

Minnesota Department of Transportation  
Approved Nonmetallic Fibers for Bridge Applications  
May 30, 2018

The Minnesota Department of Transportation (MnDOT) will only accept nonmetallic fibers from the MnDOT Approved Products List. Incorporate the fibers into the mix design in accordance with the applicable requirements of 2401, "Concrete Bridge Construction," and 2461, "Structural Concrete".

The Manufacturer must comply with the following and provide a submittal package to be considered for the MnDOT APL:

**A. Materials**

Supply Type III fibers in accordance with ASTM C1116, "Standard Specification for Fiber-Reinforced Concrete". **A minimum dosage rate of 4 lbs/cy is required.** The fibers are required to be a combination of micro and macro non-metallic fibers to provide crack control and improve the long-term performance of the bridge decks. The stated manufacturer purpose of the non-metallic fibers is for controlling plastic shrinkage cracks in concrete (micro fibers) and to provide increased residual flexural strength in the concrete (macro fibers). Single component macro fibers conforming to the requirements below may be submitted for approval.

**B. Testing**

Test fiber-reinforced concrete for the hardened properties in accordance with the following, and include the Independent Lab results with this submittal:

<b>Required Hardened Fiber-Reinforced Concrete Properties</b>		
Test	Requirement	Test Method
Equivalent Flexural Strength Ratio ( $R_{T,150}^D$ )	Minimum of 25%	ASTM C1609
Crack Reduction Ratio (CRR)	Minimum reduction >85%	ASTM C1579

**Test specimens when the concrete strength is between 3500 and 4500 psi.**

### C. Dosage, Documentation

Supply a written statement from the manufacturer of the fibers verifying the compatibility of the combination of materials and the sequence in which they are combined. Include with this submittal and to the Engineer prior to using it in any project.

### D. Application Requirements

Mix non-metallic fiber reinforcement in concrete mixer in accordance with mixing time and speed of ASTM C94, "Standard Specification for Ready-Mixed Concrete" to ensure uniform distribution and random orientation of fibers throughout concrete. Notify the Engineer in writing of the dedicated personnel for this task and the procedures for distributing fibers.

The following fiber addition methods are acceptable on all jobs:

1. Open bag and distribute fibers on aggregate belt at ready-mix concrete plant; and
2. Open bag, break apart any fiber clumps, and introduce fibers into ready-mix concrete truck in a well-distributed manner (i.e., "chicken feed")

Any alternate methods to add fibers to the concrete mix must be submitted for acceptance by the Engineer and be demonstrated by a successful trial placement. Allowing bags to dissolve in the ready-mix concrete trucks will not be allowed. Balling of fibers is defined as a 2 inch diameter or greater conglomerate of fibers at the point of placement. Any balling more prevalent than 1 location in 20 CYDs will be considered a failed trial placement. Ensure the manufacturer's technical representative is available by phone or in person to troubleshoot fiber inclusion into the mix during the trial placement and bridge deck placement.

### E. Field Acceptance

If the above criteria are met successfully, the anchorage will be given tentative approval, contingent upon satisfactory performance in the field.

### F. Non-Compliance

If future samples of these materials do not meet MnDOT specifications, the product may be removed from the MnDOT approved product list.

Please also note that it is the manufacturer's responsibility to immediately notify MnDOT if any product is changed or modified, or if the product is no longer being produced. The list of approved products may be found on the MnDOT Concrete website at <http://www.dot.state.mn.us/products/concrete/index.html>

Reference materials and certification shall be sent to:

Minnesota DOT Attention:  
MnDOT Concrete Engineering Unit  
1400 Gervais Ave.  
Maplewood, MN 55109 Tel. (651) 366-5575