



STRUCTURAL CONCRETE ES

Fast, High Early Strength, Extended Working Time, Permanent Repair

PRODUCT DESCRIPTION

Five Star Structural Concrete® ES is a high early strength, single component, permanent concrete repair material which provides a 45 minute working time. The extended set facilitates deep/large volume pours up to six cubic yards in a single lift. Five Star Structural Concrete ES produces a repair which is dimensionally stable, develops an integral bond to existing concrete, and restores structural integrity within hours of placement. Resistant to many chemicals, Five Star Structural Concrete ES is very effective in equipment foundation rebuilds, overlays, and mass pours and can be coated in less than 24 hours.

ADVANTAGES

- 45 minute working time
- One component
- Deep, large volume pours up to six cubic yards
- High six hour strengths
- Coarse aggregate extension up to 100%
- Excellent freeze/thaw resistance
- Provides permanent concrete and equipment/machinery foundation repair
- Can be coated in under 24 hours
- Facilitates equipment rebuilds in under 24 hours
- Pumpable
- High bond strength

USES

- Deep, large volume repair of concrete structures and machinery foundations
- Concrete floor toppings and overlays
- Hot weather concrete repair
- Heavy industrial repairs and retrofits

PACKAGING AND YIELD

Five Star Structural Concrete ES 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, or 0.60 cubic feet (17.0 liters) with a 60% extension using 3/8" pea gravel. Five Star Structural Concrete ES is also available in 3,000 lb. (1360 kg) bulk bags.

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.

TYPICAL PROPERTIES AT 70°F (21°C)	
Compressive Strength, ASTM C 109	
6 Hours	3000 psi (20.7 MPa)
1 Day	4500 psi (31.0 MPa)
7 Days	6000 psi (41.4 MPa)
Bond Strength, ASTM C 882	
1 Day	2000 psi (13.8 MPa)
7 Days	2500 psi (17.3 MPa)
Length Change, extended with pea gravel, ASTM C 157	
28 Days Wet	+0.03%
28 Days Dry	-0.05%
Thermal Coefficient of Expansion, ASTM C 531 5.0 x 10 ⁻⁶ in/in/°F (9.0 x 10 ⁻⁶ mm/mm/°C)	
Scaling Resistance, ASTM C 672	
50 cycles	0
Chloride Ion Permeability, ASTM C 1202	
3 Days	Very Low (<1000 Coulombs)
28 Days	Very Low (<1000 Coulombs)
Working Time at 70°F (21°C) 45 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 ES shall be free of oil, grease, laitance, and other contaminants. All horizontal and vertical concrete surfaces must be clean, sound and rough to ensure a good bond. Remove all oxidation from exposed reinforcing steel and for additional protection coat reinforcing steel with Five Star® AC Coat. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Featheredging is not desirable. Soak concrete surfaces prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water, or use Five Star® Bonding Adhesive. Surfaces shall be conditioned to between 35°F and 90°F (2°C and 32°C) at time of placement.
- 2. FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during placement. Areas where bond is not desired must be treated with form oil, paste wax or similar material. Joints may be necessary depending on pour dimensions. Any existing joints within the repair area should be maintained. Contact the Five Star Engineering and Technical Service Center for further information.
- 3. MIXING:** Wet down mortar mixer (stationary barrel with moving blades) before using and drain excess water. 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 2 1/2 to 3 quarts potable water per 50 lb. unit) to the mixer. While mixing, slowly add Five Star Structural Concrete ES and mix to a uniform consistency for three to four minutes. 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 should be used for pours greater than 2 inches (50 mm) in depth; add coarse aggregate before final water adjustment. Do not mix more material than can be placed within 45 minutes. For larger quantities, a ready-mix concrete truck may be used.
- 4. PLACEMENT PROCEDURES:** Whenever possible, place Five Star Structural Concrete ES full depth from one side of the repair to the other. To ensure optimal bond development, firmly work material into substrate. Placement should be continuous to prevent cold joints between pours. Finish as necessary. For pumping procedures, contact Five Star's Engineering and Technical Service Center.
SPECIAL CONDITIONS: For use in cold temperatures, Five Star Structural Concrete ES must be maintained at a temperature of at least 35°F (2°C). Protect from freezing until a compressive strength of at least 1000 psi (6.9 MPa) is obtained. Faster strength gain will occur when the Five Star Structural Concrete ES, mixing water and coarse aggregate have been conditioned to a higher temperature prior to placement. In high temperatures, Five Star Structural Concrete ES should be kept as cool as possible, but not exceeding 90°F (32°C). Ice cold water should be used for mixing to help maintain sufficient working time.
- 5. POST-PLACEMENT PROCEDURES:** Five Star Structural Concrete ES shall be kept wet for two to 24 hours, depending on the volume, depth and placement temperature. Wet curing shall begin as soon as the material is thumb-print hard.

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

- Never exceed the maximum water content as stated on the package or add an amount that will cause segregation.
- Temperature of surfaces must be between 35°F and 90°F (2°C and 32°C) at time of placement. For cold and hot weather placement, refer to Design-A-Spec™.
- For pours exceeding six cubic yards, contact the Five Star Products Engineering and Technical Service Center.
- When capping Five Star Structural Concrete ES with either cement or epoxy grout, surface temperature shall have cooled down to 90°F (32°C) prior to grout placement.
- For ready-mix truck mixing guidelines, contact the Five Star Engineering and Technical Service Center at (800) 243-2206.

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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