

SPECIAL SPECIFICATION

4078

Structural Grout

1. **Description.** Furnish, mix, place, and cure prepackaged, non-shrink, cementitious grout for precast bridge deck construction.
2. **Materials.** Provide prepackaged, non-shrink, cementitious grout that conforms to the following requirements:
 - A. **General.** Grout shall conform to ASTM C-1107 and the properties described in this special specification. Grout having metallic formulations or chlorides will not be allowed. No additives shall be added to prepackaged grout. Extension of a grout mix with pea gravel will be allowed only if recommended by the manufacturer. The Contractor shall submit manufacturer literature demonstrating compliance with this specification for approval by the Engineer of Record. Commercial grouts known to conform include Degussa Masterflow 928, Sika Grout 212, and Euclid Hi-Flow Grout.
 - B. **Mechanical.** Minimum compressive strength of ASTM C-109 2" cubes per Table 1.

Table 1
Minimum Grout Strengths

| Age | Compressive Strength (psi) |
|---------|----------------------------|
| 1 day | 2,500 |
| 3 days | 4,000 |
| 7 days | 5,000 |
| 28 days | 5,800 |

- C. **Compatibility.**
 1. **Expansion:** ASTM C-1107 Grade B or C
 2. **Modulus of Elasticity:** 2.8 to 5.0 x 10⁶ psi per ASTM C-469
 3. **Coefficient of Thermal Expansion:** 3.0 to 10.0 x 10⁶ / deg F per ASTM C-531
- D. **Constructability.**
 1. **Flowability:** 20 to 30 second fluid consistency efflux time per ASTM C-939 and CRD-C-611 Flow Cone.
 2. **Set Time:** 2.5 to 5.0 hours Initial Set, and 4.0 to 8.0 hours Final Set.
- E. **Durability.**

1. **Freeze Thaw:** 300 cycles, RDF 90% per ASTM C-666
2. **Sulfate Resistance:** expansion at 26 weeks < 0.1% per ASTM C-1012
3. **Equipment.** Provide clean mechanical mortar mixer for batching grout. Transport grout from mixer to final location by wheelbarrow, bucket, or pumping. Use appropriate hardware to completely fill grouted regions without air voids.
4. **Construction.** Mix and place grout in accordance with manufacturer recommendations and as described in this specification.
 - A. **Trial Batching.** A trial grouting of a simple mock-up connection will be required a minimum of two weeks in advance of the deck construction. The trial grouting will demonstrate the reliability of the Contractor's grouting procedures, confirm the ability to completely fill voids with grout, and familiarize Contractor and TxDOT personnel with the process. Job sample tests shall be conducted during this trial batching.
 - B. **Connection Preparation.** Grouted surfaces shall be cleaned by pressure washing as soon before grouting as practically possible. Grouted concrete surfaces shall be prewetted to a moist, saturated surface-dry condition prior to grouting, and without ponded or free-standing water. Forming of connections shall be grout tight.
 - C. **Grout Mixing and Placement.** Grout shall be mixed according to manufacturer recommendations, including requirements for expiration date, proportion, grout mix and outside air temperature, and mixing duration. Refer to the plans for maximum allowable durations of grout placement for a given set of components. Grout placement shall ensure no air voids are introduced. Evidence of frothing, foaming, or segregation shall be cause for removal and recasting as deemed necessary by the Engineer.
 - D. **Job Sampling.** Quality control of grouting in construction will include tests for flowability and compressive strength.
 1. **Flowability.** Periodic tests to calibrate grout mix proportions will be performed using a flow cone in accordance with TEX-437-A.
 2. **Compressive Strength.** A minimum of six (6) 3" x 6" cylinders will be sampled from the grout mixer for each bridge span, unless directed otherwise by the Engineer. At least two samples will be tested to demonstrate sufficient strength prior to specific subsequent bridge construction activities (noted in the plans), and at least two samples will be tested after 28 days to satisfy Table 1.
 - E. **Curing.** Cure exposed grout surfaces with wet mats or curing compound as recommended by the manufacturer. Temperature of the grout shall remain above 45 deg F during curing. When outside air temperatures exceed 80 deg F, the grouted connections should be shielded from sunlight. Refer to plans for any cure time or strength requirements for subsequent construction activities.
5. **Measurement.** This Item will be measured by the cubic foot of installed grout.
6. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for

“Structural Grout.” This price is full compensation for furnishing and placing grout and for all labor, tools, equipment and incidentals necessary to complete the work. The preparation of trial batches described will not be paid for directly and shall be considered subsidiary to this bid item.