TECHNICAL DATA SHEET

INTEGRAL / ACRYLIC / DESIGNED FOR POLISHED CONCRETE

GREENUMBRELLA®

FiberLite Concrete Fiber STAGE II

TRANSPARENT & STRONGER FROM TOP TO BOTTOM

FEATURES & BENEFITS

ENHANCES PERFORMANCE & DURABILITY

PROVIDES SECONDARY REINFORCEMENT

ELIMINATES PLASTIC SHRINKAGE CRACKING UP TO 100%

ALKALI RESISTANT & NON CORROSIVE

INSOLUBLE IN WATER

NO FIBER PROTRUSION FOR EASY FINISHING

HIGH IMPACT RESISTANCE

EXCELLENT BOND WITH CONCRETE PASTE

Green Umbrella® FiberLite™ is a low dose, insoluble, transparent in the mix, uniquely designed, secondary reinforcement concrete fiber. Providing isotropic, fiber reinforcement that displaces evenly without clumping or unsightly protrusion from concrete commonly seen in other fibers. The even dispersion and transparency in the mix make it the best choice for exposed architectural concrete with integral or dyed floors and all exposed concrete finishes, vertical or horizontal. FiberLite™ provides the added protection from sudden temperature fluctuation and wind changes that cause unsightly plastic cracking providing an engineered dose that outworks conventional dosing with the lowest .66 pound dosage per c/y and the highest 600,000,000+ fibers per pound count - verses standard market fibers. Transparent in placement and finishing providing no burden to the pumping or finishing crews. Secondary reinforcement with equal strength to Welded Wire Fabric. FiberLite™ reinforces without the need for WWF mats, layout, installation, overlapping, tying/placing and potential vapor barrier damage due to puncture. Fiberlite's unique formulation forms an ionic bond within the fresh matrix attacking plastic shrinkage cracking and reducing it over 94%! Three-dimensional, next generation reinforcement from top to bottom.

BASIC USE

Green Umbrella Fiberlite is a uniquely designed concrete fiber that can be used as a powerful reinforcement. Fiberlite can be used as an alternative or combined with wire mesh to reduce cracking due to stress on the slab. When used in a polished concrete application, the fibers are transparent in the mix and can be dyed and polished.

VERSATILE ARCHITECTURAL APPLICATIONS

Green Umbrella FiberLite's characteristics lend itself to a variety of concrete applications including slab-on-grade, precast concrete, shot-crete, stucco, decorative and other specialty concrete applications.

MANUFACTURER

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DIVISION/SECTION

SECTION 0324
FIBROUS REINFORCING

RELATED SECTIONS

SECTION0321
REINFORCING STEEL

SECTION03300
CAST-IN-PLACE CONCRETE

SECTION03370
SHOTCRETE

SECTION03500
CEMENTITIOUS DECKS
AND UNDERLAYMENT

GREENUMBRELLA®

ARCHITECTURAL APPLICATIONS FAQ

What other applications besides typical slabs on ground and precast can FiberLite be specified?

FiberLite can been utilized in a multitude of high performance applications such as: tunnels, saline environments, swamp areas, hurricane or seismic regions as well as less demanding applications: precast, shotcrete, thin-overlays (concrete less than 4 in. (100 mm) thick), whitetoppings, concrete curbs. For more details on each of these applications and more please contact your Green Umbrella Concrete Additives.

Can Green Umbrella fibers be used in precast products?

Yes. The definition of a precast concrete member is simply an item that is "cast before" — one that is cast and cured in a form other than its final position. This concrete product application might include a wide variety of items: patio stones, splash blocks, step units, septic tanks, architectural facade panels, median barriers, railroad ties, burial vaults, utility boxes, bridge beams, grade rings, pipes, hollow-core slabs, manholes, and fence posts, as well as hundreds of different decorative ornamental items. It is very important for the precast producer to find methods to increase the toughness and early strength of his concrete products to reduce waste, minimize callbacks and returns, and aid in the item's long-term durability. If precasters are able to strip the forms and move "green" products to a curing area without breakage, the fiber reinforcement is obviously fulfilling its initial performance obligation. In addition, precasters notice less breakage, chipping, and spalling during handling, delivery, and placement of their products due to the unique three-dimensional Green Umbrella fiber coverage. The use of higher dosages of macro fibers allows the precaster to replace a higher level of conventional steel — contact Green Umbrella for engineering assistance.

Can FiberLite be used in shotcrete applications?

Yes. The term 'shotcrete' is generally used to describe concrete or mortar that is placed or shot at a high velocity onto a given surface by means of compressed air. The reinforcement used in typical shotcrete applications is expected to provide resistance to shear, flexure, and bending loading that may result from soil or rock movement, or from local hydrostatic pressures. The placement of wire mesh on typical irregular shotcrete surfaces is both cumbersome and costly with regards to labor. Synthetic fibers may be used as alternate materials that offer the necessary toughness-index and residual strength levels required, without the hassle and labor costs associated with mesh.

Can Green Umbrella fibers be used in toppings or overlays?

Yes. An overlay is defined as a layer of concrete or mortar, seldom thinner than 1 inch (25 mm.), placed on, and usually bonded onto, the worn or cracked surface of a concrete slab. The overlay is usually designed to either restore or improve the function of the previous surface. Similarly, a topping is also defined as a layer of concrete or mortar placed to form a floor surface on a concrete base, yet is not necessarily bonded to the existing slab. Although deterioration of the old surface or severe cracking of the old slab is most often the reason for a topping course, other reasons might include a lack of floor levelness, improper elevation or plane, inadequate skid or slip resistance, or a lack of wear resistance. Regardless of the

WEBSITE & DOCUMENTS AVAILABLE AT:

GREENUMBRELLASYSTEMS.COM

CUTSHEET, APPLICATION SHEET, FEATURE BROCHURE, TECHNICAL DATA SHEET, SAFETY DATA SHEET

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reasons, slab toppings and overlays can provide a cost-effective method of restoring an existing slab into serviceable condition, without the expense of removal and replacement. In addition to the normal difficulties of placing mesh in flatwork applications, there are additional related complications when toppings and overlays are placed. Naturally, the steel wire mesh requires sufficient cover within the concrete (usually a minimum of 2" or 5 cm.) to prevent corrosion-related spalling and unsightly mesh lines. Obviously, this cover becomes impossible in thin concrete toppings. In unbonded overlay applications, the placement of wire mesh becomes equally difficult without disrupting or damaging the bond-breaking layer or sheeting. One of the most important negatives with regards to mesh is the lack of uniform reinforcement coverage. The mesh is obviously located in one plane only in these thin applications that demand reinforcement to counter problems caused by one-directional bleeding, differential shrinkage, and curling. The use of fiber alleviates these concerns.

ADDITIONAL BENEFITS

In addition to the post-first crack benefits, additional benefits in this application will include the plastic shrinkage cracking mechanism and the reduced volume change due to thermal and moisture variables. There are further quantifiable benefits that would be gained by using this 3-dimensional reinforcement system provided by the FiberLite micro fiber including enhanced surface abrasion resistance and impact resistance.

PHYSICAL PROPERTIES

Material	Modified Acrylic
Specific Gravity (g/m3)	117
Elastic Modulus (GPa)	>10.5
Tenacity (MPa)	>650
Decomposition Temperature	330˚C / 626˚F (Green Umbrella Fiberlite does not melt)
Acid & Alkali Resistance	Excellent
Color	White
Dispersity Rate	Excellent
Filament Diameter (μ)	1015
Fiber Count (fiber/kg) approx	794,000,000
Fiber Length (mm) (other lengths available)	6

PACKAGING

1 bag (.66lb)
1 Carton/32 Bags; 36 Cartons/Pallet
Truckloads are available. Bales are available upon request.

For general applications such as slab-on grade, a standard dosage of (1) bag/yd is recommended. Other fibers require higher dosage rates to achieve similar performance. For other applications, consult with your Green Umbrella™ representative for recommended dosages.

WHY DO FIBERS "BALL UP" IN CONCRETE MIXES?

ALL FIBER TYPES (STEEL, MICRO AND MACRO SYNTHETIC) HAVE THE POTENTIAL TO "BALL UP" IN CONCRETE. THIS PHENOMENON IS USUALLY CAUSED BY ADDITION OF FIBERS INTO CONCRETE MIXES THAT ARE TOO DRY (SLUMP DECREASES TO ZERO) OR INTO MIXTURES THAT DO NOT HAVE ENOUGH FINE PARTICLES (CEMENT, SAND, SUPPLEMENTAL MATERIALS, ETC.) TO COAT THE FIBER PARTICLES, WHICH IN TURN "PASTE STARVES" THE SYSTEM AND AGAIN CAUSES THE SLUMP TO DECREASE TO ZERO. LOOSE FIBERS IN AN EMPTY DRUM MAY CLUMP TOGETHER AND FIBER TYPES THAT ARE TOO LONG OR HAVE VARYING GEOMETRIES MAY ALSO CAUSE PROBLEMS. AS ALWAYS, A TEST TRIAL SHOULD BE PERFORMED TO ENSURE THAT THE MIXTURE WILL SUPPORT THE FIBER TYPE AND DOSAGE AND THAT THE BATCHING SEQUENCE WILL NOT CAUSE ANY PROBLEMS. IF NECESSARY, THE USE OF A WATER REDUCING ADMIXTURE MAY BE WARRANTED TO MAINTAIN THE DESIRED SLUMP FOR PLACEMENT.

SPECIFICATIONS

CUTSPEC

FiberLite™ by Green Umbrella® of Rochester, NY (844) 200-7336 is a low dose, insoluble, transparent in the mix, uniquely designed, secondary reinforcement concrete fiber. Providing isotropic fiber reinforcement that displaces evenly without clumping or unsightly protrusion from concrete commonly seen in other fibers. Place at mixing of *@EarlyAge* concrete at a DOSAGE RATE of .66 lb/cyd for general applications such as slab-on grade, a standard dosage of (1) bag/yd3 is recommended. Other fibers require higher dosage rates to achieve similar performance. For other applications, consult with your Green Umbrella® representative for recommended dosages.

TEST STANDARDS

ASTM C39	Concrete Cylinder Compression
ASTM C78-1	Standard Test Method for Flexural Strength of Concrete
ASTM C1018	Standard Test Method for Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete
ASTM C666	Freeze Thaw Durability
ASTM C234	Bond Strength
ASTM C1116/ C1116 M-08a	Standard Specification for Fiber-reinforced Concrete
ICS ES AC 32	Section 3.1.1 3.1.2

SUMMARY

Flexural	4.38 MPa (635 psi) 110% of Control
Bond Strength	89.02 kN (20,012 psi) 111% of Control
Impact Resistance	7 Days 225% of Control
Impact Resistance	28 Days 193% of Control
Plastic Shrinkage Cracking Average Reduction	90.4%

CONCLUSION

Based on the test results, Green Umbrella® FiberLite™ used at a dosage rate of 0.66 lb/yd (0.39 kg/m) exceeded the test parameters required by ICCES AC32.

FIBERLITE FOR WWF REPLACEMENT

FiberLite meets the definition of a micro synthetic fiber. FiberLite at .66 lb/cyd. will meet the same engineering property requirements for the slab-on-ground on projects as 6x6-W1.4xW1.4 WWF.

PRODUCT MIXING AND PUMPING

No Mix Design Change Needed

When fibers are used at recommended dosage and application rates, no mix design changes are necessary. However, if fiber volume rates are dramatically increased, some alterations in the mix design may be required. Please contact us for assistance regarding mix design and fiber dosage rates.

Dosage Rate
Green Umbrella produces a range of synthetic fibers used at various dosages to meet the performance requirements of a project or owner. Green Umbrella recommends the following performance-based characteristics:

1. For plastic shrinkage crack-control during the early life of the concrete: 1 bag per yard of FiberLite;
2. For shrinkage and temperature-related crack-control as an alternate to light non-structural wire mesh in most applications: 1 bag per yard of FiberLite;

See your Green Umbrella representative for engineered dose per application.

Timing of Fiber Addition
Green Umbrella products should be added to the concrete mixing system at the batch plant for best distribution. Follow the normal mixer manufacturers' standard recommendations and ASTM C-94. Mixing time should be a minimum of four to five minutes per load at a normal mixing speed. The batch plant will be the most economical and safest place for addition of the fibers. Typically it is not recommended that fibers be introduced to the mixer as a first ingredient, but added with other ingredients or at the end of the addition sequence.

Job Site Addition
Fibers can be added to ready-mix trucks at the job site, though it is recommended they be added at the batch plant for optimum mixing and distribution. If fibers are added at the site, extra caution should be exercised to ensure sufficient mixing time. Allow at least 4 to 5 minutes of mixing time at drum mixing speed after the last product bag has been added. Fiberlite can be stored at the job site as long as it is properly covered to keep the packaging materials intact and dry.

Concrete Slump
Because of its isotropic three-dimensional cohesive nature, fiber-reinforced concrete has the appearance of being less workable than plain concrete. In actuality, the visual slump may be reduced slightly but the flowability remains nearly same. Caution; never allow water to be added at the job site to bring back slump loss. The use of a super plasticizer is recommended to increase slump if needed.

Compatibility with Liquid Admixtures
Synthetic fibers have no effect on air entrainment, super plasticizers, or water reducers. If possible, synthetic fibers should be added prior to any liquid admixtures to take full advantage of the mixing shear and friction of the mix to optimize the distribution.

Concrete Pumping
For normal weight concrete FiberLite does not increase the pressure needed to pump the concrete mix or cause any other issues. Fiber reinforcement has become a desirable construction practice for a wide range of concrete applications. The ease of addition and the uniform distribution have given fibers distinct job site advantages over non-structural wire mesh. These advantages are even more valuable on projects where the concrete is delivered by a pumping process. The use of integral fiber reinforcement eliminates the wire mesh hassle encountered by the pump-line labor force, and allows the nozzle-man an unencumbered field in which to operate. In lieu of hoisting rolls of mesh onto upper-level deck projects, Green Umbrella-reinforced concrete can simply be pumped into place, offering significant time and labor savings to the project. Though fibers tend to change the "visual appearance" of the concrete, the pump operators typically

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notice more consistent and slightly lower pump pressures are required for fiber concrete.

Concrete Finishing
Fiberlite will not interfere with a laser screed or power trowel finish. The vibration of the laser guided screed brings cement to the surface and covers almost all exposed fibers. Those not covered will be burned off with any power trowel finish. The possibility of replacing conventional steel mats with High Volume Synthetic Fibers allows for a much easier laser screed placement and finishing process.

Broom Finish
The use of a stiff bristled broom used in only one direction will help align surface fibers with the texture ridges, making them considerably less noticeable.
There is no surface protrusion when using FiberLite. FiberLite can be pumped or placed using conventional equipment and can be used with all finishing techniques including power and hand troweling, broom finished and colored concrete.

SURFACE APPEARANCE

There is no surface protrusion when using FiberLite. FiberLite can be pumped or placed using conventional equipment and can be used with all finishing techniques including power and hand troweling, broom finished and colored concrete.

NOTE: TIME, TEMP, AND HUMIDITY

Best Practice according to ACI Standards.

WARRANTY AND LIMITATIONS

It is the responsibility of the contractor to follow all directions and requirements as outlined in the Green Umbrella installation specifications. A completed Job Survey form must accompany this warranty request. Green Umbrella™ Companies (GU) solely and expressly warrants that its products shall be free from defects in materials. and workmanship for six months from the date of purchase. Unless authorized in writing by an officer of Green Umbrella, no other representations or statements made by Green Umbrella™ or its representatives, in writing or orally shall alter this warranty, GREEN UMBRELLA MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR ORDINARY OR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES THE SAME. GREEN UMBRELLA APPLIED TO SUBSTANDARD CONCRETE IS EXCLUDED FROM ANY KIND OF WARRANTY. If any Green Umbrella™ product fails to conform to this warranty Green Umbrella™ will replace Green UmbrellaTM product at no cost to the Buyer. Replacement of any product shall be the sole and exclusive remedy available and the buyer shall have no claim for incidental or consequential damages. Any installation of Green Umbrella products that fails to conform to such installation information and 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 suitability of Green Umbrella products for the Buyers intended purposes.