SGS TEC SERVICES
Testing • Engineering • Consulting

January 7, 2025

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Subject: **Interim Report for ChemConcrete Waterproofing Admixture Compliance Verification for Type S Admixture**
ASTM C494/C494M-19- ***Standard Specification for Chemical Admixtures for Concrete***
SGS TEC Services Laboratory No: 24-1302

Dear Mr. Kaylor:

SGS TEC Services is an AASHTO R18 (Lab #100142), ANS/ISO/IEC 17025:2017 and Army Corps of Engineers accredited laboratory. SGS TEC Services is pleased to present this report of our compliance verification testing of ChemConcrete Waterproofing Admixture an ASTM C494/C494M-19- *Standard Specification for Chemical Admixtures for Concrete* (ASTM C494), Type S *(Specific Performance)* admixture. Our services were performed in accordance with our service agreement date July 23, 2024.

Sample preparation and testing was performed in accordance with applicable sections of ASTM C494, and documents referenced therein. Material and procedures outlined in ASTM C494 were used. Based on our results to date, ChemConcrete Waterproofing Admixture complies with the requirements in Table 1 of ASTM C494. These test results pertain only to the samples tested.

The compliance verification was performed by SGS TEC Services in Lawrenceville, Georgia. Concrete batching was performed on three different days in September of 2024. One control mixture and one test mixture containing ChemConcrete Waterproofing Admixture both meeting the requirements of ASTM C494 for fresh concrete properties were produced each day. One 5-gallon sample of ChemConcrete Waterproofing Admixture was supplied to SGS TEC Services by ChemConcrete Pty Ltd. The air-entraining agent used in this testing was a vinsol resin, meeting the requirements of ASTM C260/C260M-10a (2016) *Standard Specification for Air-Entraining Admixtures for Concrete*.

Testing of the concrete's plastic properties, time of setting, compressive strengths, flexural strengths, length change, and freeze thaw resistance were performed by SGS TEC Services. Mixture proportions and results of our testing are given in Tables 1 to 3. Information and test data on fine and coarse aggregates are listed in Tables 4 to 6. Table 7 contains information on ChemConcrete Waterproofing Admixture. Product information and test data on the Type I/II cement is included in Table 8. Test results for each of the six batches prepared for this report are included in Tables 9 thru 12.

Table 1: ChemConcrete Waterproofing Admixture performance and ASTM C494 requirements for a Type S admixture.

Test Results	ChemConcrete Admixture	Specification Requirements
Time of setting, deviation of control		
Initial (hr:min)	-0:32	-1:00 to +1:30
Final (hr:min)	-0:45	-1:00 to +1:30
Compressive strength (percent of control)		
3 days	171	90 (min)
7 days	142	90 (min)
28 days	130	90 (min)
56 days	135	90 (min)
90 days	130	n/a
6 months	Due 03-27-25	90 (min)
1 year	Due 09-26-25	90 (min)
Flexural strength (percent of control)		
3 days	124	90 (min)
7 days	115	90 (min)
28 days	120	90 (min)
56 days	117	90 (min)
Length change (increase over control)	0.001	+0.010 (max)
Relative durability factor	101	80 (min)

Table 2: Mixture proportions, fresh concrete properties, and ASTM C494 requirements for Type S admixture

Average of Three Separate Tests	Control Mixture	ChemConcrete Admixture	Specification Requirements
Cement factor (lb/yd^3)	515	516	517 ± 5
Water (lb/yd^3)	286	240	
Water-cement ratio	0.554	0.465	
Coarse aggregate	1844	1848	
Fine aggregate	1160	1285	
Fine aggregate-total aggregate ratio	0.39	0.41	
ChemConcrete Admixture (lbs)	0.00	10.33	
Vinsol Resin (oz/cwt)	0.52	0.56	
Slump (in.)	4.00	3.50	3 ½ ± ½
Air content (%)	5.8	5.6	5-7 (± 0.5 of control)
Density (lb/ft^3)	140.9	144.1	
Time of setting			
Initial (hr:min)	4:29	3:57	
dev. of control (hr:min)		-0:32	-1:00 to +1:30
Final (hr:min)	6:16	5:31	
dev. of control (hr:min)		-0:45	-1:00 to +1:30

Table 3: Properties of hardened concrete

Test Performed	Control Mixture	ChemConcrete Admixture
Compressive strength (psi)		
3 days	2210	3770
7 days	3080	4370
28 days	4290	5570
56 days	4630	6240
90 days	4830	6290
6 months	Due 03-27-25	Due 03-27-25
1 year	Due 09-26-25	Due 09-26-25
Flexural strength (psi)		
3 days	475	590
7 days	555	640
28 days	675	810
56 days	680	795
Length change (%)	-0.021	-0.022
Durability factor (%)	92	93

Table 4: Properties of fine and coarse aggregates

Aggregate Information	Fine aggregate	Coarse aggregate
Manufacturer	**Lambert Sand, Shorter**	**Vulcan, Lithonia**
Aggregate Type	Natural sand	Crushed Granite
Specific Gravity $_{SSD}$	2.630	2.648
Absorption (%)	0.76	0.43

Table 5: Gradation of fine aggregate and ASTM C494 requirements

Percent passing		
Sieve	**Fine Aggregate**	**Specifications Requirements**
No. 4 (4.75 mm)	100	100
No. 16 (1.18 mm)	71	65 to 75
No. 50 (300 µm)	19	12 to 20
No. 100 (150 µm)	4	2 to 5

Table 6: Gradation of coarse aggregate and ASTM C494 requirements

Percent passing		
Sieve	**Coarse Aggregate**	**Specifications Requirements**
1.5 in. (37.5 mm)	100	100
1.0 in. (25.4 mm)	98	95 to 100
0.5 in. (12.5 mm)	34	25 to 60
No. 4 (4.75 mm)	3	0 to 10
No. 8 (2.36 mm)	3	0 to 5

Table 7: Admixture information

Information	**Admixture Information**
Brand Name	ChemConcrete Waterproofing Admixture
Manufacturer	ChemConcrete Pty Ltd.
Lot Size	500 lbs
Solid content (%)	57.914
pH	5.51
Chloride Content (% per BS EN 480-10:2009)	0.001

Table 8: Cement information and test data

ASTM C 150 Type I/II cement			
Brand name		Portland Type I/II	
Manufacturer		Cemex Clinchfield Plant	
Chemical Analyses by Mass (%)			
Silicon dioxide (SiO_2)	20.2	Sulfur trioxide (SO_3)	3.3
Aluminum oxide (Al_2O_3)	4.8	Loss on ignition (950ºC)	2.8
Iron oxide (Fe_2O_3)	3.3	Insoluble residue	0.34
Calcium oxide (CaO)	65.4	Alkalies as Na_2O	0.26
Magnesium oxide (MgO)	1.0		
Calculated Potential Compounds as per ASTM C 150-05 (%)			
Tricalcium silicate (C_3S)	65	Tricalcium aluminate (C_3A)	7.0
Dicalcium silicate (C_2S)	8	Tetracalcium aluminoferrite (C_4AF)	10
Physical Testing and Results			
Fineness Specific Surface (Blaine)	472 m^2/Kg	Air Content (%)	4.9
Setting Times (Vicat) Initial	79 minutes	Autoclave Expansion (%)	0.01
Compressive 3 Day Strength (psi)	3830	Compressive 7 Day Strength (psi)	4650
C1038 Expansion @ 3.39% SO_3 (%)	0.006	Density of Hydraulic Cement (g/cm^3)	3.13

*Provided by Cemex

Table 9: Yield adjusted mixture proportions, fresh concrete properties, and time of set for three control batches.

Materials & Plastic Properties	**Control 1**	**Control 2**	**Control 3**	**Average**
Cement factor (lb/yd^3)	515	514	517	**515**
Water (lb/yd^3)	288	284	285	**286**
Water-cement ratio	0.559	0.552	0.552	**0.554**
Coarse aggregate (lb/yd^3)	1842	1839	1851	**1844**
Fine aggregate (lb/yd^3)	1152	1160	1167	**1160**
Fine aggregate-total aggregate ratio	0.385	0.387	0.387	**0.39**
ChemConcrete Admixture (lbs)	0.00	0.00	0.00	**0.00**
Vinsol Resin (oz/cwt)	0.57	0.53	0.45	**0.52**
Slump (in.)	4.00	4.00	4.00	**4.00**
Air content (%)	5.9	6.1	5.5	**5.8**
Density (lb/ft^3)	140.6	140.6	141.5	**140.9**
Time of setting				
Initial (hr:min)	4:34	4:21	4:31	**4:29**
Final (hr:min)	6:11	6:04	6:32	**6:16**

Table 10: Yield adjusted mixture proportions, fresh concrete properties, and time of set for three test batches containing ChemConcrete Waterproofing Admixture.

Materials & Plastic Properties	**Test 1**	**Test 2**	**Test 3**	**Average**
Cement factor (lb/yd^3)	516	517	516	**516**
Water (lb/yd^3)	239	241	241	**240**
Water-cement ratio	0.464	0.466	0.466	**0.465**
Coarse aggregate (lb/yd^3)	1847	1850	1848	**1848**
Fine aggregate (lb/yd^3)	1286	1285	1283	**1285**
Fine aggregate-total aggregate ratio	0.410	0.410	0.410	**0.41**
ChemConcrete Admixture (lbs)	10.32	10.34	10.32	**10.33**
Vinsol Resin (oz/cwt)	0.55	0.55	0.58	**0.56**
Slump (in.)	3.25	3.50	3.50	**3.50**
Air content (%)	5.6	5.5	5.6	**5.6**
Density (lb/ft^3)	144.0	144.2	144.0	**144.1**
Time of setting				
Initial (hr:min)	3:52	3:57	4:03	**3:57**
Final (hr:min)	5:15	5:32	5:47	**5:31**

Table 11: Properties of hardened concrete from three control test batches

Test Age	**Control 1**	**Control 2**	**Control 3**	**Average**
Compressive strength (psi)				
3 days	2000	2160	2470	**2210**
7 days	3030	3040	3180	**3080**
28 days	4390	4140	4340	**4290**
56 days	4370	4540	4970	**4630**
90 days	4840	4730	4920	**4830**
6 months	Due 03-27-25	Due 03-27-25	Due 03-27-25	**NA**
1 year	Due 09-26-25	Due 09-26-25	Due 09-26-25	**NA**
Flexural strength (psi)				
3 days	495	440	495	**475**
7 days	565	545	560	**555**
28 days	650	665	710	**675**
56 days	705	685	645	**680**
Length change (%)	-0.021	-0.020	-0.022	**-0.021**
Durability Factor (%)	92	92	92	**92**

Approximate Total Cycles Completed	Fundamental Transverse Frequency, kHz			Relative Dynamic Modulus, (%) Average of 2 Beams per Mix			Average
	Control 1	Control 2	Control 3	Control 1	Control 2	Control 3	
0 cycles	2.086	2.086	2.041	NA	NA	NA	NA
32 cycles	2.086	2.086	2.041	100	100	100	100
66 cycles	2.041	2.041	2.041	96	96	100	97
96 cycles	2.041	2.041	1.997	96	96	96	96
128 cycles	2.041	2.041	1.997	96	96	96	96
162 cycles	1.997	1.997	1.953	92	92	92	92
192 cycles	1.997	1.997	1.953	92	92	92	92
220 cycles	1.997	1.997	1.953	92	92	92	92
253 cycles	1.997	1.997	1.953	92	92	92	92
287 cycles	1.997	1.997	1.953	92	92	92	92
300 cycles	1.997	1.997	1.953	92	92	92	92

Table 12: Properties of hardened concrete from three batches containing ChemConcrete Waterproofing Admixture.

Test Age	**Test 1**	**Test 2**	**Test 3**	**Average**
Compressive strength (psi)				
3 days	3650	3800	3870	**3770**
7 days	4370	4360	4370	**4370**
28 days	5610	5520	5590	**5570**
56 days	6250	6420	6060	**6240**
90 days	6300	6080	6490	**6290**
6 months	Due 03-27-25	Due 03-27-25	Due 03-27-25	**NA**
1 year	Due 09-26-25	Due 09-26-25	Due 09-26-25	**NA**
Flexural strength (psi)				
3 days	630	575	570	**590**
7 days	670	610	640	**640**
28 days	840	800	795	**810**
56 days	810	805	765	**795**
Length change (%)	-0.027	-0.020	-0.020	**-0.022**
Durability Factor (%)	96	92	92	**93**

Approximate Total Cycles Completed	Fundamental Transverse Frequency, kHz			Relative Dynamic Modulus, (%) Average of 2 Beams per Mix			Average
	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3	
0 cycles	2.175	2.175	2.175	NA	NA	NA	NA
32 cycles	2.175	2.175	2.175	100	100	100	100
66 cycles	2.175	2.175	2.130	100	100	96	99
96 cycles	2.175	2.130	2.130	100	96	96	97
128 cycles	2.130	2.130	2.130	96	96	96	96
162 cycles	2.130	2.130	2.086	96	96	92	95
192 cycles	2.130	2.086	2.086	96	92	92	93
220 cycles	2.130	2.086	2.086	96	92	92	93
253 cycles	2.130	2.086	2.086	96	92	92	93
287 cycles	2.130	2.086	2.086	96	92	92	93
300 cycles	2.130	2.086	2.086	96	92	92	93

We appreciate the opportunity to provide our services to you on this project. Should you have any questions or comments regarding this report, please feel free to contact us at your convenience.

Sincerely,

SGS TEC Services, Inc.

Shawn P. McCormick
Laboratory Principal

Michael Lyon
Project Manager