



# HTR GROUT

High Temperature Exposure Nonshrink Grout

## PRODUCT DESCRIPTION

Five Star® HTR Grout is a unique cement based grout for supporting equipment and structural base plates in high temperature environments. Five Star® HTR Grout can be poured into place, gains strength rapidly and can be exposed to 1,000°F (538°C) in 24 hours and up to 2,400°F (1316°C) after a 7-day curing procedure. Five Star® HTR Grout exhibits positive expansion when tested in accordance with ASTM C827. Five Star® HTR Grout meets the performance requirements of ASTM C1107-02 Grades A, B and C, ASTM C1107/ C1107M-20, and CRD-C 621-93 specifications for non-shrink grout over a wide temperature range, 40°F - 95°F (4°C - 35°C).

## ADVANTAGES

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

## USES

- Areas of high temperature exposure
- Thermal cycling up to 2,400°F (1316°C)<sup>1</sup>
- Rapid turnaround during shutdowns
- Coker, kiln and foundry applications

## PACKAGING AND YIELD

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

## SHELF LIFE

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

<b>TYPICAL PROPERTIES AT 70°F (21°C)</b>			
<b>Early Height Change, ASTM C827</b>	Positive Expansion		
<b>Compressive Strength, ASTM C942 (C109 Restrained) <sup>2</sup></b>			
1 Day	4,000 psi (27.6 MPa)		
7 Days	5,500 psi (38.0 MPa)		
28 Days	6,500 psi (44.9 MPa)	5,000 psi (34.5 MPa) at 1,000°F (538°C)	2,000 psi (13.8 MPa) at 2,400°F (1316°C)
<b>Bond Strength, ASTM C882, 7 Days</b>	2,500 psi (17.3 MPa)		
<b>Thermal Coefficient of Expansion, ASTM C 531</b>	5.0 x 10 <sup>-6</sup> in/in/°F (9.0 x 10 <sup>-6</sup> mm/mm/°C)		
<b>Working Time at 70°F (21°C)</b> May be affected by colder & warmer temperatures <sup>3</sup>	20 minutes		

<sup>1</sup> Higher temperature exposure results in lower operating strength and requires additional curing time.

<sup>2</sup> The ultimate compressive strength of a material is affected by elevated operating temperatures and thermal cycling.

<sup>3</sup> Refer to Five Star® Technical Bulletins: *Concrete Repair in Cold Weather*; *Concrete Repair in Hot Weather*

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.

## APPLICATION INFORMATION

<b>Mixing Ratio</b>	3 to 3½ qts (2.75 - 3.3 L) potable water per 50 lb. bag
<b>Maximum In-Service Temperature</b>	2400°F (1316°C)

<b>Minimum Plate Clearance</b>	1 in (25 mm)
<b>Placement Depth</b>	1 in - 3 in (25 mm - 75 mm) > 3 in, contact Five Star

## PLACEMENT GUIDELINES

For optimum performance, install at temperatures between 40°F and 95°F (4°C and 35°C). Maintain grout and substrate above 40°F (4°C) until grout reaches 1,000 psi (6.9 MPa) compressive strength. Refer to Five Star® Technical Bulletins(TB) 101 and 102 *Cementitious Cold and Hot Weather Grouting* for extreme weather conditions.

- SURFACE PREPARATION:** Construction practices dictate a concrete foundation should achieve its design strength before grouting. All surfaces in contact with Five Star® Grout shall be clean and free of oil, grease, laitance, and other bond-inhibiting contaminants. To maximize bond, concrete surfaces should be prepared by acceptable means to coarse aggregate exposure. A minimum ½ inch (12 mm) peak to valley surface profile is recommended. Presoak concrete surfaces with potable water for a minimum of 8 hours (optimum 24 hours), continuously and consistently, via wet rags, wet burlap, ponding, or similar method to obtain a Saturated Surface Dry (SSD) condition. Any existing cracks shall be brought to the project engineer's attention prior to grout installation. Refer to Five Star® TB103 *Cementitious Grout Concrete Surface Preparation* and TB104 *Cementitious Grout Baseplate Preparation* for further details.
- FORMWORK:** Formwork should be constructed 24-hours prior to the pour. 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 to be placed between the edge of the baseplate and the form. The clearance for the remaining sides shall be 1 to 2 inches (25 - 50 mm). Formwork and areas where bond is not desired must be treated with form oil, paste wax, or similar material. Isolation/construction joints may be necessary depending on pour dimensions. Refer to Five Star® TB410 *Grout Formwork* for further details.
- MIXING:** Use of a mortar mixer (stationary barrel with moving blades) is required to completely mix the grout. A portable mixer and paddle are acceptable for single bag mixes. Start with approximately 3.0 quarts (2.8 L) potable water per 50 lb. bag. Add Five Star® HTR Grout and mix for approximately 2 – 3 minutes to a uniform consistency. To achieve desired flow, add additional potable water and mix for an additional 2 minutes. Do not exceed the maximum recommended amount of potable mixing water as directed. Do not allow the grout to segregate. For pours over 3 inches (75 mm) refer to Five Star® TB105 *Cementitious Grout Aggregate Extension* for further guidelines. Refer to Five Star® TB108 *Cementitious Grout Mixing* for further details.
- PLACEMENT:** Five Star® HTR Grout may be poured into place. Placement should always be across the shortest distance. A headbox is recommended for pouring applications. Finish as necessary. Refer to Five Star® TB412 *Grout Placement* for further details. If field testing of the grout is required, refer to Five Star® TB109 *Cementitious Grouts Proper Compressive Strength Testing*.
- POST-PLACEMENT PROCEDURES:** Five Star® HTR Grout shall be wet cured for a minimum of 4 hours. 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 2400°F (1316°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). Refer to Five Star® TB110 *Cementitious Grout Curing* and Five Star® TB413 *Grout Finishing* for further details.
- CLEAN-UP:** All tools and equipment may be cleaned with soap and water before the material hardens.

For additional Five Star® Technical Bulletins, visit [FiveStarProducts.com](http://FiveStarProducts.com). For further questions, or if additional information is required, contact your local Five Star® Technical Sales Representative 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.**

SKU/PRODUCT CODE	DESCRIPTION	# UNITS/PALLET	UNIT SIZE
28830	Five Star® 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](http://FiveStarProducts.com)

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