Applied Testing & Geosciences, LLC
When Quality Counts

Mrs. Katheryn L. Malusky 4/30/2025
AASHTO
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Subject: Final Report for Supercizer 7 Compliance Verification for C494 F Admixture
AASHTO M194-13 (2017) Standard Specification for Chemical Admixtures for Concrete
NTPEP ID: CADD-2024-01-003 ATG Project ID: 13292-5842

Dear Mrs. Malusky:
Applied Testing & Geosciences LLC (ATG) is an AASHTO R18, ANS/ISO/IEC 17025:2017 accredited laboratory. ATG is pleased to present this report of our compliance verification testing of Supercizer 7 admixture, a C494 F admixture. Our services were performed in accordance with our service agreement date 11/10/21.

Sample preparation and testing was performed in accordance with applicable sections of AASHTO M194-13 (2017) Standard Specifications for Chemical Admixtures for Concrete, ASTM C494 and documents referenced therein. Material and procedures outlined in AASHTO M194 were used. Based on our results to date, the product complies with the requirements in AASHTO M194 and Table 1 of ASTM C494 (except as noted)*. These test results pertain only to the samples tested.

The compliance verification was performed by ATG in Bridgeport, PA. Concrete batching was performed on 4/30/24. Three control mixtures and three test mixtures containing Supercizer 7 admixture, all meeting the requirements of AASHTO M194 and ASTM C494 for fresh concrete properties, were produced. A 1 gallon sample of Supercizer 7 admixture was supplied to ATG by Fritz-Pak Corporation. The air-entraining agent used in this testing was a vinsol resin, meeting the requirements of AASHTO M154-12 (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 ATG. 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 Supercizer 7 admixture. Product information and test data on the Type I cement is included in Table 8. Test results for each of the six batches prepared for this report are included in Tables 9 to 12.

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Table 1. Admixture performance

Test Results	Supercizer 7	Specification Requirements
Water content (percent of control)	86%	</=88%
Time of setting, deviation of control		
Initial (hr:min)	1:14	-1:00 to +1:30
Final (hr:min)	1:03	-1:00 to +1:30
Compressive strength (percent of control)		0
1 day	157%	>/=140%
3 days	170%	>/=125%
7 days	163%	>/=115%
28 days	140%	>/=110%
56 days	134%	>/=110%
90 days	135%	>/=117%(Optional)
6 months	141%	>/=100%
1 year	140%	>/=100%
Flexural strength (percent of control)		
3 days	131%	>/=110%
7 days	138%	>/=100%
28 days	126%	>/=100%
56 days	132%	>/=100%
Length change (increase over control)	-0.006	</=0.010
Relative durability factor	93%	>/=80%

*Provisional Requirement

Table 2. Mixture proportions and fresh concrete properties

Average of Three Separate Tests	Control Mixture	Supercizer 7	Specification Requirements
Cement factor (lb/yd^3)	516	515	517 +/- 5
Water (lb/yd^3)	261	225	NA
Water-cement ratio	0.506	0.436	NA
Coarse aggregate	1913	1912	NA
Fine aggregate	1159	1268	NA
Fine aggregate-total aggregate ratio	0.377	0.399	NA
Supercizer 7 % by weight	0.0	0.6	NA
Vinsol Resin (oz/cwt)	0.47	0.26	NA
Slump (in.)	3.75	3.25	3 ½ ± ½
Air content (%)	6.1	5.6	5-7 (± 0.5 of control)
Density (lb/ft^3)	142.5	145.9	NA
Time of setting			
Initial (hr:min)	4:51	6:05	
dev. of control (hr:min)	NA	1:14	-1:00 to +1:30
Final (hr:min)	6:46	7:49	
dev. of control (hr:min)	NA	1:03	-1:00 to +1:30

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Table 3. Properties of hardened concrete

Test Performed	Control Mixture	Supercizer 7
Compressive strength (psi)		
1 day	2430	3810
3 days	3300	5610
7 days	4180	6800
28 days	5380	7520
56 days	5780	7720
90 days	6310	8550
6 months	5840	8220
1 year	5580	7820
Flexural strength (psi)		
3 days	480	630
7 days	510	705
28 days	650	820
56 days	685	905
Length change (%)	-0.020	-0.027
Durability factor (%)	99%	92%

Table 4: Properties of fine and coarse aggregates

Aggregate Information	Fine aggregate	Coarse aggregate
Manufacturer	State Road	Mount Materials
Aggregate Type	Sand	Stone
Specific Gravity SSD	2.634	2.698
Absorption (%)	0.48	0.690

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)	69%	65 to 75
No. 50 (300 µm)	17%	12 to 20
No. 100 (150 µm)	2%	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)	97%	95 to 100
0.5 in. (12.5 mm)	29%	25 to 60
No. 4 (4.75 mm)	2%	0 to 10
No. 8 (2.36 mm)	1%	0 to 5

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Table 7: Admixture information

Information	Admixture Information
Brand Name	Supercizer 7
Manufacturer	Fritz-Pak Corporation
Lot Size	Per Cient
Lot Number	01231121
Specific Gravity	NA
Solid content (%)	91.40
pH	NA
Chloride Content (% per BS EN 480-10:2009)	0.022

Table 8: Cement information and test data

ASTM C 150 Type I/II cement			
Brand name	I/II Low Alk		
Manufacturer	Riverside		
Chemical Analyses by Mass (%)			
Silicon dioxide (SiO2)	19.30	Sulfur trioxide (SO3)	2.80
Aluminum oxide (Al2O3)	4.80	Loss on ignition (950ºC)	1.63
Iron oxide (Fe2O3)	3.90	Insoluble residue	0.08
Calcium oxide (CaO)	64.80	Alkalies as Na2O	0.40
Magnesium oxide (MgO)	1.60		
Calculated Potential Compounds as per ASTM C 150-05 (%)			
Tricalcium silicate (C3S)	72	Tricalcium aluminate (C3A)	7
Dicalcium silicate (C2S)	1	Tetracalcium aluminoferrite (C4AF)	11
Physical Testing and Results			
Fineness Specific Surface (Blaine) cm2/kg	4150	Air Content (%)	9.0
Setting Times (Vicat) Initial (minutes)	144	Autoclave Expansion (%)	-0.04
Compressive 3 Day Strength (psi)	4510	Compressive 7 Day Strength (psi)	5420
C1038 Expansion (%)	0.01	Density of Hydraulic Cement (g/cm3)	3.15

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/yd3)	516	516	516	516
Water (lb/yd3)	261	261	260	261
Water-cement ratio	0.506	0.506	0.505	0.506
Coarse aggregate (lb/yd3)	1913	1913	1913	1913
Fine aggregate (lb/yd3)	1188	1134	1156	1159
Fine aggregate-total aggregate ratio	0.383	0.372	0.377	0.377
Supercizer 7 % by weight	0.00	0.00	0.00	0.00
Vinsol Resin (oz/cwt)	0.47	0.47	0.47	0.47
Slump (in.)	3.75	4.00	3.75	3.75
Air content (%)	5.6	7.0	5.8	6.1
Density (lb/ft3)	143.6	141.6	142.4	142.5
Time of setting				
Initial (hr:min)	4:40	4:55	4:58	4:51
Final (hr:min)	6:36	6:44	6:58	6:46

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

Materials & Plastic Properties	Test 1	Test 2	Test 3	Average
Cement factor (lb/yd3)	515	515	515	515
Water (lb/yd3)	226	228	221	225
Water-cement ratio	0.439	0.442	0.429	0.436
Coarse aggregate (lb/yd3)	1912	1911	1912	1912
Fine aggregate (lb/yd3)	1283	1265	1255	1268
Fine aggregate-total aggregate ratio	0.401	0.398	0.396	0.399
Supercizer 7 % by weight	0.6	0.6	0.6	0.6
Vinsol Resin (oz/cwt)	0.24	0.24	0.29	0.26
Slump (in.)	3.25	3.25	3.50	3.25
Air content (%)	5.2	5.6	5.9	5.6
Density (lb/ft3)	146.4	146.0	145.2	145.9
Time of setting				
Initial (hr:min)	6:11	5:39	6:24	6:05
Final (hr:min)	7:58	7:13	8:15	7:49

Table 11 Properties of hardened concrete from three control test batches

Test Age	Control 1	Control 2	Control 3	Average
Compressive strength (psi)				
1 day	2550	2160	2580	2430
3 days	3300	3410	3190	3300
7 days	4290	4100	4140	4180
28 days	5410	5500	5230	5380
56 days	6200	5270	5860	5780
90 days	6310	6160	6460	6310
6 months	6110	5450	5950	5840
1 year	5810	5420	5510	5580
Flexural strength (psi)				
3 days	520	450	470	480
7 days	560	480	495	510
28 days	675	680	595	650
56 days	760	655	645	685
Length change (%)	-0.016	-0.021	-0.024	-0.020
Durability Factor (%)	97%	100%	100%	99%

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	2227	2188	2188	NA	NA	NA	NA
30 cycles	2227	2188	2188	100%	100%	100%	100%
60 cycles	2227	2188	2188	100%	100%	100%	100%
90 cycles	2227	2188	2188	100%	100%	100%	100%
120 cycles	2188	2188	2188	97%	100%	100%	99%
150 cycles	2188	2188	2188	97%	100%	100%	99%
180 cycles	2188	2188	2188	97%	100%	100%	99%
210 cycles	2188	2188	2188	97%	100%	100%	99%
240 cycles	2188	2188	2188	97%	100%	100%	99%
270 cycles	2188	2188	2188	97%	100%	100%	99%
300 cycles	2188	2188	2188	97%	100%	100%	99%

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Table 12 Properties of hardened concrete from three test batches.

Test Age	Test 1	Test 2	Test 3	Average
Compressive strength (psi)				
1 day	3940	3720	3770	3810
3 days	5260	5710	5850	5610
7 days	6660	6810	6940	6800
28 days	7590	6950	8010	7520
56 days	6840	8270	8050	7720
90 days	8390	8220	9050	8550
6 months	7940	7670	9060	8220
1 year	7390	8060	8010	7820
Flexural strength (psi)				
3 days	625	625	640	630
7 days	665	650	795	705
28 days	860	730	875	820
56 days	925	900	885	905
Length change (%)	-0.028	-0.025	-0.027	-0.027
Durability Factor (%)	93%	87%	97%	92%

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	2305	2344	2344	NA	NA	NA	NA
30 cycles	2305	2344	2344	100%	100%	100%	100%
60 cycles	2305	2344	2344	100%	100%	100%	100%
90 cycles	2305	2344	2344	100%	100%	100%	100%
120 cycles	2266	2305	2305	97%	97%	97%	97%
150 cycles	2266	2305	2305	97%	97%	97%	97%
180 cycles	2266	2305	2305	97%	97%	97%	97%
210 cycles	2266	2305	2305	97%	97%	97%	97%
240 cycles	2266	2305	2305	97%	97%	97%	97%
270 cycles	2266	2305	2305	97%	97%	97%	97%
300 cycles	2227	2188	2305	93%	87%	97%	92%

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,
Applied Testing & Geosciences LLC.

Craig J. Joss, PhD, PE
Technical Manager

Thomas C. Smith
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