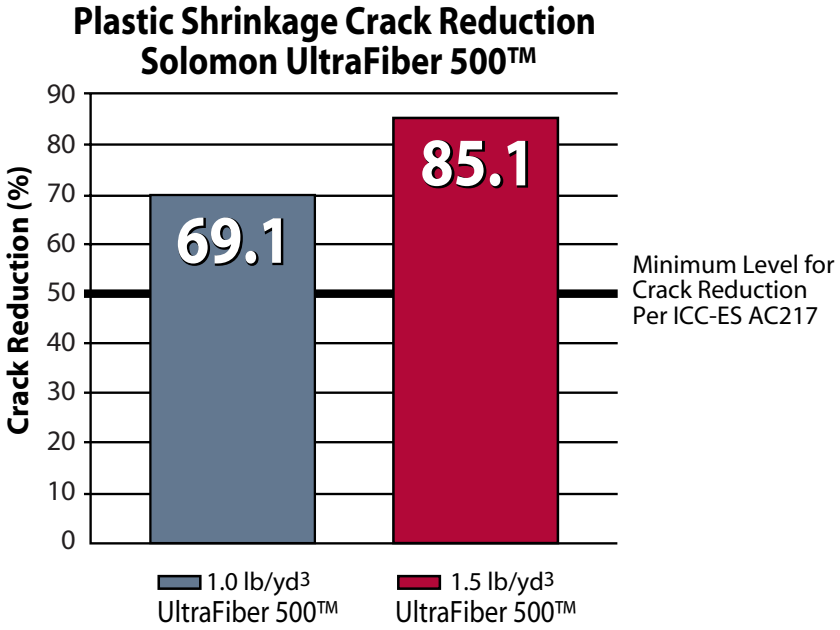
# UltraFiber Technical Bulletin
# UFTB #1
## Plastic Shrinkage Crack Reduction

### TESTING PURPOSE:

To measure plastic shrinkage cracking in concrete containing Solomon UltraFiber 500™ compared to concrete with no fiber.

### TESTING CONCLUSIONS:

Solomon UltraFiber 500™ reduces plastic shrinkage cracking by 69.1% for 1.0 lb/yd$^3$ dose and by 85.1% for 1.5 lb/yd$^3$ dose compared to concrete with no fiber. Both of these results exceed the requirements of ICC Evaulation Service, Inc. as specified in Acceptance Criteria 217, Annex A.




### RESEARCH METHODOLOGY:

Twelve concrete mixes were formed for each study (six with and six without fibers). The mix design used for each study is outlined below in Figure 1. All samples were prepared by Stork Twin City Testing Corporation personnel at Stork's facility in St. Paul, Minnesota.

**Rectangular Mold**
**with Center Stress Riser and Two Restraints**

4050 Color Plant Road, Springfield, IL 62702, PH: 800-624-0261 • 360 S Lilac, Rialto, CA 92376, PH: 866-747-2656
Email: sgs@solomoncolors.com • www.ultrafiber500.com

### Figure 1 - Mix Designs

| Materials | UF 500 | UF 500 | Control |
|---|---|---|---|
| Portland Cement, Lehigh Type I, kg/m3 (lb/yd$^3$) | 307 (517) | 307 (517) | 307 (517) |
| Coarse Aggregate, #57 Limestone Gravel, kg/m3 (lb/yd$^3$) | 1009 (1700) | 1009 (1700) | 1009 (1700) |
| Fine Aggregate, Natural Sand, kg/m3 (lb/yd$^3$) | 810 (1365) | 810 (1365) | 810 (1365) |
| Water, kg/m3 (lb/yd$^3$) | 172 (290) | 172 (290) | 172 (290) |
| Fiber, Solomon UltraFiber 500™, kg/m3 (lb/yd$^3$) | 0.59 (1.0) | 0.89 (1.5) | --- |

Testing occurred according to the procedures outlined in ICC-ES AC217, Annex A. The size of each test panel was 22-11/16" long by 13-5/16" wide. Each mold contained two restraints and a center stress riser. The samples were cast, screeded, and placed in front of a uniform airflow of 10 mph or greater. A one square foot monitoring pan of water was placed adjacent to each sample and weighed periodically to determine the evaporative moisture loss. A minimum evaporative moisture loss of 0.2 pounds of water per square foot of surface per hour (0.975 kg/m$^2$/h) is required by the Annex A test method. Environmental testing conditions were adjusted to produce the required amount of water loss.

Testing continued to the point at which final set occurred (minimum of 3 hours) as specified in ASTM C 403. Once final set was obtained, the total cracking value was determined for each test panel by adding the crack area (length of crack multiplied by average width of the crack) for each crack. From the cracking value, a percent crack reduction is calculated on each UltraFiber 500™ reinforced panel and its corresponding control panel.

## RESEARCH RESULTS

The average crack reduction for the 1.0 lb/yd$^3$ samples of UltraFiber 500™ was 69.1%. The average crack reduction for the 1.5 lb/yd$^3$ samples of UltraFiber 500™ was 85.1%. ICC-ES AC217 specifies that virgin cellulose fibers decrease plastic shrinkage cracking by a minimum of 50%. Solomon UltraFiber 500™ exceeds the ICC requirement for plastic shrinkage crack control at both 1.0 lb/yd$^3$ and 1.5 lb/yd$^3$. A detailed data sheet of all research results is available through Solomon.

**Using 1.0 lb/yd$^3$ UltraFiber 500™ and Corresponding Controls**

**AVERAGE CRACK REDUCTION 69.1%**

**Using 1.5 lb/yd$^3$ UltraFiber 500™ and Corresponding Controls**

**AVERAGE CRACK REDUCTION 85.1%**

## REFERENCES

**Stork Twin City Testing Corporation, St. Paul, MN**
- Project No.: 033411, January 23, 2004
- Project No.: 034051, March 8, 2005
- Project No.: 325039.10, November 7, 2005
- Project No.: 325039.11, November 7, 2005

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