



STRUCTURAL CONCRETE® ESX

Pre-Extended, High Early Strength, Permanent Concrete Repair

PRODUCT DESCRIPTION

Five Star Structural Concrete® ESX is a high early strength, single component, pre-extended, permanent concrete repair material. The product achieves a self-consolidating concrete (SCC) consistency at maximum water dosage, enabling easy placement, excellent flowability, and superior encapsulation of reinforcement without vibration. The 45-minute working time facilitates deep/large volume pours in a single lift of up to 24 inches (610 mm). Five Star Structural Concrete® ESX 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® ESX provides increased corrosion protection of steel reinforced structures with migrating corrosion inhibitor technology and very low chloride ion permeability.

ADVANTAGES

- Pre-extended in the bag at the manufacturing facility ensures consistent quality and saves contractor labor
- Self-consolidating concrete (SCC) at maximum water dosage
- Easy to use, single component with a 45-minute working time that enables deep pours of 24 inches (610 mm) in a single lift
- With high six-hour strengths, facilitates equipment foundation rebuilds in under 24 hours
- High bond strength
- Pumpable
- Provides permanent concrete and equipment/machinery foundation repair
- Can apply cement/epoxy grouts and epoxy coatings as early as 6 hours after placement dependent on environmental conditions
- Excellent freeze/thaw resistance
- Outstanding corrosion resistance for rebar protection and concrete rehabilitation

USES

- Deep, large volume concrete structures and machinery foundations
- Full depth concrete floor repairs (24 inches [610 mm])

PACKAGING AND YIELD

Five Star Structural Concrete® ESX is packaged in 50 lb. (22.7 kg) bags yielding approximately 0.38 cubic feet (10.7 liters) at maximum water.

SHELF LIFE

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

PROPERTIES AT 70°F (21°C)		
Minimum Compressive Strength	ASTM C109, 2 inch cubes	ASTM C39 / ACI 318, 4x8 inch cylinders
6 Hours	3,000 psi (20.7 MPa)	2,500 psi (17.2 MPa)
1 Day	5,000 psi (34.5 MPa)	4,000 psi (27.6 MPa)
7 Days	6,500 psi (44.8 MPa)	5,000 psi (34.5 MPa)
28 Days	8,000 psi (55.2 MPa)	7,000 psi (48.2 MPa)
Minimum Slant Shear Bond Strength, ASTM C882		
1 Day	2,000 psi (13.8 MPa)	
7 Days	2,500 psi (17.2 MPa)	
Length Change, ASTM C157 , 28 day shrinkage, Demold at 6 hours + Wet cure to 7 days	≤ 300 µε or ≤ .03%	
Freeze/Thaw Resistance, ASTM C666A at 300 cycles, Relative Durability Modulus	≥ 90%	
Chloride Ion Permeability, ASTM C1202, 28 Days	Very Low (<1,000 Coulombs)	
Slump, ASTM C143 / ASTM C94, Initial	10 inch nominal, 8.5 in - 11.5 in (215 mm - 290 mm)	
Density, ASTM C138	144 lb./ft ³ (2307 kg/m ³)	
Initial Set, ASTM C266	60 - 80 minutes	
Final Set, ASTM C266	80 - 100 minutes	
Working Time at 70°F (21°C)	45 minutes	

Unless otherwise stated, 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.

APPLICATION INFORMATION

Mixing Ratio	1¾ - 2¼ quarts (1.7 - 2.1 L) potable water per 50 lb. (22.7 kg) bag	Placement Depth	½ in. - 24 in (13 mm - 610 mm) > 24 in. (610 mm), contact Five Star
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PLACEMENT GUIDELINES

The material can be installed at an ambient temperature range from 35°F – 95°F (2°C – 35°C), however for optimum performance, the material, environment, mixing equipment, and all surfaces in contact with the material should be at temperatures between 50°F - 90°F (10°C and 32°C). After installation, maintain material and substrate temperatures above 35°F (2°C) until material reaches a minimum of 1,000 psi (6.9 MPa) compressive strength. **Flowability, strength gain, and working time are affected** by lower and higher temperatures. Refer to Five Star® Technical Bulletin (TB) 300 and 301 *Concrete Repair Cold and Hot Weather* for installation temperatures outside recommended ranges.

- SURFACE PREPARATION:** All horizontal and vertical concrete surfaces in contact with Five Star Structural Concrete® ESX shall be clean and free of oil, grease, laitance, and other bond-inhibiting contaminants. To maximize bond, concrete surfaces shall be prepared by acceptable means to remove the top surface to coarse aggregate exposure. A minimum 1/4 to 1/2 inch (6 mm - 12 mm) peak to valley surface profile is recommended. Remove all oxidation from exposed reinforcing steel. A perimeter edge and minimum depth of 1/2 inch (12 mm) should be provided. Featheredging is not recommended. Presoak concrete surfaces with potable water for a minimum of 4 - 8 hours (optimum presoak 24 hours), continuously and consistently, via wet rags, wet burlap, ponding, or similar method to obtain a Saturated Surface Dry (SSD) condition. Presoak times are temperature dependent. In some applications an epoxy bonding adhesive may be utilized, contact Five Star Products. Any existing cracks shall be brought to the project engineer's attention prior to material installation. Refer to TB306 *Concrete Repair Surface Preparation*.
- FORMWORK:** Formwork should be constructed sufficiently in advance to allow it to be properly sealed, prepped, and tested prior to use. Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight, and strong enough to resist forces developed during placement. Liquid tight forms should also allow for pre-soaking of the substrate and avoid material leakage. Formwork and areas where bond is not desired shall be treated with form release oil, paste wax, or similar material. Isolation/construction joints may be necessary depending on pour dimensions. Any existing joints within the repair area should be maintained. Air relief ports, installation ports, and quick acting isolation valves may also be necessary. Refer to ACI Committee 347 Guide to Formwork for Concrete [ACI 347-14(21)] for additional information.
- MIXING:** Use of a mortar mixer (stationary barrel with moving blades) is required to completely mix the material. For single bag mixes, refer to TB416 Single Unit Mixing Instructions. Start with approximately 2 quarts (1.9 L) potable water per 50 lb. bag (22.7 kg) in the mixer. Add Structural Concrete® ESX and mix for approximately 2 – 3 minutes, after the addition of the final bag, to a uniform consistency. To achieve desired consistency, add additional potable water as necessary and mix for an additional 1 - 2 minutes. Do not exceed the maximum recommended amount of potable mixing water as directed. Do not allow the product to segregate. In high temperatures, Five Star Structural Concrete® ESX 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. Do not mix more material than can be placed within 45 minutes. For pours over 24 inches (610 mm) in depth or bulk mixing applications, contact Five Star Products.
- PLACEMENT:** Five Star Structural Concrete® ESX shall be form and poured, poured, pumped, or horizontally troweled into place. If possible, firmly work the material into substrate and place at full depth from one side of the repair to the other. Placement should be continuous to prevent cold joints between pours. Finish as necessary. For pumping procedures, contact Five Star Products.
- POST-PLACEMENT:** Five Star Structural Concrete® ESX shall be continuously wet cured for a minimum of 4 hours*. Wet curing of exposed surfaces shall begin as soon as the hydration process is visibly underway (surface changes from dark to light). Continuously wet cure all exposed material surfaces by flooding, using wet rags, burlap, or burlene saturated with potable water/ice. If needed, place plastic sheeting over the material used for wet cure to protect against evaporation. Monitor the condition of material used for wet cure to ensure drying does not occur during the minimum cure time duration. Protect the new concrete from traffic, vibration, damage, wind/sun/rain exposure, and temperature extremes (< 40°F [5°C] and >90°F [32°C]) while the material is developing the desired strength. *Refer to TB307 *Structural Concrete Curing* for lower cure time scenarios and additional information.
- CLEAN UP:** All tools and equipment may be cleaned with soap and water before the material hardens. Sand or a similar abrasive may be used with the soap and water to aid in the clean-up.

For additional Five Star® Technical Bulletins, visit FiveStarProducts.com. For further questions, or if additional information is required, contact your local Five Star® Technical Sales Representative 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.**

SKU/PRODUCT CODE	DESCRIPTION	#UNITS/PALLET	UNIT SIZE
29410	Five Star Structural Concrete® ESX	56	50 lb. (22.7 kg) bag

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Five Star Products, Inc.
Corporate Headquarters
2 Enterprise Drive
Suite 303
Shelton, CT 06484 USA
Tel: +1 203-336-7900 • Fax: +1 203-336-7913
FiveStarProducts.com

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