



**FIVE STAR
MARINE**

STRUCTURAL CONCRETE® UNDERWATER PG

High Early Strength Pump Grade Underwater Repair

PRODUCT DESCRIPTION

Five Star Structural Concrete® Underwater PG (pump grade) is a high early strength, single component, permanent concrete repair material designed for pumping underwater. This concrete repair material features excellent pumping properties and minimal washout during large volume placements underwater and is designed for placement in tidal zones and underwater. Five Star Structural Concrete® Underwater PG provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor.

ADVANTAGES

- Pumpable
- Large volume placements
- Saltwater resistant
- High 6-hour strength
- Adjustable working time
- Course aggregate extension
- Variable application thickness
- Chloride and sulfate resistant
- Outstanding corrosion resistance for protection and rehabilitation

USES

- Large volume underwater concrete repairs
- Tanks, dams, marine and hydraulic structure repairs
- Filling underwater concrete cavities and voids

PACKAGING AND YIELD

Five Star Structural Concrete® Underwater PG is packaged in heavy-duty polyethylene lined 50 lb. (22.7 kg) bags yielding approximately 0.42 cubic feet (11.9 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	
6 Hours	2,500 psi (17.3 MPa)
1 Day	5,000 psi (34.5 MPa)
7 Days	6,000 psi (41.4 MPa)
28 Days	7,500 psi (51.7 MPa)
Underwater Bond Strength, ASTM C 882	
1 Day	1,000 psi (6.9 MPa)
7 Days	1,500 psi (10.3 MPa)
Length Change, ASTM C 157	
28 Days Wet	+0.02%
Thermal Coefficient of Expansion, ASTM C 531	
	$5. \times 10^{-6}$ in/in/°F (9.0×10^{-6} mm/mm/°C)
Chloride ion Permeability, ASTM C 1202	
28 Days	Negligible (<100 Coulombs)
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 above may result. Test methods are modified where applicable.

PLACEMENT GUIDELINES

- 1. SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete® Underwater PG 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 prior to application in tidal zones. A perimeter edge and minimum depth of one inch (25 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 Five Star® Design-A-Spec™ or call Five Star Products' Engineering and Technical Service Center at 1-800-243-2206.
- 2. MIXING:** Mix Five Star Structural Concrete® Underwater PG 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 3 to 4 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, may be required for large volume pours. Do not mix more material than can be placed in 20 minutes. Follow printed instructions on the package.
- 3. PLACEMENT PROCEDURES:** Five Star Structural Concrete® Underwater PG is designed to be tremie poured or pumped in place underwater. When pumping, a positive displacement type pump is recommended. Consult pump manufacturer for specific pumping guidelines before proceeding with installation. Installation shall be continuous to prevent cold joints. In tidal zones, Five Star Structural Concrete® Underwater PG shall be kept wet for a minimum of 30 minutes.

SPECIAL CONDITIONS: For use in cold temperatures, Five Star Structural Concrete® Underwater PG 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. In hot temperatures, Five Star Structural Concrete® Underwater PG 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 provide more working time.

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

- 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® 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
29230	Five Star Structural Concrete® Underwater PG (pump grade)	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

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