
DMS-4550

Fibers for Concrete

Effective Date: November 2023



1. DESCRIPTION

This Specification establishes requirements and specific test methods to determine the **minimum** dosage of fibers **in Fiber-Reinforced Concrete (FRC)** for Class A and B concrete.

2. UNITS OF MEASUREMENTS

The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

3. MATERIAL PRODUCER LIST

The **Materials & Tests** Division (**MTD**) maintains the Material Producer List (MPL) of all materials conforming to the requirements of this Specification. Concrete made with materials appearing on the MPL, entitled "**Fibers for Class A and Class B Concrete Applications**" must be tested in accordance with the frequency established in the Department's [Guide Schedule of Sampling and Testing](#).

4. BIDDERS' AND SUPPLIERS' REQUIREMENTS

The Department will purchase or allow on projects only those products listed by manufacturer and product code, or designation shown on the MPL.

Use of pre-qualified product does not relieve the contractor of the responsibility to provide product that meets this Specification. The Department may inspect or test material at any time and reject any material that does not meet the specifications.

5. PRE-QUALIFICATION PROCEDURE

5.1. **Pre-Qualification Request.** Submit a written request **on company letterhead** for evaluation **under DMS-4550** to DMS_Prequal@txdot.gov.

Include the following information in the request:

- Company name,
- Physical and mailing addresses,
- Product name and **technical** data sheets,
- **The minimum dosage of the fiber product to meet this specification,**
- Contact person, phone numbers, and email address, and
- **Independent laboratory test report containing test results and certifying compliance of the material with this Specification. Test reports older than 1 yr. must be accompanied by a notarized certification stating**

that there has been no alteration of the product since originally submitted to the independent laboratory for testing.

- 5.2. **Pre-Qualification Sample.** After reviewing the pre-qualification request, MTD will request a sample of adequate size to complete testing. Ship sample with packaging representative of that supplied to the field to the Texas Department of Transportation, Materials and Tests Division, Laboratory Building, 6230 E. Stassney Ln, Austin, TX 78744.

Include the following with the sample:

- current safety data sheet (SDS) and
- manufacturer's certification and lot number for submitted sample.

Submit all materials for pre-qualification at no cost to the Department.

- 5.3. **Evaluation.** MTD will test for conformance to this Specification and notify prospective bidders and suppliers after completion of material evaluation.

- 5.3.1. **Qualification.** If approved for use by the Department, MTD will add the material to the MPL. Report changes in the composition or in the manufacturing process that result in material with different properties than what was originally tested and approved. Significant changes reported by the manufacturer, as determined by MTD, may require a re-evaluation of performance. The Department reserves the right to conduct whatever tests it deems necessary to identify a pre-qualified material and determine if there is a change in the composition, manufacturing process, or quality that may affect its performance. In case of variance, the Department's tests will govern.

- 5.3.2. **Failure.** Producers not qualified under this Specification may not furnish materials for Department projects.

Producers failing to qualify may submit a request for re-evaluation after 12 mo. have elapsed from the date of the original request. MTD may modify this time limit at its discretion. In the request for re-evaluation, document the cause for failing to meet the requirements of this Specification and corrective action taken. Include an independent laboratory test report containing test results and certifying compliance of the corrected material with this Specification.

Costs of sampling and testing are normally borne by the Department; however, the supplier may bear the costs to sample and test materials failing to conform to the requirements of this Specification and any re-evaluation testing. MTD will assess this cost at the time of testing and amounts due will be billed to the producer.

6. QUALITY ASSURANCE

The Department reserves the right to randomly sample and evaluate pre-qualified materials for conformance to this Specification and to perform random audits of documentation. Department representatives may sample material from the manufacturing plant, the project site, and the warehouse. The Department may also request samples for evaluation at any time from the producer. Failure of materials to comply with the requirements of this Specification may be cause for removal of those materials from the MPL.

- 6.1. **Periodic Evaluation.** The Department reserves the right to conduct periodic evaluations on pre-qualified products. Pre-qualified products must meet the requirements of Article 7., "Material Requirements", to maintain pre-qualified status.

6.2. **Failure.** Failure of materials to comply with the requirements of this Specification as a result of periodic evaluation may be cause for removal of those materials from the MPL. In case of variance, the Department's tests will govern.

6.3. **Disqualification.** Causes for disqualification and removal from the MPL may include, but are not limited to:

- falsification of documentation,
- producer fails to report any change in material composition or manufacturing process to MTD,
- material fails to meet the requirements of this Specification as a result of periodic evaluation,
- producer does not provide the department with samples for periodic evaluations when requested, and
- producer has unpaid charges for failing samples.

MTD will remove disqualified producers from the MPL and will not allow submission of material for re-qualification for up to 12 mo., at the discretion of the Department.

6.4. **Re-Qualification.** Once the disqualification period established by MTD has elapsed, producers disqualified and removed from the MPL may begin the re-qualification process by submitting a request in accordance with Section 5.1., Pre-Qualification Request including additional documentation identifying the cause of the problem and corrective action taken. The re-qualification process will then follow all subsequent Sections of Article 5., "Pre-Qualification Procedure."

The Department normally bears the costs of sampling and testing; however, the disqualified producer will bear the costs associated with re-qualification. MTD will assess this cost at the time of re-qualification and amounts due will be billed to the producer.

7. MATERIAL REQUIREMENTS

7.1. **General Requirements.** Provide fibers conforming to ASTM C1116, including synthetic fibers, that are alkali-proof, non-absorptive, resistant to deterioration due to long-term exposure to moisture or substances present in admixtures, and do not contribute to nor interfere with the air entrainment of the concrete. Steel fibers for fiber reinforced concrete must conform to ASTM A820, and glass fibers must conform to ASTM C1666.

7.2. **Fiber Testing.** The fiber will be evaluated at the minimum dosage listed on the request letter, product label, or technical data sheet. The minimum fiber dosage is required to be 4 lb./yd³ or greater and not so high that causes the fibers to clump and form a fiber ball. The minimum dosage will be reported on the MPL.

7.2.1. **Concrete Mix.** The water-to-cement ratio of the concrete mix should be selected so that the compressive strength of the concrete specimens determined according to [Tex-418-A](#) after 7 days is between 3,500 psi and 4,500 psi (or alternatively, the flexural strength determined according to ASTM C78 is between 500 psi and 640 psi). The Portland cement used must be ASTM C150 Type I, II, or ASTM C595 Type IL. The aggregate used must conform to ASTM C33 Grade 57 or 67. The mixing and making specimens must be according to the procedure outlined in ASTM C192. The fiber shall be added to the mixture after adding the mixing water.

Note 1: The typical mix design used by MTD for fiber qualification has w/c=0.60, Type IL cement with content of 423 lb/yd³, ASTM C33 Grade 67 limestone coarse aggregate, and Coarse Aggregate Factor of 0.52. Specimens will be vibrated with an external vibrator until consolidated in the MTD laboratory. Other concrete mix design or consolidation methods that are in compliance with the requirements outlined in this section are acceptable.

7.2.2. **Specimens Preparation.** MTD will cast at least four specimens measuring 4" × 4" × 14" steel molds for ASTM C1609 testing, four 6" × 12" cylindrical specimens for the double punch test, and three companion compressive strength cylinders to be tested at 7 days in accordance with Tex-418-A to verify that concrete strength is in compliance with the requirement of Section 7.2.1., "Concrete Mix." The preparation of the specimens will be according to the pertinent test procedures.

Note 2: Alternatively, 6" × 6" × 20" steel molds for ASTM C1609 testing are allowed.

7.2.3. **Faulty Specimens and Outliers.** If a specimen is obviously defective, discard the specimen. If the result of an individual specimen is greater than 20% outside the average of all specimens in the batch, consider the specimen defective and discard. If only one specimen remains after discarding faulty specimens, make a new set of specimens following Sections 7.2.1., "Concrete Mix," and 7.2.2., "Specimens Preparation."

7.2.4. **Material Requirements.** The fiber-reinforced concrete made according to this Section must meet the requirements listed in Table 1. The qualification can be based on either of the test methods allowed in Table 1 (ASTM C1609 or [Tex-475-A](#)).

Table 1
Material Requirements of FRC

Property	Test Method	Specimen Age	Requirement
Minimum Equivalent Flexural Strength Ratio $R_{T,150}^D$ or Minimum Equivalent Tensile Strength Ratio	ASTM C1609 or Tex-475-A	7 days	21% or 19%
Minimum Residual Strength at Net Deflection of L/150 f_{150}^D or Minimum Residual Strength @ $\delta=0.1$	ASTM C1609 or Tex-475-A		110 psi or 31 psi

8. ARCHIVED VERSIONS

Archived versions are available.