



# **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 that combines high performance with the greatest reliability and meets the performance requirements of EN 1504-3 (Class R4) and complies with UK Specification for Highway Works Volume 1, Clause 2601. 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 areas subject to freshwater, saltwater or brackish exposure
- Grouting underwater structures and as a pile jacket fill material

## **PACKAGING AND YIELD**

Five Star® Cementitious Underwater High-Strength Grout is packaged in 25 kg bags yielding approximately 12.2 litres of hardened material at maximum water.

## **SHELF LIFE**

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

### **TYPICAL PROPERTIES AT 20°C AT MAX WATER**

Property	Test Standard	Requirement per EN 1504	FSP Result
Compressive Strength	EN 12190:1999		
	1 Day	NR <sup>1</sup>	28 MPa
	7 Days	NR	55 MPa
	28 Days	≥ 45 MPa (Class R4)	70 MPa
Chloride Ion Content	EN 1015-17:2000	≤ 0.05%	0.01%
Bond Strength	EN 1542:1999	≥ 2 MPa	2.3 MPa
Modulus of Elasticity	EN 13412	≥ 20 GPa	23 GPa
Thermal Compatibility	EN 13687-1:2002	≥ 2 MPa (Class R4)	Pass
Carbonation Resistance	EN 13295:2005	$d_k \leq$ concrete control (Class R4)	$d_k \leq$ control concrete
Fire Classification	EN 1504-3 Section 5.5	Declared	Euroclass A1
Flow Between Glass Plates @ 5°C Flow Between Glass Plates @ 20°C @ 20 mm clearance	HCD Drawing No. K2	Per MCHW 2601, Part 4 (iii): Material should flow under the glass plate and rise ≥ 10 mm above the underside of the top plate at all positions, without signs of segregation, bleeding, effervescence or air inclusion	PASS PASS
Working Time @ 20°C May be affected by colder & warmer temperatures <sup>2</sup>	EN 13395-1:2002	Declared per FPC <sup>3</sup>	60 minutes

<sup>1</sup> NR = Not required

<sup>2</sup> Refer to Five Star® Technical Bulletins: *Cementitious Grouting in Cold Weather*; *Cementitious Grouting in Hot Weather*

<sup>3</sup> FPC = Factory Production Control

*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** 4.0 - 4.5 L potable water per 25 kg bag

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

## PLACEMENT GUIDELINES

For optimum performance, install at temperatures between 4°C and 35°C. For hot or cold weather grouting contact Five Star Products.

- 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 hessian, 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: Forced Action Mortar Mixer:** Start with approximately 4.0 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 4.0 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 shall 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.

**PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY.** For more detailed information contact Five Star Products at +44 (0) 7469 746101.

## 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

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

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Specifications Subject to Change.  
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