**  
“Cold Weather Concreting”

**ACI 351.1R-R99**  
“Grouting Between Foundations and Bases for Support of Equipment and Machinery”

**PIP/API RP 686**  
“Process Industry Practices”

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## TECHNICAL BULLETIN 102

### Cementitious Grouting - Hot Weather

#### CEMENTITIOUS GROUTING - HOT WEATHER

High temperatures accelerate the set time and decrease working time of cement based grouts. The guidelines below may compensate for these conditions.

- A. Materials should be pre-conditioned so that the grout mix temperature is between 50°F and 95°F (10°C and 35°C) . Due to the mass of palletized material, up to 72 hours of pre-conditioning may be required. Store grout in a shaded area out of direct sunlight.
- B. All surfaces in contact with cement based grout shall be pre-conditioned and maintained below 95°F (35°C) for 8- 24 hours. Pre soaking of surfaces, mixing equipment and wheelbarrows with cold or iced water will facilitate cooling of surfaces.
- C. Mix grout using cold or iced water. **Do not** put ice directly in with grout during mixing.
- D. Provide shading during grout placement and where feasible, place grout when temperatures are decreasing, at night or early morning. Provide protection from excessive wind to reduce rapid drying and evaporation of water from exposed grout surfaces.
- E. Begin wet cure immediately after grout takes initial set and continuously wet cure all exposed grout surfaces using wet rags, burlap or burlene. Place plastic sheeting over material used for wet cure to ensure continuous wet cure. Monitor condition of material used for wet cure to ensure drying does not occur.
- F. After a minimum 24 hour continuous wet cure, continue wet cure for an additional 48 hours or coat all exposed grout surfaces with an approved curing compound meeting the water retention requirements of ASTM C 309.

#### REFERENCE:

##### **ACI 351.1R-R99**

"Grouting Between Foundations and Bases for Support of Equipment and Machinery"

##### **PIP/API RP 686**

"Process Industry Practices"

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## TECHNICAL BULLETIN 103

### Epoxy Grouting - Cold Weather

#### EPOXY GROUTING - COLD WEATHER

Low temperatures decrease flow, delay set and strength development of epoxy grout and make working with epoxy products more difficult. The guidelines below may compensate for these conditions.

- A. All epoxy grout components (resin, hardener and aggregate) shall be pre-conditioned so that placed grout is between 70°F and 90°F (21°C and 32°C). Due to the mass of palletized material (aggregate component), up to 72 hours of pre-conditioning may be required. Store epoxy grout components in an enclosed, warm or heated area where necessary.
- B. Indirect heating of surfaces (steel, concrete) will also help compensate for cold temperatures. During mixing, the barrel of the mortar mixer may be heated using an appropriate heater to keep the grout mix temperature within an acceptable range.
- C. When necessary, heating shall be accomplished by indirect exposure. Heated enclosures must be windproof and weatherproof. Heaters shall not be permitted to unevenly heat concrete. *Caution: Exhaust gases of unvented heaters may contaminate or cause carbonation of concrete within enclosed environment.*
- D. Grout temperature shall be maintained above 50°F (16°C) until grout reaches required strength (as specified by the engineer).
- E. Gradually allow grout temperature to cool to ambient to avoid thermal shock.

#### REFERENCE:

##### **ACI 351.1R-R99**

"Grouting Between Foundations and Bases for Support of Equipment and Machinery"

##### **PIP/API RP 686**

"Process Industry Practices"

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## TECHNICAL BULLETIN 104

### Epoxy Grouting - Hot Weather

#### EPOXY GROUTING - HOT WEATHER

High temperatures decrease the working time of epoxy grouts. The guidelines below may help compensate for these conditions.

- A. All epoxy grout components (resin, hardener and aggregate) should be pre-conditioned so that the mixed material is between 60°F and 90°F (16°C and 32°C). Due to the mass of palletized material (aggregate), up to 72 hours of pre-conditioning may be required. Store all epoxy grout components in a cool, shaded area out of direct sunlight.
- B. All surfaces, equipment and tools in contact with epoxy grout should be shaded and kept at temperatures between 60°F and 90°F (16°C and 32°C). **Do not** use water to cool surfaces or equipment in contact with epoxy grout.
- C. Shade application area from direct sunlight and where feasible, place epoxy grout when temperatures are decreasing, at night or during early morning.
- D. Place epoxy grout immediately after mixing, do not allow epoxy grout to sit for extended periods of time in buckets or wheelbarrows.
- E. Maintain shading of application area for 24 hours after placement.

#### REFERENCE:

##### **ACI 351.1R-R99**

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## TECHNICAL BULLETIN 105

### Aggregate Extension Guidelines

### Cementitious Grouting

#### **AGGREGATE EXTENSION GUIDELINES - CEMENTITIOUS GROUTING**

Five Star® Grout, Five Star® Fluid Grout 100, Five Star® High Strength Grout, Five Star® Special Grout 110, Five Star® Special Grout 120, Five Star® Special Grout 150, and Five Star® Special Grout 550 may be placed up to 6" (150 mm) in depth neat. For placement over 6", clean washed pea gravel meeting ASTM C33 should be used according to the following table:

Estimated Depth of Pour	Aggregate Extension Percentage	Aggregate Extension Weight	Approximate Yield per 50 lb. Bag*
7" (178mm)	35%	17.5 lbs. (7.4kg)	0.60 ft³ (.0169m³)
9" (230mm)	50%	25 lbs. (11.3kg)	0.65 ft³ (.0184m³)
12" (305mm)	60%	30 lbs. (13.6kg)	0.68 ft³ (.0192m³)
15" (380mm)	70%	35 lbs. (15.9kg)	0.71 ft³ (.0201m³)
18" (455mm)	80%	40 lbs. (18.1kg)	0.75 ft³ (.0212m³)

*\*Actual yields attained in the field will vary and should be verified where greater accuracy is required. Yields are at max. water*

Five Star® Instant Grout may be placed up to 3" (75mm) in depth neat. For placement over 3" (75mm) clean, washed pea gravel meeting ASTM C33 should be used according to the following table:

Estimated Depth of Pour	Aggregate Extension Percentage	Aggregate Extension Weight	Approximate Yield per 55 lb. Bag*
4" (101mm)	40%	22 lbs. (10kg)	0.56 ft³ (.0159m³)
6" (150mm)	50%	27.5 lbs. (12.5kg)	0.61 ft³ (.0172m³)
8" (203mm)	60%	33 lbs. (15kg)	0.64 ft³ (.0181m³)
10" (254mm)	70%	38.5 lbs. (17.5kg)	0.67 ft³ (.0190m³)
12" (305mm)	80%	44 lbs. (20kg)	0.71 ft³ (.0201m³)

*\*Actual yields attained in the field will vary and should be verified where greater accuracy is required. Yields are at max. water*

When mixing grout in a mortar mixer (stationary barrel mixer) coarse aggregate should be added after initial mixing of 3 to 4 minutes. Add coarse aggregate prior to final water adjustment. Mix until coarse aggregate is uniformly and completely wetted with grout.

When mixing grout in a concrete mixer (rotating drum mixer) add water (80%) and coarse aggregate to the mixer first, with the mixer running, followed by grout. After 4 minutes of mixing, make final water adjustment up to 100% (maximum water content). Concrete mixers are only acceptable when extending grout with coarse aggregate.

*Five Star® Fluid Grout 100 should only be extended when mixed to less than a fluid consistency (flowable). For extension guidance using Five Star® HTR Grout and Five Star® EZ-Cure™ Grout, contact the Five Star Products, Inc. Engineering and Technical Center at (800) 243-2206.*

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## TECHNICAL BULLETIN 106

### Aggregate Extension Guidelines

### Concrete Repair

For placements greater than 2 inches (50 mm) in depth, Five Star® Structural Concrete, Five Star® Structural Concrete ES, Five Star® Structural Concrete S 300, Five Star® Structural Concrete UW PG, Five Star® Rapid Repair and Five Star® Rapid Repair ES should be extended with a clean, washed coarse aggregate meeting the requirements of ASTM C 33. Coarse aggregate size typically should not exceed 1/3 the depth of the repair.

When mixing in a mortar mixer, add coarse aggregate after initial mixing of Five Star® Concrete Repair material with mix water for 2-3 minutes. Continue mixing until coarse aggregate is uniformly wetted with repair material. Ensure larger size aggregates can be mixed properly in mortar mixer.

For mixes using a concrete mixer (rotating drum mixer) add water and coarse aggregate to mixer first with mixer running followed by repair material. Concrete mixers are acceptable when extending repair material with coarse aggregate.

Depth of Pour	% By Weight Aggregate Extension (per 50 lb (22.7 kg) bag of repair material)	Actual Weight Aggregate Extension (per 50 lb (22.7 kg) bag of repair material)
Up to 2 inches (50 mm)	0%	0 lbs/kg
2 to 6 inches (50 - 150 mm)	50%	25 lbs (11.3 kg)
6 to 9 inches (150 - 225 mm)	60%	30 lbs (13.6 kg)
9 to 12 inches (225 - 300 mm)	80%	40 lbs (18.1 kg)
Over 12 inches (over 300 mm)	Contact Five Star Products	

*Repair material yield will increase with coarse aggregate extension depending upon aggregate size, extension level, air content and specific gravity of aggregate. Typically a 50% by weight extension (by weight) will increase yield by approximately 35%. Actual yield attained in the field will vary and should be verified where greater accuracy is required.*

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## TECHNICAL BULLETIN 107

### Mix Water Requirements

CEMENTITIOUS GROUTS	Weight	Minimum Water	Maximum Water	Notes
Five Star® Grout	50 lbs (22.7 kg)	3.5 qts (3.3 liters)	5.5 qts (5.2 liters)	
Five Star® Grout	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	
Five Star® High Strength Grout	50 lbs (22.7 kg)	2¾ qts (2.6 liters)	3¼ qts (3.1 liters)	
Five Star® Fluid Grout 100	55 lbs (24.9 kg)	4.0 qts (3.8 liters)	+	To consistency 20-30 seconds (typically 5¼ – 5½ qts)
Five Star® HTR Grout	50 lbs (22.7 kg)	3.0 qts (2.8 liters)	3.5 qts (3.3 liters)	
Five Star® Instant Grout	55 lbs (24.9 kg)	3.0 qts (2.8 liters)	3.5 qts (3.3 liters)	
Five Star® Special Grout 110	50 lbs (22.7 kg)	3.5 qts (3.3 liters)	5.5 qts (5.2 liters)	
Five Star® Special Grout 110	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	
Five Star® Special Grout 120	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	
Five Star® Special Grout 150	50 lbs (22.7 kg)	3.5 qts (3.3 liters)	5.5 qts (5.2 liters)	
Five Star® Special Grout 150	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	
Five Star® Special Grout 400	49 lbs (22.2 kg)	6.0 qts (5.7 liters)	6.5 qts (6.2 liters)	Refer to PTI guide spec for modified flow cone
Five Star® Special Grout 550	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	

STRUCTURAL CONCRETE REPAIR	Weight	Minimum Water	Maximum Water	Notes
Five Star® Structural Concrete	50 lbs (22.7 kg)	2.5 qts (2.4 liters)	3.0 qts (2.8 liters)	
Five Star® Structural Concrete ES	50 lbs (22.7 kg)	2.5 qts (2.4 liters)	3.0 qts (2.8 liters)	
Five Star® Structural Concrete S300	50 lbs (22.7 kg)	2.25 qts (2.1 liters)	3.0 qts (2.8 liters)	
Five Star® Structural Concrete V/O	50 lbs (22.7 kg)	3.0 qts (2.8 liters)	4.0 qts (3.8 liters)	
Five Star® Structural Concrete Gunitite	50 lbs (22.7 kg)	1.75 qts (1.6 liters)	2.25 qts (2.1 liters)	
Five Star® Structural Concrete Gunitite WP	50 lbs (22.7 kg)	2.25 qts (2.1 liters)	3.0 qts (2.8 liters)	
Five Star® Structural Concrete Gunitite S300	50 lbs (22.7 kg)	1.75 qts (1.7 liters)	2.5 qts (2.4 liters)	
Five Star® Structural Concrete HTR Shotcrete	50 lbs (22.7 kg)	2.5 qts (2.4 liters)	3.5 qts (3.3 liters)	
Five Star® Structural Concrete HTR	50 lbs (22.7 kg)	2.5 qts (2.4 liters)	3.0 qts (2.8 liters)	
Five Star® Structural Concrete Underwater HP	50 lbs (22.7 kg)	3.0 qts (2.8 liters)	3.5 qts (3.3 liters)	
Five Star® Structural Concrete Underwater PG	50 lbs (22.7 kg)	3.0 qts (2.8 liters)	4.0 qts (3.8 liters)	

*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.*

INFRASTRUCTURE/ COMMERCIAL	Weight	Minimum Water	Maximum Water	Notes
Five Star® Highway Patch	50 lbs (22.7 kg)	2.25 qts (2.1 liters)	3.0 qts (2.8 liters)	
Five Star® Fast Set Cement	94 lbs (42.6 kg)	**	**	

COATINGS	Weight	Minimum Water	Maximum Water	Notes
Five Star® Waterproofing	50 lbs (22.7 kg)	1.5 + 1.5 qts (1.4 + 1.4 liters)	2.0 + 2.0 qts (1.9 + 1.9 liters)	2.0 qts. water + 2.0 qts Five Star® Liquid (1.4 liters water + 1.4 liters Five Star® Liquid)

- 1) All the products above should be mixed to a recommended consistency.
- 2) Cement grouts may use less than minimum posted water for dry pack consistency.

\*\* Water requirements for Five Star® Cement Systems are typically based upon project specific mix designs with water-cement ratios ranging from 0.30 to 0.45 (maximum); also available in 2500 lb (1134 kg) bulk sacks.

**Contact the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206 for more information.**

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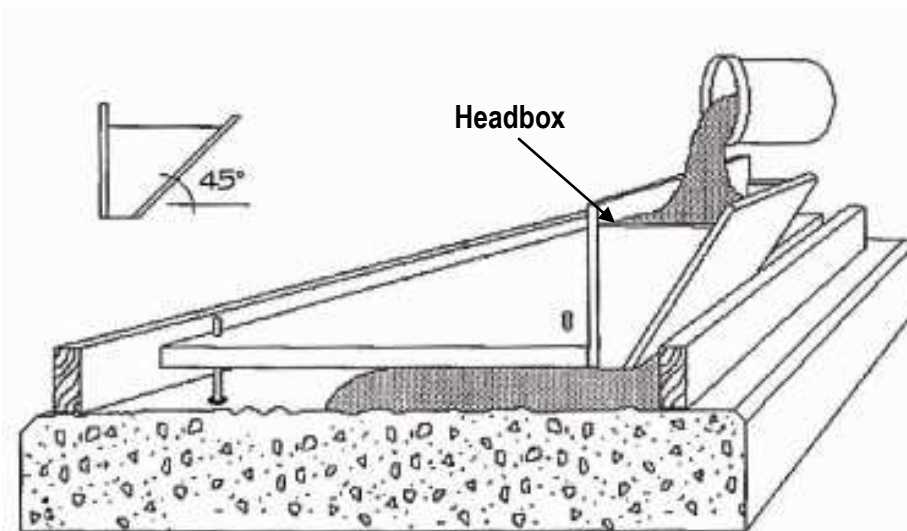
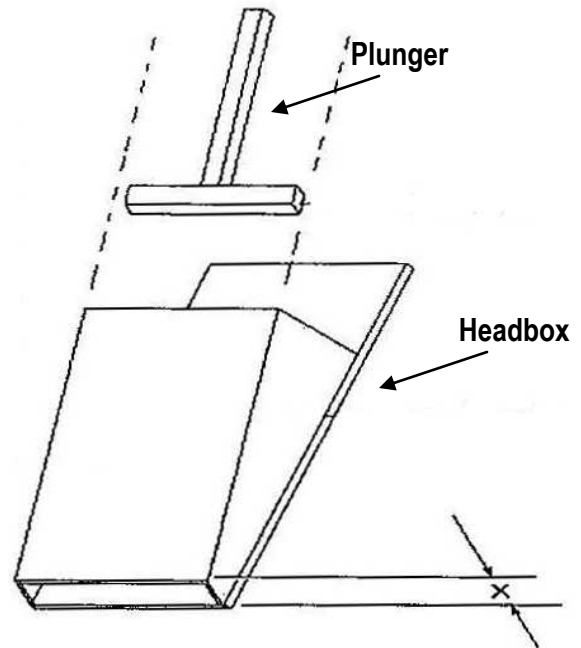


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#### HEADBOX and PLUNGER

A headbox is required for a continuous pour to avoid air pockets under the baseplate and will improve grout flow significantly. When pouring into a headbox, grout shall be introduced in a manner to avoid air entrapment. Care must be taken during grouting to keep the headbox at least half full of material to ensure even grout flow. If necessary to assist the flow, a plunger may be used. This procedure shall continue until the grout rises above the bottom edge of the baseplate on the opposite side.

Note: width "x" shall allow placement of the output end of the headbox to fit between the edge of the baseplate and formwork as illustrated in the bottom diagram.



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**NOTES:**

[illegible]





## TECHNICAL BULLETIN 109

### Proper Testing for Compressive Strength of Five Star® Cementitious Grouts

Five Star® Cementitious Grouts should be tested for compressive strength using 2" x 2" cube specimens made in brass or steel cube molds and a cover plate as directed in ASTM C 942. The use of cylinders, plastic molds, lack of a cover plate or curing at temperatures below 70°F (21°C) will all result in lower compressive strengths being reported.

#### A. Equipment Required for Testing

- 2" x 2" brass or steel cube mold + cover plate  
*[plastic molds or plastic inserts not acceptable]*
- Release Agent
- Compression Testing Machine
- Moist Cabinet – Temperature 70°F – 77°F  
(21°C - 25°C), Humidity 95% min.

#### B. Test time tolerances

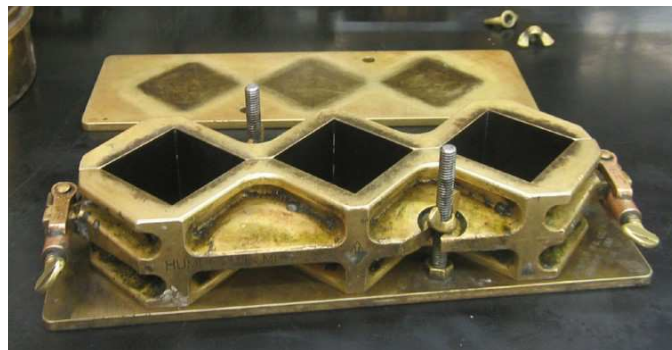
- 1 day ± ½ hour (from start time)
- 3 days ± 1 hour (from start time)
- 7 days ± 3 hours (from start time)
- 28 days ± 12 hours (from start time)

#### C. Compressive Strength Requirement

- See Product Datasheet of product being tested.

#### D. Testing Procedure

1. Using mold release agent, spray cube mold and cover plate.
2. **Flowable or Fluid** consistency grout: fill all cube molds halfway with grout. Puddle grout in cube mold 5 times with gloved finger or tamping rod; fill mold full with grout, puddle with gloved finger or tamping rod 5 times.  
**Dry-Pack** consistency grout: fill cube mold ⅓ way and tamp 25 times using tongue depressor or tamping rod. Repeat process for dry-pack consistency grout two more times, tamping each new layer of grout into previous layer until cube mold is filled.
3. **Dry-Pack** consistency grout (only): tap the side of cube mold 5 times (each side) with rubber mallet for dry-pack consistency grouts.
4. Screed off excess grout so the surface of each specimen is flush with the top of the mold.



*2" x 2" brass cube mold with cover plate*



*Fill cube mold ½ way with fluid/flowable grout.*



*Puddle 5 times with gloved finger or tamping rod.*

5. Clean off any excess material on the top of the mold.
6. Place the cover plate on the mold and tighten with screws or clamps.
7. Immediately upon completion of molding: Place laboratory specimens in the moist room and cure in accordance with the applicable portions of Test Method C 109/C 109M.
8. Identify cubes with product name, batch code, start time, age, test date and water content.
9. Leave mold undisturbed for 24 hours.
10. De-mold cubes after 24 hours and break one cube. Place remaining cubes in a moisture cabinet in a laboratory. The other cubes are tested at 7 days and 28 days.
11. When testing cubes do not apply the load to the original top or bottom cube surfaces (rotate cubes 90° before loading in compression tester).
12. Record the compressive strength in pounds per square inch by dividing the cross sectional area by load.



*Clean off excess material from the top of the mold.*



*Tighten the cover plate with screws or clamps.*

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## TECHNICAL BULLETIN 110

### Proper Testing for Compressive Strength of Five Star® Epoxy Grouts

Five Star® Epoxy Grouts should be tested for compressive strength using 2" x 2" cube specimens made in brass or steel cube molds as directed in ASTM C 579, Method B. The use of cover plates on cube molds ensures more accurate testing and is highly recommended. Using cylinders, plastic molds or curing at temperatures below 70°F will all result in lower compressive strengths being reported.

The most critical aspect of testing epoxy grouts for compressive strength is the rate at which epoxy cube specimens are loaded; ASTM C 579 specifically designates one of two load rates only:

**Load Rate I:** 6,000 psi per minute load rate.

**Load Rate II:** 0.1 to 0.125 inches per minute crosshead speed x specimen height (2") = 0.20 to 0.25 inches/minute for a 2" epoxy grout cube.

ASTM C 579 further states about the two load rate methods: "the above load rates are not identical and may produce different compressive strength results."

Since Five Star Products, Inc. tests and reports compressive strength data based upon Load Rate II, it is highly recommended that any testing facility have its compression tester calibrated to Load Rate II when testing Five Star® Epoxy Grouts. At no time should epoxy grouts ever be tested using a load rate other than what is specified in ASTM C 579. Using load rates other than that specified in ASTM C 579, such as load rates for cement-based grouts (ASTM C 109), concrete or other materials will result in much lower compressive strengths reported.

#### **A. Equipment Required for Testing**

- 2" x 2" brass or steel cube mold + cover plate *[plastic molds or plastic inserts are not acceptable]*
- Release Agent
- Compression Testing Machine Calibrated to Load Rate II
- Curing Location Temperature 70°F – 75° F.

#### **B. Test time tolerances**

- 1 day ± ½ hour (from start time)
- 7 days ± 3 hours (from start time)

#### **C. Compressive Strength Requirement**

- See Product Five Star® Datasheet of product being tested.

#### **D. Testing Procedure**

1. Using mold release agent, spray cube mold and cover plate.
2. Fill all cube molds halfway with epoxy grout. Tamp or rod epoxy grout in mold using tongue depressor or tamping rod to remove any entrapped air. Fill mold full with epoxy grout and tamp/rod second layer into first layer. Remove any entrapped air. Fill molds to a slightly overfill condition.



*2" x 2" brass cube mold with cover plate*



*Fill molds halfway with epoxy grout then tamp or rod to remove entrapped air.*



3. Strike off excess epoxy grout from mold.
4. Screed off epoxy grout with tongue depressor or margin trowel using sawing motion so the surface of epoxy grout is flush with the top of the mold.
5. Clean off any excess material on the top of the mold.
6. Place the cover plate on the mold and tighten with screws or clamps.
7. Move the mold to a nearby job site trailer or similar area where temperatures are above 65°F and leave undisturbed for 24 hours. **DO NOT** transport newly cast cube specimens of epoxy grout for 24 hours.
8. Identify cubes with product name, batch code, amount of aggregate, start time, test date and temperature.
9. Leave mold undisturbed for 24 hours.
10. De-mold cubes after 24 hours and test one cube. The other cube is tested at 7 days and the other is held as a retain or can be tested at 28 days. Confirm proper calibration of compression tester where required.
11. When testing cubes do not apply the load to the original top or bottom cube surfaces (rotate cubes 90° before loading in compression tester).
12. Record the compressive strength in pounds per square inch by dividing the cross sectional area by load



*Screed off excess epoxy grout using a trowel or tongue depressor and clean off any excess material on top of the mold.*



*Tighten the cover plate with screws or clamps.*

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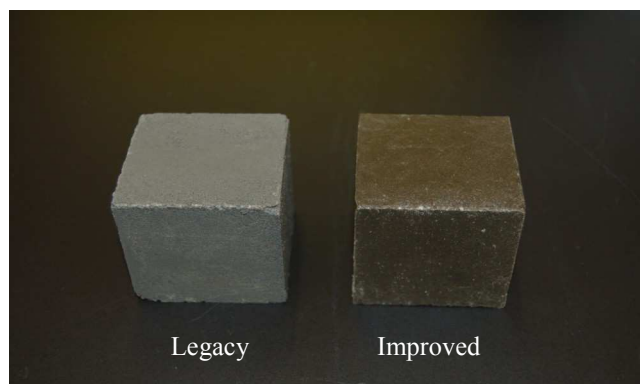


# PRODUCT UPDATE BULLETIN 111

## Improved HP & DP Epoxy Grouts

### Color Change

Five Star® has improved HP & DP Epoxy Grouts with more environmentally friendly formulations in response to the company's desire to be environmental stewards and responsible community stakeholders. There is no change in performance specifications. The only appreciable difference is in the color due to a change in pigmentation ingredients.



#### HP EPOXY GROUT TYPICAL PROPERTIES AT 70°F (21°C)

	HP Epoxy Grout (Standard)		HP Epoxy Grout (High Flow)	
<b>Clearances</b>	4 to 6 inches (100 - 150 mm)		1 to 4 inches (25 - 100 mm)	
<b>Height Change, ASTM C 827, at 90°F (32°C)</b>	Positive Expansion		Positive Expansion	
<b>Effective Bearing Area</b>	95%		95%	
<b>Creep, ASTM C 1181, 1 year 400 psi (2.8 MPa) 140°F (60°C)</b>	1.2 x 10 <sup>-3</sup> in/in (mm/mm)		2.0 x 10 <sup>-3</sup> in/in (mm/mm)	
<b>Compressive Strength, ASTM C 579 B*</b>	<b>Standard Compressive Strength psi (MPa)</b>	<b>Standard Compressive Modulus psi (MPa)</b>	<b>High Flow Compressive Strength psi (MPa)</b>	<b>High Flow Compressive Modulus psi (MPa)</b>
16 Hours	11000 (75.9)	1.6 x 10 <sup>6</sup> (11.0 x 10 <sup>3</sup> )	10000 (69.0)	1.5 x 10 <sup>6</sup> (10.4 x 10 <sup>3</sup> )
1 Day	15000 (103.5)	2.0 x 10 <sup>6</sup> (13.8 x 10 <sup>3</sup> )	14000 (96.6)	1.9 x 10 <sup>6</sup> (13.1 x 10 <sup>3</sup> )
7 Days	16500 (113.9)	2.2 x 10 <sup>6</sup> (15.2 x 10 <sup>3</sup> )	16000 (110.4)	2.1 x 10 <sup>6</sup> (14.5 x 10 <sup>3</sup> )
Post cured at 140°F (60°C)	17500 (120.8)	2.5 x 10 <sup>6</sup> (17.2 x 10 <sup>3</sup> )	17000 (117.3)	2.3 x 10 <sup>6</sup> (15.9 x 10 <sup>3</sup> )

#### DP EPOXY GROUT TYPICAL PROPERTIES AT 70°F (21°C)

	DP Epoxy Grout (Standard)		DP Epoxy Grout (High Flow)	
<b>Clearances</b>	1 to 18 inches (25 - 457 mm)		1/2 to 9 inches (13 - 220 mm)	
<b>Height Change, ASTM C 827, at 90°F (32°C)</b>	Positive Expansion		Positive Expansion	
<b>Effective Bearing Area</b>	95%		95%	
<b>Creep, ASTM C 1181, 1 year 400 psi (2.8 MPa) 140°F (60°C)</b>	3.7 x 10 <sup>-3</sup> in/in (mm/mm)		4.3 x 10 <sup>-3</sup> in/in (mm/mm)	
<b>Compressive Strength ASTM C 579 B*</b>	<b>Standard Compressive Strength psi (MPa)</b>	<b>Standard Compressive Modulus psi (MPa)</b>	<b>High Flow Compressive Strength psi (MPa)</b>	<b>High Flow Compressive Modulus psi (MPa)</b>
1 Day	11000 (75.9)	1.5 x 10 <sup>6</sup> (10.4 x 10 <sup>3</sup> )	9000 (62.1)	1.4 x 10 <sup>6</sup> (9.7 x 10 <sup>3</sup> )
7 Days	14000 (96.6)	2.0 x 10 <sup>6</sup> (13.8 x 10 <sup>3</sup> )	13000 (89.7)	1.9 x 10 <sup>6</sup> (13.1 x 10 <sup>3</sup> )
Post cured at 140°F (60°C)	17000 (117.2)	2.2 x 10 <sup>6</sup> (15.2 x 10 <sup>3</sup> )	16000 (110.3)	2.0 x 10 <sup>6</sup> (13.8 x 10 <sup>3</sup> )

**NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY.** For complete Technical Specifications see applicable data sheet. For more detailed placement procedures, refer to Design-A-Spec™ installation guidelines or call the Five Star Products Engineering and Technical Service Center at (800) 243-2206. For worldwide availability, additional product information and technical support, contact your local Five Star distributor, local sales representative, or you may call Five Star's Engineering and Technical Service Center at (800) 243-2206.



# TECHNICAL BULLETIN 112

## Ultra-High Performance Epoxy Grout Placement Considerations

Five Star® SP Epoxy Grout is the latest advancement in ultra-high performance epoxy grouts and represents further enhancements to the Five Star® product line. No other commercially available grout offers similar high performance characteristics for both today's and tomorrow's applications.

With ultra-high strength its cornerstone, Five Star® SP Epoxy Grout was designed with key engineering properties at the forefront:

- ☑ Positive Expansion when tested in accordance with ASTM C 827
- ☑ Very High Effective Bearing Area (EBA)
- ☑ Very Low Creep when tested in accordance with ASTM C 1181
- ☑ Very High Flexural Strength
- ☑ Placement Versatility via Pumpable and Pourable Systems
- ☑ Exceptional Temperature Resistance — up to 250°F

Five Star® SP Epoxy Grout was developed specifically towards high-load equipment packages or grouting within smaller footprints, such as the recently completed Gas Turbine Compressor set at El Paso Natural Gas (see illustrations).

Other applications include crane rails with next generation high load gantry cranes, wind turbine bases with substantial uplift forces and rotating equipment with ever tighter alignment tolerances.

To achieve ultra-high strengths in epoxy grouts, the reaction during cure has to be driven to the limits of current epoxy resin technology. In doing so, the byproduct of this reaction, exotherm, increases as well.

The result is a product with a higher exotherm than other Five Star® Epoxy Grouts:

Five Star® Epoxy Grout	Peak Exotherm Temp.
Five Star® DP Epoxy Grout	96°F - 103°F (35.5°C - 35.5°C)
Five Star® HP Epoxy Grout	108°F - 128°F (42.2°C - 53.3°C)
Five Star® SP Epoxy Grout	155°F (68.3°C)
Five Star® Rapid Epoxy Grout	212°F (100°C)



Due to its higher exotherm, Five Star® SP Epoxy Grout is recommended for pour depths not to exceed 4 inches (10.2 cm) and placement volume limits of approximately 12 cubic feet (340 L). The placement depth still allows Five Star® SP Epoxy Grout to be utilized for many typical grouting application depths, but requires a mandatory use of expansion joints to limit placement volume between joints. A Design-A-Spec™ for Five Star® SP Epoxy Grout is available that incorporates these specific placement and application details.

It is important to remember Five Star® SP Epoxy Grout is not a replacement for Five Star® DP Epoxy Grout or Five Star® HP Epoxy Grout, but was designed to surpass other higher strength systems such as Euclid E<sup>3</sup>X and Chockfast Red SG. The Euclid E<sup>3</sup>X system, for example, exhibits shrinkage when tested in accordance with ASTM C 827, has poor EBA, and an exotherm of 177°F (80.5°C).

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## TECHNICAL BULLETIN 113

### Procedure for Mixing Five Star® Grouts In Ready Mix Trucks

Certain Five Star® Grouts may be mixed via 3,000 lb. bulk bags in ready mix trucks. **These include Five Star® Grout, Five Star® Cementitious Underwater Grout, Five Star® Special Grout 120, Five Star® Special Grout 150, and Five Star® Fluid Grout 100.** Contact Five Star Products' Technical Support @ 1-800-243-2206 to verify the grout in question may be mixed in a ready mix truck, and for proper aggregate extension guidelines.

**To mix Five Star® Grouts in 3,000 lb. bulk bags at a pre-determined coarse aggregate extension follow these guidelines:**

- A. Verify working time of grout and water requirements under jobsite conditions before placement in ready mix trucks, particularly under hot weather conditions. Additional set retarders such as Five Star® Summerset may be required. Determine the amount of grout to be mixed per truck. Do not mix more than (3) x 3,000 lb. bulk bags per truck. **IMPORTANT** – Before commencing any bulk bag project, consult with Five Star Products and your local technical representative.
- B. Mixing drum and mixing blades must be in good operating condition, pre-dampened, and all excess water / washout removed. Trucks should be designated to arrive at job site with 80% of total mix water and 100% of pre-determined coarse aggregate (clean, damp 3/8" pea gravel meeting ASTM C33 or similar type). Ready mix plant must provide batch certification on water content and aggregate for each truck on site. It is advisable to pre-test aggregate before use with any Five Star® Grouts.
- C. Alternatively, aggregate may be added on site. Trucks should arrive at job site with 80% of total mix water. Utilizing a scale and a loader, the aggregate can be properly weighed and added (clean, damp 3/8" pea gravel meeting ASTM C33 or similar type). It is advisable to pre-test aggregate before use with Five Star® Grouts.
- D. The person who will be opening the bulk bag should wear appropriate face and respiratory protection. Fully open vent on top of bulk bag. Lift and position the sack over the truck hopper. This may be done with a forklift or crane. **CAUTION** – when using a crane to lift bulk bag it is advisable to use a crane with more than a single hook as this can cause bulk bag to spin during lifting and positioning. Once in position, using a drywall knife, cut the bottom of the bulk bag in an 18" diameter "U" shaped pattern.
- E. Add the grout with drum turning at slow speed. After loading the last bulk bag, use approximately 5 gallons of held back water to wash down the hopper and drum. Mix thoroughly for 5 minutes after the last bulk bag is loaded.
- F. Reverse the drum to check consistency. Add only as much of the remaining water as needed. Increase the drum speed to high and mix for 5 additional minutes to uniform consistency. Do not exceed the maximum allowable water content. Extra 50 lb. bags of applicable grout should be available to stiffen consistency if necessary.
- G. Position the truck as close as possible to the pour and promptly discharge the grout. It is recommended that the grout pass through a screen to remove any clumps prior to entering the pump hopper.

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## PRODUCT UPDATE BULLETIN 114

### Universal Low Dust Epoxy Aggregate Epoxy Liquid Modifications

Effective January 2013 Five Star® Epoxy Grouts will be manufactured with an innovative technology that significantly reduces dusting during mixing. These new Universal Low Dust Aggregates will replace the existing aggregate components in Five Star® DP, DP PG, HP, SP and SP PG Epoxy Grouts.

In order to maintain existing product yields, packaging weights on some products require a modification as follows:

	<u>Existing Packaging</u>	<u>New, Universal Low-Dust Packaging</u>
Five Star® DP Epoxy Grout High Flow 1.75 ft <sup>3</sup> Product Code 33155	Resin 18.9 lbs Hardener 5.7 lbs Aggregate 4 x 45 lbs	Resin 20.9 lbs Hardener 6.3 lbs Aggregate 4 x 50 lbs
Five Star® DP Epoxy Grout Standard Flow 2.0 ft <sup>3</sup> Product Code 33610	Resin 18.9 lbs Hardener 5.7 lbs Aggregate 5 x 45 lbs	Resin 20.9 lbs Hardener 6.3 lbs Aggregate 5 x 50 lbs
Five Star® HP Epoxy Grout High Flow 1.75 ft <sup>3</sup> Product Code 33600	Resin 23.8 lbs Hardener 4.2 lbs Aggregate 4 x 50 lbs	NO CHANGE NO CHANGE NO CHANGE
Five Star® HP Epoxy Grout Standard Flow 2.0 ft <sup>3</sup> Product Code 33100	Resin 23.8 lbs Hardener 4.2 lbs Aggregate 5 x 50 lbs	NO CHANGE NO CHANGE NO CHANGE
Five Star® SP Epoxy Grout Product Code 33500	Resin 23.7 lbs Hardener 7.7 lbs Aggregate 5 x 45 lbs	Resin 21.9 lbs Hardener 5.4 lbs Aggregate 4 x 50 lbs
Five Star® DP Epoxy Grout PG Product Code 33630	Resin 18.9 lbs Hardener 5.7 lbs Aggregate 4 x 40 lbs	Resin 20.9 lbs Hardener 6.3 lbs Aggregate 4 x 44 lbs
Five Star® SP Epoxy Grout PG Product Code 33501	Resin 23.7 lbs Hardener 7.7 lbs Aggregate 4 x 50 lbs	Resin 21.9 lbs Hardener 5.4 lbs Aggregate 4 x 44 lbs

For distributors and/or customers with inventory of existing packaging, please note these can be addressed under the following scenarios:

1. Existing Five Star® DP Aggregate with New DP Liquids – add between ½ to one additional 45 lb bag of existing DP Aggregate to the new DP PG liquids.
2. Existing Five Star® DP liquids with new DP Low Dust Aggregate – add all four bags of new Low Dust Aggregate at 50 lbs – since the flow is improved using the new Low Dust Aggregate, additional aggregate will not effect flow.
3. Existing Five Star® DP PG Aggregate with new DP PG Liquids – add between ½ to one additional 40 lb bag of existing DP PG Aggregate to new DP PG Liquids.
4. Existing Five Star® DP PG Liquids with new DP PG Liquids – add all four bags of New DP PG Low Dust Aggregate.

**NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY.** For complete Technical Specifications see applicable datasheet. For more detailed placement procedures, refer to Design-A-Spec™ installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206. For worldwide availability, additional product information and technical support, contact your local Five Star® distributor, local sales representative, or you may call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.



**NOTES:**

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# FIVE STAR

Specified by the World's Best™



A recognized international leader in industrial-grade construction and marine industry solutions, **Five Star Products, Inc.** remains committed to providing value to our customers through technically advanced, quality products. Our specification assistance, technical support, and customer service are unsurpassed in the industry.

At Five Star Products, it is our goal to be your preferred choice for effective and reliable Precision Machinery Grouts, Concrete Repair Products, Coatings and Adhesives.

To learn more about Five Star® products, visit our website:

**FiveStarProducts.com**

Specifications subject to change.  
For current versions of Data Sheets go to our web site  
[www.FiveStarProducts.com](http://www.FiveStarProducts.com).



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