



Producer Statement

UltraFiber500

Description

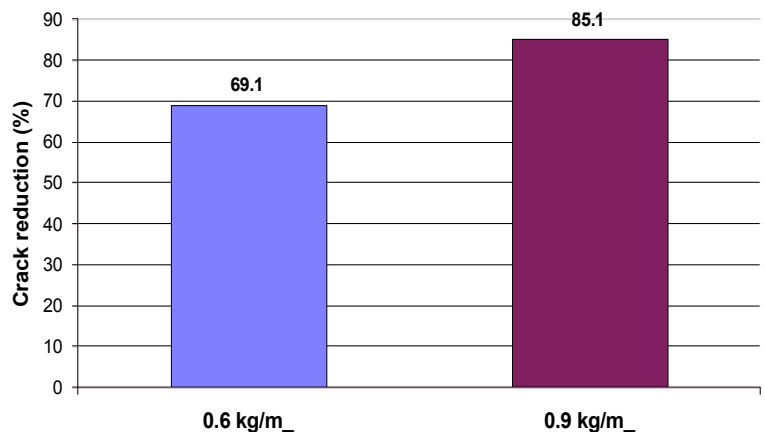
UltraFiber™ 500 fibre reinforcement, a curing and conditioning system for concrete, is a natural 100% virgin specialty cellulose fibre with a patented alkaline resistant coating specifically engineered and manufactured in an ISO 9001 certified facility. The fibres have a tensile strength between 620 – 900 MPa with an average length of 2.1mm and diameter of 16um. The fibre is hydrophilic and will absorb up to 85% of its weight in water.

Purpose

UltraFiber500 is used to give a pronounced reduction in plastic shrinkage, early age and temperature cracking in concrete poured on grade. They are hydrophilic and assist to cure the concrete from within, and can be used as an additional curing method in accordance with NZS3109. They promote more complete hydration of cement in concrete as moisture is drawn from fibres. Which with cement crystals bonding to the pervasive fibre add strength that leads to strength gains above

comparable dry cured concrete's at 28 days. The small fibres use this moisture attraction and bond to effectively condition the concrete and stop micro-cracking. Used to produce a pronounced increase in concrete bond strength to steel reinforcing, and to reduce concrete's brittleness when the steel is in tension, making it suitable for seismic design. To considerably improve fire resistance to concrete and in suspended floors. The concrete produced provides superior freeze - thaw durability. UltraFiber500 concrete reduces the permeability of concrete; and it also increases: impact resistance; flexural strength; and abrasion resistance.

Plastic shrinkage crack reduction using UltraFiber500 (control = 0% reduction)



Under the Microscope (140x magnification)

	28 Day Observations		
	Control	UltraFiber500	UltraFiber500
Observation	No Fibre	0.9 kg/m3	1.8 kg/m3
Unhydrated cement	Some	Less than control	Less than 0.9kg
Micro-cracks	Yes	None	None

UltraFiber500 effectively improves the micro-structure of concrete

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Mix Design

The addition of UltraFiber500 reinforcing fibres at normal dosage rates does not require any mix design changes.

Mixing Procedures

UltraFiber500 reinforcing fibres disperse best when added at the beginning of the batching sequence usually with the water. Follow normal mixing time and speed as recommended by the code. Additional mixing instructions for full dispersal of fibre are available on request.

Application Rate

The standard application rate for UltraFiber500 is 0.9 kg/m³ of concrete. Increased dosage rates can provide improved performance. The dosage shall not exceed 9.0 kg/m³.

Compatibility

UltraFiber500 reinforcing fibre is compatible with all normal concrete constituents and admixtures and will not adversely affect their performance.

Approved installations

Includes floor slab on ground, footpaths, driveways, parking areas, sloped paving, kerb and channel, decorative finishes, overlays, swimming pool surrounds, marine environments, commercial floors, concrete with or without reinforcing, composite floors and decks, shotcrete, precast, polished concrete, slip form and casting insitu-walls and columns, and fire rated concretes.

Usage Guidelines – NZS 3604:1999

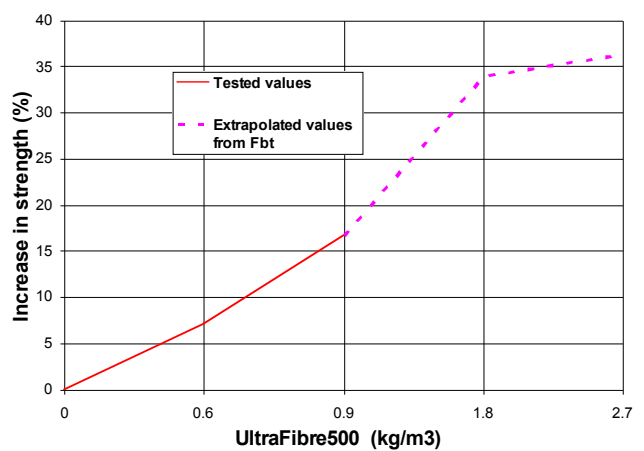
UltraFiber500 fibres may be used as an alternative to temperature and shrinkage mesh such as 668, 665 or higher meshes in accordance with the Building Code. It shouldn't be used as an alternative for any reinforcement used on unstable ground, but may be used in combination for good results. Design of the concrete, joint spacing, thickness and subbase strength shall comply with the current NZ standard. UltraFiber500 usage is normally limited to aggregate based concretes, as their shearing action is required to disperse fibres.

Durability

UltraFiber500's alkali resistance is high in accordance with ASTM D6942. The fibre has been tested in concrete since 1990 and has been shown not to deteriorate.

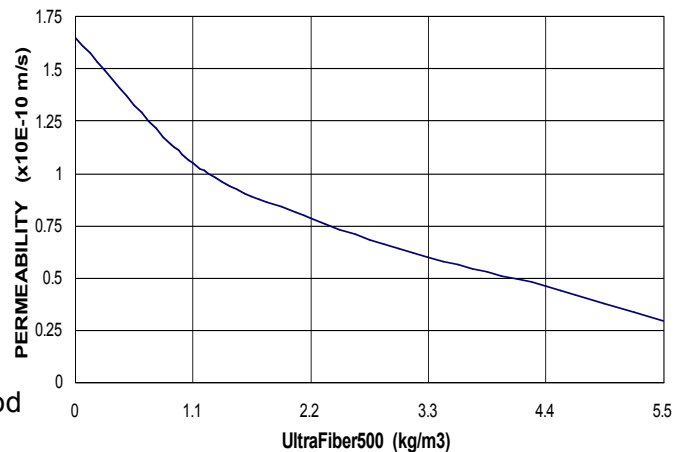
Fire: Concrete using UltraFiber500 has been shown to pass the standard 90 minute fire test curve for columns with little deterioration as described in AS3600/ NZS3101:2006/ISO834 (rated 90/90/-) They have also passed 2hr fire rating in suspended floors. The use of UltraFiber500 provides an additional method to protect reinforcing from environmental exposure, resulting in an increase in concrete life.

Effect on compressive strength



UltraFiber500 increases concrete strength

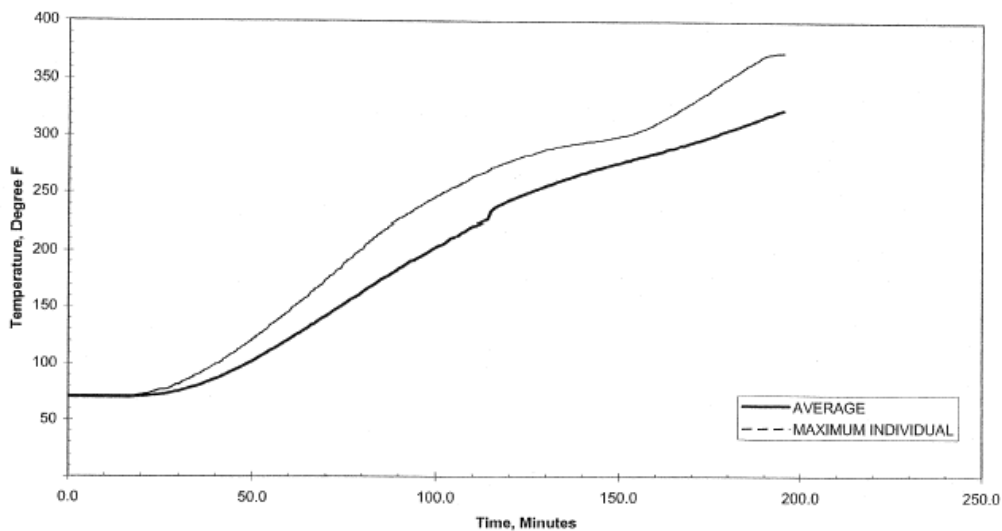
Change in Permeability



UltraFiber500 effectively reduces water permeability in concrete

Fire test on Suspended steel floor

BUCKEYE TECHNOLOGIES
D900 FLOOR - CEILING ASSEMBLY
UNEXPOSED SURFACE AVG. & MAX TEMPERATURES, °F



Test results on a 50mm deep, 0.75mm thick fluted steel floor, with 115mm of 30MPa concrete reinforced with 0.9kg/m³ of UltraFiber500, and 20mm Ø shear connectors. The preloaded floor passes a 3hour 12min fire test exceeding the 2hour design, making it superior to ordinary concrete. (Underwriters Laboratories Inc, Oct 2006)

Finishing

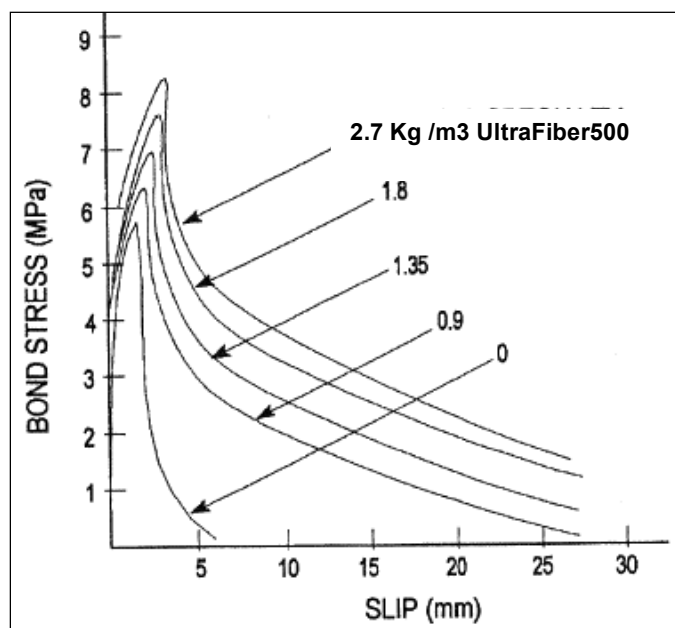
UltraFiber500 provides superior finishability and has no restrictions or barriers to normal finishing techniques. This is because the fibres lie flat and are virtually invisible on the surface. These finishes include: trowel, broom, exposed aggregate, imprint, coloured, stained and many others. They also promote a more controlled water bleed rate that finishers can use to advantage.

Dispersible Bags or Automated Bulk Dispenser Technology

Various bag sizes are available from the ½ kg bag up to the super size 180kg sack. For cost effective labour reducing production the automated dispenser is recommended.

Safety

UltraFiber500 is a natural cellulose fibre and when exposed below published TLV's the fibre is not likely to be harmful when ingested or inhaled, though they may be abrasive in the eyes. Material safety data sheets are available on request.



Seismic - Ultrafiber500 locks cement particles together to resist shearing action of reinforcing in concrete. (Graph shows 20mm reinforcing rod embedded into 30MPa concrete).

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Precast Concrete

UltraFiber500 can be used with confidence in all precast work to enhance the finished appearance, and to reduce flexural cracking and bug holes. The surface is stronger which leads to less damage when lifting. The concrete releases more cleanly from the formwork and bed and there is a definite reduction in edge chipping, and handling damage. For thinner sections, visual appearance improves by eliminating reinforcing shadowing. Overall the panel achieves a more consistent and smoother finish liked by finishers and clients.

Environmentally Friendly

UltraFiber500 is made from renewable and sustainable resources and can contribute to achieving the Green Star rating for a building. It is an excellent alternative to steel mesh.

Recommended Dosage Rates

Concrete type	Volume / m ³
Driveways, Residential Slabs on Grade, Non-structural, Pool surrounds, Kerb and channel, Bench Tops, Polished finish, Exposed aggregate, Decorative Concrete and Block fill.	From 0.90 kg - 2 bags
Commercial Slabs, Precast elements, Composite floors, Structural members, Parking buildings, Roads, Toppings, Insitu- Walls.	Varies. Refer to Multiform Systems Engineers

Rates may be increased with confidence where excessive drying is expected or other properties are required. Please contact Multiform Systems engineers for advice on your job.

Supplementary References

1. Auberg, R. and Legenhausen, U., "Tests to improve the crack development of concrete caused by shrinking processes by using cellulose and plastic Fibres", WISSBAU® Consultant Engineers GmbH, Kruppstr 82-100, 45145 Essen, Germany., 2004.
2. Banthia, N. and Bhargava, A., "Permeability of stressed concrete and role of Fibre reinforcement" The University of British Columbia, Canada. 2004.
3. Collignon, C. and Robert. F., "Spalling test of concrete prisms with Buckeye Fibres following a standard fire curve (ISO 834)", CERIB, Construction Products Division - Fire Section. 2004.
4. Dixon, D.E., "Comparative examination of concrete samples"-Hydration effects using UltraFibre500, Dixon & Associates, INC. 2004.
5. Buckeye Technologies, INC., "BTB #2 Finishability" 2006.
6. Buckeye Building Fibres LLC., "BTB #3 Alkali resistance" 2006.
7. Buckeye Building Fibres LLC., "BTB #4 Hydration benefit" 2006.
8. Material Safety Data Sheets, 2005.
9. ICC Evaluation Services, INC., "ESR-1032, Buckeye UltraFibre 500™ Virgin Cellulose Fibres". 2005.
10. Johnson, V., "Decorative Colored Fibres Evaluation" Buckeye Technologies, INC., 2005.
(New international testing undertaken regularly and available on request)
11. Information for Engineers, Multiform Systems Ltd, 2010

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MFS UF500D1005

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