



# **SPECIAL GROUT 400**

Fluid Precision Nonshrink Cable Grout

## **PRODUCT DESCRIPTION**

Five Star® Special Grout 400 is a cement-based, nonmetallic, nonshrink, fluid grout specifically formulated for grouting of cables and tendons requiring corrosion protection. When tested in accordance with ASTM C 827, Five Star Special Grout 400 shows positive expansion. Five Star Special Grout 400 meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, CRD-C 621-93 specifications for nonshrink grout, and Post Tensioning Institute specifications for grouting post tensioned structures.

## **ADVANTAGES**

- Air release technology per ACI 351.1 R
- Pumpable fluid grout for very tight clearances
- Non-bleeding
- Permanent filling of voids
- Extended working time
- Pumpable up to 2 hours at 90°F (32° C)
- Nonshrink from the time of placement
- Does not contain aluminum powder

## **USES**

- Provides corrosion protection of bridge cables
- Nonshrink grouting between precast panels, walls and beams
- Pressure placement into tendon ducts

## **PACKAGING AND YIELD**

Five Star Special Grout 400 is packaged in heavy-duty, polyethylene lined bags and is available in 49 lb (22.3 kg) units yielding approximately 0.50 cubic feet (14.2 liters) of hardened material at maximum water content.

## **SHELF LIFE**

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

<b>TYPICAL PROPERTIES AT 70°F (21°C) <sup>(1)</sup></b>	
<b>Early Height Change, ASTM C 827</b>	Positive Expansion
<b>Hardened Height Change, ASTM C 1090</b>	
1 Day	> 0.0%
28 Days	< 0.2%
<b>Compressive Strength, ASTM C 942</b>	
1 Day	3500 psi (24.1 MPa)
7 Days	7000 psi (48.3 MPa)
28 Days	8500 psi (58.6 MPa)
<b>Bleeding, ASTM C 940 (Modified), 4 Hours</b>	0.0%
<b>Permeability, ASTM C 1202, 30V, 28 Days</b>	< 1000 coulombs, very low
<b>Accelerated Corrosion Test</b>	> 2500 hours
<b>Gelman Filter, PTI, bleed water, 100 psi for 5 minutes</b>	0%
<b>Working Time at 90°F (32°C)</b>	2 hours

<sup>(1)</sup> Mixed using a high speed shear mixer (1500 rpm).

The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown may result. Test methods are modified where applicable.

## **PLACEMENT GUIDELINES**

1. **PREPARATION:** When Five Star® Special Grout 400 is used for grouting of tendons and cables, all ducts shall be purged using oil free compressed air to remove water, debris and foreign material. All vents should be checked and the duct shall be pressure tested with air. All leaks shall be repaired before grouting can commence.
2. **MIXING:** Mix Five Star Special Grout 400 to a uniform consistency with a colloidal or high speed shear mixer. For optimum performance, condition between 40°F and 90°F (4°C and 32°C). Mix Five Star Special Grout 400 with approximately 6 quarts of potable water per 49 lb bag. Mix to a flow of 9 - 20 seconds through a flow cone per ASTM C 939 modified to PTI requirements. Add more water if necessary but do not add more than 6 1/2 quarts (13.5 lb.) of water per 49 lb. bag. If more than 6 1/2 quarts of water (per 49 lb. bag) must be added to achieve a 9 - 20 second flow, contact the Five Star Engineering and Technical Service Center. Working time is approximately 2 hours at 90°F (32°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
3. **PLACEMENT PROCEDURES:** The grout should be injected from the first low point inlet. A pressure gauge should be placed near the inlet and the pressure should not exceed 150 psi. Under normal grouting operations the pressure should not exceed 75 psi. The placement should continue using a one-way flow. If the duct contains a high point, the adjacent downstream vent shall be closed first and the grout expelled at the high point vent until good grout consistency is present. If the inlet pressure exceeds 150 psi, the inlet shall be closed using a mechanical shut-off valve and the grouting shall be resumed at the last intermediate vent where grout has already been expelled. DO NOT resume the grouting operation on a vent where grout has not been expelled. Once the tendon is filled and sufficient grout has been vented, the outlet valve shall be closed and the tendon pressurized with 75 psi. Normal grouting operations should be completed in 30 minutes using a grouting speed between 16 - 49 feet/min (5 - 15 m/min).
4. **POST-PLACEMENT PROCEDURES:** After 24 hours the grout caps should be checked for voids. Partially filled caps are an indication of additional voids within the anchorage zone. All inlet and outlet grout tubes shall be removed and explored with a drill to verify that no void is present. If a void is found, the tendon shall be repaired using a submitted and approved repair procedure. All explorative openings shall be repaired with grout or other approved material as soon as possible. Vent openings through the roadway surface shall be recessed two inches and patched with an approved repair material.

**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**

- At time of placement, if temperatures of equipment and surfaces are above 90°F (4°C and 32°C), refer to Design-A-Spec™ for cold and hot weather grouting procedures or contact the Five Star Engineering and Technical Service Center at (800) 243-2206.
- Substrate shall be free of frost and ice.
- Grout shall be protected from freezing until it reaches 1000 psi (6.9 MPa).
- Never exceed the maximum water content stated on the bag.
- Construction practices dictate concrete foundation should achieve its design strength before grouting.

## **CAUTION**

Contains cementitious material. 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 Center at (800) 243-2206.

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