

Special Specification 4118

Rapid Setting Fiber Reinforced Concrete (RSFRC)



1. DESCRIPTION

Furnish and place rapid setting fiber reinforced concrete (RSFRC) where shown on the plans.

2. MATERIALS

2.1. **RSFRC.** Provide a RSFRC meeting the requirements of Table 1.

Table 1
RSFRC Requirements

Property	Test Method	Requirement
4-hour Compressive Strength ¹ , Min (psi)	Tex-418-A	3,000
Effective Flexural Residual Strength (f_{e3}) ^{1,2} , Min (psi)	ASTM C1609	160
Slump, in.	Tex-415-A	4 ½ to 6 ½
Entrained Air Content, %	Tex-416-A	4.0

1. f_{e3} is defined as the $R^{D_{T150}}$ (as defined in ASTM C 1609) multiplied by the flexural strength (f_1) of the concrete tested. ($f_{e3} = R^{D_{T150}} \times f_1$)

2. Perform ASTM C 1609 when the flexural strength of the concrete is at least 700 psi.

2.2. **Rapid Hardening Cement.** Furnish a non-blended belitic calcium sulfoaluminate cement meeting the requirements of ASTM C 1600 Type URH (ultra-rapid hardening).

2.3. **Water.** Furnish water meeting the requirements of Item 421.

2.4. **Aggregates.** Furnish aggregates meeting the requirements of Item 421. Use a coarse aggregate grade having a maximum nominal size of not greater than 3/4 in.

2.5. **Chemical Admixtures.** Furnish chemical admixtures meeting the requirements of DMS-4640

2.6. **Fibers.** Furnish fibers meeting the requirements of ASTM C 1116 Type I or Type III. The fiber manufacturer will determine the fiber length and aspect ratio appropriate for the application and that will meet the requirement of Table 1.

3. EQUIPMENT

3.1. Provide equipment necessary to batch, mix, transport, and place RSFRC. All batching equipment must meet the requirement of Item 421.3 "Equipment." Provide an adequate amount of mixing, placing, and consolidation equipment to properly place RSFRC. Provide equipment necessary to test fresh and hardened RSFRC properties.

4. CONSTRUCTION

4.1. **Pre-Pour Meeting.** Prior to the initial placement of the RSFRC, arrange for an onsite pre-pour meeting with the material representatives, and the Engineer. The objective of the meeting will be to clearly outline the procedures for mixing, transporting, finishing and curing of the RSFRC material.

4.2. **Storage:** Properly store all materials as required by the manufacturer in order to protect materials against loss of physical and mechanical properties.

- 4.3. **Trial Batch.** Perform trial batches, at least 2 months prior to construction, using proposed materials and equipment to demonstrate RSFRC can be mixed and placed properly. Conduct the necessary testing to ensure the proposed RSFRC meets the workability and compressive strength requirements.
- 4.4. **Mixing, Placing, and Finishing RSFRC.** Mix and place RSFRC in accordance to the cement manufacturer's and fiber manufacturer's recommendations. Use mixing equipment that is recommended by the cement manufacturer.
- Place and adequately consolidate prior to the RSFRC reaching initial set. When pouring long or intersecting joints, ensure that the leading edge of the pour does not dry out and crack. Pour all succeeding RSFRC placements into fluid RSFRC.
- 4.5. **Curing.** Water cure RSFRC in accordance to Item 422.8, "Final Curing," and as recommended by the cement manufacturer. Maintain curing until RSFRC has achieved a compressive strength of 3,000 psi.
- 4.6. **Quality Control.** Perform the testing listed in Table 2. The Engineer will make and test the compressive strength cylinders.

Table 2
UHPC Testing Requirements

Property	Test Method	Frequency
Slump	Tex-415-A	Every Batch
Temperature	Tex-422-A	Every Batch
Cylinder for Compressive Strength	ASTM C 39	3 sets per production day ^{1,2}

1. Each set consists of two cylinders.
2. Make sets of cylinders intermittently throughout the pour.

The Engineer will test sets of cylinders from each production day at 4 hours, and 7 days after casting, and as necessary to determine opening to traffic.

5. MEASUREMENT

Measurement will be by the cubic yard of RSFRC measured in place.

6. PAYMENT

The work performed, materials furnished, trial batches, equipment, labor, tools, and incidentals will not be paid for directly, but will be considered subsidiary to pertinent items.