



SOLOMON

UltraFiber 500®

Secondary Reinforcement Fiber for Concrete

Description:

UltraFiber® 500 reinforcement fiber for concrete is 100% virgin specialty cellulose fiber with a patented alkaline resistant coating specifically engineered and manufactured in an ISO 9001 certified facility. UltraFiber 500® provides secondary reinforcement in concrete (temperature and shrinkage crack control) and meets ICC evaluation criteria for use in slab on grade. UltraFiber 500® is manufactured in the USA from renewable resources and complies with National Building Codes, ASTM C1116-08 and ASTM D7357-07. A dosage rate of 1.0 to 4.0 lb/yd³ is recommended depending on the application. In areas where freeze/thaw performance is a significant factor, a 2.0 lb/cy dosage rate is strongly recommended with a 1.5 lb/cy dosage rate minimum

Applications:

- Commercial & Residential Slabs
- Composite Metal Decks
- Paving
- Pervious Paving
- Curb and Gutter
- Slip Form
- Architectural & Decorative
- Pre-Cast
- Shotcrete
- Walls
- White Topping

Advantages:

UltraFiber 500® provides excellent secondary reinforcement from high fiber surface area, close fiber spacing, excellent bonding within the cement matrix, high fiber tensile strength, and easy dispersion in concrete so it is always positioned correctly. It is safe, easy to use, and offers superior finish-ability. UltraFiber 500® provides significant benefits in numerous applications.

Benefits:

- Alternate system to traditional secondary reinforcement in concrete
- Reduces the formation of intrinsic cracking in concrete
- Reduces concrete permeability and absorption.
- Improves concrete freeze/thaw resistance
- Improves concrete durability
- Provides enhanced hydration which improves concrete strength properties
- Improves concrete impact resistance
- Improves concrete shatter resistance
- Improves bond strength between rebar and cement paste

Concrete Fire Resistance:

- UL Classified for use in all composite metal deck Designs No. D700, D800 & D900.
- UL Classified for use in composite metal deck Design No. D973 Reduced Thickness of NWC (normal weight concrete) while achieving a 2 Hour Fire Rating

Performance Characteristics:

Water Absorption	Up to 80% of the fiber weight
Specific Gravity	1.10
Avg. Fiber Length	2.1 mm
Projected Fiber Diameter	18 um
Fiber Tensile Strength	90 -130 ksi
Alkali Resistance	High (ASTM D6942)

For additional information please contact us at 800-624-0261 or visit www.ultrafiber500.com. This publication should not be construed as engineering recommendations or advice. Users of this product should determine its suitability for their own particular application. UltraFiber 500® is sold with no express or implied warranty; seller's sole liability for claims is limited to replacement of defective or nonconforming product.

UltraFiber® 500



UltraFiber
Excellent Bond



Polypropylene Fiber
Minimal Bond

UltraFiber 500® vs. Synthetic Fibers

Attribute, units	UF-500	Synthetic Fiber
Avg. Length, mm	2.1	16
Denier, g/9,000m	2.5	6
Diameter, um	18	30
Count, fibers/lb.	720,000,000	44,000,000
Density, g/cm ³	1.10	0.91
Tensile, N/mm ²	600 - 900	200 - 500
Surface area, cm ² /g	25,000	1,500
Fiber Spacing, um	640	950

Application Rate

The minimum application rate for Buckeye UltraFiber 500® is 1.0 lb/yd³. A dosage of 1.5 lb/yd³ is recommended for most commercial slab on grade applications. Dosages of 2.0 to 4.0 lb/yd³ may be used for applications requiring maximum impact and/or abrasion resistance and crack control.

Mix Design

The addition of UltraFiber 500® reinforcing fibers at normal dosage rates does not require any mix design changes. UltraFiber 500® is compatible with typical admixtures and other mix constituents.

Finish-ability

UltraFiber 500® reinforcing fiber provides superior finish-ability and has no restrictions or barriers to normal finishing techniques. These finishes include: trowel, swirl, broom, exposed, decorative, colored, and stained. All finishes exhibit excellent results, and the finisher can use normal timing.

Compatibility

UltraFiber 500® reinforcing fiber is compatible with all normal concrete constituents and admixtures and will not adversely affect their performance or concrete workability.

Usage Guideline

UltraFiber 500® reinforcing fiber can be used as an alternate system to provide secondary reinforcement. It cannot be used as an alternative for structural reinforcement. UltraFiber 500® fiber should not be used to alter the concrete design for thickness or strength. ACI recommended curing practices, joint spacing and depth should be followed.

Mixing Procedure

UltraFiber 500® reinforcing fibers disperse best when added at the beginning of the batching sequence. Follow normal mixing, time and speed, as recommended by ASTM C94.

Packaging

UltraFiber 500® reinforcing fibers are available in 1.0 pound and 1.5 pound, water-soluble bags. Larger 20 pound non-soluble bags are also available. For automated dispensing, 500 pound bulk bags are recommended.

Engineering Specification

Use only 100% virgin alkali-resistant cellulose fibers manufactured for use in concrete for secondary reinforcement. Dosage rates are 1.0 lb/yd³ (minimum), 1.5 lb/yd³ (recommended), and up to 4.0 lb/yd³ for special applications. Buckeye UltraFiber 500® fiber is for the control of cracking due to plastic shrinkage and thermal expansion/contraction, to reduce water migration, and for increased impact capacity and shatter resistance. Fiber manufacturer must provide compliance with applicable building codes, ISO 9001 certification of manufacturing facility and ASTM C1116-08 compliance. Fibrous concrete reinforcement shall be manufactured by Solomon Colors, Inc. 4050 Color Plant Road, Springfield, IL 62702 Phone: 800-624-0261, Fax: 217-522-3145

Website: www.ultrafiber500.com.



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Spirit Bank Event Center
UltraFiber added @ 3.0 lbs/cyd

Solomon Colors can recommend the use of UltraFiber 500 as an alternate for welded wire fabric (WWF) because it has met the standards of the leading nationally recognized construction testing organizations in North America. UltraFiber 500 increases the pre-crack load carrying capacity of concrete slabs through improved internal hydration of the concrete. UltraFiber 500 has a significantly higher fiber count than synthetic fibers to intercept more micro-cracks as they begin to form. As reported by Naaman et.al., (ACI Materials Journal, V. 102, Jan – Feb 2005) fiber length does not have a noticeable effect on plastic shrinkage cracking, whereas smaller fiber diameters have a significant positive effect on plastic shrinkage cracking.

Solomon Colors recommends the use of UltraFiber 500 at dosage rates from 1.5 lbs to 4.0 lbs per cubic yard for the replacement of WWF and mild temperature steel based on the design criteria set forth by the architect or structural engineer for each individual project. Solomon recommends following all ACI guidelines for joint spacing and concrete curing.

International Code Council (ICC)

UltraFiber 500 meets the highest standards of industry testing for replacing welded wire fabric in the construction industry {i.e., the International Code Council (ICC) and Underwriters Laboratories (UL)}. UltraFiber 500 currently holds ICC (formally, SBC, BOCA, IBC, UBC) code certification stating that UltraFiber 500 may be used as an alternate to WWF for plastic shrinkage and temperature cracking (see ICC ERS-1032).

ICC does not recognize post cracking average residual strength (ARS) as a code acceptance requirement for fiber reinforced concrete. ARS (i.e., ASTM 1399) is induced by an applied extrinsic force, not intrinsic stresses. ARS is only measuring the temporary strength of the fibers spanning a concrete crack. This strength will decline as plastic polypropylene fibers degrade due to exposure to ultraviolet light and ambient conditions. Under ASTM 1399 test methods the fiber is only loaded one time. The test method does not consider the affect of repeated loads on the same concrete. Under repeated loading, polypropylene fibers will pull out of the concrete or the fibers will stretch, therefore the benefit of the post crack performance is minimal at best. All of the fiber types (synthetic macro, synthetic micro, steel, glass, etc) sold under ICC evaluation has the same secondary reinforcement approval as UltraFiber 500, with no requirement for post cracking average residual strength as an acceptance criterion.

Use the chart below to determine the proper dosage rate for Ultrafiber500

New designation by wire number	Old designation by wire gauge	UltraFiber500 dosage
6 x 6 -w 1.4 x w 1.4	6 x 6 -10 x 10	1.5 pounds per yard
6 x 6 -w 2.0 x w 2.0	6 x 6 - 8 x 8	2.0 pounds per yard
6 x 6 -w 2.9 x w 2.9	6 x 6 - 6 x 6	3.0 pounds per yard
6 x 6 -w 4.0 x w 4.0	6 x 6 - 4 x 4	4.0 pounds per yard
Temperature steel	# 3 at 24" on center	3.0 pounds per yard
Temperature steel	# 4 at 24" on center	3.0 pounds per yard
Temperature steel	# 3 at 18" on center	4.0 pounds per yard
Temperature steel	# 4 at 18" on center	4.0 pounds per yard

Disclaimer:

1. This chart should not be construed as engineering advice.

UltraFiber 500 reinforces concrete at the micro level to combat crack formation and increase the stress carrying capacity of the concrete prior to reaching the first crack level (i.e. flexural strength). Flexural strength testing is required by ICC (and universally recognized by Structural/Civil Engineers) in their evaluation criteria for fibers in concrete (synthetic and cellulose). Flexural strength testing has shown that UltraFiber 500 fibers are equal to or better than synthetic fibers when used for secondary reinforcement

ARS History– A Synthetic Fiber Marketing Tool

The first synthetic fibers introduced for use in fiber reinforced concrete were fibrillated polypropylene fibers. The average fiber length was 2 - 2 ¼" and the recommended fiber dosage was 1.5 lb/cy. The fiber dosage, based on the longer fiber length, was not a high enough volume and therefore produced poor results. These fibers also proved to be difficult to finish and produced a "hairy" look on the concrete surface. Monofilament polypropylene fibers were soon introduced in response to these issues. In an effort to differentiate between these fiber types, tests such as average residual strength (ARS) and toughness were developed. ARS is a marketing tool developed by polypropylene fiber suppliers to support the replacement of WWF. ARS test methods produce an extremely high rate of variability and are currently being debated and modified in ASTM and ACI committees. Problems in interpreting ARS and toughness of fiber reinforced concrete are discussed by Banthia and Mindess (see ASTM Journal of Testing and Evaluation, March 2004, Vol. 32 (#2), pp 1-5). Synthetic polypropylene fiber producers claim that these tests indicate the "crack holding power" of fibers. Neither of these tests is required by International Code Council in their evaluation criteria for the use of fibers (synthetic or cellulose) in concrete for secondary reinforcement. Furthermore, these tests results are not considered by Structural/Civil Engineers in the design of concrete slabs or other fiber reinforced concrete structures. All secondary reinforcing fibers are discontinuous and are considered only as crack control. Fibers are not considered structural reinforcement. To minimize product liability claims, caution should be taken when presenting post cracking ARS strength results to architects and engineers.

UltraFiber 500 Benefits vs. WWF

UltraFiber 500 provides a reduction in plastic shrinkage cracking and is distributed throughout the concrete matrix to provide three dimensional reinforcement. UltraFiber 500 will not corrode, provides internal curing, and improves concrete strength, durability, permeability and freeze-thaw properties. UltraFiber 500 is also more cost effective to use than WWF.

WWF is typically not positioned in the proper location in the concrete and only reinforces the concrete after cracking has occurred.

Visit www.ultrafiber500.com to calculate your cost savings vs. WWF and to learn more about the benefits of UltraFiber 500 !