

June 22, 2009

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**Evaluation of Grout Boost Additive with Mapei Keracolor S Grout – ANSI A118.7
Final Report for CTLGroup Project No. 409576**

Dear Ms. Miller:

Attached are the final test results of grout testing performed by CTLGroup on behalf of Specialty Construction Brands, Inc., between February 16, 2009 and March 17, 2009, at our Skokie facility. The objective of this work was to evaluate the performance of Mapei Keracolor S Grout¹ modified with Grout Boost additive² relative to that mixed with water. The scope of work included the evaluation of one tile grout product and the preparation of this report.

As instructed, the grout was mixed according to the manufacturer's directions and testing was performed primarily in accordance with ANSI A118.7 – 1999, "American National Standard Specifications for Polymer Modified Cement Grouts for Tile Installation" and in general accordance with the corresponding ASTM standards. The following sections were included in the test program:

- N-3.3 Linear Shrinkage (ASTM C 531)
- N-3.4 Water Absorption
- N-3.5 Compressive Strength (ASTM C 109)
- N-3.6 Tensile Strength (ASTM C 307)
- N-3.7 Flexural Strength (ASTM C 580)

LINEAR SHRINKAGE, ANSI A118.7 SECTION N-3.3 (ASTM C 531)

Four molds as described in ASTM C 531-00(2005), "Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes," were filled with grout, leveled and struck off. Specimens were stored in the molds at 73.5°F ± 3.5°F and 55% ± 5% RH for 72 hours and then removed from the molds. The length change of each bar was determined with a length comparator (S/N 338-97). The measurement at 3 days is considered the initial measurement. Additional measurements were taken at 24 hours and 7 days after the initial measurement.

¹ Lot No. WHITE S21K8124(2).

² Lot No. 3981222702.

Test results for linear shrinkage indicate that Mapei Keracolor S grout achieved a 0.01% improvement in linear shrinkage when prepared with Grout Boost additive as compared to mixtures containing only water. The linear shrinkage percentage reported is the average of four bars.

WATER ABSORPTION, ANSI A118.7 SECTION N-3.4

Cylinders of grout, approximately 1-inch tall, were cast from a 1-inch inside diameter piece of plastic tubing and stored at $73.5^{\circ}\text{F} \pm 3.5^{\circ}\text{F}$ and $55\% \pm 5\%$ RH for 72 hours, at which time the specimens were removed from the tubing molds. The specimens were then cured for an additional 25 days at the same laboratory conditions. Six grout specimens were prepared for testing.

The specimens were weighed to the nearest 0.01 grams (W_i) and then fully submerged in water at 140°F and allowed to cool for 22 hours. After cooling, the specimens were removed, patted dry with a paper towel, and weighed to the nearest 0.01 grams (W_s). The specimens were then oven dried to a constant weight (W_d) at $120^{\circ}\text{F} \pm 5^{\circ}\text{F}$.

Test results indicate that Mapei Keracolor S grout modified with Grout Boost additive obtained higher water exclusion, or decrease in water absorption values. Grout Boost additive improved the 50% RH-to-immersion water absorption performance by 52.8%. Further, Grout Boost additive improved the immersion-to-dry water absorption performance by 69.1%.

COMPRESSIVE STRENGTH, ANSI A118.7 SECTION N-3.5 (ASTM C 109)

A set of three 2-in, standard cubes were cast from the grout mixture and stored at $73.5^{\circ}\text{F} \pm 3.5^{\circ}\text{F}$ and $55\% \pm 5\%$ RH for 72 hours, at which time the specimens were removed from the molds. The specimens were then cured for an additional 25 days at the same laboratory conditions. At the age of 28 days the specimens were tested in compression according to ASTM C 109/C109M-01, "*Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)*" and the average of the three specimens was determined.

Test results indicate that Grout Boost additive improved the 28-day compressive strength of Mapei Keracolor S Grout by 42.3% as compared to mixtures containing only water.

TENSILE STRENGTH, ANSI A118.7 SECTION N-3.6 (ASTM C 307)

Two sets of three tensile briquettes were cast from the grout mixture and stored at $73.5^{\circ}\text{F} \pm 3.5^{\circ}\text{F}$ and $55\% \pm 5\%$ RH for 72 hours, at which time the specimens were removed from the molds. One set of three specimens were allowed to cure for an additional 4 days and the other set of three for an additional 25 days, all under the same laboratory conditions. Specimens were then tested in tension after 7 and 28 days, respectively. The tensile strength of the grout was determined in accordance with ASTM C 307-03(2008), "*Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.*"

Test results indicate that Grout Boost additive improved tensile strength. The grout specimens tested in tension at 7 days obtained a 17.1% increase in tensile strength when prepared with Grout Boost additive as compared to mixtures containing only water. Additionally, grout specimens tested in tension at 28 days obtained a 69.7% increase in tensile strength when prepared with Grout Boost additive as compared to mixtures containing only water.

FLEXURAL STRENGTH, ANSI A118.7 N-3.7 (ASTM C 580)

Upon completion of linear shrinkage testing, the test bars were tested for flexural strength. At the end of seven days of curing out of the molds, the specimens were tested as outlined in ASTM C 580-02(2008), "Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes."

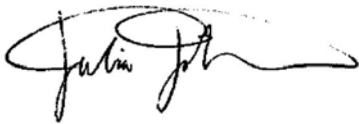
Test results indicate that Grout Boost additive improved flexural strength by 13.9% as compared to mixtures containing only water. A summary of all test results is presented in Table 1.

Table 1. Summary of Test Results

<u>ANSI Test Method</u>	<u>% Improvement by Grout Boost Additive</u>
Linear Shrinkage	0.01
50% RH-to-Immersion Water Absorption	52.8
Immersion-to-Dry Water Absorption	69.1
28-day Compressive Strength	42.3
7-day Tensile Strength	17.1
28-day Tensile Strength	69.7
Flexural Strength	13.9

We appreciate this opportunity to conduct specialized testing for you. Should you have any questions or require further testing, please contact us.

Sincerely,



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Attachments