



FIBER REINFORCED CONCRETE



EUCLID CHEMICAL'S FIBER REINFORCED CONCRETE (FRC) PRODUCTS

The use of micro and macro-synthetic fibers in concrete can often greatly improve the overall durability and long-term performance of concrete structures. The Euclid Chemical Company provides fibers for concrete under the Fiberstrand and TUF-STRAND SF™ product lines.

Fiberstrand micro-synthetic fibers provide superior resistance to the formation of plastic shrinkage cracks versus welded wire fabric. However, they are unable to provide any resistance to further crack width openings caused by drying shrinkage, structural load or other forms of stress.

TUF-STRAND SF macro-synthetic fibers will provide concrete with enhanced toughness and the ability to deliver some structural capacity when properly designed while also providing resistance to shrinkage cracking. TUF-STRAND SF can be used as a true alternative to welded wire fabric, steel fibers and light gauge steel rebar for pre-cast, slabs-on-grade and shotcrete applications.



MICRO-SYNTHETIC FIBERS



Fiberstrand micro-synthetic fibers are specifically designed to help control plastic shrinkage cracking as a replacement for secondary reinforcing of concrete only.

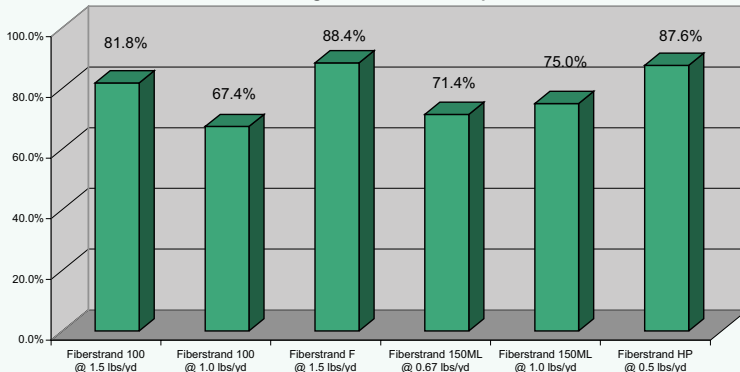
- Fiberstrand F / fibrillated polypropylene**
- Fiberstrand HP / ultra-fine monofil polypropylene**
- Fiberstrand 100 / monofil polypropylene**
- Fiberstrand 150 / monofil polypropylene**
- Fiberstrand 150 ML / multi-cut polypropylene**
- Fiberstrand 200 / monofil polyester**
- Fiberstrand N / monofil nylon**



APPLICATIONS

- Pre-cast Concrete
- Architectural Concrete
- Pumped Concrete
- Residential Structures
- Civil Projects
- Shotcrete

Plastic Shrinkage Reduction versus plain concrete



All Euclid Chemical Fibers comply with ASTM C 1116

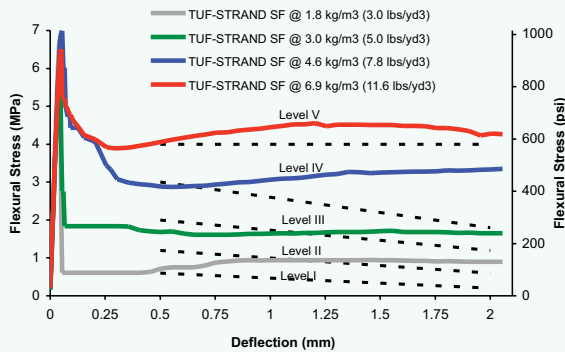


MACRO-SYNTHETIC FIBERS

TUF-STRAND SF

TUF-STRAND SF is a patented “structural” macro-synthetic fiber engineered for use in slabs on grade, pre-cast concrete and shotcrete applications. TUF-STRAND SF can be used as a true replacement for welded wire fabric, conventional light gage rebar and steel fibers. The ability of TUF-STRAND SF to increase its surface area during mixing leads to exceptional bonding of the fiber in concrete which improves toughness, impact and abrasion resistance and provides superior shrinkage control. TUF-STRAND SF is also UL certified for use in composite metal deck construction.

ASTM C 1609 $f'_c=33$ MPa (4800 psi) $f_r(\text{design})=4$ MPa (580psi)



Fiber Dosage kg/m^3 (lbs/yd ³)	1.8 (3.0)	3.0 (5.0)	4.6 (7.8)	6.9 (11.6)
Toughness Factor, R_{403} (%)	20	37	53	75



APPLICATIONS

- Industrial and Warehouse Floors
- Thin-Wall Pre-cast Products
- White-Toppings and Overlays
- Shotcrete
- Composite Metal Deck Construction



TUF-STRAND SF before mixing



TUF-STRAND SF after mixing

TUF-STRAND SF dosages for most pre-cast, floors and pavements are calculated by determining equivalent post-crack load carrying capacity to specified steel as determined from traditional engineering methods.



Testing for Fiber Reinforced Concrete:

ASTM C 1116

Standard Specification

ASTM C 78 & C 1609

Flexural Strength and Toughness

ASTM C 1399

Average Residual Strength

ASTM C 1550

Round Determinate Panel Test

Plus

- Plastic and Drying Shrinkage
- Creep and Fatigue
- Impact and Abrasion
- UL fire testing





EUCLID CHEMICAL'S MICRO AND MACRO SYNTHETIC FIBER PRODUCTS

Product Name	Type of Fiber	Available Lengths	Notes
Fiberstrand F	Fibrillated Polypropylene	¾", 1.5", 2" (19, 38, 50 mm)	Secondary reinforcing fibers (plastic shrinkage only); typical dosage rates range from 0.5 to 1.5 lbs/yd ³ (0.3-0.9 kg/m ³) For more information on packaging sizes and available fiber lengths, please call 1-800-321-7628 or contact your local Euclid Chemical Representative.
Fiberstrand HP	Monofil Polypropylene	¾" (19 mm)	
Fiberstrand 100	Monofil Polypropylene	½", ¾" (12, 19 mm)	
Fiberstrand 150	Monofil Polypropylene	¾" (19 mm)	
Fiberstrand 150ML	Multi-cut Polypropylene	varies ¼" - ¾" (6-19 mm)	
Fiberstrand 200	Monofil Polyester	¾" (19 mm)	
Fiberstrand N	Monofil Nylon	¾" (19 mm)	
TUF-STRAND SF	Polypropylene / Polyethylene	2" (50 mm)	For actual WWM and steel fiber replacement; typical dosage rates range from 3.0 to 20 lbs/yd ³ (1.8-11.5 kg/m ³)

For additional technical information, including MSDS and technical data sheets, please contact your local Euclid Chemical Sales Representative or consult our website at www.euclidchemical.com.

Quick Reference Guide for Slab-on-Grade Design with TUF-STRAND SF™, lbs/yd³ (kg/m³)

Slab Thickness	6x6 10/10	6x6 6/6	4x4 6/6	4x4 4/4	#3 @ 12"	#3 @ 16"	#4 @ 12"	#4 @ 16"
4"	3.0 (1.8)	3.0 (1.8)	3.9 (2.3)	6.1 (3.6)	4.9 (2.9)	3.6 (2.1)	8.6 (5.1)	6.5 (3.9)
6"	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	4.0 (2.4)	3.2 (1.9)	3.0 (1.8)	5.8 (3.4)	4.3 (2.6)
8"	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	4.3 (2.6)	3.2 (1.9)
10"	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.5 (2.1)	3.0 (1.8)
12"	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)	3.0 (1.8)

For specified 70 ksi welded wire fabric and 60 ksi light steel as shown for temperature and shrinkage crack control only; 4000 psi concrete and for location of steel in top half of slab only.

Note: The values shown for pavement and floor construction are valid only for Euclid's TUF-STRAND SF fiber and have been derived from standardized testing. For dosing requirements in pre-cast concrete, shotcrete, structural floors or other applications, please contact your local Euclid Chemical Sales Representative.

A full Technical and Marketing package of information is available to Ready-Mix Producers, General Contractors, Engineers, Architects and Owners to assist with your Fiberstrand and TUF-STRAND SF Fiber Reinforced Concrete project requirements.



EUCLID CHEMICAL

19218 Redwood Rd. • Cleveland, OH 44110
Toll-free: [800] 321-7628 • Fax: [216] 531-9596

www.euclidchemical.com



An RPM Company

The Euclid Chemical Company serves the global building market as an ISO 9001:2000 supplier of specialty products and support services for the concrete and masonry construction industry. Marketed under the Barcade, Dural, Euco, Eucon, Speed Crete and Tamms brands, we offer a full line of admixtures, repair and maintenance products based on the latest technologies. We provide complete specification assistance and laboratory support as well as on-site service for guidance on proper product usage. EUCCO materials are warehoused in over 200 locations in the USA and are available world-wide through international affiliates.

B12 Fiber Reinforced Concrete 05.10 5M © 2010 The Euclid Chemical Company. All rights reserved. The information contained herein is, to our knowledge, true and accurate. While this material is furnished in good faith, no warranty expressed or implied, of merchantability, completeness, fitness or otherwise is made. This material is offered only for your consideration, investigation and verification, and The Euclid Chemical Company disclaims any liability incurred from the use thereof and shall not in any event be liable for any special, incidental or consequential damages arising from such use. This information is not intended to be all inclusive and the manner and conditions of use and handling of any material may involve other or additional considerations specific to the use or user. Nothing herein should be construed as permission or recommendation to infringe any patent or as to any specific use. No agent, representative or employee of this company is authorized to vary any term of this notice.