

## CONCRETE FIBERS

Master Format #: 03 24 00

# TUF-STRAND™ SF

## SYNTHETIC MACROFIBER



EUCLID CHEMICAL

### PRODUCT INFORMATION

#### PACKAGING

3.0 lb (1.36 kg), 4.0 lb (1.81 kg), 5.0 lb (2.27 kg) and 7.5 lb (3.4 kg) water soluble bags

#### SHELF LIFE

3 years in original, unopened package

#### SPECIFICATIONS/COMPLIANCES

ASTM C1116

ASTM D7508

IBC 2015 SDI/ANSI-C1.0

ICC AC383 (ESR4072)

UL/ULC (CBXQ.R13773)

#### TECHNICAL INFORMATION

**Material:** Polypropylene/polyethylene

**Specific Gravity:** 0.92

#### Typical Dosage Rates:

3.0 to 20.0 lbs/yd<sup>3</sup> (1.8 to 12.0 kg/m<sup>3</sup>)

**Available Lengths:** 2" (51 mm)

**Aspect Ratio:** 74

#### Tensile Strength:

87-94 ksi (600 to 650 MPa)

#### Modulus of Elasticity (EN 14889.2):

1380 ksi (9.5 GPa)

**Melt Point:** 320°F (160°C)

**Electrical/Thermal Conductivity:** Low

**Water Absorption:** Negligible

**Acid and Alkali Resistance:** Excellent

**Color:** White

### DESCRIPTION

TUF-STRAND SF is a patented polypropylene and polyethylene synthetic macrofiber successfully used to replace steel fibers, welded wire mesh and conventional reinforcing bars in a wide variety of applications. TUF-STRAND SF fibers comply with ASTM C1116, Standard Specification for Fiber Reinforced Concrete and Shotcrete, and are specifically designed to provide equivalent tensile and bending resistance to conventional reinforcement requirements. Concrete reinforced with TUF-STRAND SF will have three-dimensional reinforcing with enhanced flexural toughness, impact and abrasion resistance and will also help mitigate the formation of plastic shrinkage cracking in concrete. Dosage rates will vary depending upon the reinforcing requirements and can range from 3.0 to 20.0 lbs/yd<sup>3</sup> (1.8 to 12.0 kg/m<sup>3</sup>). TUF-STRAND SF synthetic macrofibers comply with the International Code Council (ICC) Acceptance Criteria AC383 for synthetic fibers, are UL certified for composite metal deck construction and are recognized within ACI 360 and IBC 2015 as an alternative reinforcement.

### PRODUCT CHARACTERISTICS

#### FEATURES & BENEFITS

- Equivalent strengths to WWM and rebar provided by engineering calculations
- Controls and mitigates plastic shrinkage cracking and reduces segregation and bleed-water
- Provides three-dimensional reinforcement against micro and macro-cracking
- Reduces equipment wear, fiber rebound and increases build-up thickness compared to steel fibers for shotcrete applications
- Increases overall concrete durability, fatigue resistance and flexural toughness
- Reduction of in-place cost versus wire mesh
- Easily added to concrete mixture at any time prior to placement
- Applicable for design by ACI 332, ACI 360 and ACI 544
- Tested in accordance with ASTM C1609, ASTM C1550 and EN 14651
- Certified for use by UL/ULC for D900 and F900 Series metal deck assemblies as alternate to WWM (CBXQ.R13773)
- Reduction of carbon footprint (CO<sub>2eq</sub>) compared to conventional reinforcement

#### PRIMARY APPLICATIONS

- Slabs-on-Ground: Parking lots, sidewalks, distribution centers, warehouses, industries, decorative concrete
- High performance floors with extended joint spacing
- Thin walled precast (septic tanks, vaults, walls, etc.)
- Shotcrete for tunnel linings, pool construction and slope stabilization
- Whitetoppings, bridge decks and concrete pavements
- Residential poured and ICF walls
- Elevated construction, composite metal decks

## PRECAUTIONS/LIMITATIONS

- Use of fibers may cause an apparent loss in measured slump of concrete. This may be offset with the use of a water reducing admixture if necessary.
- Fibers should never be added to a “zero-slump” concrete. Ensure a minimum concrete slump of 3” (80 mm) prior to addition of any fiber material. Fibers may also be added in loose form to aggregate charging devices.
- In all cases, consult the Safety Data Sheet before use.

## DIRECTIONS FOR USE

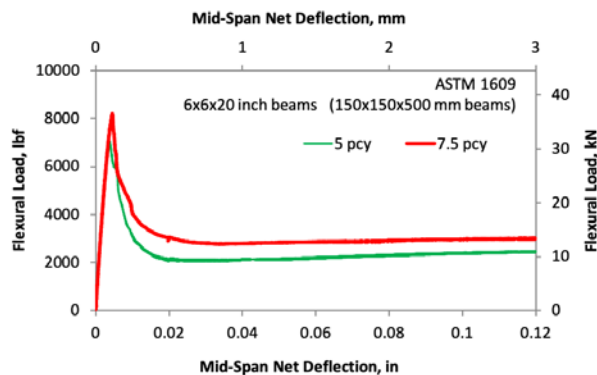
TUF-STRAND SF fibers can be added to the concrete mixture at any time prior to placement of the concrete. It is generally recommended to add any fiber material at the ready-mix concrete plant during batching. Fibers must be mixed with concrete for a minimum of three (3) to five (5) minutes at maximum mixing speed, depending on the mixer type, to ensure complete dispersion and uniformity. When adding up to 5.0 lbs/yd<sup>3</sup> (3.0 kg/m<sup>3</sup>), a slump loss of up to 2” (50 mm) can be expected for a typical ready-mix concrete design. For higher dosages, increased loss in slump can be expected depending upon the mixture design. The use of water reducers and/or superplasticizers, such as the Eucon series or the Plastol series of admixtures may be necessary to maintain desired workability.

Add other admixtures independently from fiber addition. TUF-STRAND SF is compatible with all Euclid Chemical admixtures. When used properly, and placed in a concrete mix of sufficient workability, the fibers will not adversely alter the compressive or flexural strength of concrete or shotcrete.

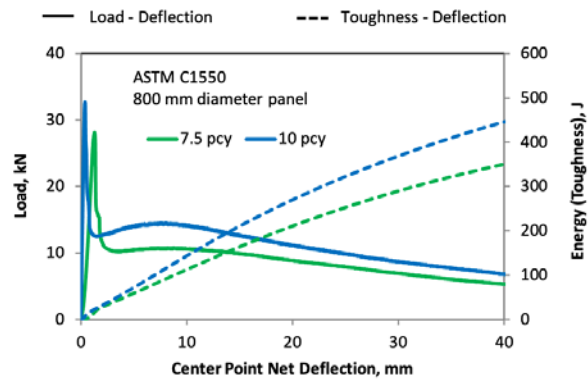
For further recommendations please consult Euclid Chemical Technical Bulletins at [www.euclidchemical.com](http://www.euclidchemical.com).

## PERFORMANCE

Fiber-reinforced concrete (FRC) is characterized by standard test methods such as ASTM C1399, C1609, and C1550 or RILEM TC162 (EN14651). The flexural residual strength of FRC is measured using these beam tests and is used for design purposes with proper conversion factors. Typical test results for ASTM C1609 and EN14651 (FRC beams) and C1550 (FRC round panels) are shown for TUF-STRAND SF macro synthetic fiber tested at different dosage rates. These test results could vary with mix design and curing conditions. For additional or specific test results in concrete, please contact Euclid Chemical.



ASTM C1609	A <sub>3</sub>		f <sub>r</sub>		f <sub>3</sub>		f <sub>e3</sub>		Re <sub>3</sub>
Dosage	lbf-in	N-m	psi	MPa	psi	MPa	psi	MPa	%
5 lb/yd <sup>3</sup> (3 kg/m <sup>3</sup> )	298	33.6	588	4.0	206	1.4	207	1.4	35
7.5 lb/yd <sup>3</sup> (4.4 kg/m <sup>3</sup> )	375	42.4	684	4.7	250	1.7	260	1.6	38



ASTM C1550	Corrected Energy Absorption, W Joules (J) at given deflection, mm				
Dosage	5	10	20	30	40
7.5 lb/yd <sup>3</sup> (4.4 kg/m <sup>3</sup> )	60	115	215	295	356
10 lb/yd <sup>3</sup> (5.9 kg/m <sup>3</sup> )	73	147	276	376	454

## CLEAN UP

Loose fiber material may be disposed in proper receptacles for refuse. Finishing equipment with fibers embedded in concrete should be thoroughly cleaned.

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**WARRANTY:** The Euclid Chemical Company (“Euclid”) solely and expressly warrants that its products shall be free from defects in materials and workmanship for one (1) year from the date of purchase. Unless authorized in writing by an officer of Euclid, no other representations or statements made by Euclid or its representatives, in writing or orally, shall alter this warranty. EUCLID MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR ORDINARY OR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES THE SAME. If any Euclid product fails to conform with this warranty, Euclid will replace the product at no cost to Buyer. Replacement of any product shall be the sole and exclusive remedy available and buyer shall have no claim for incidental or consequential damages. Any warranty claim must be made within one (1) year from the date of the claimed breach. Euclid does not authorize anyone on its behalf to make any written or oral statements which in any way alter Euclid’s installation information or instructions in its product literature or on its packaging labels. Any installation of Euclid products which fails to conform with such installation information or instructions shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of Euclid’s products for the Buyer’s intended purposes.