# TUF-STRAND SF

## Macro Synthetic Fiber

EUCLID CHEMICAL



## Description

TUF-STRAND SF is a patented polypropylene / polyethylene macro synthetic fiber 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 lbs/yd (1.8 kg/m ) to 20 lbs/yd (12 kg/m ). TUF-STRAND SF synthetic macro-fibers comply with applicable portions of 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 SDI/ANSI-C1.0 as an alternative reinforcement.

## Primary Applications

- Slab on Grade and elevated construction (distribution centers, warehouses, etc.)
- Thin walled pre-cast (septic tanks, vaults, walls, etc.)
- Shotcrete for tunnel linings, pool construction and slope stabilization
- Pavements and white-toppings
- Residential Walls

## 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 durability, fatigue resistance and flexural toughness
- Reduction of in-place cost versus wire mesh for temperature / shrinkage crack control
- Easily added to concrete mixture at any time prior to placement
- Tested in accordance with ASTM C 1399, C 1550, C 1609
- Applicable for design by ACI 360 R-10
- Certified for use by UL/ULC for D900 and F900 Series metal deck assemblies as alternate to WWF (CBXQ.R13773)

## Technical Information

**Typical Engineering Data**

| | | | |
|---|---|---|---|
| Material | Polypropylene/polyethylene blend | Modulus of Elasticity (EN 14889.2) | 9.5 GPa |
| Specific Gravity | 0.92 | Melt Point | 160°C |
| Typical Dosage Rates | 1.8 to 12 kg/m$^3$ | Electrical & Thermal Conductivity. | Low |
| Available Length | 2" (51 mm) | Water Absorbtion | Negligible |
| Aspect Ratio | 74 | Acid & Alkali Resistance | Excellent |
| Tensile Strength | 600 to 650 MPa | Color | White |

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## Packaging

TUF-STRAND SF fibers are packaged in 1.36 kg, 1.81 kg and 2.27 kg water soluble bags.

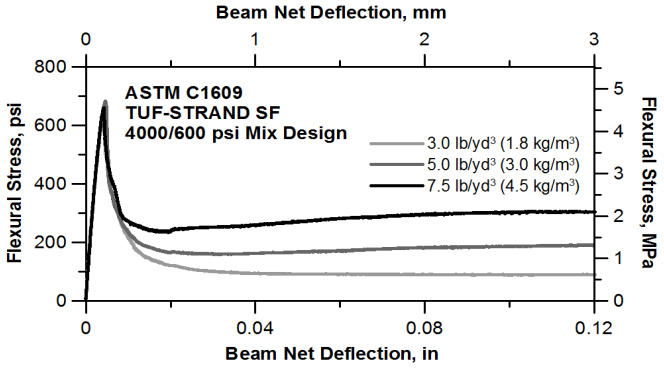
## Shelf Life

3 years in original, unopened package.

## Directions for Use

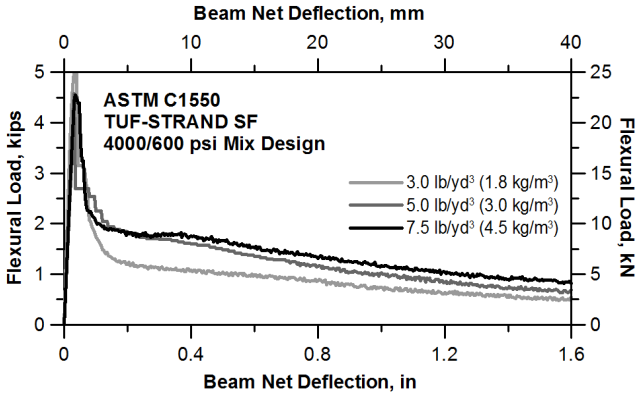
TUF-STRAND SF fibers can be added to the concrete mixture at any time prior to placement of the concrete. It is generally recommended to add any fiber material at the ready-mix concrete plant during batching. Fibers must be mixed with concrete for a minimum of three (3) to five (5) minutes at maximum mixing speed, depending on the mixer type, to ensure complete dispersion and uniformity. When adding 3 to 5 lbs/yd (1.8 to 3 kg/m ), a slump loss of up to 2" (50 mm) can be expected for a typical ready-mix concrete design. For dosages of 6 to 12 lbs/yd (4 to 7 kg/m ), a slump loss of 3 to 5 in (75 to 125 mm) can be expected. The use of water reducers and/or superplasticizers, such as Eucon 1037, 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.
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 (FRC beam) and C1550 (FRC round panel) 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.




| Dosage | $f_{e3}$ | $R_{e3}$ |
|---|---|---|
| lb/yd³ (kg/m³) | psi (MPa) | % |
| 3.0 (1.8) | 128 (0.9) | 22±3 |
| 5.0 (3.0) | 203 (1.4) | 30±2 |
| 7.5 (4.5) | 288 (2.0) | 44±4 |

(Typical Data)




| Dosage | Energy (J) at Delection (mm) | | | | |
|---|---|---|---|---|---|
| lb/yd³ (kg/m³) | 5 | 10 | 20 | 30 | 40 |
| 3.0 (1.8) | 43 | 67 | 109 | 144 | 171 |
| 5.0 (3.0) | 48 | 83 | 138 | 178 | 208 |
| 7.5 (4.5) | 58 | 107 | 190 | 254 | 302 |

(Typical Data)

## Clean-Up

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

## 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 80 mm prior to addition of any fiber material. Fibers may also be added in loose form to aggregate charging devices.
- In all cases, refer the Safety Data Sheet before use.

TREMCO
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