Technical Bulletin #10

UltraFiber500® versus Macro Fiber Study

UltraFiber 500® is the revolutionary, custom-modified cellulose polymer, which is alkali resistant and provides numerous advantages like superior finishing and excellent crack reduction. **UltraFiber 500®** has over 700 million crack-fighting fibers per pound! This facilitates their ability to stop micro cracks as they may form.

Previous field research conducted by the University of Nevada Reno showed that **UltraFiber 500** was much easier to finish and produced a superior slab finish than any of the macro fibers. In the field work, the compressive strength and level of shrinkage crack control was the same as the macro fibers.

This study was conducted with a leading certified concrete lab to compare the shrinkage crack control and strength between a leading macro fiber and UltraFiber 500® under more controlled lab conditions. The fiber dosage rate was 4 lbs per cubic yd.

Mix Design:					
slump	**Max CA**	**C Ash**	**Air**	**w/cm**	**f'_c**
4-5 in	3/4 in	15%	1.5-2.5%	0.45	4,000 psi
Batch Weights: lbs/yd³					
PC Type I	**Fly Ash**	**FA**	**CA**	**Water**	**Fiber Addition**
559	99	1365	1700	295	0 or 4

Results comparing UF-500 to a leading "Macro" fiber

Test:	**UF500®**	**% of Control**	**Polypropylene[1]**	**% of Control**
Beam Strength (C78)	770 psi	105.5	730	102.1
7-day Cylinder (C39)	6870 psi	107.5	6240	108.0
28-day Cylinder (C39)	8440 psi	108.3	7870	107.1
Plastic Cracking[2]	------	**-82.7**	------	**-57.4**

[1] The fibers were Grace Strux 90/40. Similar results were obtained with other polypropylene products.
[2] Test procedure taken from Appendix A of AC 32 & AC 217. Full lab report is available upon request.

Conclusions: The above results show that both natural and synthetic fibers provide a small improvement in strength performance based on beam and cylinder testing. **However, the reduction of plastic shrinkage cracking is significantly higher for UltraFiber 500®.** This difference is related to the fibers per pound number. Since the natural fibers are shorter and thinner than the synthetic fibers, there are more individual fibers for the natural fibers at equal weight. This means that the natural fibers are more effective at preventing micro-cracks that become large scale cracks that are unsightly and lead to water intrusion and corrosion of reinforcement.

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