



# **STRUCTURAL CONCRETE<sup>®</sup> ES-60**

High Strength, 60-Minute Working Time for Elevated Temperatures Permanent Repair Material

## **PRODUCT DESCRIPTION**

Five Star Structural Concrete<sup>®</sup> ES-60 is a high early strength, single component, permanent concrete repair material for elevated temperatures that provides a 60-minute working time at 90°F (32°C). The extended working times facilitate deep/large volume pours and applications in hot weather. Five Star Structural Concrete<sup>®</sup> ES-60 produces a repair which is dimensionally stable, develops an integral bond to existing concrete, and restores structural integrity within hours of placement. Five Star Structural Concrete<sup>®</sup> ES-60 provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

## **ADVANTAGES**

- 60 minute working time at 90°F (32°C)
- Deep, large volume pours
- High six-hour strengths
- Coarse aggregate extension up to 80% with Five Star<sup>®</sup> 3/8 Coarse Aggregate
- Excellent freeze/thaw resistance with high bond strength
- Can apply cement/epoxy grouts and epoxy coatings as early as 8 hours after placement in elevated temperatures
- Pumpable
- Provides permanent concrete and equipment/machinery foundation repair
- Facilitates equipment rebuilds as early as 12 hours in very high temperatures
- Outstanding corrosion resistance for protection and rehabilitation

## **USES**

- Deep, large-volume repair of concrete structures and machinery foundations
- Hot weather concrete repair
- Boiler/furnace rooms
- Heavy industrial repairs and retrofits
- Bulk mixing/handling

## **PACKAGING AND YIELD**

Five Star Structural Concrete<sup>®</sup> ES-60 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<sup>®</sup> ES-60 is also available in 800 lb. (364 kg), 1000 lb. (454 kg) and 3000 lb. (1362 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 90°F (32°C)**

<b>Compressive Strength, ASTM C 109</b>	
6 Hours	3,000 psi (20.7 MPa)
1 Day	4,500 psi (31.0 MPa)
7 Days	6,000 psi (41.4 MPa)
28 Days	7,700 psi (53.1 MPa)
<b>Bond Strength, ASTM C 882</b>	
1 Day	2,000 psi (13.8 MPa)
7 Days	2,500 psi (17.3 MPa)
<b>Length Change, extended with pea gravel, ASTM C 157</b>	
28 Days Wet	+0.05%
28 Days Dry	-0.09%
<b>Thermal Coefficient of Expansion, ASTM C 531</b>	
	6.0 x 10 <sup>-6</sup> in/in/°F (10.8 x 10 <sup>-6</sup> mm/mm/°C)
<b>Scaling Resistance, ASTM C 672, 50 cycles</b>	
	0
<b>Chloride Ion Permeability, ASTM C 1202, 28 Days</b>	
	Very Low (<1,000 Coulombs)
<b>Working Time</b>	
	60 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.*

**Use Five Star Structural Concrete® ES-60 in hot weather applications -- 90°F+ (32°C+). For applications below 90°F (32°C) use Five Star Structural Concrete® or Five Star Structural Concrete® ES.**

**PLACEMENT GUIDELINES**

- SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete® ES-60 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. To maximize bond, concrete surfaces should be prepared by acceptable means to coarse aggregate exposure. Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of 1/4 inch (6 mm) should be provided for a durable repair. Allow for 1/2 inch (12 mm) for more aggressive traffic. 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.
- 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 Products for further information.
- 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 2½ to 3 quarts potable water per 50 lb. unit) to the mixer. While mixing, slowly add Five Star Structural Concrete® ES-60 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. For larger quantities, a ready-mix concrete truck may be used.
- PLACEMENT PROCEDURES:** Whenever possible, place Five Star Structural Concrete® ES-60 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 Products.
- POST-PLACEMENT PROCEDURES:** Wet cure as soon as material reaches final set (surface changes from dark to light), cover surface with clean plastic to retain moisture, or apply approved curing compound meeting water retention properties of ASTM C 309. At colder temperatures, final set will take notably longer and cure by covering with clean plastic or approved curing compound. If capping with grout or coating, cover surface with clean plastic to retain moisture until 30 - 60 minutes before placement. Five Star Structural Concrete® ES-60 shall be cured continuously for a minimum 30 minutes up to 48 hours depending on volume, depth, placement temperature, and application. Ponding and/or circulation will help dissipate heat from large pours when excessively warm.

**NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY.** For more detailed placement procedures, refer to the Five Star® Design-A-Spec™ installation guidelines or call Five Star Products at 1-800-243-2206.

**CONSIDERATIONS**

- Never exceed the maximum water content as stated on the package or add an amount that will cause segregation.
- When capping Five Star Structural Concrete® ES-60 with either cement or epoxy grout, surface temperature shall have cooled down to 95°F (35°C) or within 10°F (6°C) of ambient temperature prior to grout placement.
- When mixing from bulk bags, use of a metered mobile mixer is not recommended. Bulk bags should be mixed as full units. For bulk mixing guidelines, contact Five Star Products at 1-800-243-2206.

**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 SAFETY DATA SHEET.**

For worldwide availability, additional product information and technical support, contact your local Technical Sales Representative, or call Five Star Products at 1-800-243-2206.

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	UNIT SIZE
29800	Five Star Structural Concrete® ES-60	56	50 lb. (22.7 kg) <b>Bag</b>
29700	Five Star Structural Concrete® ES-60	36	50 lb. (22.7 kg) <b>Pail</b>
29104	Five Star Structural Concrete® ES-60	2	800 lb. (364 kg) <b>Bulk Bag</b>
29101	Five Star Structural Concrete® ES-60	2	1,000 lb. (454 kg) <b>Bulk Bag</b>
29103	Five Star Structural Concrete® ES-60	1	3,000 lb. (1,362 kg) <b>Bulk Bag</b>

**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](http://FiveStarProducts.com)

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