Instructions for Use of
3-Part Master Specification

Synthetic Fiber Reinforced Concrete (SnFRC)

This specification specifies the use of synthetic fibers as reinforcement in concrete. Its purpose is to assist design professionals in the preparation of project or office master specifications. It follows guidelines established by the Construction Specifications Institute and, therefore, may be used with minor editing in most master specification systems

This specification assumes that standard section numbers are used in the project or master specifications, and it should be placed in Section 3240-Fiberous Reinforcement.

Notes:

- Edit carefully to suit project requirements.
- Modify as necessary and delete items that are not applicable.
- Verify that reference section numbers and titles are correct.
- Insure all references to ACI and ASTM specifications, test procedures and state-of-the-art reports are current.

The design professional can find a number of references to synthetic-fiber reinforcement and to synthetic fiber-reinforced concrete in ACI and ASTM documents. Some of these documents are listed in Sections 1.02, 6.a and b. A complete list can be furnished by Nycon, Inc. by request.

Nycon ProConF 3-Part Master Specification

03200: CONCRETE REINFORCEMENT/FIBROUS REINFORCEMENT

MANUFACTURER
Nycon, Inc.
101 Cross Street
Westerly, RI 02891
Phones: 800.456-9266
401-596-3955
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E-Mail: nycon@nycon.com
Website: www.nycon.com
Product
Name: Nycon ProConF

03241: FIBROUS CONCRETE REINFORCEMENT

For the purpose of providing plastic shrinkage reinforcement and secondary/ temperature-shrinkage reinforcement Nycon ProConF is used at the dosage rate of 1.5 pounds per cubic yard. For use solely as plastic shrinkage reinforcement Nycon ProConF can be used at 0.75 pound per cubic yard. At higher dosage levels, such as 3.0 pounds per cubic yard the Nycon ProConF can be used in Ultra-Thin Whitetopping, per FHWA specifications, where the fatigue strength enhancement is an important factor.

PART 1: GENERAL

1.01 SUMMARY

A. Section Includes: Synthetic fibers as secondary reinforcement for concrete.
B. Related Sections:
   1. Section 03210-Reinforcing Steel
   2. Section 03300- Cast-In-Place Concrete
   3. Section 03370-Specially Placed Concrete (shotcrete)
   4. Section 03400-Precast Concrete
   5. Section 03500-Cementitious Decks and Underlayment
C. All materials furnished per this section shall conform to applicable codes and/or standards.

1.02 SUBMITTALS

Submit the following items:

1. Product Data: Required physical property data for product specified per ASTM C1116, Section 4.1.3 and Note 3 and ICC ES Acceptance Criteria 32, Sections 4.1.1 and 4.1.2.

2. Letter of Certification stating compliance with applicable specifications and/or codes.

3. Samples: Samples of the specific products recommended for use shall be provided to the engineer of record by request. Samples must be of the length and configuration specified.

4. Quality Assurance/Control Submittals:
   * Related concrete test reports from commercial and/or university laboratories.
   * Installation instructions (mixing, placing, finishing)
   * MSDS

5. Technical Support:
   If the engineer requires technical assistance in developing the design of a specific synthetic fiber reinforced concrete element, the engineer is directed to contact the engineering group of the manufacturer (see item 2.01.A).

6. References:

   a. American Concrete Institute (ACI)

      1) ACI 211.1-Standard practices for selecting
      2) proportions for normal weight, heavyweight and mass concrete
      3) ACI 302-Guide for Concrete Floor and Slab Construction
      4) ACI 318-Building Code Requirements for Reinforced Concrete
      5) ACI 330-Guide for Design and Construction of Parking Lots
      6) ACI 345-Guide for Concrete Highway Bridge Deck
      7) ACI 360-Design of Slabs on Grade
      8) ACI 362-Guide for Design of Durable Parking Structure
      9) ACI 506.1R-State-of-the Art Report on Fiber Reinforced Shotcrete
      10) ACI 544.1R-State-of-the-Art Report on Fiber Reinforced Concrete
      11) ACI 544.3R-Proportioning, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete

   b. American Society of Testing and Materials (ASTM)

      1) C1116-Specification for fiber reinforced concrete and shotcrete
      2) C1018-Test method for flexural toughness and first-crack strength of fiber reinforced concrete
      3) C1399-Test method for obtaining average residual-strength of fiber-reinforced concrete
      4) C1550-Test method for flexural toughness of fiber reinforced concrete (using centrally loaded round panel
      5) C78-Test method for flexural strength of concrete
      6) C143-Test method for slump of hydraulic cement concrete
      7) C995-Test method for time of flow of fiber reinforced concrete through inverted slump cone

8) C94-Specification for ready-mixed concrete
9) C173-Test method for air content of freshly mixed concrete by the volumetric method
10) C231-Test method for air content of freshly mixed concrete by the pressure method

1.03 QUALITY CONTROL

A. Qualifications:
It is recommended that a pre-construction trial mix, using proposed ingredients, be fabricated to insure targeted-engineering properties are met and the mix workability is acceptable. This recommendation is specifically important when 3 pounds or more of the synthetic fibers are added per cubic yard.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery: Standard methods of transportation. Product is packaged in pre-weighed bags, boxed, palletized and identified for traceability.
B. Special Instructions: Please read MSDS for handling instructions.
C. Storage: Keep material dry.
D. Handling: Count out and add the proper number of pre-weighed bags of product to the mixing system. There is no correct time to introduce the bags to the concrete. There is a single warning: Do not add the bags containing the fibers at the same time as the cement. When added after all of the standard ingredients have been added and mixed, allow for an extra 3-4 minutes to thoroughly distribute the synthetic fibers.

1.05 PROJECT/SITE CONDITIONS

A. Environmental Requirements: No unique/special requirements
B. Sampling/Testing:
Externally vibrate all specimens for use in strength tests, do not internally rod. Preferred air content test method is ASTM C173.

PART 2: PRODUCTS

2.01 FIBROUS CONCRETE REINFORCEMENT

Fiber reinforced concrete or more specifically synthetic fiber reinforced concrete (SnFRC) utilizes discrete synthetic fibers, typically ¾” to 2” in length to provide certain enhancements to quantifiable concrete properties. These enhancements include modifications to the macro/micro cracking mechanism, impact resistance, fatigue strength and reduced permeability. The degree of enhancement is dependent on the dosage level.

A. Acceptable Manufacturer: Nycon, Inc., 101 Cross Street, Westerly, RI 02891, phones: 800.456-9266, 401-596-3955, fax: 401-596-4242, e-mail: www.nycon@nycon.com

B. Alternates:

2.02 MATERIALS

A. Synthetic Fiber: Collated Fibrillated Polypropylene fiber meeting the requirements of ASTM C1116 Section 4.1.3 and Note 3 and ICC ES AC 32 Sections 4.1.1and 4.1.2.

2.03 PHYSICAL CHARACTERISTICS

A. Configuration:
Primary: Collated Fibrillated (continuous network)

B. Length:
Primary: ¾”
Alternate: 1”, 1 ½” or 2”

C. Dosage
Primary as Secondary Reinforcement: 1.5 pounds/cy
Alternate as Plastic Shrinkage Reinforcement: 0.75 pound/cy

D. Synthetic Fiber Reinforced Concrete Design
Mix Design: Standard mix design as modified to accommodate the synthetic fiber when dosage level is 3 or more pounds per cubic yard.
Compressive Strength: Per project specifications.
Flexural Strength: Per project specification.
Slump: As per project specifications. Note if there is a difference for plain concrete versus SnFRC.

PART 3: EXECUTION

3.01 EXAMINATION

A. Verify by comparing packing slip and box label that product is per specification.
B. Verify the bag weight complies with the project specifications.
C. Verify that the number of bags to be added per cubic yard and per truckload of concrete meet the project requirements.
D. Verify the synthetic fibers will have sufficient mixing time to insure proper

distribution.

3.02 INTRODUCING, MIXING, PLACING, FINISHING

A. Follow procedures outlined in manufacturer's printed instructions.
B. Comply with standard procedures found in ACI 302 and other related documents.
C. Vibrating screed, laser screed or roller screed are the preferred methods of consolidating concrete in large square footage industrial and commercial interior slabs-on-grade.

3.03 MANUFACTURER'S FIELD SUPPORT

A. Manufacturer will provide field support at pre-construction trial and start-up of project when requested.
B. Manufacturer will provide phone access to technical support to ready mixer and project personnel.