



**FIVE STAR**

# **STRUCTURAL CONCRETE UNDERWATER HP**

Hand Applied, Rapid Strength Underwater Repair

## **PRODUCT DESCRIPTION**

Five Star Structural Concrete Underwater HP is a rapid strength gain, single component, permanent concrete repair material intended for underwater application by hand or trowel. This concrete repair material allows small volume hand placements with minimal washout underwater. Designed for placement in tidal zones and underwater only, application thickness may range from one-half inch (13 mm) to several inches in a single installation.

## **ADVANTAGES**

- Rapid set underwater placement
- Minimal washout
- Saltwater resistant
- Chloride and sulfate resistant
- High three hour strength
- Variable application thickness

## **USES**

- Underwater repair of concrete tanks, dams and hydraulic structures
- Underwater repair of concrete piles, piers, seawalls and marine structures
- Filling underwater concrete cavities and voids

## **PACKAGING AND YIELD**

Five Star Structural Concrete Underwater HP is packaged in heavy-duty polyethylene lined bags or plastic pails and is available in 50 lb (22.7 kg) units yielding approximately 0.42 cubic feet (11.9 liters) at maximum water.

## **SHELF LIFE**

One year (packaged in bags) or two years (packaged in pails) 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>Compressive Strength, ASTM C 109</b>	
3 Hours	4000 psi (27.6 MPa)
1 Day	5000 psi (34.5 MPa)
7 Days	6000 psi (41.4 MPa)
28 Days	7000 psi (48.3 MPa)
<b>Underwater Bond Strength, ASTM C 882</b>	
1 Days	950 psi (6.5 MPa)
7 Days	1150 psi (7.9 MPa)
<b>Length Change, ASTM C 157</b>	
28 Days Wet	+0.02%
<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>Chloride Ion Permeability, ASTM C 1202</b>	
28 Days	Negligible (<100 Coulombs)
<b>Working Time at 70°F (21°C)</b>	10 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 HP 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 in tidal zone areas. A perimeter edge and minimum depth of 1/2 inch (13 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 Design-A-Spec™ or call the Five Star Products Engineering and Technical Service Center at (800) 243-2206.
2. **MIXING:** Five Star Structural Concrete Underwater HP is used for small volume underwater repairs. Mix thoroughly with a drill and paddle mixer to a uniform consistency. Start by adding the minimum amount of potable water (total water content is 3.0 to 3.5 quarts potable water per 50 lb. unit) and mix for three to four minutes. Adjust consistency as necessary, but do not exceed maximum water content as stated on the package or add an amount that will cause segregation. Do not mix more material than can be placed in ten minutes.
3. **PLACEMENT PROCEDURES:** Firmly work a small amount of Five Star Structural Concrete Underwater HP into concrete surface with a trowel or by hand, taking care not to leave air pockets. Application is from one side of the repair to the other, filling the repair to the desired level. For multiple lift applications, contact Five Star's Engineering and Technical Service Center. Finish as necessary.  
**SPECIAL CONDITIONS:** For use in cold temperatures, Five Star Structural Concrete Underwater HP must be maintained at a temperature of at least 45°F (7°C). Protect from freezing until a compressive strength of 1000 psi (6.9 MPa) is obtained. In hot temperatures, Five Star Structural Concrete Underwater HP 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. Summerset® may also be used if necessary to provide more working time.
4. **POST-PLACEMENT PROCEDURES:** In tidal zones, Five Star Structural Concrete Underwater HP shall be kept wet for 30 minutes after hardening.

**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 Products Engineering and Technical Service Center at (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 1000 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 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.

**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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