



# **CEMENTITIOUS UNDERWATER HIGH-STRENGTH GROUT**

Precision Underwater Cementitious Grout

## **PRODUCT DESCRIPTION**

Five Star® Cementitious Underwater High-Strength Grout is an underwater pump grade, cement-based, non-shrink grout for pile restoration and similar applications. It is formulated with Air Release technology which combines high performance with the greatest reliability. When tested in accordance with ASTM C 827, Five Star® Cementitious Underwater High-Strength Grout exhibits positive expansion for shrink compensation. Five Star® Cementitious Underwater High-Strength Grout meets the performance requirements of ASTM C 1107 and CRD-C 621 specifications for non-shrink grout.

## **ADVANTAGES**

- Placement via tremie, pump or pour
- Salt and seawater resistant
- Non-ferrous, Non-corrosive
- Non-shrink from the time of placement
- Contains migrating corrosion inhibitors for superior corrosion resistance

## **USES**

- Pile repair, rehabilitation and restoration
- Grouting underwater structures and as a pile jacket fill material
- Grouting areas subject to freshwater, saltwater, or brackish exposure

## **PACKAGING AND YIELD**

Five Star® Cementitious Underwater High-Strength Grout is packaged in 25 kg bags yielding approximately 13.5 liters of hardened material at maximum water.

## **SHELF LIFE**

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

### **TYPICAL PROPERTIES AT 25°C AT MAX WATER**

<b>Compressive Strength, (ASTM C 109)</b>	
1 Day	20 MPa
7 Days	50 MPa
28 Days	60 MPa
<b>Bond Strength, (ASTM C 882)</b>	
28 Days	15 MPa
<b>Modulus of Elasticity, (ASTM C 469)</b>	20 GPa
<b>Early Height Change, (ASTM C 827)</b>	Positive Expansion
<b>Working Time at 25°C</b> May be affected by colder & warmer temperatures <sup>1</sup>	60 minutes

<sup>1</sup> Refer to Five Star® Technical Bulletins: 101 *Cementitious Grouting in Cold Weather* ; 102 *Cementitious Grouting 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

**Mixing Ratio** 4.25 - 4.75 L potable water per 25 kg bag

**Placement Depth** 25 mm - 160 mm  
> 160 mm, call Five Star Products

## PLACEMENT GUIDELINES

At time of placement, if temperatures of equipment and surfaces are not between 4°C and 35°C, contact Five Star Products for cold and hot weather grouting procedures. For atmospheric temperature above 35°C, working and setting times will be reduced and grout may dry prematurely without proper curing. Atmospheric temperatures below 20°C will slow setting time and strength development. Provide conditioning, either cooling or heating, plus curing as necessary in temperature extremes.

- 1. SURFACE PREPARATION:** Construction practices dictate concrete substrate should achieve its design strength before grouting. All surfaces in contact with Five Star® Cementitious Underwater High-Strength Grout shall be clean and free of marine growth, oil, grease, laitance and other bond-inhibiting contaminants. To maximize bond, concrete surfaces should be prepared by acceptable means to coarse aggregate exposure. Presoak with potable water concrete surfaces for a minimum of 8 hours, continuously and consistently, via wet rags, wet burlap, or similar method to obtain a saturated surface dry (SSD) condition.
- 2. 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.
- 3. MIXING: Mortar Mixer** (stationary barrel with moving blades): Start with approximately 4.25 litres potable water per 25 kg bag in the mixer. Add Five Star® Cementitious Underwater High-Strength Grout and mix for approximately 2 – 3 minutes after the addition of the final bag to a uniform consistency. Add additional potable water as necessary to achieve desired flow mixing for an additional 1 – 2 minutes after final addition of potable water. Do not exceed the maximum recommended amount of potable mixing water as directed or add an amount that will cause segregation.

**Single Bag Mixing Drill and Paddle:** Start with about 4.25 litres in the mix vessel. Add approximately 75-80% of Five Star® Cementitious Underwater High-Strength Grout to the potable mix water and mix to uniform consistency only until grout easily wets out and add remaining grout and continue to mix to uniform consistency. Add additional potable water as needed to achieve desired flow mixing for an additional 1 – 2 minutes after final addition of potable water. Do not exceed the maximum recommended amount of potable mixing water as directed or add an amount that will cause segregation.

For pours over 160 mm in depth contact Five Star Products for aggregate extension recommendations. For bulk mixing applications, contact Five Star Products.

- 4. PLACEMENT:** Five Star® Cementitious Underwater High-Strength Grout may be poured or pumped into place.
- 5. POST-PLACEMENT PROCEDURES:** Five Star® Cementitious Underwater High-Strength Grout shall be kept continuously wet for three days in tidal zone areas. Areas outside the tidal zone, in which Five Star® Cementitious Underwater High-Strength Grout is exposed, shall be wet cured with water for a minimum of 24 hours. After initial 24-hour wet cure, grout can be coated with an approved curing compound. If curing compound is not used, grout shall be wet cured for an additional 48 hours totaling 3 days. During the curing process, protect the grout from direct sun and wind exposure. Do not allow product to freeze until it reaches 7 MPa compressive strength. In-service operation may begin immediately after the required grout strength has been reached. If Five Star® Cementitious Underwater High-Strength Grout is being used in a pile jacket application, after a 24-hour wet cure create a 45° bevel with Five Star® Splash Zone or other suitable marine mastic.

**PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY.** For more detailed information contact Five Star Products.

## HEALTH AND SAFETY

Contains cementitious material. May produce an allergic reaction. 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, READ THE SAFETY DATA SHEET.**

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	UNIT SIZE
20757	Five Star® Cementitious Underwater High-Strength Grout	40	25 kg bag

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