

January 15, 2017

Mr. Clint Shimon
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Subject: **Report of ANSI A118.7 Testing**
Product: Various Products
TEC Services Project No: TEC 15-5977
TEC Services Laboratory No: 16-1163

Dear Mr. Shimon:

Testing Engineering & Consulting Services, Inc. (TEC Services) is an AASHTO R18, ANS/IEC/ISO 17025:2005, and Army Corps of Engineering accredited laboratory. TEC Services is pleased to present this report of testing on the four pre-packaged products submitted to our laboratory in November of 2016. The four products were designated as Mapei Ultra Color Plus, Laticrete Permacolor, TEC Power Grout, and Custom Building Products Prism Color Consistent Grout. Testing was performed in accordance with the terms and conditions of our Service Agreement (TEC-PRO-15-5977). These test results pertain only to the samples tested.

The purpose of the testing was to evaluate the physical properties of the submitted product in accordance with ANSI A118.7-2012 *American National Standard Specifications for High Performance Cement Grouts for Tile Installation*. The materials were conditioned to $73 \pm 3.5^{\circ}\text{F}$ for 24 hours prior to sampling. Mixing was performed at conditions of $73 \pm 3.5^{\circ}\text{F}$ and $52 \pm 2\%$ relative humidity using a mixer meeting the requirements of ASTM C305-14 *Standard Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency*. The water was added to the mixing bowl followed by the introduction of the dry material. The products were mixed and slacked in accordance with each of the manufacturer's recommendations. Mix proportions and ambient conditions are reported in Table 1. Summary test results are reported in Table 2. Testing was performed in accordance with the following test standards as modified by the applicable sections of ANSI 118.7.

ASTM C109/C109M-16a	<i>Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)</i>
ASTM C580-02(2012)	<i>Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes</i>
ASTM C190 - 85	<i>Method of Test for Tensile Strength of Hydraulic Cement Mortars (Withdrawn 1990)</i>
ASTM C531-00(2012)	<i>Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes</i>
ASTM C413-01(2012)	<i>Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes</i>

Table 1 – Mix Proportions

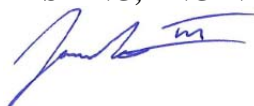
Product	Mapei Ultra Color Plus	Laticrete Permacolor	TEC Power Grout	Custom Building Products Prism Color
Dry Material (g)	3000	3000	3000	3000
Water (g)	651	501	501	738
w/m ratio:	0.217	0.167	0.167	0.246
Mixer Type	C305	C305	C305	C305
Mixing Time (min.)	3	2	2	5
Slack Time (min.)	3	5	5	10
Material Temperature (°F)	74	74	74	74
Ambient Temperature (°F)	74	74	74	75
Relative Humidity (%)	52	55	55	55

Table 2 – Summary Test Results

Test Method	Property	Age	Ultra Color Plus	Permacolor	Power Grout	Prism
ASTM C109	Compressive Strength (psi)	24 hrs	2,870	2,880	6,910	4,050
		28 days	4,650	5,810	10,390	5,600
ASTM C190	Direct Tensile Strength (psi)	7 days	330	470	610	300
		28 days	500	610	710	460
ASTM C580	Flexural Strength (psi)	28 days	1095	1175	1355	1000
ASTM C413	Absorption (%)	28 days	7.1	0.6	1.1	6.1
ASTM C531	Length Change (% Change)	24 hrs	-0.027	-0.039	-0.032	-0.033
		3 days	-0.078	-0.080	-0.059	-0.071
		7 days	-0.096	-0.087	-0.068	-0.089
		14 days	-0.107	-0.123	-0.078	-0.102
		28 days	-0.138	-0.140	-0.082	-0.121

We appreciate the opportunity to provide our services to you on this project. Please do not hesitate to contact us at your convenience if you have any questions about this report or if we may be of further assistance.

TESTING, ENGINEERING & CONSULTING SERVICES, INC.



James G. McCants III
Laboratory Manager, Chemist



Shawn P. McCormick
Laboratory Principal

Attachments: Tables 3-8

Table 3 – ASTM C109 – Compressive Strength – 24 hrs

Sample ID	Width (in.)	Depth (in.)	Area (in ²)	Peak Load (lbf.)	Compressive Strength (psi)	Average (psi)
Ultra Color Plus	2.00	2.00	4.00	11,530	2,880	2,870
	2.00	2.00	4.00	11,630	2,910	
	2.00	2.00	4.00	11,220	2,810	
Permacolor	2.00	2.00	4.00	11,460	2,870	2,880
	2.00	2.00	4.00	11,530	2,880	
	2.00	2.00	4.00	11,600	2,900	
Power Grout	2.00	2.00	4.00	28,790	7,200	6,910
	2.00	2.00	4.00	26,610	6,650	
	2.00	2.00	4.00	27,500	6,880	
Prism Color	2.00	2.00	4.00	16,300	4,080	4,050
	2.00	2.00	4.00	16,380	4,100	
	2.00	2.00	4.00	15,930	3,980	

Table 4 – ASTM C109 – Compressive Strength – 28 days

Sample ID	Width (in.)	Depth (in.)	Area (in ²)	Peak Load (lbf.)	Compressive Strength (psi)	Average (psi)
Ultra Color Plus	2.00	2.00	4.00	18,477	4,620	4,650
	2.00	2.00	4.00	18,502	4,630	
	2.00	2.00	4.00	18,794	4,700	
Permacolor	2.00	2.00	4.00	23,500	5,880	5,810
	2.00	2.00	4.00	22,760	5,690	
	2.00	2.00	4.00	23,470	5,870	
Power Grout	2.00	2.00	4.00	41,220	10,310	10,390
	2.00	2.00	4.00	41,660	10,420	
	2.00	2.00	4.00	41,790	10,450	
Prism Color	2.00	2.00	4.00	22,820	5,710	5,600
	2.00	2.00	4.00	22,560	5,640	
	2.00	2.00	4.00	21,830	5,460	

Table 5 – ASTM C190 – Tensile Strength – 7 days

Sample ID	Width (in.)	Depth (in.)	Area (in ²)	Peak Load (lbf.)	Tensile Strength (psi)	Average (psi)
Ultra Color Plus	1.00	1.00	1.00	393	395	335
	1.00	1.00	1.00	299	300	
	1.00	1.00	1.00	313	315	
Permacolor	1.00	1.00	1.00	461	460	470
	1.00	1.00	1.00	468	470	
	1.00	1.00	1.00	474	475	
Power Grout	1.00	1.00	1.00	613	615	610
	1.00	1.00	1.00	606	605	
	1.00	1.00	1.00	604	605	
Prism Color	1.00	1.00	1.00	325	325	320
	1.00	1.00	1.00	326	325	
	1.00	1.00	1.00	309	310	

Table 6 – ASTM C190 – Tensile Strength – 28 days

Sample ID	Width (in.)	Depth (in.)	Area (in ²)	Peak Load (lbf.)	Tensile Strength (psi)	Average (psi)
Ultra Color Plus	1.00	1.00	1.00	472	470	505
	1.00	1.00	1.00	540	540	
	1.00	1.00	1.00	506	505	
Permacolor	1.00	1.00	1.00	663	665	610
	1.00	1.00	1.00	607	605	
	1.00	1.00	1.00	564	565	
Power Grout	1.00	1.00	1.00	696	695	705
	1.00	1.00	1.00	718	720	
	1.00	1.00	1.00	701	700	
Prism Color	1.00	1.00	1.00	442	440	455
	1.00	1.00	1.00	443	445	
	1.00	1.00	1.00	486	485	

Table 7 – ASTM C580 – Flexural Strength – 28 days

Sample ID	Width (in.)	Depth (in.)	Span Length (in.)	Peak Load (lbf.)	Flexural Strength (psi)	Average (psi)
Ultra Color Plus	1.00	1.00	9.00	84.9	1,145	1,095
	1.00	1.00	9.00	76.2	1,030	
	1.00	1.00	9.00	79.9	1,080	
	1.00	1.00	9.00	82.8	1,120	
Permacolor	1.00	1.00	9.00	89.1	1,205	1,175
	1.00	1.00	9.00	89.6	1,210	
	1.00	1.00	9.00	78.4	1,050	
	1.00	1.00	9.00	90.5	1,220	
Power Grout	1.00	1.00	9.00	94.4	1,275	1,355
	1.00	1.00	9.00	101.3	1,370	
	1.00	1.00	9.00	106.6	1,440	
	1.00	1.00	9.00	98.0	1,325	
Prism Color	1.00	1.00	9.00	67.5	1,015	1,005
	1.00	1.00	9.00	67.5	1,015	
	1.00	1.00	9.00	64.9	975	
	1.00	1.00	9.00	67.1	1,015	

Table 8 – ASTM C531 – Linear Shrinkage - % Change

Sample ID	Specimen	1 day	3 days	7 days	14 days	28 days
Ultra Color Plus	1	-0.027	-0.076	-0.096	-0.105	-0.139
	2	-0.025	-0.082	-0.097	-0.114	-0.134
	3	-0.027	-0.076	-0.096	-0.105	-0.139
	4	-0.027	-0.076	-0.096	-0.105	-0.139
	Average	-0.027	-0.078	-0.096	-0.107	-0.138
Permacolor	1	-0.041	-0.077	-0.084	-0.120	-0.138
	2	-0.029	-0.069	-0.090	-0.116	-0.135
	3	-0.043	-0.082	-0.065	-0.125	-0.141
	4	-0.041	-0.093	-0.108	-0.130	-0.147
	Average	-0.039	-0.080	-0.087	-0.123	-0.140
Power Grout	1	-0.033	-0.052	-0.065	-0.075	-0.078
	2	-0.034	-0.059	-0.070	-0.078	-0.082
	3	-0.036	-0.057	-0.070	-0.076	-0.081
	4	-0.026	-0.067	-0.065	-0.082	-0.086
	Average	-0.032	-0.059	-0.068	-0.078	-0.082
Prism Color	1	-0.031	-0.073	-0.088	-0.102	-0.120
	2	-0.033	-0.075	-0.090	-0.105	-0.120
	3	-0.034	-0.067	-0.088	-0.099	-0.120
	4	-0.033	-0.070	-0.090	-0.102	-0.122
	Average	-0.033	-0.071	-0.089	-0.102	-0.121

