

# Product Data Guide

TECHNICAL DATA SHEETS & TECH BULLETINS



Advanced Technology From Advanced Thinking®



# About Us



LOOK for this symbol on select Five Star<sup>®</sup> 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.



Five Star Products, Inc. 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 Fax: +1 203-336-7930 www.FiveStarProducts.com 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 9001-2015 standard.



# Contents

- Cementitious Grouts
- Epoxy Grouts
- CONCRETE REPAIR & OVERLAYS
- Nuclear Safety Application Ready Products
- Specialty Concrete Repair
- Infrastructure & Commercial Concrete Repair
- Adhesives & Sealants
- Coatings & Waterproofing
- Chemical Grouts & Polyurethanes
- Technical & Product Bulletins



# Cementitious Grouts

#### **FIVE STAR® GROUT**

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

FIVE STAR<sup>®</sup> HIGH-STRENGTH GROUT

High compressive strength precision non-shrink grout

#### **FIVE STAR® CLARIFIER GROUT**

Overlay grout – Sulfate resistant and moderate heat of hydration, cement-based, nonmetallic grout for supporting machinery requiring precision alignment.

**FIVE STAR® FLUID GROUT 100** Premier fluid grout for supporting equipment requiring precision alignment

#### **FIVE STAR® FLUID GROUT 161**

High-performance precision non-shrink fluid grout that can be used in environments that come into contact with potable water

FIVE STAR<sup>®</sup> HTR GROUT

High-temperature exposure grout

#### **FIVE STAR® HYBRID GROUT**

Ultra high-performance precision non-shrink grout for permanent support of highload machinery, light vibratory equipment, and more

#### **FIVE STAR® INSTANT GROUT**

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

#### **FIVE STAR® SPECIAL GROUT 400**

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

NOTES:		



# FIVE STAR<sup>®</sup> 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

### **USES**

- Grouting of machinery and equipment to maintain precision alignment
- Non-shrink grouting of structural steel and precast concrete

# PACKAGING AND YIELD

Five Star<sup>®</sup> 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) 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 PROPE	RTIES 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)	Dry Pack	Flowable
1 Day	4,000 psi (27.6 MPa)	2,500 psi (17.3 MPa)
3 Days	5,500 psi (38.0 MPa)	3,500 psi (24.1 MPa)
7 Days	6,500 psi (44.9 MPa)	5,000 psi (34.5 MPa)
28 Days	8,000 psi (55.2 MPa)	6,500 psi (44.9 MPa)
Working Time at 70°F (21°C)	45 minutes	

- Permanent support for machinery requiring precision alignment
- Does not contain gas generating additives, such as aluminum powder
- Non-shrink from the time of placement
- Grouting of anchors and dowels
- Support of tanks and vessels

- SURFACE PREPARATION: All surfaces in contact with Five Star® Grout shall be free of oil, grease laitance and other bond-inhibiting contaminants. Concrete should be mechanically roughened to coarse aggregate exposure to maximize bond. A Concrete Surface Profile (CSP) of 6-9 in accordance with ICRI Technical Guideline 310.2R is recommended. Presoak concrete surfaces for 8 to 24 hours, continuously and consistently, via wet rags, wet burlap, ponding or similar method.
- 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<sup>®</sup> 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 depending upon jobsite conditions. Mix Five Star<sup>®</sup> 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.
- 4. METHODS OF PLACEMENT: Five Star<sup>®</sup> Grout may be dry packed, poured or pumped into place. Minimum placement thickness for Five Star<sup>®</sup> Grout is 1 inch (25 mm). For pours over 6 inches (150 mm) in depth Five Star<sup>®</sup> Grout should be extended with a clean, damp coarse aggregate meeting the requirements of ASTM C 33. Refer to Five Star Products' Technical Bulletin "Cement Grout Aggregate Extension" for guidelines. For more detailed placement procedures, go to FiveStarProducts.com and select Design-A-Spec<sup>™</sup> in product downloads.
- POST-PLACEMENT PROCEDURES: Five Star<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206. **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 Five Star<sup>®</sup>Design-A-Spec<sup>™</sup> for cold and hot weather grouting procedures, or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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.
- 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 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<sup>®</sup> 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
25500	Five Star <sup>®</sup> Grout	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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7913 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12514 Rev. C | American Owned & Operated





# 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

#### <u>USES</u>

- Grouting of machinery and equipment under high loads
- Non-shrink grouting of structural steel and precast concrete
- Support of tanks and vessels

### PACKAGING AND YIELD

Five Star<sup>®</sup> 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		
Early Height Change, ASTM C 827	0.0 to 4.0%	0.0 to 4.0%		
Hardened Height Change, ASTM C 1090	0.0 to 0.3%	0.0 to 0.3%		
Effective Bearing Area	95%	95%		
Bond Strength, ASTM C 882 / 28 Days	2,000 psi (13.8 MPa)	2,000 psi (13.8 MPa)		
Pull-out Strength, Shear Bond with #5 deformed bar, 7 days	2,400 psi (16.6 MPa)	2,400 psi (16.6 MPa)		
Compressive Strength, 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)		
Working Time at 70°F (21°C)	20 minutes	20 minutes		

- Permanent support for machinery requiring precision alignment
- Non-shrink from the time of placement
- Wind turbines
- Compressors and turbo equipment
- Grouting of anchors and dowels

- SURFACE PREPARATION: All surfaces in contact with Five Star® High Strength Grout shall be free of oil, grease laitance and other bondinhibiting contaminants. Concrete should be mechanically roughened to coarse aggregate exposure to maximize bond. A Concrete Surface Profile (CSP) of 6-9 in accordance with ICRI Technical Guideline 310.2R is recommended. Presoak concrete surfaces for 8 to 24 hours, continuously and consistently, via wet rags, wet burlap, ponding or similar method.
- 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 20 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 20 minutes.
- 4. METHODS OF PLACEMENT: Five Star<sup>®</sup> High Strength Grout may be dry packed, wet set or poured into place. Minimum placement thickness for Five Star<sup>®</sup> High Strength Grout is one inch (25 mm). For pours over 6 inches (150 mm) in depth Five Star<sup>®</sup> High Strength Grout should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star<sup>®</sup> Technical Bulletin "Cement Grout Aggregate Extension" for guidelines. For more detailed placement procedures, go to FiveStarProducts.com and select Design-A-Spec<sup>™</sup> in product downloads.
- 5. POST-PLACEMENT PROCEDURES: Five Star<sup>®</sup> 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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 not between 40°F and 90°F (4°C and 32°C), refer to Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> for cold and hot weather grouting procedures or call 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.
- 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 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
42000	Five Star <sup>®</sup> High Strength Grout	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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 12-17-2018 12575 Rev. C | American Owned & Operated





# **CLARIFIER GROUT**

**Clarifier Overlay Grout** 

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> Clarifier Grout is a sulfate resistant and moderate heat of hydration, cement-based, nonmetallic grout for supporting machinery requiring precision alignment. Five Star<sup>®</sup> Clarifier Grout meets the performance requirements of ASTM C1107 and CRD-C 621 specifications for non-shrink grout for Grade A, B and C over a wide temperature range and a long working time.

## **ADVANTAGES**

- Sulfate resistance
- Moderate heat of hydration
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Formulated with Devoider® for optimum load transfer

#### USES

- Clarifier bottoms
- Sulfate resistant overlays
- Patching and repairs

- Permanent support for machinery requiring precision alignment
- Does not contain gas generating additives, such as aluminum powder
- Non-shrink from the time of placement
- Support of tanks and vessels
- Repair of concrete in confined areas

# PACKAGING AND YIELD

Five Star<sup>®</sup> Clarifier Grout 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. 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 73°F (23°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)	
Compressive Strength, ASTM C 109		
1 Day	2,500 psi (17.3 MPa)	
7 Days	5,000 psi (35.3 MPa)	
28 Days	7,000 psi (48.3 MPa)	
Working Time at 73°F (23°C)	45 minutes	

- 1. SURFACE PREPARATION: All surfaces in contact with Five Star<sup>®</sup> Clarifier Grout shall be free of oil, grease laitance and other bondinhibiting contaminants. Concrete should be mechanically roughened to coarse aggregate exposure to maximize bond. A Concrete Surface Profile (CSP) of 10 in accordance with ICRI Technical Guideline 310.2R-2013 is recommended. Presoak concrete surfaces for 8 to 24 hours, continuously and consistently, via wet rags, wet burlap, ponding or similar method. Minimum ½ inch peak to valley profile.
- 2. MIXING: Mix Five Star® Clarifier Grout thoroughly for approximately 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 (15°C and 27°C). Mix Five Star® Clarifier Grout per directions on the packaging. Working time is approximately 45 minutes at 73° F (23°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
- PLACEMENT PROCEDURES: Five Star<sup>®</sup> Clarifier Grout may be poured or pumped into place. For placement thicknesses greater than two inches (50 mm), add clean washed pea gravel. Contact Five Star Products' Engineering and Technical Service Center for further details.
- 4. POST-PLACEMENT PROCEDURES: Five Star<sup>®</sup> Clarifier Grout must be flood cured for a minimum of three days. 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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 not between 40°F and 90°F (4°C and 32°C), refer to Five Star<sup>®</sup> Design -A-Spec<sup>™</sup> 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 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<sup>®</sup> 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
20962	Five Star <sup>®</sup> Clarifier Grout	56	50 lb. (22.7 kg) bag
20950	Five Star <sup>®</sup> Clarifier Grout - bulk bag	1	3,000 lb (1,363 kg) 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 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2019 Five Star Products, Inc. | 03-28-2019 12974 Rev. C | American Owned & Operated





# 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 1107-14 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

### USES

- Grouting clearances to 1/2 inch
- Grouting of anchors and dowels
- Grouting of machinery and equipment to maintain 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
- Non-shrink grouting of structural steel and precast concrete
- Preplaced aggregate grouting
- Support of tanks and vessels

# PACKAGING AND YIELD

Five Star<sup>®</sup> 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 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 PROPE	RTIES 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	2,000 psi (13.8 MPa)/28 days	
Freeze Thaw Resistance, ASTM C 666A, 300 Cycles	> 95% RDM	
Compressive Strength, ASTM C 942 (C109 Restrained)	Plastic Consistency <sup>1</sup>	Fluid Consistency <sup>2</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)
Working Time at 70°F (21°C)	30 minutes	

<sup>1</sup> 100% - 125% flow on flow table (plastic consistency), CRD-C 621 (ASTM C 230, 5 drops in 3 seconds).

<sup>2</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.

- SURFACE PREPARATION: All surfaces in contact with Five Star<sup>®</sup> Fluid Grout 100 shall be free of oil, grease laitance and other bondinhibiting contaminants. Concrete should be mechanically roughened to coarse aggregate exposure to maximize bond. A Concrete Surface Profile (CSP) of 8-10 in accordance with ICRI Technical Guideline 310.2R is recommended. Presoak concrete surfaces for 8 to 24 hours, continuously and consistently, via wet rags, wet burlap, ponding or similar method.
- 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® 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 4.5 quarts potable water per 55 lb. bag. Mix for approximately two minutes. Add an additional 0.5 to 1.0 quarts of water and continue mixing for three minutes. If a fluid consistency is required, typically around 5 ½ quarts water (total) will allow for a fluid consistency. 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.
- 4. 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.
- 5. POST-PLACEMENT PROCEDURES: Five Star<sup>®</sup> 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. For more detailed placement procedures, refer to the Five Star<sup>®</sup> Design-A-Spec<sup>™</sup>.

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

- 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> for cold and hot weather grouting procedures or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Never exceed the maximum water content as stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.
- Cement Based grout should attain a minimum compressive strength of 1,000 psi before being exposed to freezing 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 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
25000 F	Fluid Grout 100	56	55 lb. (25 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7913 FiveStarProducts.com



© 2019 Five Star Products, Inc. | 01-11-2019 12515 Rev. E | American Owned & Operated





# FLUID GROUT 161

**High Performance Precision** Non-Shrink Fluid Grout

# PRODUCT DESCRIPTION

Five Star® Fluid Grout 161 is a UL classified cement-based, nonmetallic, non-shrink fluid grout for supporting machinery and equipment in environments that may come into contact with potable water. 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 161 exhibits positive expansion. Five Star® Fluid Grout 161 meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-14 and CRD-C 621-93 specifications for non-shrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

# **ADVANTAGES**

Tested and certified to NSF/ANSI 61 for use in applications that may come into contact with potable water



- Air release technology per ACI 351.1 R
- Placement within tight clearances down to 1/2 inch
- High 1, 7, 28 day strength

### USES

- Grouting of structural baseplates, anchors, dowels, connections and skid mounted equipment associated with: filter bed trays, small pumps/motors, cross-screw conveyors, centrifuges, residuals handling and other water treatment systems
- Annular space grouting for sliplining and pipe rehabilitation

- 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
- Grouting of machinery and equipment to maintain precision alignment
- Non-shrink grouting of structural steel and precast concrete •
- Grouting of drinking water system storage and transportation • components such as tanks, vessels, and pipelines

# PACKAGING AND YIELD

Five Star® Fluid Grout 161 is packaged in heavy-duty, polyethylene lined bags and is available in 55 lb. (25 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)				
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	2,000 psi (13.8 MPa)/28 days			
Freeze Thaw Resistance, ASTM C 666A, 300 Cycles	> 95% RDM			
Compressive Strength, ASTM C 942 (C109 Restrained)	Plastic Consistency <sup>1</sup>	Fluid Consistency <sup>2</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)		
Working Time at 70°F (21°C)	30 minutes			

<sup>1</sup> 100% - 125% flow on flow table (plastic consistency), CRD-C 621 (ASTM C 230, 5 drops in 3 seconds). <sup>2</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.



- 1. SURFACE PREPARATION: All surfaces in contact with Five Star<sup>®</sup> Fluid Grout 161 shall be free of oil, grease laitance and other bondinhibiting contaminants. Concrete should be mechanically roughened to coarse aggregate exposure to maximize bond. A Concrete Surface Profile (CSP) of 8-10 in accordance with ICRI Technical Guideline 310.2R is recommended. Presoak concrete surfaces for 8 to 24 hours with liberal quantities of potable water, via wet rags, wet burlap, ponding or similar method. Leave 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® Fluid Grout 161 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 161 may be mixed to a flowable or fluid consistency. Begin by mixing Five Star® Fluid Grout 161 with 4.5 quarts potable water per 55 lb. bag. Mix for approximately two minutes. Add an additional 0.5 to 1.0 quarts of water and continue mixing for three minutes. If a fluid consistency is required, typically around 5 ½ quarts water (total) will allow for a fluid consistency. 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.
- 4. METHODS OF PLACEMENT: Five Star® Fluid Grout 161 may be poured or pumped into place. Minimum placement thickness is 1/2 inch (12 mm) when mixed to a fluid consistency. Maximum placement thickness is 6 inches (150 mm). For pours over 6 inches (150 mm) in depth, call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 5. POST-PLACEMENT PROCEDURES: Five Star<sup>®</sup> Fluid Grout 161 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. For more detailed placement procedures, refer to the Five Star<sup>®</sup> Design-A-Spec<sup>™</sup>.

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

- 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 Five Star® Design-A-Spec<sup>™</sup> for cold and hot weather grouting procedures or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Never exceed the maximum water content as stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.
- Cement Based grout should attain a minimum compressive strength of 1,000 psi before being exposed to freezing 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 SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star<sup>®</sup> 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
25200	Fluid Grout 161	56	55 lb. (25 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7913 FiveStarProducts.com





MH62949 Barrier Material Water Contact Temperature 73°F (23°C) TY Surface Area to Volume 25 cm<sup>2</sup>/L

NSF/ANSI 61

© 2019 Five Star Products, Inc. 03-15-2019 | 13085 Rev. D American Owned & Operated





# HTR GROUT

# High Temperature Exposure Nonshrink Grout

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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 1,000°F (538°C) in 24 hours and up to 2,400°F (1316°C) after a 7-day curing procedure. Five Star<sup>®</sup> HTR Grout exhibits positive expansion when tested in accordance with ASTM C 827. Five Star<sup>®</sup> HTR 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
- Thermal shock resistance

## USES

- Areas of high temperature exposure
- Thermal cycling up to 2,400°F (1316°C)

- High temperature resistance
- High 24-hour compressive strength
- Rapid turnaround during shutdowns
- Coker, kiln and foundry applications

### PACKAGING AND YIELD

Five Star<sup>®</sup> 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.

	Thermal Shock Resistance			stance		
	50	00 psi	_			
TYPICAL PROPER	TIES AT 70°F (21°C)					
Early Height Change, ASTM C 827	Positive Expansion					
Compressive Strength, ASTM C 942 (	C109 Restrained)					
1 Day	4,000 psi (27.6 MPa)					
7 Days	5,500 psi (38.0 MPa)		∎ 1 day	7 day	/S	28 days
28 Days	6,500 psi (44.9 MPa)		# CV(		AGE	STRENGTH
Bond Strength, ASTM C 882, 7 Days	2,500 psi (17.3 MPa)		1 1/2 c	ycles	2 days	5300 psi
Thermal Coefficient of Expansion, ASTM C 531	<b>5.0 x 10<sup>-6</sup> in/in/°F</b> (9.0 x 10.6 mm/mm/°C)		5 1/2 c	ycles	7 days	5300 psi
Working Time at 70°F (21°C)	20 minutes		20 1/2 (	cycles	28 days	5300 psi
			Samp	les cured	at 70°F (21°0	C) for 24 hours,

then exposed to 1000°F (538°C) in 24 hour cycles

- 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 Products' 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 24 hours after placement, material can be brought up to an operating temperature of 1,000°F (538°C). For operating temperatures up to 2,400°F (1,316°C), wet cure for 3 days followed by dry cure for 4 days. Then slowly apply heat up to 2,400°F (1,316°C).

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

# 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> for cold and hot weather grouting procedures, or call 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.

# 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<sup>®</sup> 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
28830	Five Star <sup>®</sup> HTR Grout	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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



 $\textcircled{\sc 0}$  2019 Five Star Products, Inc. | 02-22-2019 12582 Rev. C | American Owned & Operated



# FIVE STAR

# **HYBRID GROUT**

# Precision Non-Shrink Ultra-High Performance Cementitious Specialty Grout

#### PRODUCT DESCRIPTION

Five Star® Hybrid Grout is a fusion of many key properties found in Five Star Products' cementitious specialty grouts with high compressive strengths. It achieves superb flowability while reaching high early and ultimate compressive strengths. It can be installed over a wide temperature range (35-100°F / 2-38°C) allowing you to extend your installation season by letting you grout during cold and hot weather months. Hybrid Grout reaches one of the highest effective bearing areas (EBA) in the industry with the use of air release technology per ACI 351.1 R and meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-14a, and CRD-C 621-93 specifications.

#### ADVANTAGES

- Ultra-high 1, 7 and 28 day compressive strengths
- 95% EBA (effective bearing area)
- Highly flowable can be pumped or poured
- Non-shrink from time of placement
- Nonmetallic

- Formulated with air release technology for reduced voids and increased bond
- Can be installed over a wide temperature range (35-100°F / 2-38°C)
- Can be exposed to temperatures up to 600°F (315°C)
- Experienced field engineering and technical support

- <u>USES</u>
- Permanent support for high static load machinery
- Low vibration equipment
- Structural steel and precast concrete
- Support for tanks, vessels, generators and small pumps
- Wind turbines
- Seismic isolators
- High-load rebar, anchors and dowels
- High-load infrastructure

#### PACKAGING AND YIELD

Five Star® Hybrid Grout is packaged in heavy-duty, 45 lb. (20.4 kg) polyethylene lined bags yielding approximately 0.39 cubic feet (11 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				
	35°F (2°C)	72°F (22°C)	100°F (38°C)	
Compressive Strength, ASTM C 942, (C109 Restrained), psi (MPa)				
8 Hour	-	4,000 (27.6)	5,000 (34.5)	
1 Day	2,000 (13.8)	7,500 (51.7)	8,000 ( 55.2)	
7 Days	8,000 (55.2)	13,000 (89.6)	13,000 (89.6)	
28 Days	12,000 (82.7)	16,500 (113.8)	17,000 (117.2)	
Bond Strength, ASTM C 882 / 28 Days, concrete failure, psi (MPa)	4,000 (27.6)	4,000 (27.6)	4,000 (27.6)	
Early Height Change, ASTM C 827	0.0 to 2.0%	0.0 to 2.0 %	0.0 to 2.0%	
Hardened Height Change, ASTM C 1090	0.0 to 0.2%	0.0 to 0.2%	0.0 to 0.2%	
Effective Bearing Area, ASTM C 1339	≥ 95%	≥ 95%	≥ 95%	
Flow, ASTM C 1339, 1" height, seconds	≤ 60	≤ 60	≤ 60	
Consistency Flow Test, 2 x 4 in. (50 x 100 mm) cylinder, inches (mm)	8 - 12 (200-300)	8 - 12 (200-300)	8 - 12 (200-300)	
Freeze/Thaw, ASTM C 666, Procedure A, Durability Factor	≥95%	≥95%	≥95%	
<b>Chloride Permeability</b> , ASTM C 1202 28 days, rating (coulombs)	Very low (<1,000)	Very low (<1,000)	Very low (<1,000)	
Set Time, Initial, ASTM C 191, minutes	180	120	60	
<b>Modulus of Elasticity</b> , ASTM C 469 / 28 Days 3 x 6 in. (75 x 150 mm) cylinder, psi (GPa)				
Neat	-	4.5 x 10 <sup>6</sup> (31.0)	-	
Working Time in Minutes	30	30	30	

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.

- 1. SURFACE PREPARATION: All surfaces in contact with Five Star® Hybrid Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to a recommended ½" peak to valley profile to ensure proper bond. Continuously soak concrete surfaces for 8-24 hours prior to application of grout 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 1 to 2 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 Service Center for further information.
- 3. MIXING: Mix Five Star® Hybrid Grout thoroughly for four to five minutes to a uniform consistency with a mortar mixer (stationary barrel mixer with moving blades). For optimum performance, maintain grout before and during placement at temperatures between 60°F and 90°F (16°C and 32°C). Use heated or chilled water to help adjust working time. Start by adding 6.9 lbs (3.3 qts / 3.13 L) per bag of potable water to mixer. Due to the nature of this material, an electric mortar mixer is not recommended for multiple bag mixes (use gas, diesel, or hydraulic mixers). Add Five Star® Hybrid Grout SLOWLY while mixing and mix for two minutes. Be careful not to overwhelm the mixer and allow the material to be too dry. Add additional water as needed up to a max of 0.60 lbs (0.29 qts / 0.27 L) per bag for a max total of 7.5 lbs (3.6 qts / 3.4 L) per bag and continue to mix for two to three minutes to achieve maximum flow. Working time is approximately 30 minutes at 70°F (21°C). Do not mix more grout than can be placed within that time. Follow printed instructions on the package. Always add mixing water to the mixer first, followed by grout.

For single bag mixes, a heavy-duty power drill, shear mixing paddle and 7-gallon pail should be used. Start by adding 6.9 lbs of water (3.3 qts / 3.13 L) to the pail. Add grout SLOWLY being careful not to overwhelm the drill. Mix for two minutes until all material is fully wet and incorporated. Add additional water as needed up to a max of 0.60 lbs (0.29 qts / 0.27 L) per bag for a max total of 7.5 lbs (3.6 qts / 3.4 L) per bag and continue to mix for two to three minutes.

- 4. METHODS OF PLACEMENT: Five Star® Hybrid Grout may be pumped, wet set or poured into place. Minimum placement thickness for Five Star® Hybrid Grout is ¾ inch (19 mm). For pours over 6 inches (150 mm) in depth Five Star® Hybrid 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<sup>®</sup> Hybrid 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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 not between 35°F and 100°F (2°C and 38°C), refer to the Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> for cold and hot weather grouting procedures or call 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.
- For high-temperature operating environments above 600°F (316°C) contact Five Star Products' Engineering and Technical Service Center.

#### 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
25600	Five Star <sup>®</sup> Hybrid Grout	56	45 lb. (20.4 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 IN CONNECTION WITH THIS PRODUCT. IS PRAIL NOT BE LIABLE FOR DAMAGES OF ANY SORT, 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.\*

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com

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



© 2020 Five Star Products, Inc. | 03-20-2020 12932 Rev. I | American Owned & Operated





# **INSTANT GROUT**

# Rapid Strength Gain Precision Non-Shrink Grout

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> Instant Grout is a rapid strength gain, nonmetallic, non-shrink 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<sup>®</sup> Instant Grout exhibits positive expansion. Five Star<sup>®</sup> 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 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
- 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

#### <u>USES</u>

- Low temperature placement
- Fast turnaround time
- Grouting of machinery base plates to maintain precision 

   alignment
- Non-shrink grouting of structural steel and precast concrete
- Installation of anchors and dowels
  - Support of tanks and vessels

# PACKAGING AND YIELD

Five Star<sup>®</sup> Instant Grout is packaged in heavy-duty, polyethylene lined bags 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 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	2,500 psi (17.3 MPa)
Effective Bearing Area	95%
Compressive Strength, ASTM C 942 (C 109 Restrained)	
4 Hours	4,000 psi (27.6 MPa)
1 Day	5,500 psi (38.0 MPa)
7 Days	6,500 psi (44.9 MPa)
28 Days	7,000 psi (48.3 MPa)
Working Time at 70°F (21°C)	10 minutes

- SURFACE PREPARATION: All surfaces in contact with Five Star<sup>®</sup> Instant Grout shall be free of oil, grease laitance and other bondinhibiting contaminants. Concrete should be mechanically roughened to coarse aggregate exposure to maximize bond. A Concrete Surface Profile (CSP) of 6-9 in accordance with ICRI Technical Guideline 310.2R is recommended. Presoak concrete surfaces for 8 to 24 hours, continuously and consistently, via wet rags, wet burlap, ponding or similar method
- 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 Service Center for further information.
- 3. MIXING: Mix Five Star<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> Instant Grout may be poured into place. Minimum placement thickness for Five Star<sup>®</sup> Instant Grout is 1 inch (25 mm). For pours over 3 inches (75 mm) in depth Five Star<sup>®</sup> Instant Grout should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star<sup>®</sup> Technical Bulletin "Cement Grout Aggregate Extension" for guidelines. For more detailed placement procedures, go to FiveStarProducts.com.
- 5. POST-PLACEMENT PROCEDURES: Five Star<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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 not between 35°F and 80°F (2°C and 27°C), refer to Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> for extreme 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 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 SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star<sup>®</sup> 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
50100	Five Star <sup>®</sup> Instant Grout	56	55 lb. (24.9 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 OR FITNESS FOR A PARTICULAR PURPOSE IN CONNECTIONS AND 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2019 Five Star Products, Inc. | 01-11-2019 12581 Rev D | American Owned & Operated





# **SPECIAL GROUT 400**

# Fluid Precision Non-shrink Cable Grout

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> Special Grout 400 shows positive expansion. Five Star<sup>®</sup> 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

#### <u>USES</u>

- Provides corrosion protection of bridge cables
- Non-shrink grouting between precast panels, walls and beams

#### PACKAGING AND YIELD

- 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
- Pressure placement into tendon ducts

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

- 1. PREPARATION: When Five Star<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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 and select Design-A-Spec<sup>™</sup> 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<sup>™</sup> installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

### **CONSIDERATIONS**

- For non post-tensioning applications, minimum placement thickness is 1/8".
- At time of placement, if temperatures of equipment and surfaces are above 90°F (4°C and 32°C), refer to Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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<sup>®</sup> 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

Five Star Products, Inc. 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-20-2018 12573 Rev. C| American Owned & Operated





# Epoxy Grouts

#### FIVE STAR<sup>®</sup> DP EPOXY GROUT

Deep pour (DP) low exotherm precision epoxy grout

# FIVE STAR<sup>®</sup> 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 PG**

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<sup>®</sup> FLUID EPOXY High-performance, all-purpose fluid epoxy

**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:		

**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

### USES

- Large volume applications
- Foundation rebuilds and skid mounted equipment
- Precision alignment under dynamic load conditions
- Vibration dampening for rotating equipment
- Aggressive chemical environments

- 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
- Support of tanks, vessels and rotating equipment
- Installation of anchors and dowels
- Wind turbine baseplates

# 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.

T	YPICAL PROPERTI	ES AT 70°F (21°C)		
	DP Epoxy Grout (St	andard)	DP Epoxy Grout (Hig	gh Flow)
Clearances	1 to 18 inches (25 - 457	' mm)	1/2 to 9 inches (13 - 220	) 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)	3.7 x 10 <sup>-3</sup> in/in (mm/mm	))	4.3 x 10 <sup>.3</sup> in/in (mm/mm)	)
Tensile Strength, ASTM C 307	2,100 psi (14.5 MPa)		2,000 psi (13.8 MPa)	
Flexural Strength, ASTM C 580	3,800 psi (26.2 MPa)		4,000 psi (27.6 MPa)	
Coefficient of Expansion, ASTM C 531	17 x 10 <sup>-6</sup> in/in/°F (30 x <sup>-</sup>	10 <sup>-6</sup> mm/mm/°C)	18 x 10 <sup>.</sup> 6 in/in/°F (32 x 1	0 <sup>-6</sup> mm/mm/°C)
Bond to Concrete, ASTM C 882	Concrete Failure		Concrete Failure	
Working Time at 70°F (21°C)	90 Minutes		60 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)
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.



- 1. 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.
- 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 Five Star Products' 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 90 minutes (60 minutes High Flow) when temperatures are at 70°F (21°C). Mix with 4 or 5 bags of aggregate normally, using 4 bags for better flow. Under special conditions, aggregate may be reduced further to 3½ bags where clearances are 1" or less and areas involve larger footprints.
- 4. 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 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.
- 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206. CONSIDERATIONS

- Yield at 3½ bags is approximately 1.54 cubic feet. Physical properties will be lower than 4 bag properties.
- 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup>.
- 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 180°F (82°C), contact 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, 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
33610	Five Star <sup>®</sup> DP Epoxy Standard Grout	36 (4 pallets)	Resin (A): 20.9 lbs. (9.5 kg) Hardener (B): 6.3 lbs. (2.9 kg) Aggregate (C): 5 Bags 50 lbs. ea (22.7 kg)
33155	Five Star <sup>®</sup> DP Epoxy High-Flow Grout	36 (4 pallets)	Resin (A): 20.9 lbs. (9.5 kg) Hardener (B): 6.3 lbs. (2.9 kg) Aggregate (C): 4 Bags 50 lbs. ea (22.7 kg)
33175	Five Star <sup>®</sup> DP Epoxy High-Flow Grout (small unit)	24	Resin (A): 5.3 lbs. (2.4 kg) Hardener (B): 1.6 lbs. (0.7 kg) Aggregate (C) <sup>1</sup> : One Bag 50 lb. (22.7 kg)

<sup>1</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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7913 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12516 Rev. E | American Owned & Operated







# **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

#### USES

- Large volume applications
- Foundation rebuilds and skid mounted equipment
- Precision alignment under dynamic load conditions
- Vibration dampening for rotating equipment

- Superior creep resistance
- Chemically resistant
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Excellent adhesion to steel
- 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<sup>®</sup> 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%			
<b>Creep</b> , 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	15 x 10 <sup>-6</sup> in/in/°F (27 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)	<b>Compressive Modulus</b> 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.

- 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 Five Star Products' 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 entragment. 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 Five Star Products' 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup>.
- 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 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 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 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
33630	Five Star <sup>®</sup> DP Epoxy Grout PG	36 (packaged on 4 pallets)	Resin (A): 20.9 lbs (9.5 kg) Hardener (B): 6.3 lbs (2.9 kg) Aggregate (C): Four Bags 44 lbs. ea. (20kg)

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.

Five Star Products, Inc. For most current version of datasheet, go to FiveStarProducts.com **Corporate Headquarters** 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 08-22-2018 12724 Rev. E | American Owned & Operated







# **HP EPOXY GROUT**

# High Performance Precision Grout Standard/High Flow

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> HP Epoxy Grout is a high-performance expansive, non-shrink, epoxy system for supporting equipment requiring precision alignment. Five Star<sup>®</sup> 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<sup>®</sup> 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

#### USES

- High performance machinery grouting
- Crane rail grouting
- Precision alignment under dynamic load conditions
- Vibration dampening filler for rotating equipment

- Superior creep resistance
- Chemically resistant
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Excellent adhesion to steel
- Support of chemical tanks, vessels and rotating equipment
- Aggressive chemical environments
- Installation of anchors and dowels
- Wind turbine baseplates

### 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	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	C) Positive Expansio	n	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 (mr	n/mm)	2.0 x 10 <sup>.3</sup> in/in (mm/mm)		
Tensile Strength, ASTM C 307	2,400 psi (16.6 MF	Da)	2,000 psi (13.8 MPa)		
Flexural Strength, ASTM C 580	4,800 psi (33.1 MF	Pa)	4,400 psi (30.4 MPa)		
Coefficient of Expansion, ASTM C 531	17 x 10 <sup>.</sup> 6 in/in/°F (	30 x 10-6 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.

- SURFACE PREPARATION: All surfaces to be in contact with Five Star<sup>®</sup> 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.
- 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 Five Star Products' 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 60 minutes (45 minutes High Flow) when temperatures are at 70°F (21°C).
- 4. 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 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 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 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup>.
- 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 180°F (82°C), contact 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, 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'

SKU / PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	UNIT SIZE
33100	Five Star <sup>®</sup> HP Epoxy Grout	36 (packaged on 4 pallets)	Resin (A): 23.8 lbs. (10.8 kg) Hardener (B): 4.2 lbs. (1.9 kg) Aggregate (C): Five 50 lb. (22.7 kg) Bags
31600	Five Star <sup>®</sup> HP Epoxy Grout High Flow	36 (packaged on 4 pallets)	Resin (A): 23.8 lbs. (10.8 kg) Hardener (B): 4.2 lbs. (1.9 kg) Aggregate (C): Four 50 lb. (22.7 kg) Bags

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 OCONSEQUENTIAL 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



0 2018 Five Star Products, Inc. | 07-19-2018 12517 Rev. D | American Owned & Operated





# SP EPOXY GROUT PG

# Superior Performance, Precision Non-Shrink Grout

Pump Grade

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> SP Epoxy Grout PG is the next generation in ultra-high performance epoxy grout. Five Star<sup>®</sup> SP Epoxy Grout PG has extremely high compressive strength, is expansive non-shrink, with ultra-low creep and outstanding Effective Bearing Area (EBA). Five Star<sup>®</sup> SP Epoxy Grout PG is a 100% solids epoxy grout system for high performance machinery and equipment.

#### **ADVANTAGES**

- Ultra-high 1 day & 7 day strengths
- Very low creep
- Excellent chemical resistance

- 95% Effective Bearing Area (EBA)
- Expansive and non-shrink per ASTM C 827
- Simple soap and water clean-up

### <u>USES</u>

- 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<sup>®</sup> SP Epoxy Grout PG is a three-component system consisting of partially filled containers of resin, hardener and polyethylene lined bags of aggregate. Five Star<sup>®</sup> SP Epoxy Grout PG is available in a unit yielding approximately 1.55 ft<sup>3</sup> (43.9 liters).

#### 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)		
Early Height Change, ASTM C 827	Positive Expansion	
Effective Bearing Area (EBA)	95%	
<b>Creep,</b> ASTM C 1181, 1 Year 400 psi @ 140° F	1.0 x 10 <sup>-3</sup> in/in	
Tensile Strength, ASTM C 307	2,300 psi (15.9 MPa)	
Flexural Strength, ASTM C 580	5,500 psi (37.95 MPa)	
Bond to Concrete, ASTM C 882	Concrete Failure	
Coefficient of Expansion, ASTM C 531	17 x 10 <sup>-6</sup> in/in/°F (30.6 x 10 <sup>-6</sup> mm/mm/°C)	
Compressive Strength, ASTM C 579 B*		
1 Day	16,500 psi (113.8 MPa)	
7 Day	17,500 psi (120.7 MPa)	
28 Days	20,000 psi (138.0 MPa)	
Post Cure	22,000 psi (151.7 MPa)	
Working Time at 70° F (21° C)	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.

- 1. SURFACE PREPARATION: All surfaces to be in contact with Five Star<sup>®</sup> SP 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" (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 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 PG may be poured or pumped 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 peristatic 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 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. ČLEAN 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 Five Star® 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 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 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 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
33501	Five Star <sup>®</sup> SP Epoxy Grout PG	36 (packaged on 4 pallets)	Resin (A): 21.9 lbs. (9.9 kg) Hardener (B): 5.4 lbs. (2.5 kg) Aggregate (C): Four 44 lb. (20 kg) Bags

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."

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com

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



© 2020 Five Star Products, Inc. | 10-07-2020 12753 Rev. F | American Owned & Operated





# **ELASTOMERIC GROUT**

Elastomeric Polyurethane Grout

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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

### <u>USES</u>

- Light rail applications
- Railroad track rehabilitation
- Precision alignment under dynamic load conditions
- Vibration and noise dampening applications

- Superior adhesion prevents water penetration
- Chemically resistant
- Strong adhesion to steel and concrete
- Flexible concrete patching
- Header repair compound
- Cast elastomers

# PACKAGING AND YIELD

Five Star<sup>®</sup> 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)

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

- 1. SURFACE PREPARATION: All surfaces to be in contact with Five Star<sup>®</sup> 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<sup>®</sup> 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. Minimum placement thickness for Five Star<sup>®</sup> Elastomeric Grout is 1" (25 mm). Maximum placement thickness is 6" (152 mm) in depth. For clearances less than 1" (25 mm) or greater than 6" (152 mm), call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 60°F (15.6°C) or above 80°F (26.7°C), contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 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

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<sup>®</sup> 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
35000	Five Star <sup>®</sup> Elastomeric Grout	36	Resin (A): 8.8 lbs. (4.0 kg) pail Hardener (B): 4.0 lbs. (1.82 kg) pail Aggregate (C): 44 lbs. (20 kg) one 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2019 Five Star Products, Inc. | 062419 12754 Rev. D | American Owned & Operated


## Five Star

## **EPOXY CHOCK & EPOXY CHOCK EX**

#### High Performance Epoxy Chock

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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
- Pourable two component system

- Chemically resistant
- Eliminates costly machining

#### <u>USES</u>

- Compressors
- Turbines and generators
- Motors and pumps

#### PACKAGING AND YIELD

- Hot-running machinery
- Replacement for steel chocks

Five Star<sup>®</sup> 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.

TYPICAL PROPERTIES AT 70°F (21°C)			
Compressive Strength, ASTM C 579 B	Epoxy Chock	Epoxy Chock EX	
Post Cure @ 140°F (60°C)	20,500 psi (141.3 MPa)	20,500 psi (141.3 MPa)	
Compressive Strength, ASTM D 695			
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)	
Compressive Secant Modulus	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</b> , ASTM C 531			
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)	
Linear Shrinkage, ASTM C 531	0.0002 in/in	0.0002 in/in	
Flexural Strength, ASTM C 580	7,000 psi (48.3 MPa)	5,000 psi (34.5 MPa)	
Tensile Strength	6,800 psi (46.9 MPa) ASTM D 638	2,300 psi (15.9 MPa) ASTM C 307	
Pot Life 70°F (21°C)	30 Minutes	40 minutes	
Fire Resistance, ASTM D 635	Self Extinguishing	Self Extinguishing	
Maximum Service Temperature	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.

- SURFACE PREPARATION: All surfaces to be in contact with Five Star<sup>®</sup> 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.
- 2. 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.
- 3. 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<sup>®</sup> Epoxy Chock.
- 4. 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 2½ inches (63 mm) or 0.15 ft<sup>3</sup> (260 in<sup>3</sup>, 4.3 L), contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 5. 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.
- 6. 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<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 2½ inches (63 mm) or exceeding 0.15 ft<sup>3</sup> (260 in<sup>3</sup>, 4.3 L), contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

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

• Flowability, cure times and strength gain are adversely affected by lower temperatures.

#### <u>CAUTION</u>

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. PRIOR TO USE, REFER TO SAFETY DATA SHEET.

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	UNIT SIZE
91750	Five Star <sup>®</sup> Epoxy Chock	48	Resin (A): 16 lbs. (7.6 kg) Hardener (B): 0.9 lbs. (0.4 kg) 1.1 gallon pail
91775	Five Star <sup>®</sup> Epoxy Chock EX	48 (packaged on 2 pallets)	Resin (A): 16 lbs. (7.6 kg) Hardener (B): 0.9 lbs. (0.4 kg) <sup>1.1 gallon pail</sup> Aggregate (C): One Bag 5 lbs. (2.3 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 PUNITVE, 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 RE SPONSIBLE FOR USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT HELD BY OTHERS."

Five Star Products, Inc. Corporate Headquarters 60 Parrot Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com

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

© 2018 Five Star Products, Inc. | 07-19-2018 12409 Rev. C • American Owned & Operated







EPOXY NOVOLAC GROUT

Highly Chemical Resistant Epoxy Grout

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> 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

#### <u>USES</u>

- Grouting for machinery/pump baseplates
- High chemical resistance requirements

- Excellent impact and wear resistance
- Expansive, nonshrink
- Superior bond to concrete or steel
- Process equipment
- Secondary containment

#### PACKAGING AND YIELD

Five Star<sup>®</sup> 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%)	Cadmiun 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.

- 1. SURFACE PREPARATION: All surfaces to be in contact with Five Star<sup>®</sup> 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.
- 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 Five Star Products' Engineering and Technical Service Center for further information.
- 3. 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).
- 4. METHODS OF PLACEMENT: Five Star<sup>®</sup> 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<sup>®</sup> 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 Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 Five Star® Design-A-Spec<sup>™</sup>.
- 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 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 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:
34975	Five Star <sup>®</sup> Epoxy Novolac Grout (Grey)	36 (packaged on 4 pallets)	Resin (A): 23.1 lbs. (10.5 kg) Pail Hardener (B): 4.4 lbs. (2 kg) Pail Aggregate (C): Four 50 lb. (22.7 kg) Bags

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."

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com

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

> ISO 9001:2015 CERTIFIED

© 2018 Five Star Products, Inc. | 07-19-2018 12755 Rev. C | American Owned & Operated





### **FLUID EPOXY** High Performance Fluid Epoxy

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> Fluid Epoxy is a two component, all-purpose, rapid cure fluid epoxy system. Five Star<sup>®</sup> 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

#### <u>USES</u>

- Anchoring machines, baseplates and other equipment
- Repair of spalled and cracked concrete
- Installation of bolts, anchors and dowels

- Good impact resistance
- Chemically resistant
- Convenient packaging
- Dynamic loads
- Skid resistant surfaces
- Operating temperatures up to 150°F (65°C)

#### PACKAGING AND YIELD

Five Star<sup>®</sup> 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 PROPERTIESAT 70°F (21°C)				
Compressive Strength, ASTM C 579 A*	Compressive Strength	Compressive Secant Modulus		
6 Hours	11,000 psi (75.8 MPa)	3.5 x 10 <sup>5</sup> psi (2.4 x 10 <sup>3</sup> MPa)		
1 Day	13,000 psi (89.6 MPa)	4.3 x 10 <sup>5</sup> psi (2.9 x 10 <sup>3</sup> MPa)		
7 Days	14,000 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°l	<sup>=</sup> (60°C), 400 psi (2.8 MPa)		
Tensile Strength, ASTM C 307	2,500 psi (17.2 MPa)			
Flexural Strength, ASTM C 580	6,800 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> mn	n/mm/°C)		
Bond to Concrete, ASTM C 882	Concrete Failure			
Working Time at 70°F (21°C)	30 minutes			

- 1. SURFACE PREPARATION: All surfaces to be in contact with Five Star<sup>®</sup> 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 Five Star Products' 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<sup>®</sup> 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<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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.
- For placement temperatures below 50°F (10°C) or above 90°F (32°C) contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- For placements greater than 1 ½ inches (38 mm), or greater than 0.20 cubic feet (5.7 liters) contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

#### 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 SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star<sup>®</sup> 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
31400	Five Star <sup>®</sup> Fluid Epoxy	48 (packaged on 2 pallets)	Resin/Aggregate (A/C) pre-blend: 20.8 lbs. (9.4 kg) Hardener (B): 1.1 lbs. (0.5 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-19-2018 12756 Rev. C | American Owned & Operated





## **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

#### <u>USES</u>

- 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)

- 95% Effective Bearing Area (EBA)
- Chemically resistant
- High temperature performance up to 250°F (121°C)
- Excellent adhesion to steel
- 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 x 10 <sup>6</sup> (0.9 x 10 <sup>4</sup> MPa)		
1 Day	14,000 psi (96.5 MPa)	1.6 x 10 <sup>6</sup> (1.1 x 10 <sup>4</sup> MPa)		
7 Days	15,000 psi (103.5 MPa)	1.7 x 10 <sup>6</sup> (1.2 x 10 <sup>4</sup> MPa)		
Tested at 180°F (82°C)	11,000 psi (75.9 MPa)	1.2 x 10 <sup>6</sup> (0.8 x 10 <sup>4</sup> 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 x 10 <sup>-3</sup> 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 x 10 <sup>6</sup> (1.3 x 10 <sup>4</sup> MPa)		
Tested at 180°F (82°C)	4,000 psi (27.6 MPa)	1.4 x 10 <sup>6</sup> (0.9 x 10 <sup>4</sup> MPa)		
Coefficient of Expansion, ASTM C 531	17 x 10 <sup>-</sup>	<sup>.6</sup> in/in/°F (30 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 0.25 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.

- SURFACE PREPARATION: All surfaces to be in contact with Five Star<sup>®</sup> 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 Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 Five Star® Design-A-Spec<sup>™</sup>.
- 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 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 250°F (121°C), contact 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 Product' Engineering and Technical Service Center at 1-800-243-2206.

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	UNIT SIZE
32500	Five Star <sup>®</sup> Rapid Epoxy Grout	24	Resin (A): 9.5 lbs. (4.3 kg) Hardener (B): 1.5 lbs. (0.7 kg) Aggregate (C): One Bag 50 lbs. (22.7 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-19-2018 12787 Rev. C | American Owned & Operated





## **CRANE RAIL GROUT**

#### High-Flow Epoxy for Low Clearance Applications

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> Crane Rail Grout has excellent chemical resistance.

#### **ADVANTAGES**

- High flow for tight clearances
- Excellent adhesion to steel
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures

#### <u>USES</u>

- Crane rail
- Railroad track rehabilitation
- Precision alignment under dynamic load conditions
- Tight clearance grouting of dynamic loads

- Expansive, non-shrink per ASTM C 827
- Chemically resistant
- Rapid strength gain for fast turnaround
- Transfer car runways
- Material handling tracks
- Light rail applications

#### PACKAGING AND YIELD

Five Star<sup>®</sup> 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.

- 1. SURFACE PREPARATION: All surfaces to be in contact with Five Star<sup>®</sup> 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.
- 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 Five Star Products' Engineering and Technical Service Center for further information.
- 3. MIXING: Mix using 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).
- 4. METHODS OF PLACEMENT: Five Star<sup>®</sup> 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. For placements less than 0.4 inch (10 mm) or greater than three inches (75 mm), contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 5. POST-PLACEMENT PROCEDURES: If final finishing of exposed surfaces is necessary, it may be done before material becomes unworkable using a steel trowel. 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 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 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 Five Star® Design-A-Spec<sup>™</sup>.
- To obtain bond, concrete shall be visibly free of surface moisture.
- Do not reduce aggregate loading or add solvents to increase flowability.
- For operating temperatures exceeding 180°F (82°C), contact 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.

SKU / PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	UNIT SIZE
33195	Five Star <sup>®</sup> Crane Rail Grout (Domestic)	48 (3 pallets)	Resin (A): 10 lb (4.5 kg) Pail Hardener (B): 1.7 lb (0.77 kg) Can Aggregate (C): 50 lb (22.7 kg) Bag
331951	Five Star <sup>®</sup> Crane Rail Grout (International)	48 (3 pallets)	Resin (A): 10 lb (4.5 kg) Jerry can Hardener (B): 1.7 lb (0.77 kg) Can Aggregate (C): 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."

Five Star Products, Inc. F Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com

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



© 2018 Five Star Products, Inc. | 07-18-2018 12711 Rev. D | American Owned & Operated





## **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:		



## **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

#### <u>USES</u>

- 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<sup>®</sup> 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)

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

- 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: Immediately pour Five Star<sup>®</sup> MP Epoxy Patch into repair area. Float or trowel to desired level. For more detailed placement instructions call five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

#### **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 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
30820	Five Star <sup>®</sup> MP Epoxy Patch	60 (Packaged on 2 pallets)	Resin (A): 4.88 lbs. (2.2 kg.) Hardener (B): 4.04 lbs. (1.8 kg.) Aggregate (C): 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."

Five Star Products, Inc. F Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com

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



© 2018 Five Star Products, Inc. | 07-18-2018 12823 Rev. C | American Owned & Operated





## **NOVOLAC STRUCTURAL CONCRETE<sup>®</sup>**

Secondary Containment Epoxy Repair Material

#### **PRODUCT DESCRIPTION**

Five Star Novolac Structural Concrete<sup>®</sup> is a three component, 100% solids, highly chemical resistant epoxy repair material for the construction or repair of curbs, trenches, floors and pads in secondary containment. Five Star Novolac Structural Concrete<sup>®</sup> 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

#### <u>USES</u>

• Secondary containment repairs and reconstruction

#### PACKAGING AND YIELD

Five Star Epoxy Novolac Structural Concrete<sup>®</sup> 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)					
Compressive Strength, ASTM C 579	Compressive Strength, ASTM C 579				
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)				
Tensile Strength, ASTM C 307	2,100 psi (14.5 MPa)				
Bond Strength, ASTM C 882	Concrete Failure				
Flexural Strength, ASTM C 580	6,000 psi (38.7 Mpa)				
Coefficient of Expansion, ASTM C 531	15 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%)	Cadmiun 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.

- 1. **SURFACE PREPARATION:** All surfaces to be in contact with Five Star Novolac Structural Concrete<sup>®</sup> 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.
- 3. 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).
- 4. 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.
- 5. **POST PLACEMENT PROCEDURES:** For load bearing applications, in-service operation may begin immediately after required strength is 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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 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
34900	Five Star Novolac Structural Concrete® (Grey)	24	Resin (A): 5.3 lbs. (2.4 kg) bottle Hardener (B): 1.0 lbs (0.5 kg) bottle Aggregate (C): 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."

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com

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



© 2018 Five Star Products, Inc. | 07-18-2018 12760 Rev. C | American Owned & Operated





## 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

#### <u>USES</u>

- Repair of concrete structures
- Rapid machinery foundation rebuilds
- Fast repairs for coatings
- Concrete floor repairs and overlays

- Coarse aggregate extension
- Very low shrinkage
- Excellent freeze/thaw resistance
- One product for thin and thick placements
- Outstanding corrosion resistance for protection and rehabilitation
- Construction joint repair
- Marine and hydraulic structure repairs
- Repair of tanks, sumps and curbs

#### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> 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)			
Compressive Strength, ASTM C 109			
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)		
Bond Strength, ASTM C 882			
1 Day	2,000 psi (13.8 MPa)		
7 Days	2,500 psi (17.3 MPa)		
Length Change, ASTM C 157			
28 Days Wet	+ 0.05%		
28 Days Dry	- 0.09%		
Freeze/Thaw Resistance, ASTM C 666A			
Relative Durability Modulus	95%		
Chloride Ion Permeability, ASTM C 1202			
28 Days	Very Low ( <1,000 Coulombs)		
Working Time at 70°F (21°C)	15 minutes		

- 1. 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. Mechanically roughen concrete surfaces in accordance with ICRI Technical Guideline 310.2R to a minimum concrete surface profile (CSP) of 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 sturated 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 Five Star Products' Engineering and Technical Service Center for further information.
- 3. 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.
- 4. 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.

5. POST-PLACEMENT PROCEDURES: Five Star Structural Concrete<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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 Design-A-Spec<sup>™</sup>.
- For placements thicker than two inches (50 mm) and a volume exceeding two cubic feet (56.5 liters), contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 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 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
29100	Five Star Structural Concrete®	56	50 lb. (22.7 kg) Bag
29000	Five Star Structural Concrete®	36	50 lb. (22.7 kg) 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, 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



© 2019 Five Star Products, Inc. | 01-11-2019 12519 Rev. E | American Owned & Operated





## STRUCTURAL CONCRETE® V/O

Vertical/Overhead Permanent Repair

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> V/O is a high strength, rapid setting, one component, permanent concrete repair material for vertical and overhead structural repairs. Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> 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

#### USES

- Rapid repair of load bearing walls, ceilings and other structural members
- Rapid repairs during shutdown

#### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> 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%
Chloride Ion Permeability, ASTM C 1202	
28 Days	Very Low (<1,000 Coulombs)
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.

- One product for thin and thick placement
- Excellent freeze/thaw resistance
- Outstanding corrosion resistance for protection and rehabilitation
- Marine and hydraulic structure repairs

- 1. SURFACE PREPARATION: All concrete surfaces in contact with Five Star Structural Concrete<sup>®</sup> 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.
- 2. MIXING: Mix Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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 Five Star Products' Engineering and Technical Service Center at 1-800-243-2206. Finish as necessary.
- 4. POST-PLACEMENT PROCEDURES: Five Star Structural Concrete<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

#### **CONSIDERATIONS**

- Never exceed the maximum water content stated on the package.
- 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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 SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star<sup>®</sup> 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
29600	Five Star Structural Concrete® V/O	56	50 lb. (22.7 kg) Bag
29500	Five Star Structural Concrete $^{\ensuremath{\mathbb{R}}}$ V/O	36	50 lb. (22.7 kg) 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."

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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7913 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12518 Rev. D | American Owned & Operated





## STRUCTURAL CONCRETE® ES

#### Fast, High Early Strength, Extended Working Time Permanent Repair

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> ES is a high early strength, single component, permanent concrete repair material which provides a 25-minute working time. The extended set facilitates deep/large volume pours up to six cubic yards in a single lift. Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> ES provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

#### **ADVANTAGES**

- 25 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

#### **USES**

- Deep, large volume repair of concrete structures and machinery foundations
- Concrete floor toppings and overlays

- 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
- Hot weather concrete repair
- Heavy industrial repairs and retrofits

#### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> 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 PROP	TYPICAL PROPERTIES AT 70°F (21°C)			
Compressive Strength, ASTM C 109				
6 Hours	3,000 psi (20.7 MPa)			
1 Day	4,500 psi (31.0 MPa)			
7 Days	6,000 psi (41.4 MPa)			
Bond Strength, ASTM C 882				
1 Day	2,000 psi (13.8 MPa)			
7 Days	2,500 psi (17.3 MPa)			
Length Change, extended with pea gravel, 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)			
Scaling Resistance, ASTM C 672				
50 cycles	0			
Chloride Ion Permeability, ASTM C 1202				
28 Days	Very Low ( <1,000 Coulombs)			
Working Time at 70°F (21°C)	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.

- 1. 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 310.2R to a minimum concrete surface profile (CSP) of 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.
- 3. 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 course aggregate before final water adjustment. Do not mix more material than can be placed within 25 minutes. For larger quantities, a ready-mix concrete truck may be used.
- 4. PLACEMENT PROCEDURES: Whenever possible, place Five Star Structural Concrete<sup>®</sup> 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 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.

5. 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup>.
- For pours exceeding six cubic yards, contact Five Star Products' Engineering and Technical Service Center.
- When capping Five Star Structural Concrete<sup>®</sup> 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 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 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	#UNITS/PALLET	UNIT SIZE
29400	Five Star Structural Concrete <sup>®</sup> ES	56	50 lb. (22.7 kg) Bag
29300	Five Star Structural Concrete <sup>®</sup> ES	36	50 lb. (22.7 kg) 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 OR FIRESS 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products | 12-17-2018 12761 Rev. D | American Owned & Operated





## STRUCTURAL CONCRETE® GUNITE

#### Fast Turnaround, Dry Process Shotcrete Repair

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> Gunite is a dry process shotcrete applied, high early strength permanent concrete repair material. Containing migrating corrosion inhibitor technology, Five Star Structural Concrete<sup>®</sup> 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

- <u>USES</u>
- 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<sup>®</sup> 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 PROPE	ERTIES 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)
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)
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.

- 1. SURFACE PREPARATION: All concrete surfaces in contact with Five Star Structural Concrete® Gunite 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® Gunite 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<sup>®</sup> Gunite 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<sup>®</sup> Gunite 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<sup>®</sup> Gunite 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<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 Five Star® Design-A-Spec<sup>™</sup>.
- 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 SAFETY DATA SHEET.

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

SKU / PRODUCT CODE D	DESCRIPTION	#UNITS/PALLET	UNIT SIZE
29200 F	ive Star Structural Concrete <sup>®</sup> Gunite	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 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: 203-336-7900 • Fax: 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12762 Rev. C | American Owned & Operated



# FIVE STAR

## STRUCTURAL CONCRETE® GUNITE S300

High Strength Dry Process Shotcrete Repair

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> Gunite S300 is a dry process shotcrete applied, high strength, permanent concrete repair material. Five Star Structural Concrete<sup>®</sup> Gunite 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<sup>®</sup> Gunite 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

#### USES

- Vertical and overhead repairs
- Repair of load bearing walls, ceilings and other structural members

- 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
- Structural repair for industrial plants
- Marine and hydraulic structure repair
- Sulfur pits

#### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> Gunite 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<sup>®</sup> Gunite 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.

|--|

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)	
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)	
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.

- 1. SURFACE PREPARATION: All surfaces in contact with Five Star Structural Concrete® Gunite 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.
- 2. MIXING: The mixing equipment should be capable of maintaining placement continuously.

DRY MIX PROCESS: Predampen Five Star Structural Concrete Gunite<sup>®</sup> 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.

- 3. METHODS OF PLACEMENT: Apply Five Star Structural Concrete<sup>®</sup> Gunite 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 Gunite<sup>®</sup> 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.
- 4. POST-PLACEMENT PROCEDURES:. Five Star Structural Concrete<sup>®</sup> Gunite 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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<sup>®</sup> 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	Five Star Structural Concrete <sup>®</sup> Gunite 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 OR 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 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



© 2018 Five Star Products, Inc. | 07-18-2018 12702 Rev C | American Owned & Operated





## STRUCTURAL CONCRETE® GUNITE WP

#### High Strength Wet Process Shotcrete Repair

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> 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

#### <u>USES</u>

- Vertical and overhead repairs
- Repair of load bearing walls, ceilings and other structural members

## applicationsOutstanding corrosion resistance for protection and rehabilitation

• Structural repair for industrial plants

Very low chloride ion permeability Excellent freeze/thaw resistance

Available in 3,000 lb. bulk bag packaging for large volume

• Marine and hydraulic structure repair

#### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> 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)		
Compressive Strength, ASTM C 109		
1 Day	3,000 psi (20.7 MPa)	
28 Days	8,000 psi (55.2 MPa)	
Compressive Strength, ASTM C 42 in accordance with ACI	506R-05	
3 Days	6,000 psi (41.4 MPa)	
7 Days	7,500 psi (51.8 MPa)	
28 Days	8,500 psi (58.7 MPa)	
Bond Strength, ASTM C 882		
7 Days	2,000 psi (13.8 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)	
Chloride Ion Permeability, ASTM C 1202		
28 Days	Very Low ( <1,000 Coulombs)	
Working Time at 70°F (21°C)	30 minutes	

- 1. 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.
- 2. 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.
- 3. 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.

4. POST-PLACEMENT PROCEDURES: Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 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 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
29426	Five Star Structural Concrete® Gunite WP	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 PRE PAID 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 SONT, 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

Five Star Products, Inc. F Corporate Headquarters 60 Parrott Drive Shelton, CT USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12944 Rev. B| American Owned & Operated



# FIVE STAR

## **STRUCTURAL CONCRETE® GUNITE WP/FS**

Fiber Reinforced, High Strength Gunite Repair

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> Gunite 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<sup>®</sup> Gunite 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<sup>®</sup> Gunite 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

#### <u>USES</u>

- Vertical and overhead repairs
- Repair of load bearing walls, ceilings and other structural members

#### PACKAGING AND YIELD

- 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
- Structural repair for industrial plants
- Tight or confined space repair

Five Star Structural Concrete<sup>®</sup> Gunite 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 PROPE	ERTIES 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	6,000 psi (41.4 MPa)
7 Days	7,500 psi (51.8 MPa)
28 Days	8,500 psi (58.7 MPa)
Bond Strength, ASTM C 882	
7 Days	2,000 psi (13.8 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)
Chloride Ion Permeability, ASTM C 1202	
28 Days	Low
Working Time at 70°F (21°C)	30 minutes

- 1. SURFACE PREPARATION: All surfaces in contact with Five Star Structural Concrete<sup>®</sup> Gunite 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.
- 2. 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® Gunite 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.
- 3. METHODS OF PLACEMENT: Apply Five Star Structural Concrete<sup>®</sup> Gunite 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<sup>®</sup> Gunite 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® Gunite 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® Gunite WP/FS and mixing water have been conditioned to a higher temperature prior to placement. In high temperatures, Five Star Structural Concrete® Gunite 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.

4. **POST-PLACEMENT PROCEDURES**: Five Star Structural Concrete<sup>®</sup> Gunite 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<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 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<sup>®</sup> 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
29427	Five Star Structural Concrete <sup>®</sup> Gunite WP/FS	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 FUNITIVE, ACTUAL, REMOTE, ON 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."

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: 203-336-7900 • Fax: 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12763 Rev. C | American Owned & Operated





## STRUCTURAL CONCRETE® S300

Long Working Time, Permanent Repair

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> S300 is a normal setting, one component, enhanced hydraulic cement mortar used for pourable and pumpable repairs of concrete structures. Five Star Structural Concrete<sup>®</sup> S300 may be extended with coarse aggregate for large volume repairs and foundation upgrades. Five Star Structural Concrete<sup>®</sup> 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

#### USES

- Repair of concrete structures
- Industrial floors, slabs and overlays
- Equipment foundations

#### PACKAGING AND YIELD

- 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
- Repair of tanks, sumps and curbs
- Ready-mix concrete truck batching
- Structural fortifications

Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> 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 PROPE	ERTIES AT 70°F (21°C)
Compressive Strength, ASTM C 109	
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)
Bond Strength, ASTM C 882	
7 Days	2,300 psi (15.9 MPa)
Time of Set, ASTM C 266	
Initial Set	5 Hours (approximately)
Final Set	6 Hours (approximately)
Linear Length Change, ASTM C 157	
28 Days Wet	+0.03%
28 Days Dry	-0.05%
Chloride Ion Permeability, ASTM C 1202	
28 Days	Very Low (<1,000 Coulombs)
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 above may result. Test methods are modified where applicable.

- 1. 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 310.2R 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.
- 3. 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.
- 4. 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).

5. 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. Inservice 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<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

#### CONSIDERATIONS

- 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.

#### 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	Five Star Structural Concrete <sup>®</sup> 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 RE SPONSIBLE FOR USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT HELD BY OTHERS."

Five Star Products, Inc. 60 Parrott Drive Shelton, CT 06484 USA Tel: 203-336-7900 • Fax: 203-336-7930 FiveStarProducts.com Specifications Subject to Change. For most current version of datasheet, go to FiveStarProducts.com



© 2019 Five Star Products, Inc. | 01-11-2019 12703 Rev D | American Owned & Operated





### **FIVE STAR SUMMERSET<sup>®</sup>**

Extended Working Time Additive

#### **PRODUCT DESCRIPTION**

Five Star Summerset<sup>®</sup> is an additive which extends the working time and retards the set of certain Five Star<sup>®</sup> rapid setting hydraulic cement products. Five Star Summerset<sup>®</sup> 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<sup>®</sup> rapid setting products which call for Five Star Summerset<sup>®</sup> by name such as Five Star Structural Concrete<sup>®</sup>, Five Star<sup>®</sup> Instant Grout, Five Star<sup>®</sup> Highway Patch, and Five Star Centri-Cast<sup>®</sup> mortars.

#### **INSTRUCTIONS**

The working time and set time of certain Five Star® rapid setting products may be extended by adding Five Star Summerset® to the mixing water, thoroughly mixing into water, and then adding the dry material. Total dispersion of Five Star Summerset® in the mixing water will result in a consistent working time and set time for the entire batch. Do not add Five Star Summerset® to the dry material. Each tube of Five Star Summerset® will extend the working time by approximately 30% - 40% percent. A general guide for the use of Five Star 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:** Five Star Summerset<sup>®</sup> extends the set time and thus slows down the rate of early strength gain. Five Star Summerset<sup>®</sup> does not reduce the ultimate compressive strength or compromise other properties.

#### CAUTION

Five Star Summerset<sup>®</sup> 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 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
29900	Five Star Summerset <sup>®</sup>	N/A	0.5 Fluid Oz. Tube

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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products | 07-18-2018 12764 Rev. B | American Owned & Operated



NOTES:		



## 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<sup>®</sup> 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<sup>®</sup> for your next nuclear construction or repair project.

#### **CEMENTITIOUS GROUTS**

- Five Star<sup>®</sup> Grout
- Fluid Grout 100

#### **EPOXY GROUTS**

- DP Epoxy Grout
- HP Epoxy Grout

#### **CONCRETE REPAIR PRODUCTS**

- Structural Concrete®
- Structural Concrete® V/O

NOTES:		


# FIVE STAR<sup>®</sup> GROUT

High Performance Precision Non-Shrink Grout For Nuclear Safety Zone Applications

#### **PRODUCT DESCRIPTION**

Five Star<sup>®</sup> 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<sup>®</sup> Grout exhibits positive expansion. Five Star<sup>®</sup> 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). This specialized version of Five Star<sup>®</sup> Grout is compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs.

#### **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

#### <u>USES</u>

- Grouting of machinery and equipment to maintain precision alignment
- Non-shrink grouting of structural steel and precast concrete

- Permanent support for machinery requiring precision alignment
- Does not contain gas generating additives, such as aluminum powder
- Non-shrink from the time of placement
- Grouting of anchors and dowels
- Support of tanks and vessels

#### PACKAGING AND YIELD

Five Star<sup>®</sup> 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) 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				



- SURFACE PREPARATION: All surfaces in contact with Five Star<sup>®</sup> Grout shall be free of oil, grease laitance and other bond-inhibiting contaminants. Concrete should be mechanically roughened to coarse aggregate exposure to maximize bond. A Concrete Surface Profile (CSP) of 6-9 in accordance with ICRI Technical Guideline 310.2R is recommended. Presoak concrete surfaces for 8 to 24 hours, continuously and consistently, via wet rags, wet burlap, ponding or similar method.
- 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<sup>®</sup> 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<sup>®</sup> 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.
- 4. PLACEMENT PROCEDURES: Five Star<sup>®</sup> Grout may be dry packed, poured or pumped into place. Minimum placement thickness for Five Star<sup>®</sup> Grout is 1 inch (25 mm). For pours over 6 inches (150 mm) in depth Five Star<sup>®</sup> Grout should be extended with a clean, damp coarse aggregate meeting the requirements of ASTM C 33. Refer to Five Star Products' Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
- 5. **POST-PLACEMENT PROCEDURES:** Five Star<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

#### **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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> for cold and hot weather grouting procedures, or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 SAFETY DATA SHEET**.

For worldwide availability, additional product information and technical support, contact your local Five Star<sup>®</sup> 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
25500N	Five Star® Grout for Nuclear Safety Zone	56	50 lb. (22.7 kg) Bag

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 INFRINCE ON ANY PATENT HELD BY OTHERS."

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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7913 FiveStarProducts.com



© 2019 Five Star Products, Inc. | 01-09-2019 12901 Rev. D | American Owned & Operated





# **FLUID GROUT 100**

High Performance Precision Non-Shrink Fluid Grout For Nuclear Safety Zone Applications

#### 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

#### USES

- Grouting clearances to 1/2 inch
- Grouting of anchors and dowels
- Grouting of machinery and equipment to maintain 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
- Non-shrink grouting of structural steel and precast concrete
- Preplaced aggregate grouting
- Support of tanks and vessels

#### 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 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)				
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	2,000 psi (13.8 MPa)/28 days			
Freeze Thaw Resistance, ASTM C 666A, 300 Cycles	> 95% RDM			
Compressive Strength, ASTM C 942 (C109 Restrained)	Plastic Consistency <sup>1</sup>	Fluid Consistency <sup>2</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)		
Working Time at 70°F (21°C)	30 minutes			

<sup>1</sup> 100% - 125% flow on flow table (plastic consistency), CRD-C 621 (ASTM C 230, 5 drops in 3 seconds).

<sup>2</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.



- SURFACE PREPARATION: All surfaces in contact with Five Star<sup>®</sup> Fluid Grout 100 shall be free of oil, grease laitance and other bondinhibiting contaminants. Concrete should be mechanically roughened to coarse aggregate exposure to maximize bond. A Concrete Surface Profile (CSP) of 8-10 in accordance with ICRI Technical Guideline 310.2R is recommended. Presoak concrete surfaces for 8 to 24 hours, continuously and consistently, via wet rags, wet burlap, ponding or similar method.
- 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® 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 4.5 quarts potable water per 55 lb. bag. Mix for approximately two minutes. Add an additional 0.5 to 1.0 quarts of water and continue mixing for three minutes. If a fluid consistency is required, typically around 5 ½ quarts water (total) will allow for a fluid consistency. 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.
- 4. METHODS OF PLACEMENT: Five Star<sup>®</sup> 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<sup>®</sup> Fluid Grout 100 should be extended with a clean damp coarse aggregate meeting the requirements of ASTM C 33. Refer to Five Star Products' Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
- 5. POST-PLACEMENT PROCEDURES: Five Star<sup>®</sup> 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. For more detailed placement procedures, go to FiveStarProducts.com and select Design-A-Spec<sup>™</sup> in product downloads.

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

- 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 Five Star® Design-A-Spec<sup>™</sup> for cold and hot weather grouting procedures or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- Never exceed the maximum water content as stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.
- Cement Based grout should attain a minimum compressive strength of 1,000 psi before being exposed to freezing 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 SAFETY DATA SHEET.

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

SKU/PRODUCT CODE D	DESCRIPTION	#UNITS/PALLET	UNIT SIZE
25000N <sup>3</sup> Fi	ive Star® Fluid Grout 100 for Nuclear Safety Zone	56	55 lb. (25 kg) bag

<sup>3</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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7913 FiveStarProducts.com



© 2019 Five Star Products, Inc. | 01-09-2019 12900 Rev. D | American Owned & Operated







## **DP EPOXY GROUT**

#### Dual-Purpose, Deep Pour Precision Grout Standard/High Flow For Nuclear Safety Zone Applications

#### 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. This specialized version of Five Star® DP Epoxy Grout is compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs.

#### **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

#### <u>USES</u>

- Large volume applications
- Foundation rebuilds and skid mounted equipment
- Precision alignment under dynamic load conditions
- Vibration dampening for rotating equipment

- 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
- Aggressive chemical environments
- Support of tanks, vessels and rotating equipment
- Installation of anchors and dowels
- Wind turbine baseplates

#### 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 hardmaterial.

#### 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 (St	andard)	DP Epoxy Grout (Hig	gh Flow)
Clearances	1 to 18 inches (25 - 457	' mm)	1/2 to 9 inches (13 - 220	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)	3.7 x 10 <sup>.3</sup> in/in (mm/mm	)	4.3 x 10 <sup>.3</sup> in/in (mm/mm)	l
Tensile Strength, ASTM C 307	2,100 psi (14.5 MPa)		2,000 psi (13.8 MPa)	
Flexural Strength, ASTM C 580	3,800 psi (26.2 MPa)		4,000 psi (27.6 MPa)	
Coefficient of Expansion, ASTM C 531	17 x 10 <sup>.6</sup> in/in/°F (30 x 1	10-6 mm/mm/°C)	18 x 10 <sup>.6</sup> in/in/°F (32 x 1	0-6 mm/mm/°C)
Bond to Concrete, ASTM C 882	Concrete Failure		Concrete Failure	
Working Time at 70°F (21°C)	90 Minutes		60 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)
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.

- 1. 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.
- 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 Five Star Products' 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 90 minutes (60 minutes High Flow) when temperatures are at 70°F (21°C). Mix with 4 or 5 bags of aggregate normally, using 4 bags for better flow. Under special conditions, aggregate may be reduced further to 3½ bags where clearances are 1" or less and areas involve larger footprints.
- 4. 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 Five Star Products' 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 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.
- 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<sup>™</sup> installation guidelines or Five Star Products' Engineering and Technical Service Center at 1-800-243-2206. CONSIDERATIONS

- Yield at 3½ bags is approximately 1.54 cubic feet. Physical properties will be lower than 4 bag properties.
- 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<sup>™</sup>.
- 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 180°F (82°C), contact 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, 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<sup>®</sup> 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
33610N	Five Star® DP Epoxy Standard Grout for Nuclear Safety Zone	36 (4 pallets)	Resin (A): 20.9 lbs. (79.1 kg) Hardener (B): 6.3 lbs. (23.8 kg) Aggregate (C): Five 50 lb. (22.7 kg) Bags
33155N	Five Star® DP Epoxy High-Flow Grout for Nuclear Safety Zone	36 (4 pallets)	Resin (A): 20.9 lbs. (79.1 kg) Hardener (B): 6.3 lbs. (23.8 kg) Aggregate (C): Four 50 lb. (22.7 kg) Bags
33175N	Five Star® DP Epoxy High-Flow Grout (small unit) for Nuclear Safety Zone1	24	Resin (A): 5.3 lbs. (2.4 kg) Hardener (B): 1.6 lbs. (0.7 kg) Aggregate (C): One 50 lb. (22.7 kg) Bag

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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7913 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-19-2018 12902 Rev. C | American Owned & Operated







# **HP EPOXY GROUT**

High Performance Precision Grout Standard/High Flow For Nuclear Safety Zone Applications

#### 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. This specialized version of Five Star® HP Epoxy Grout is compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs.

#### **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

#### <u>USES</u>

- High performance machinery grouting
- Crane rail grouting
- Precision alignment under dynamic load conditions
- Vibration dampening filler for rotating equipment

- Superior creep resistance
- Chemically resistant
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Excellent adhesion to steel
- Support of chemical tanks, vessels and rotating equipment
- Aggressive chemical environments
- Installation of anchors and dowels
- Wind turbine baseplates

#### 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 PRO	DPERTIES AT 70°F (21°C)		
	HP Epoxy Grout	(Standard)	HP Epoxy Grout (High Flo	ow)
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	C) Positive Expansion	n	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 (mr	n/mm)	2.0 x 10 <sup>.3</sup> in/in (mm/mm)	
Tensile Strength, ASTM C 307	2,400 psi (16.6 MF	Pa)	2,000 psi (13.8 MPa)	
Flexural Strength, ASTM C 580	4,800 psi (33.1 MF	Pa)	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 10º (10.4 x 10³)
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.

- 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.
- 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 Five Star Products' 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 60 minutes (45 minutes High Flow) when temperatures are at 70°F (21°C).
- 4. METHODS OF PLACEMENT: Five Star<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> DP Epoxy Grout or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 Five Star® Design-A-Spec<sup>™</sup>.
- 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 180°F (82°C), contact 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, 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
33100N	Five Star® HP Epoxy Standard Grout for Nuclear Safety Zone	36 (4 pallets)	Resin (A): 23.8 lbs. ( 10.8 kg) Hardener (B): 4.2 lbs. ( 1.9 kg) Aggregate (C): Five 50 lb. (22.7 kg) Bags
31600N	Five Star® HP Epoxy High Flow Grout for Nuclear Safety Zone	36 (4 pallets)	Resin (A): 23.8 lbs. ( 10.8 kg) Hardener (B): 4.2 lbs. ( 1.9 kg) Aggregate (C): Four 50 lb. (22.7 kg) Bags

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



© 2018 Five Star Products, Inc. | 07-19-2018 12903 Rev. C | American Owned & Operated





# STRUCTURAL CONCRETE®

Fast, High Early Strength Permanent Repair For Nuclear Safety Zone Applications

#### 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. This specialized version of Five Star Structural Concrete® is compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs.

#### **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

#### <u>USES</u>

- Repair of concrete structures
- Rapid machinery foundation rebuilds
- Fast repairs for coatings
- Concrete floor repairs and overlays

- Coarse aggregate extension
- Very low shrinkage
- Excellent freeze/thaw resistance
- One product for thin and thick placements
- Outstanding corrosion resistance for protection and rehabilitation
- Construction joint repair
- Marine and hydraulic structure repairs
- Repair of tanks, sumps and curbs

#### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> 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)	
Compressive Strength, ASTM C 109		
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)	
Bond Strength, ASTM C 882		
1 Day	2,000 psi (13.8 MPa)	
7 Days	2,500 psi (17.3 MPa)	
Length Change, ASTM C 157		
28 Days Wet	+ 0.05%	
28 Days Dry	- 0.09%	
Freeze/Thaw Resistance, ASTM C 666A		
Relative Durability Modulus	95%	
Chloride Ion Permeability, ASTM C 1202		
28 Days	Very Low ( <1,000 Coulombs)	
Working Time at 70°F (21°C)	15 minutes	



- 1. 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. Mechanically roughen concrete surfaces in accordance with ICRI Technical Guideline 310.2R to a minimum concrete surface profile (CSP) of 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 started 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 Five Star Products' Engineering and Technical Service Center for further information.
- 3. MIXING: Mix Five Star Structural Concrete<sup>®</sup> 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.
- 4. 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<sup>®</sup> 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<sup>®</sup> and mixing water have been conditioned to a higher temperature prior to placement. In hot temperatures, Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> may also be used to provide more working time if necessary.

5. POST-PLACEMENT PROCEDURES: Five Star Structural Concrete<sup>®</sup> 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 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<sup>®</sup> Design-A-Spec<sup>™</sup>.
- For placements thicker than two inches (50 mm) and a volume exceeding two cubic feet (56.5 liters), contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206 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 SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star® distributor, local sales representative, or call Five

SKU/PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	UNIT SIZE
29100N	Five Star Structural Concrete <sup>®</sup> for Nuclear Safety Zone	56	50 lb. (22.7 kg) Bag
29000N	Five Star Structural Concrete® for Nuclear Safety Zone	36	50 lb. (22.7 kg) Pail

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 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



© 2019 Five Star Products, Inc. | 01-09-2019 12904 Rev. D | American Owned & Operated





# STRUCTURAL CONCRETE® V/O

#### Vertical/Overhead Permanent Repair For Nuclear Safety Zone Applications

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> V/O is a high strength, rapid setting, one component, permanent concrete repair material for vertical and overhead structural repairs. Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> 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. This specialized version of Five Star Structural Concrete<sup>®</sup> V/O is compliant with NRC 10CFR50 Appendix B and ASME NQA-1 Quality Programs.

#### 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

#### USES

- Rapid repair of load bearing walls, ceilings and other structural members
- Rapid repairs during shutdown

#### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> 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%
Chloride Ion Permeability, ASTM C 1202	
28 Days	Very Low (<1,000 Coulombs)
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 showr above may result. Test methods are modified where applicable.



- One product for thin and thick placement
  Excellent freeze/thaw resistance
- Outstanding corrosion resistance for protection and rehabilitation
- Marine and hydraulic structure repairs

- 1. SURFACE PREPARATION: All concrete surfaces in contact with Five Star Structural Concrete<sup>®</sup> 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.
- 2. 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<sup>®</sup> 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 Five Star Products' Engineering and Technical Service Center at 1-800-243-2206. Finish as necessary.
- 4. POST-PLACEMENT PROCEDURES: Five Star Structural Concrete<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

#### **CONSIDERATIONS**

- Never exceed the maximum water content stated on the package.
- 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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 SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star<sup>®</sup> 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
29600N	Five Star Structural Concrete $^{\otimes}$ V/O for Nuclear Safety Zone	56	50 lb. (22.7 kg) Bag
29500N	Five Star Structural Concrete $^{\otimes}$ V/O for Nuclear Safety Zone	36	50 lb. (22.7 kg) Pail

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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7913 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-20-2018 12905 Rev. C | American Owned & Operated





# Concrete Repair

#### FIVE STAR® STRUCTURAL CONCRETE® UNDERWATER HAND PACK

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:		



### STRUCTURAL CONCRETE® UNDERWATER HAND PACK

#### Hand Applied, Rapid Strength Underwater Repair

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> Underwater Hand Pack provides corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

#### **ADVANTAGES**

Minimal washout

Saltwater resistant

• Rapid set underwater placement

High early strength

structures

- Variable application thickness
- One component for reliability and ease of use
- Migrating corrosion inhibitor technology

Chloride and sulfate resistant

#### USES

- Underwater repair of concrete tanks, dams and hydraulic structures
- Filling underwater concrete cavities and voids

### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> 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)					
Compressive Strength, ASTM C 109					
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)				
Underwater Bond Strength, ASTM C 882					
7 Days	1,150 psi (7.9 MPa)				
Length Change, ASTM C 157					
28 Days Wet	+0.02%				
Working Time at 70°F (21°C)	10 minutes				

• Underwater repair of concrete piles, piers, seawalls and marine

- SURFACE PREPARATION: All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete<sup>®</sup> 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<sup>™</sup> or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 2. MIXING: Five Star Structural Concrete<sup>®</sup> Underwater Hand Pack is designed for small volume underwater repairs. Mix thoroughly with a drill and paddle mixer to a uniform consistency. Start by adding the minimum amount of potable water followed by repair material and mix for two to three minutes. Adjust consistency as necessary. Do not mix more material than can be placed in 10 minutes.
- 3. PLACEMENT PROCEDURES: Firmly work Five Star Structural Concrete® Underwater Hand Pack into concrete surface with a trowel or by hand, taking care not to leave air pockets. Application is from one side of the repair to the other, filling the repair to the desired level. For multiple lift application instructions, contact Five Star Products' Engineering and Technical Service Center. Finish as necessary. SPECIAL CONDITIONS: For use in cold temperatures, Five Star Structural Concrete® Underwater Hand Pack must be maintained at a temperature of at least 45°F (7°C). Protect from freezing until a compressive strength of 1,000 psi (6.9 MPa) is obtained. In hot temperatures, Five Star Structural Concrete® Underwater Hand Pack should be kept as cool as possible, but not exceeding 90°F (32°C). Cold water should be used for mixing to help maintain sufficient working time. Five Star® Summerset® may also be used if necessary to
- POST-PLACEMENT PROCEDURES: In tidal zones, Five Star Structural Concrete<sup>®</sup> 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<sup>®</sup> distributor, local sales representative, or call the Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

SKU / PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	UNIT SIZE
29220	Five Star Structural Concrete <sup>®</sup> UW-HP	36	36 lb. (16.3 kg) 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 OR 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 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



© 2018 Five Star Products, Inc. | 07-20-2018 12393 Rev. C | American Owned & Operated





## STRUCTURAL CONCRETE HTR

#### High Early Strength Repair For High Temperature Exposure

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> HTR is a unique high temperature resistant concrete repair material which can be pumped or poured into place. Five Star Structural Concrete<sup>®</sup> HTR gains strength rapidly and can be exposed to 1,000°F (538°C) in six hours and up to 2,400°F (1,316°C) after a 7-day curing procedure.

#### **ADVANTAGES**

- Thermal shock resistant
- High temperature resistance
- Coarse aggregate extension up to 100%

#### USES

- Areas of high temperature exposure
- Thermal cycling up to 2,400°F (1316°C)

- Resistant to sulfates
- High early strengths
- Excellent freeze/thaw resistance
- Rapid repairs during shutdowns
- Coker, kiln and foundry repairs

#### PACKAGING AND YIELD

Five Star Structural Concrete<sup>®</sup> 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.

٠

		5,000 psi	Thermal	Shock Re	sistance
TYPICAL PROPERTIES	AT 70°F (21°C)				
Compressive Strength, ASTM C 109					
6 Hours	2,500 psi (17.3 Mpa)	ļ	1.4	alas sa	
1 Day	4,500 psi (31.1 MPa)		i day / days		28 days
7 Days	5,500 psi (38.0 MPa)		# CYCLE	AGE	STRENGTH
28 Days	7,000 psi (48.3 MPa)		3 hour cycle	9 hours	5,000 psi
Bond Strength, ASTM C 882			1 1/2 cycles	1 day	5,300 psi
1 Day	1,500 psi (10.4 MPa)		5 1/2 cycles	7 days	5,300 psi
7 Days	2,500 psi (17.3 MPa)		20 1/2 cycles	28 days	5,300 psi
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)	tł h	ampies cured nen exposed to our cycles	at 70 F (21° 1,000°F (53	8°C) in 24
Working Time at 70°F (21°C)	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.

- 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. 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 Five Star Products' 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 2.5 to 3 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 2 inches (50 mm) in depth and detailed information regarding pumping, contact Five Star Products' Engineering and Technical Service Center at 1-800-243-2206. 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 thumbprint hard. Approximately six hours after placement, material can be brought up to an operating temperature of 1,000°F (538°C). For operating temperatures up to 2,400°F (1,316°C), wet cure for 3 days followed by dry cure for 4 days. Then slowly apply heat up to 2,400°F (1,316°C).

NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY. For more detailed placement procedures, refer to Five Star® Design-A-Spec<sup>™</sup> 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 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup>, or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 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 SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star<sup>®</sup> 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
28800	Five Star Structural Concrete <sup>®</sup> HTR	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, RROMENTE, 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."

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7913 FiveStarProducts.com



Specifications Subject to Change.

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

© 2019 Five Star Products, Inc. | 053019 12765 Rev. F | American Owned & Operated





# STRUCTURAL CONCRETE® HTR SHOTCRETE

#### Rapid Strength, Dry Process for High Temperature Exposure

#### PRODUCT DESCRIPTION

Five Star Structural Concrete<sup>®</sup> HTR Shotcrete is a unique high temperature resistant concrete repair material which is applied by dry process shotcrete. Five Star Structural Concrete<sup>®</sup> HTR Shotcrete gains strength rapidly and can be exposed to 1,000°F (538°C) in three hours and up to 2,400°F (1,316°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

#### <u>USES</u>

- Areas of high temperature exposure
- Rapid repairs during shutdownsCoker, kiln and foundry repairs
- Thermal cycling up to 2,400°F (1,316°C)

#### 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.

		1	Thermal S	Shock Resi	stance
	5,000 ps				
TYPICAL PROPERTIES	AT 70°F (21°C)				
Compressive Strength, ASTM C 109					
3 Hours	2,500 psi (17.3 Mpa)				
1 Day	4,500 psi (31.1 MPa)				
28 Days	7,000 psi (48.3 MPa)	1 day	7 da	ys	28 days
Compressive Strength, ASTM C 42 in accordance	e with ACI 506R-90	#	CYCLE	AGE	STRENGTH
3 Days	5,000 psi (34.5 Mpa)	3 h	our cycle	6 hours	5,000 psi
7 Days	5,700 psi (39.3 MPa)	11	/2 cycles	1 day	5,300 psi
28 Days	7,000 psi (48.3 MPa)	5 1	/2 cycles	7 days	5,300 psi
Bond Strength, ASTM C 882		20	1/2 cycles	28 days	5,300 psi
1 Day	1,500 psi (10.4 MPa)	then	amples cure exposed to 1	d at 70°F (21° ,000°F (538°C	C) for 3 hours, ) in 24 hour cycles
7 Days	2,500 psi (17.3 MPa)				, <u>,</u>
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				

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.

- 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. 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 thumbprint hard. Approximately three hours after placement, material can be brought up to an operating temperature of 1,000°F (538°C). For operating temperatures up to 2,400°F (1,316°C), wet cure for 3 days followed by dry cure for 4 days. Then slowly apply heat up to 2,400°F (1,316°C).

NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY. For more detailed placement procedures, refer to Five Star® Design-A-Spec<sup>™</sup> 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.
- 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup>, or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- For placements thinner than two inches (50 mm) or greater than four inches (102 mm), 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. PRIOR TO USE, REFER TO SAFETY DATA SHEET.

For worldwide availability, additional product information and technical support, contact your local Five Star <sup>®</sup> 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
29430	Five Star Structural Concrete <sup>®</sup> HTR Shotcrete	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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7913 FiveStarProducts.com



© 2019 Five Star Products, Inc. | 053019 12766 Rev. D | American Owned & Operated





# Concrete Repair

#### **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® 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 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.

NOTES:		



# **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

#### USES

- Highways and bridges
- Parking decks and ramps
- Airport runways and taxiways

- Resistant to salts
- Cold weather installation
- Coarse aggregate extension
- 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)					
Compressive Strength, ASTM C 109					
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)				
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	+ 0.05%				
28 Days Dry	- 0.05%				
Freeze/Thaw Resistance, ASTM C 666A					
Relative Durability Factor	90%				
Flexural Strength, ASTM C 78					
3 Hours	400 psi (2.8 MPa)				
Chloride Ion Permeability, ASTM C 1202					
28 Days	Very Low (<1,000 Coulombs)				
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.

- 1. SURFACE PREPARATION: All horizontal and vertical surfaces in contact with Five Star<sup>®</sup> 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. 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<sup>®</sup> Bonding Adhesive. Surfaces shall be conditioned to between 35°F and 90°F (2°C and 32°C) at time of placement.
- 2. MIXING: Mix Five Star<sup>®</sup> 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<sup>®</sup> Highway Patch following water requirements on packaging. 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.
- 3. PLACEMENT PROCEDURES: When bonding adhesive is not used, firmly work Five Star<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> Highway Patch and mixing water have been conditioned to a higher temperature prior to placement. In hot temperatures, Five Star<sup>®</sup> 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.

4. 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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 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
40000 F	Five Star <sup>®</sup> Highway Patch	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."

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com

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



© 2018 Five Star Products, Inc.| 07-19-2018 12391 Rev. C | American Owned & Operated







## **HIGHWAY PATCH FR**

#### Fiber Reinforced, Fast Traffic Area Repair

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> 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

#### <u>USES</u>

- Highways and bridges
- Parking decks and ramps
- Airport runways and taxiways

- Warehouse floorsSidewalks
  - Cold weather repairs

Resistant to salts

Coarse aggregate extension

No Wet Cure or Curing Compounds Required

#### 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)					
Compressive Strength, ASTM C 109					
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)				
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	+ 0.05%				
28 Days Dry	- 0.05%				
Freeze/Thaw Resistance, ASTM C 666A					
Relative Durability Factor	90% +				
Chloride Ion Permeability, ASTM C 1202					
28 Days	Low				
Working Time at 70°F (21°C)	15 minutes				

- 1. 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.
- 2. MIXING: Pre-wet mortar mixer, empty excess water. Mix Five Star<sup>®</sup> Highway Patch FR following water requirements on packaging. Slowly add Five Star<sup>®</sup> 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.
- 3. 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.

4. 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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 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 <sup>®</sup> 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 INFRINCE ON ANY PATENT HELD BY OTHERS."

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

Five Star Products, Inc. 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-19-2018 12689 Rev. C | American Owned & Operated





## **HIGHWAY PATCH WINTER**

Fast Traffic Area Repair for Cold Weather

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> 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

#### <u>USES</u>

- Highways and bridges
- Parking decks and ramps
- Airport runways and taxiways

- Adjustable to working time
- Resistant to salts
- Cold weather installation
- Coarse aggregate extension
- Expansion joint rebuild
- Dowel bar retrofit
- Cold weather repairs

#### 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 a 70% 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)
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%
Freeze/Thaw Resistance, ASTM C 666A	
Relative Durability Factor	> 90%
Flexural Strength, ASTM C 78	
3 Hours	400 psi (2.8 MPa)
Chloride Ion Permeability, ASTM C 1202	
28 Days	Very Low (<1,000 Coulombs)

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.

- 1. SURFACE PREPARATION: All horizontal and vertical surfaces in contact with Five Star® Highway Patch Winter 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 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 time of placement.
- 2. MIXING: Mix Five Star® Highway Patch Winter thoroughly for approximately three 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 Winter following water requirements on packaging. 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.
- 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<sup>®</sup> 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<sup>®</sup> Highway Patch Winter and mixing water have been conditioned to a higher temperature prior to placement. In warmer temperatures, chilled water or Five Star Summerset<sup>®</sup> 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 the 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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 75°F (2°C and 24°C) at time of placement. For extreme temperatures, call 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
40010	Five Star <sup>®</sup> Highway Patch Winter	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."

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com

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



© 2018 Five Star Products, Inc.| 07-19-2018 12946 Rev. B | American Owned & Operated





## **Rapid Surface Repair Easy Mix**<sup>™</sup>

#### Fast Turnaround Surface Repair for Roads, Runways & 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

#### **USES**

- Expansion joint and bridge header reconstruction
- Control joint filler
- Repair cracks, potholes, spalls

- Traffic ready in as little as 30 minutes\*
- Very low odor
- Make repairs year round can be used in temperatures down to 0°F (-18°C)
- Airport runways, walkways, floors, and parking lots
- Airport lighting cans and conduit channels

#### PACKAGING AND YIELD

Five Star® Rapid Surface Repair Easy Mix is packaged in a .64 gal. (2.42 L) kit containing .32 gal. (1.21 L) "A", .32 gal. (1.21 L) "B" and 50 lbs. (22.7 kg) of aggregate yielding approximately .41 ft<sup>3</sup> (.011 m<sup>3</sup>) per kit.

#### 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)		
Mix Ratio by Volume	(1) Part A : (1) Part B	
Viscosity @ 77°F (25°C) -mixed	60 cps	
Gel Time, Neat	2 to 3 minutes	
Working time with Aggregate	Approx. 5 minutes	
Cured		
Color	Dark Grey	
Cure Time (reopen to traffic)	30 minutes	
Hardness, Durometer D, ASTM D-2240	70	
Tensile Strength, ASTM D-412	3,000 psi (20.7 MPa)	
Compressive Strength, ASTM C-579B		
1 hour	2,000 psi (13.8 MPa)	
1 day	6,000 psi (41.3 MPa)	
7 days	7,000 psi (48.2 MPa)	
28 days	8,000 psi (55.1 MPa)	
Elongation, ASTM D-638	10 - 15%	
Bond Strength, ASTM C-882	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.

#### 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 (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. For crack filling, route out as necessary to a maximum 1/2 inch wide by 1/2 inch deep, minimum.
- 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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	#UNITS/PALLET	UNIT SIZE
30928	Five Star <sup>®</sup> Rapid Surface Repair Easy Mix Kit	120	Resin (A): 0.32 gal (1.2 L) Hardener (B): 0.32 gal (1.2 L) Aggregate (C): 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."

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com

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



© 2018 Five Star Products, Inc. | 07-19-2018 12512 Rev. H | American Owned & Operated





## 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.

#### **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

#### 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	
Cured		
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	

- Repair cracks, potholes, spalls
- Resurface walkways, floors & bridge deck overlays

#### SURFACE PREPARATION

- 1. Prepare concrete surfaces to a minimum Concrete Surface Profile (CSP) 4 to 5 in accordance with ICRI Technical Standard 310.1R (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 must be visibly dry prior to placement. Use a heat source to ensure dry substrate prior to placement.
- 3. For optimum performance, liquid components should be conditioned to between 70-90°F (21-32°C) prior to use. Aggregate should be heated to a minimum 90°F (32°C) and a maximum 140°F (60°C).
- 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 plural 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<sup>®</sup> Rapid Surface Repair PF-60 may also be used for small repairs. Measure exactly equal amounts by volume of components A & B. Mix together for 30 seconds. Remember, as material quantities increase, heat generated by the product increases and the pot life of mixed product will decrease respectively. Pour product immediately.

#### APPLICATION

- 1. Repair areas should have aggregate pre-placed at thicknesses 1 to 4 inches per lift.
- 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 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<sup>®</sup> Design-A-Spec<sup>™</sup> 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 60 80°F (15 27°C), and conditioned ideally to 70 90°F (21 32°C) 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 call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.

SKU / PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	UNIT SIZE
30912	Five Star <sup>®</sup> Rapid Surface Repair PF-60 KIT (PART A & B)	36 (18 kits)	Resin (A): 5 gal. (18.9 L) Hardener (B): 5 gal. (18.9 L)
30911	Five Star <sup>®</sup> Rapid Surface Repair PF-60 KIT (PART A & B)	6 (3 kits)	Resin (A): 15 gal. (56.7 L) Hardener (B): 15 gal. (56.7 L)
30850	Five Star <sup>®</sup> Rapid Surface Repair PF-60 KIT (PART A & B)	2 (2 kits)	Resin (A): 54 gal. (204.4 L) Hardener (B): 54 gal. (204.4 L)
30846	Fast-Start Catalyst	N/A	4 oz. (113.4 g)

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."

#### Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive

60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com









# 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® EPOXY PRIMER**

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

NOTES:		



## **BONDING ADHESIVE**

Multi-Purpose Epoxy Adhesive

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> Bonding Adhesive is a multi-purpose, two component, 100% solids, moisture insensitive structural epoxy adhesive. Five Star<sup>®</sup> 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<sup>®</sup> 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

#### <u>USES</u>

- Bonding fresh concrete to hardened concrete or steel
- Corrosion protection for steel

- Convenient 1:1 mixing ratio
- Low odor
- Easy to use
- 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.

- 1. 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).
- 3. METHODS OF PLACEMENT:

To bond fresh concrete or repair material to hardened concrete: Five Star<sup>®</sup> Bonding Adhesive may be sprayed, brushed or rolled, approximately 80 sq. ft. per gallon. Place fresh concrete or repair material while Five Star<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> Bonding Adhesive is still tacky.

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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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 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
30806	Five Star <sup>®</sup> Bonding Adhesive 1 gallon	60	Resin (A): 4.6 lbs. (2.1 kg) Hardener (B): 7.4 lbs. (3.6 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 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12554 Rev. C | American Owned & Operated


## EPOXY ADHESIVE LV

#### Low-Viscosity Epoxy Adhesive

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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 patching mortar. Five Star Epoxy Adhesive LV meets ASTM C 881 Types I, II, IV and V, Grade 1, Classes B & C.

#### **ADVANTAGES**

- Low viscosity ensures deep penetration
- Moisture insensitive
- High modulus structural adhesive
- High strength

#### <u>USES</u>

- 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

#### 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	300 cps
Flexural Strength, ASTM D 790	9,600 psi (62.2 MPa)
Bond Strength, ASTM C 882	
2 Day Cure	2,400 psi (16.6 MPa)
14 Day Cure	3,600 psi (24.8 MPa)
Shrinkage, ASTM D 2566	0.21%
Shear Strength, ASTM D 732	9,000 psi (62.1 MPa)
Heat Deflection Temperature, ASTM D 648	122°F (50°C)
Compressive Properties, ASTM D 695	7 Day
Compressive Strength	11,000 psi (75.8 MPa)
Compressive Modulus	2.20 x 10 <sup>5</sup> psi (1,500 MPa)
Tensile Properties, ASTM D 638	
Tensile Strength	7,000 psi (48.3 MPa)
Percent Elongation at Break	2.9
Gel Time, ASTM C 881	30-35 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.

- Excellent adhesion to masonry, concrete, wood, steel and most structural material
   Meets USDA specification for use in food processing areas
- Seal interior slabs and exterior above grade slabs from water and chlorides
- Gravity feed or pressure inject as void filler under equipment
- Binder for epoxy patching mortar of interior horizontal surfaces

- 1. 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. Blow out all surfaces with oil-free compressed air.
- MIXING: Five Star<sup>®</sup> 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 appropriate epoxy gel where required.

Pressure Injection: Use automated equipment. Set appropriate injection ports. Seal ports and cracks with appropriate epoxy 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 Five Star Design-A-Spec<sup>™</sup> 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.
- 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 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
30811	Five Star <sup>®</sup> Epoxy Adhesive LV	60	Resin (A): 6.2 lbs. (2.8 kg) Hardener (B): 2.7 lbs. (1.2 kg) 1 gallon

EXCLUSIVE WARRANTY: DISCLAIMER OF LIABILITY: 'FIVE STAR MARINE, INC. (FSM) WARRANTS THAT FSM PRODUCTS ARE MANUFACTURED TO (i) BE FREE OF MANUFACTURING DEFECTS AND (ii) MEET FSM'S CURRENTLY PUBLISHED SPECIFICATIONS FOR PHYSICAL PROPERTIES, PROVIDED THAT THE FSM PRODUCTS ARE APPLIED IN ACCORDANCE WITH FSM'S DIRECTIONS AND TESTED IN ACCORDANCE WITH ASTM INTERNATIONAL AND FSM STANDARDS. IN THE EVENT THAT A FSM PRODUCT FAILS TO SATISFY THE FOREGOING WARRANTY, FSM WILL REPLACE THE DEFECTIVE FSM PRODUCT; PROVIDED HOWEVER, PRIOR TO PROVIDING SUCH REPLACEMENT, FSM MAY REQUIRE THE RETURN TO FSM OF ANY UNUSED, DEFECTIVE OF ALLEGEDLY DEFECTIVE FSM PRODUCT; REGISTING SHALL HAVE THE RIGHT TO INSPECT ANY PROJECT IN WHICH ALLEGEDLY DEFECTIVE FSM PRODUCT HAS BEEN APPLIED AND TO INTERVIEW PERSONNEL AND REVIEW ASSOCIATED RECORDS RELATING TO THE USE OR APPLICATION OF ALLEGEDLY DEFECTIVE FSM PRODUCTS. EXCEPT AS SET FORTH ABOVE, WITH REGARDS TO THE FSM PRODUCTS, FSM MAKES NO REPRESENTATIONS OR WARRANTEY OF MAY NATURE WHATSOEVER, ETHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OF NON-INFRINCEMENT, FOR THE AVOUNDANCE OF DOUBT, THE FOREGOING IS INTENDED AS A SOLE AND EXCLUSIVE REMEDY FOR ANY FSM PRODUCT DEFECT, AND FSM SHALL NOTBE LIABLE FOR DAMAGES OF ANY SORT ARISING FROM THE USE OF FSM PRODUCTS, INCLUDING PUNITIVE, ACTUAL, REMOTE, OR CONSEQUENTIAL DAMAGES, AND WHETHER RESULTING FROM CLAIMS OF BREACH OF CONTRACT, BREACH OF ANY WARRANTY (WHETHER EXPRESS OR IMPLIED) OR FROM ANY OTHER CAUSE WHATSOEVER. WITHOUT LIMITING THE FOREGOING, FSM SHALL NOT BE LIABLE IN THE EVENT THAT THE USE OF FSM PRODUCTS INFRINGES ANY PATENT OR OTHER INTELLECTUAL PROPRIETARY RIGHT OF ANY THIRD PARTY.

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com Specifications Subject to Change.



For most current version of datasheet, go to FiveStarProducts.com © 2020 Five Star Products, Inc. | 08-10-2020 12767 Rev. D | American Owned & Operated





### **EPOXY PRIMER**

#### Low Viscosity Epoxy Baseplate Primer

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> Epoxy Grouts
- Fast cure response

#### <u>USES</u>

- Pump bases
- Rotating equipment

- Induced draft fans
- Compressors

#### PACKAGING AND YIELD

Five Star<sup>®</sup> 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 ft<sup>2</sup> (49.2 m<sup>2</sup>) @ 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 4	541			
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 , AS	TM D 2240	Pencil Hardness, ASTM	I 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

- 1. SURFACE PREPARATION: Surface must be clean, dry and free from any other substance or contaminates. For best results surfaces should be prepared to an SSPC-SP5 or better profile.
- 2. MIXING: Five Star<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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.
- 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 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
34600	Five Star <sup>®</sup> Epoxy Primer (Clear)	24	Resin (A): 6.7 lbs. (3.0 kg) Hardener (B): 2.0 lbs. (0.9 kg) 1 gallon unit

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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12768 Rev. B | American Owned & Operated





# **Coatings & Waterproofing**

#### **FIVE STAR® COAL TAR EPOXY**

Protective coating for concrete, steel, aluminum and wood structures exposed to corrosive environments including salt and fresh water

FIVE STAR<sup>®</sup> 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® WATERPROOFING**

High performance, cementitious waterproofing coating for concrete and masonry surfaces

NOTES:		



# <u>Centri-Cast<sup>®</sup> Coal Tar</u>

### **Epoxy Coal Tar Protective Coating**

#### DESCRIPTION

Five Star Centri-Cast<sup>®</sup> 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.

#### <u>USES</u>

Five Star Centri-Cast<sup>®</sup> 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<sup>®</sup> 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		

SURFACE PREPARATION: All surfaces must be clean, dry and free from oil, grease and other contaminates.

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

#### **CONSIDERATONS**

- 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 <sup>®</sup> Coal Tar 5 gallon kit	24	Resin (A): 4 gal. (15.1 L) Hardener (B): 1 gal. (3.8 L)

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

Five Star Products, Inc. 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 • Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products, Inc. | 07-18-2018 12687 Rev. C | American Owned & Operated





### **EPOXY NOVOLAC COATING**

#### Highly Chemical Resistant Epoxy Coating Horizontal Applications

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> Epoxy Novolac Coating is a two component, 100% solids, highly chemical resistant epoxy coating for horizontal applications. Five Star<sup>®</sup> 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

#### 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		

Chemica	I Resistance Chart	t* 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%)	Cadmiun 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.

- Low permeability
- Low odor

- 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<sup>®</sup> 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 Products' Engineering and Technical Service Center at 1-800-243-2206.
- 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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. Use Five Star<sup>®</sup> Waterborne Primer in conjunction with Five Star<sup>®</sup> 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 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
34000	Five Star <sup>®</sup> Epoxy Novolac Coating (Grey)	48	Resin (A): 14.2 lbs. (6.4 kg.) pail Hardener (B): 8.6 lbs. (3.9 kg.) 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."

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



© 2018 Five Star Products | 07-18-2018 12943 Rev. B | American Owned & Operated





## **EPOXY NOVOLAC COATING NON-SAG**

Highly Chemical Resistant Epoxy Coating Vertical Applications

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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
- USES
- Vertical applications
- Secondary containment surfaces

- Low permeability
- Low odor
- Coatings for concrete tanks
- Concrete and steel surfaces

#### PACKAGING AND YIELD

Five Star<sup>®</sup> 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	7,200 psi (49.6 MPa)		
Compressive Strength, ASTM D 695			
7 Days	10,000 psi (70.0 MPa)		
In-Service Time, (allow 3-5 days for maximum cure)	72 hours		

Chemica	I 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%)	Cadmiun 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.

- 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<sup>®</sup> 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 Five Star<sup>®</sup> Design-A-Spec<sup>™</sup> 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. Use Five Star<sup>®</sup>
  Waterborne Primer in conjunction with Five Star<sup>®</sup> 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 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
34001	Five Star <sup>®</sup> Epoxy Novolac Coating Non-Sag (Grey)	48	Resin (A): 14.2 lbs. (6.44 kg.) pail Hardener (B): 9.1 lbs. (4.1 kg.) 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."

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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products | 07-18-2018 12770 Rev. B | American Owned & Operated





## WATERPROOFING

High Performance Waterproof Coating

#### PRODUCT DESCRIPTION

Five Star<sup>®</sup> 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<sup>®</sup> 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

#### <u>USES</u>

- Concrete and masonry surfaces
- Vertical and horizontal applications
- Base for moisture-sensitive coatings
- Elevator/escalator pits

- Self-curing
- Trowel or brush applied
- Foundations
- Manholes
- Vaults
- Tanks

#### PACKAGING AND YIELD

Five Star<sup>®</sup> 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<sup>®</sup> 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

Compressive 3

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

TYPICAL PROPERTIES AT 70°F (21°C) AT 1/8 INCH THICKNESS		
Strength, ASTM C 109		

4 Hours	3,000 psi (20.7 MPa)
28 Days	7,000 psi (48.3 MPa)
Bond Strength, ASTM C 882	
7 Days	2,400 psi (16.5 MPa)
Permeability, CRD-C 48, 1/8 inch (3 mm) thickness	
Negative Side	7.16 x 10 <sup>-13</sup> cm/sec
Positive Side	7.96 x 10 <sup>-14</sup> cm/sec
Chloride Ion Permeability, ASTM C 1202, 1/8 inch (3 mm) thickness	
28 Days	Very Low (<1,000 Coulombs)
Working Time at 70°F (21°C)	20 minutes

- 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.
- 2. 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.
- 3. METHODS OF PLACEMENT: <u>Brush Application</u>: 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. <u>Trowel Application</u>: Apply in a single application at 1/8 inch (3 mm) thick. Apply firmly to promote bond development.
- 4. POST-PLACEMENT PROCEDURES: Five Star<sup>®</sup> Waterproofing is a self-curing product under normal field conditions. Five Star<sup>®</sup> Waterproofing must be protected from freezing, rain, hydrostatic pressure, and traffic until it reaches its normal 24-hour strength.
- 5. 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 Five Star® Design-A-Spec<sup>™</sup> 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 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<sup>®</sup> 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
10100	Five Star <sup>®</sup> Waterproofing	36	Dry Material: 50 lbs. (22.7 kg.) Liquid: 4.2 lbs. (1.9 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 OTHERRS."

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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products | 07-18-2018 12738 Rev. B | American Owned & Operated





# **Crack Fillers/Joint Repair**

**CRACK REPAIR SLV** Low viscosity polyurethane crack repair for horizontal surfaces; deep penetration into hairline cracks

NOTES:		



### Crack Repair SLV

#### Low Viscosity Polyurethane Crack Repair for Horizontal Surfaces

#### PRODUCT DESCRIPTION

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

#### **ADVANTAGES**

- Very low viscosity
- Can be used in temperatures from 0°F to 115°F (-18°C to 46°C)

- Self-leveling
- Solvent free / No VOC content
- Fast turnaround

#### <u>USES</u>

- 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<sup>®</sup> 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 78°F (26°C)			
Compressive Strength, ASTM D 695			
1 Hour	4,900 psi ( 33.8 MPa)		
24 Hours	5,200 psi ( 35.9 MPa)		
Tensile Strength, ASTM D 638	4,100 psi (28.3 MPa)		
Elongation, ASTM D 638	5%		
Shore D Hardness, ASTM D 2240	70		
Viscosity (mixed)	60 cps		
Bond Strength, ASTM C 882	1,800 psi (12.4 MPa)		
Gel Time (60 gram sample)	2-3 minutes		
Tack-Free Time	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.

- PREPARATION: Prepare crack 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.
- 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<sup>®</sup> Design-A-Spec<sup>™</sup> installation guidelines or call 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 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 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 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
30792	Five Star <sup>®</sup> Crack Repair SLV	48 cases (576 units) (12 Units per Case)	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 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

Five Star Products, Inc. Corporate Headquarters 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7900 · Fax: +1 203-336-7930 FiveStarProducts.com



© 2018 Five Star Products | 07-18-2018 12757 Rev. C American Owned & Operated

	•
00000	
00000	
_	



# Bulletins

**TECHNICAL BULLETIN 101** Cementitious Grout - Cold Weather

**TECHNICAL BULLETIN 102** Cementitious Grout - Hot Weather

**TECHNICAL BULLETIN 103** Epoxy Grouting - Cold Weather

**TECHNICAL BULLETIN 104** Epoxy Grouting - Hot Weather

**TECHNICAL BULLETIN 105** Aggregate Extension Guidelines - Cementitious Grouting

**TECHNICAL BULLETIN 106** Aggregate Extension Guidelines - Concrete Repair

**TECHNICAL BULLETIN 107** Mix Water Requirements

**TECHNICAL BULLETIN 108** Grout Headbox and Plunger

**TECHNICAL BULLETIN 109** Testing Cementitious Grout

**TECHNICAL BULLETIN 110** Testing Epoxy Grout **PRODUCT UPDATE BULLETIN 111** HP & DP Epoxy Grouts - Improved Color

**TECHNICAL BULLETIN 112** Epoxy Grout Placement Considerations

**TECHNICAL BULLETIN 113** Mixing Five Star<sup>®</sup> Grout in Ready Mix Trucks

**PRODUCT UPDATE BULLETIN 114** Universal Low Dust Epoxy Aggregate Epoxy Liquid Modifications

**TECHNICAL BULLETIN 133** Anchor Bolt Grouting in Cement Grout

**TECHNICAL BULLETIN 134** Anchor Bolt Grouting in Epoxy Grout

**TECHNICAL BULLETIN 142** Control/Expansion Joint Recommendations for Wind Turbine Foundations (Epoxy Grouts)

NOTES:		



## Cementitious Grouting in 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 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<sup>®</sup> 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"



Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

© 2018 Five Star Products, Inc. | 12775 Rev A

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

#### For information 1-800-243-2206 • FiveStarProducts.com





### Cementitious Grouting in 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. Presoaking 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"  $% \mathcal{A} = \mathcal{A} = \mathcal{A}$ 

PIP/API RP 686: "Process Industry Practices"



Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

#### For information 1-800-243-2206 • FiveStarProducts.com





### Epoxy Grouting in 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.
- F. Heated enclosures must be properly vented to ensure heater exhaust gases do not accumulate in the enclosure and create a potentially dangerous safety situation

**REFERENCE:** 

ACI 351.1R-R99: "Grouting Between Foundations and Bases for Support of Equipment and Machinery"  $% \mathcal{A} = \mathcal{A} = \mathcal{A}$ 

PIP/API RP 686: "Process Industry Practices"



Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

Rev A

© 2018 Five Star Products, Inc. | 12777

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

#### For information 1-800-243-2206 • FiveStarProducts.com





## Epoxy Grouting in 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 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: "Grouting Between Foundations and Bases for Support of Equipment and Machinery"

PIP/API RP 686: "Process Industry Practices"



Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

#### For information 1-800-243-2206 • FiveStarProducts.com





# Aggregate Extension Guidelines

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 ft <sup>3</sup> (.0192m <sup>3</sup> )
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<sup>®</sup> 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.

Five Star<sup>®</sup> Fluid Grout 100 should only be extended when mixed to less than a fluid consistency (flowable). For extension guidance using Five Star<sup>®</sup> HTR Grout and Five Star<sup>®</sup> EZ-Cure<sup>™</sup> Grout, contact Five Star Products' Engineering and Technical Center at 1-800-243-2206.

For information 1-800-243-2206 • FiveStarProducts.com



1

Rev A

© 2018 Five Star Products, Inc. | 12779

**Mortar Mixer**: 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.

**Concrete Mixer**: 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 Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

**CONCRETE REPAIR & OVERLAYS** 



# **TECHNICAL BULLETIN 106**

# Aggregate Extension Guidelines

For placements greater than 2 inches (50 mm) in depth, Five Star Structural Concrete®, Five Star Structural Concrete® ES, Five Star Structural Concrete® S300, 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.

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	

**Mortar Mixer:** When mixing in a mortar mixer, add coarse aggregate after initial mixing of Five Star<sup>®</sup> 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.

**Concrete Mixer**: When mixing in 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.

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.



Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

#### For information 1-800-243-2206 • FiveStarProducts.com





# **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 <sup>®</sup> Grout	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	
Five Star <sup>®</sup> High Strength Grout	50 lbs (22.7 kg)	2¾ qts (2.6 liters)	31/4 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 $5\frac{1}{4} - 5\frac{1}{2}$ 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 <sup>®</sup> Special Grout 110	50 lbs (22.7 kg)	3.5 qts (3.3 liters)	5.5 qts (5.2 liters)	
Five Star <sup>®</sup> Special Grout 110	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	
Five Star <sup>®</sup> Special Grout 120	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	
Five Star <sup>®</sup> Special Grout 150	50 lbs (22.7 kg)	3.5 qts (3.3 liters)	5.5 qts (5.2 liters)	
Five Star <sup>®</sup> Special Grout 150	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	
Five Star <sup>®</sup> 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 <sup>®</sup> Special Grout 550	100 lbs (45.4 kg)	7.0 qts (6.6 liters)	11.0 qts (10.4 liters)	

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)

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.

#### For information 1-800-243-2206 • FiveStarProducts.com



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 Gunite	50 lbs (22.7 kg)	1.75 qts (1.6 liters)	2.25 qts (2.1 liters)	
Five Star® Structural Concrete Gunite WP	50 lbs (22.7 kg)	2.25 qts (2.1 liters)	3.0 qts (2.8 liters)	
Five Star® Structural Concrete Gunite 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)	

All the products above should be mixed to a recommended consistency.

Cement grouts may use less than minimum posted water for dry pack consistency.

\*\* Water requirements for Five Star<sup>®</sup> 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.

Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

#### For information 1-800-243-2206 • FiveStarProducts.com



# Technical Bulletin 108 Grout Headbox & Plunger



A headbox is required for a continuous pour to avoid air pockets under the baseplate and will improve grout flow significantly. When a headbox is used and hydraulic head pressure is the means of flowing grout into place, the minimum height of the headbox should be from 1/3 to 1/2 the distance the grout must flow.

**When pouring into a headbox**, grout shall be introduced in a manner to avoid air entrapment. Fill the headbox to the maximum height and allow the grout to flow down under the baseplate. Care must be taken during grouting to <u>keep</u> the headbox at least half full of material to ensure even grout flow.

**To prevent trapping of air under baseplate,** the level of grout in the headbox must never fall below the top of the baseplate. This procedure is repeated until the grout moves completely under the baseplate, pushing air out in front of it, and rising above the bottom of the baseplate on the far side.

When the baseplate is long and the headbox is less than the full length of the baseplate, begin grouting at one end of the long side. When the grout front reaches the far side, begin sliding the headbox down the length of the baseplate, keeping pace with the advancing grout front until the baseplate is completely grouted.

To increase the rate of flow from a headbox, manually apply pressure in addition to the hydraulic head by using a plunger. A plunger is a tool, usually fabricated on the job site, made from two pieces of wood nailed together to form a T. The stem is the plunger handle, and the crossbar which is just slightly smaller than the width of the headbox, applies the pressure.



For large, repetitive, or unique grouting applications, specially designed headboxes may be utilized.

> FIVE STAR TECHNICAL BULLETINS ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND SHOULD BE USED AS GENERAL GUIDELINES FOR CON-SIDERATION BY CONTRACTORS AND ENGINEERS. WHILE EVERY REASONABLE EFFORT HAS BEEN MADE TO ENSURE THIS INFORMATION IS ACCURATE AND AUTHORITATIVE, FIVE STAR PRODUCTS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, OR ITS APPROPRIATE-NESS FOR ANY PARTICULAR PURPOSE. THE USER OF THESE DOCUMENTS REMAINS SOLELY RESPONSIBLE FOR THE SPECIFICATION OF ALL METHODS, MATERIALS AND PRACTICES.

NOTES:		

#### **CEMENTITIOUS** GROUTS



# **TECHNICAL BULLETIN 109**

## PROPER TESTING FOR Compressive Strength

Five Star<sup>®</sup> 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 and 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% minimum

#### **B. Test Time Tolerances**

- 1 day ± 1/2 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**

• Refer to Technical Data Sheet 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.



A. 2"x2" Brass cube mold with cover plate



D.2. Fill cube mold ½ way with fluid / flowable grout.



#### For information 1-800-243-2206 • FiveStarProducts.com



- 3. Dry-Pack consistency grout:
  - Fill cube mold half way and tamp 25 times using ASTM C 109 tamper or tamping rod. Repeat process for dry-pack consistency, tamping new layer of grout into previous layer until cube mold is filled.
  - Tap the side of cube mold 5 times (each side) with rubber mallet for drypack consistency grouts. Drop mold on solid surface 5 times from a height of 6 inches to further help consolidation.
- 4. Screed off excess grout so the surface of each specimen 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. 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. On a jobsite, place molds in cooler with top, with wet towels and cover plates firmly in place. Move to lab at an appropriate time and place in humidity cabinet, if available.
- 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.



D.5. Clean off any excess material on top of mold.



D.6. Place cover plate on mold and tighten with screws or clamps.

Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

#### For information 1-800-243-2206 • FiveStarProducts.com





## PROPER TESTING FOR Compressive Strength

Five Star<sup>®</sup> Epoxy 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 579, Method B. The use of cover plates on cube molds ensures more accurate testing and is highly recommended. The use of cylinders, plastic molds, or curing at temperatures below 70°F (21°C) 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: 6000 psi per minute load rate

Load Rate II: 0.1 to 0.125 inches per minute crosshead speed x specimen height (2 inches) = 0.20 to 0.25 inches per minute for a 2 inch 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 and cover plate (plastic molds or plastic inserts not acceptable)
- · Release agent
- Compression Testing Machine calibrated to Load Rate II
- Curing Location Temperature 70°F 77°F (21°C 25°C)

#### **B. Test Time Tolerances**

- 1 day ± ½ hour (from start time)
- 7 days ± 3 hours (from start time)



A. 2"x2" Brass cube mold with cover plate

Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

© 2018 Five Star Products, Inc. | 12783 Rev A

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

#### For information 1-800-243-2206 • FiveStarProducts.com



#### **C. Compressive Strength Requirement**

• Refer to Technical Data Sheet 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.
- 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 (18°) 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.



D.2. Fill molds halfway with epoxy grout then tamp or rod to remove entrapped air.







D.6. Place cover plate on mold and tighten with screws or clamps.

#### For information 1-800-243-2206 • FiveStarProducts.com





### PRODUCT UPDATE BULLETIN 111 Improved HP & DP Epoxy Grouts Color Change

Five Star<sup>®</sup> 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 Gr	out (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 I	Expansion	Positive Expansion		
Effective Bearing Area	95	5%	95%		
<b>Creep</b> , 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)		
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	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 EPO	XY GROUT TYPICA	L PROPERTIES AT 7	70°F (21°C)		
	DP Epoxy Gro	out (Standard)	DP Epoxy Gro	out (High Flow)	
Clearances	1 to 18 inches	(25 - 457 mm)	1/2 to 9 inches (13 - 220 mm)		
Height Change, ASTM C 827, at 90°F (32°C)	Positive E	Expansion	Positive Expansion		
Effective Bearing Area	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)		
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)	
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<sup>™</sup> 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.

NOTES:		


# Ultra-High Performance 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  $\text{Star}^{\otimes}$  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 (121°C)

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.



El Paso Natural Gas



### For information 1-800-243-2206 • FiveStarProducts.com



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<sup>®</sup> 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<sup>®</sup> 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<sup>™</sup> for Five Star<sup>®</sup> SP Epoxy Grout is available that incorporates these specific placement and application details.

It is important to remember Five Star<sup>®</sup> SP Epoxy Grout is not a replacement for Five Star<sup>®</sup> DP Epoxy Grout or Five Star<sup>®</sup> HP Epoxy Grout, but was designed to surpass other higher strength systems such as Euclid E3X and Chockfast Red SG. The Euclid E3X 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).

Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

For information 1-800-243-2206 • FiveStarProducts.com





### MIXING GROUTS IN Ready Mix Trucks

Certain Five Star<sup>®</sup> Grouts may be mixed via 3,000 lb. bulk bags in ready mix trucks. These include Five Star<sup>®</sup> Grout, Five Star<sup>®</sup> Cementitious Underwater Grout, Five Star<sup>®</sup> Special Grout 120, Five Star<sup>®</sup> Special Grout 150, and Five Star<sup>®</sup> Fluid Grout 100. Contact Five Star Products' Engineering and Technical Service Center at 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. 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. 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.



Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

### For information 1-800-243-2206 • FiveStarProducts.com



### FIVE STAR PRODUCT UPDATE BULLETIN 114 Universal Low Dust Epoxy Aggregate Epoxy Liquid Modifications

Effective January 2013 Five Star<sup>®</sup> 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<sup>®</sup> 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:

New, Universal Low-Dust Packaging Existing Packaging Five Star<sup>®</sup> DP Epoxy Grout Resin 18.9 lbs Resin 20.9 lbs High Flow 1.75 ft<sup>3</sup> Hardener 5.7 lbs Hardener 6.3 lbs Product Code 33155 Aggregate 4 x 45 lbs Aggregate 4 x 50 lbs Five Star<sup>®</sup> DP Epoxy Grout Resin 18.9 lbs Resin 20.9 lbs Standard Flow 2.0 ft<sup>3</sup> Hardener 5.7 lbs Hardener 6.3 lbs Product Code 33610 Aggregate 5 x 45 lbs Aggregate 5 x 50 lbs Five Star<sup>®</sup> HP Epoxy Grout Resin 23.8 lbs NO CHANGE High Flow 1.75 ft<sup>3</sup> NO CHANGE Hardener 4.2 lbs Product Code 33600 Aggregate 4 x 50 lbs NO CHANGE Five Star<sup>®</sup> HP Epoxy Grout Resin 23.8 lbs NO CHANGE Standard Flow 2.0 ft<sup>3</sup> Hardener 4.2 lbs NO CHANGE Product Code 33100 Aggregate 5 x 50 lbs NO CHANGE Five Star<sup>®</sup> SP Epoxy Grout Resin 23.7 lbs Resin 21.9 lbs Product Code 33500 Hardener 7.7 lbs Hardener 5.4 lbs Aggregate 5 x 45 lbs Aggregate 4 x 50 lbs Five Star<sup>®</sup> DP Epoxy Grout PG Resin 18.9 lbs Resin 20.9 lbs Product Code 33630 Hardener 5.7 lbs Hardener 6.3 lbs Aggregate 4 x 40 lbs Aggregate 4 x 44 lbs Five Star<sup>®</sup> SP Epoxy Grout PG Resin 23.7 lbs Resin 21.9 lbs Product Code 33501 Hardener 7.7 lbs Hardener 5.4 lbs Aggregate 4 x 50 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<sup>®</sup> 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.
- Existing Five Star<sup>®</sup> 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<sup>®</sup> DP PG Aggregate with new DP PG Liquids add between ½ to one additional 40 Ib bag of existing DP PG Aggregate to new DP PG Liquids.
- 4. Existing Five Star<sup>®</sup> 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<sup>™</sup> 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<sup>®</sup> distributor, local sales representative, or you may call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.



### **Anchor Bolt Grouting**

### **Surface Preparation**

Bolts: Free of oil, grease and rust. Preferably sandblasted to a "bright metal" condition.

- Holes: A. Dry drilled holes shall be cleaned of dust and debris.
  - B. Wet drilled holes shall be cleaned of drilling slurry.
  - C. Formed and/or core drilled holes shall be scarified to roughen anchor hole surface.
  - D. Concrete shall be saturated with water for 24 hours prior to grouting.
  - E. Standing water shall be removed immediately prior to grouting.

### Dimensions

The dimensions called for in this technical bulletin are designed to eliminate the possibility of a grout failure. A concrete or steel failure is still possible. Therefore, if the concrete is designed to withstand maximum steel tension, the bolt/bar will be the governing design factor. (i.e. failure due to cone mechanism is eliminated due to reinforced concrete or because of baseplate.)

- L = Length of Embedment
- D = Diameter of Hole
- d = Diameter of Bolt/Bar
- Fy = Yield Strength of Bolt/Bar
- C = Bolt/Bar Shape Factor
- S = Factor of Safety
- C = 1.0 for Smooth Bolt/Bar
- C = 1.5 for Deformed Bolt/Bar
- C = 2.0 for Threaded Bolt/Bar



Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

Rev B

© 2018 Five Star Products, Inc. | 12877

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

### For information 1-800-243-2206 • FiveStarProducts.com



### Length of Embedment

Based on a shear/bond strength of 1,000 psi: 1,000 psi x C x  $\pi dL = \pi d^2$  Fy x <sup>1</sup>/<sub>4</sub> Solving for L: minimum  $L = Fyd \div [4,000 x C]$ 

#### **Therefore:**

#### With Fy = 80,000 psi ( moderate strength steel)

minimum L = 20d for Smooth Bolt/Bar

minimum L = 15d for Deformed Bolt/Bar

minimum L = 10d for Threaded Bolt/Bar

With Fy = 135,000 psi (high strength steel)

minimum L = 34d for Smooth Bolt/Bar

minimum L = 23d for Deformed Bolt/Bar

minimum L = 16d for Threaded Bolt/Bar

#### **Hole Diameter**

The diameters called for in this bulletin are minimum diameters. The requirements will ensure an adequate size bonding surface between grout and concrete. Larger dimensions may ease placement on deep or awkward pours.

When bolt diameter;  $d \le 1.0$  in, then hole diameter shall be a minimum of 2 in.

When bolt diameter;  $d \ge 1.0$  in, then hole diameter shall be a minimum 2d.

NOTE: These calculations are for reference only. Design calculation should be approved by a professional engineer.

For information 1-800-243-2206 • FiveStarProducts.com





### **Anchor Bolt Grouting**

### **Surface Preparation**

Bolts: Degrease, sandblast, pickle, powerbrush or use other methods to achieve a "bright metal" surface.

- Holes: A. Dry drilled holes shall be cleaned of dust and debris.
  - B. Wet drilled holes shall be cleaned of drilling slurry.
  - C. Formed and/or core drilled holes shall be scarified to roughen anchor hole surface.
  - D. Standing water shall be removed and all anchor hole surfaces completely dry.

### **Dimensions**

The dimensions called for in this technical bulletin are designed to eliminate the possibility of a grout failure. A concrete or steel failure is still possible. Therefore, if the concrete is designed to withstand maximum steel tension, the bolt/bar will be the governing design factor. (i.e. failure due to cone mechanism is eliminated due to reinforced concrete or because of baseplate.)

#### L = Length of Embedment

- D = Diameter of Hole
- d = Diameter of Bolt/Bar
- Fy = Yield Strength of Bolt/Bar
- C = Bolt/Bar Shape Factor
- S = Factor of Safety
- C = 1.5 for Smooth Bolt/Bar
- C = 2.0 for Deformed Bolt/Bar
- C = 2.5 for Threaded Bolt/Bar

[Epoxy grout bears a different relationship to steel surfaces than cement grout.]



FORCE

Five Star Technical Bulletins are provided for informational purposes only and should be used as general guidelines for consideration by contractors and engineers. While every reasonable effort has been made to ensure this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or its appropriateness for any particular purpose. The user of these documents remains solely responsible for the specification of all methods, materials and practices.

FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900 Support: 1-800-243-2206 (IN THE U.S.)

### For information 1-800-243-2206 • FiveStarProducts.com



### Build on our strength

© 2018 Five Star Products, Inc. | 12878 Rev B

### Length of Embedment

### Using:

1,000psi x C x  $\pi dL = \pi d^2$  Fy x  $\frac{1}{4}$ 

Solve for L: minimum  $L = Fyd \div [4,000 \times C]$ 

#### **Therefore:**

#### With Fy = 135,000 psi (high strength steel):

minimum L = 22.6d for Smooth Bolt/Bar minimum L = 17.0d for Deformed Bolt/Bar minimum L = 13.6d for Threaded Bolt/Bar

### **Hole Diameter**

The diameters called for in this bulletin are minimum diameters. The requirements will ensure an adequate size bonding surface between grout and concrete. Larger dimensions may ease placement on deep or awkward pours.

When bolt diameter;  $d \le 1\frac{1}{2}$  in., then hole diameter;  $D \ge d + 1\frac{1}{2}$  in.

When bolt diameter;  $d \ge 1\frac{1}{2}$  in., then hole diameter;  $D \ge d + 2$  in.

NOTE: These calculations are for reference only. Design calculation should be approved by a professional engineer.



NTSB Safety Recommendation H-07-23 prohibits the use of adhesive anchors in sustained tensile-load overhead highway applications where failure of the adhesive would result in a risk to the public until testing standards and protocols have been developed and implemented that ensure the safety of these applications.

### For information 1-800-243-2206 • FiveStarProducts.com



**EPOXY GROUTS** 

## **Technical Bulletin 142**

### Windfarm Turbine Foundation Control/Expansion Joint Recommendations



Control/expansion joints will serve to break up the grout pours into smaller sections, thereby reducing the probability that the grout will crack. It will also make the installation easier.

- 1. Install a minimum of (3) three control/expansion joints at full depth evenly spaced (i.e., 4 joints would be 90 degrees apart, as shown above) across the short dimension of the grout ring.
- 2. Control/expansion joints shall be located where they do not bridge or interfere with shim placement.
- 3. Control/expansion joints should be made from 1/2 in. to 1 in. (12 mm to 25 mm) thick closed-cell neoprene foam rubber or other material that is non-reactive with epoxy grout.
- 4. Control/expansion joints should be installed prior to setting the tower base and secured in place with silicone caulking material.
- 5. Control/expansion joints shall be filled with a weather resistant and UV resistant sealant flush or higher than the top of the grout to prevent water from infiltrating the joint.



Submit the technical data sheets for the control/expansion joint material and sealant to project engineer for approval prior to installing the material.

### For information 1-800-243-2206 • FiveStarProducts.com

© 2020 FIVE STAR PRODUCTS, INC. | 13221 REV A

FIVE STAR TECHNICAL BULLETINS ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND SHOULD BE USED AS GENERAL GUIDELINES FOR CONSIDERATION BY CONTRACTORS AND ENGINEERS. WHILE EVERY REASONABLE EFFORT HAS BEEN MADE TO ENSURE THIS INFORMATION IS ACCURATE AND AUTHORITATIVE, FIVE STAR PRODUCTS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, OR ITS APPROPRIATENESS FOR ANY PARTICULAR PURPOSE. THE USER OF THESE DOCUMENTS REMAINS SOLELY RESPONSIBLE FOR THE SPECIFICATION OF ALL METHODS, MATERIALS AND PRACTICES.



FIVE STAR PRODUCTS, INC. 60 Parrott Drive Shelton, CT 06484 USA Phone: +1 203-336-7900





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 Technical Data Sheets go to our web site FiveStarProducts.com.

**Five Star Products, Inc.** 60 Parrott Drive Shelton, CT 06484 USA Tel: +1 203-336-7930 Fax: +1 203-336-7930 FiveStarProducts.com