



# HTR GROUT

High Temperature Exposure Nonshrink Grout

## PRODUCT DESCRIPTION

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

## ADVANTAGES

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

## USES

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

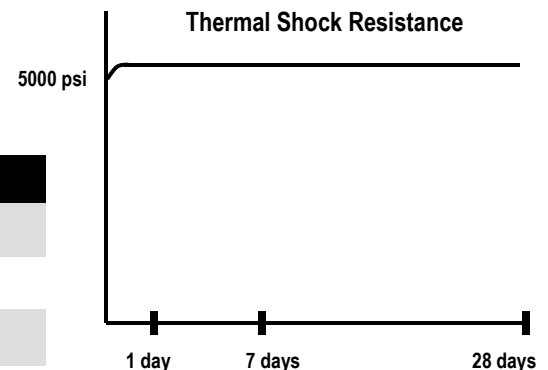
## PACKAGING AND YIELD

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

## SHELF LIFE

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

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



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

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

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

## PLACEMENT GUIDELINES

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

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

## CONSIDERATIONS

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

## CAUTION

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

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

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