AMERICAN ENGINEERING TESTING, INC.

September 22, 2021

Ms. Katheryn Malusky
NTPEP
444 N Capitol Street NW
Suite 249
Washington DC, 20001

CADD-2020-01-058
Final Compliance Report: Fritz-Pak Corp., Super Slump Buster, Type S
ASTM C494/C494M – 16, "Standard Specification for Chemical Admixtures for Concrete"
AASHTO M194/M194 – 13(2017), "Standard Specification for Chemical Admixtures for Concrete"
AET Project No. 29-20780

Dear Ms. Malusky:

American Engineering Testing, Inc. (AET) is pleased to present this report of our compliance verification testing of Super Slump Buster. The attached report presents the final test results of the referenced admixture. One 20-lb bag of the admixture was received on July 21, 2020 and the NTPEP notification to proceed was received on June 30, 2020.

All sample preparation and testing was performed in accordance with the applicable sections of AASHTO M194M/M194M – 13(2017), ASTM C494/C494M – 16, "Standard Specification for Chemical Admixtures for Concrete" and all referenced documents. Based on our results through one year, Super Slump Buster, Type S complies with the requirements in AASHTO M194/M194 and Table 1 of ASTM C494 for a Type S, specific performance admixture.

Concrete batching and test specimen fabrication was conducted on three separate days. One control mixture and one test mixture containing Super Slump Buster, both meeting the requirements of AASHTO M194 and ASTM C494 for fresh concrete properties, were produced each day. A commercially available vinsol resin air-entraining admixture was used for the concrete mixtures. Holcim Type I/II portland cement from the St. Genevieve plant was used for all concrete mixtures.

Product information and cement chemical and physical properties are presented in Tables 1 and 2. Aggregate properties and gradations are presented in Tables 3 and 4. Mixture proportions and results of testing are given in Tables 5 and 6.

If there are any questions with regard to this report, please contact me.

Sincerely,
American Engineering Testing, Inc.

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TABLE 1. Admixture Information

	Reference Admixture	Test Admixture
Manufacturer	Mapei	Fritz-Pak Corp.
Brand Name	Vinsol Resin	Super Slump Buster
NTPEP CADD Number	--	CADD-2020-01-058
Lot Number	E093014	97180
Quantity Supplied	1 Quart	One 20-lb Bag
Total Solids, %	15.01	97.49
Specific Gravity	1.044	N/A
pH	10.7	11.75
Chloride, %	0.009	0.151 note 1

Note 1: Testing conducted using European Standard EN 480-10, Method 1

TABLE 2. Portland Cement Analysis – Chemical and Physical

ASTM C150 Type I/II Cement

Brand Name: St. Genevieve — Manufacturer: LafargeHolcim Inc.

Chemical Analysis, Mass %

Silicon dioxide (SiO_2)	19.9	Tricalcium silicate (C_3S) (%)	67
Aluminum oxide (Al_2O_3)	4.5	Dicalcium silicate (C_2S) (%)	3
Iron oxide (Fe_2O_3)	3.1	Tricalcium aluminate (C_3A) (%)	6
Calcium oxide (CaO)	64.0	Tetracalcium alumino ferrite (C_4AF) (%)	9
Magnesium oxide (MgO)	2.3	$C_3S + 4.75C_3A$ (%)	96.1
Sulfur trioxide (SO_3)	3.3		
Insoluble Residue (%)	0.36	Loss on Ignition (%)	3.1
Alkalies as Na_2O_{eq} (%)	0.55		

Physical Analysis

Fineness, Blaine (m^2/kg)		392	Air Content (%)		6.0
Vicat Time of Set	Initial, minutes	90	Autoclave Expansion (%)		0.04
Mortar expansion (%) (C1038)		0.005			
Compressive Strength		3 Day (psi)	4,210	7 Day (psi)	5,250

TABLE 3. Properties of Fine and Coarse Aggregates

	Fine Aggregate	Coarse Aggregate
Manufacturer	Aggregate Industries	Martin Marietta
Aggregate type, ID	Natural Sand, Elk River	#57 Crushed Granite
Specific gravity, SSD	2.667	2.698
Absorption %	0.7	0.3

TABLE 4. Gradations of Fine and Coarse Aggregates, According to ASTM C136

Fine Aggregate		
	Percent passing	**ASTM C494/AASHTO M 194 Requirements**
No. 4 [4.75 mm]	100	100
No. 16 [1.18 mm]	72	65 to 75
No. 50 [300 µm]	17	12 to 20
No. 100 [150 µm]	2	2 to 5

Coarse Aggregate		
	Percent passing	**ASTM C494/AASHTO M 194 Requirements**
1.5 in. [37.5 mm]	100	100
1.0 [25.0 mm]	96	95 to 100
0.50 in. [12.5 mm]	44	25 to 60
0.375 in. [9.5 mm]	6	0 to 10
No. 4 [4.75 mm]	3	0 to 5
No. 8 [2.36 mm]	100	100

TABLE 5. Test Results for Concrete Made with Super Slump Buster, Type S, Using 0.02 lb/cwt

		Control Mixtures				Test Mixtures				ASTM C494/AASHTO M 194 Requirements, Type S
Mix Number		**1**	**2**	**3**	**Average**	**1**	**2**	**3**	**Average**	
Cast Date		8/4/2020	8/12/2020	8/18/2020		8/4/2020	8/12/2020	8/18/2020		
Mixture Proportions	Cement, pcy	519	521	520	**520**	520	520	520	**520**	**517 ± 5**
	Fine Aggregate, pcy	1,282	1,289	1,285	**1,285**	1,285	1,285	1,285	**1,285**	
	Coarse Aggregate, pcy	1,770	1,780	1,775	**1,775**	1,775	1,775	1,775	**1,775**	
	Water, pcy	285	286	286	**286**	286	286	286	**286**	
		Water Content, % of Control				100	100	100	**100**	
	AEA (Vinsol Resin)	Mapei Vinsol Resin				Mapei Vinsol Resin				
	AEA dose, oz/cwt	0.8	0.8	0.8	**0.8**	0.8	0.8	0.8	**0.8**	
	Test Admixture	--	--	--	**--**	Super Slump Buster				
	Admixture dose, lb/cwt	--	--	--	**--**	0.02	0.02	0.02	**0.02**	
	Water-to-Cement Ratio	0.55	0.55	0.55	**0.55**	0.55	0.55	0.55	**0.55**	
Plastic Properties	Slump, inches	4.00	3.75	3.75	**3.75**	3.50	3.75	4.00	**3.75**	**3.50 ± 0.50**
	Air Content, %	6.0	5.9	6.0	**6.0**	5.9	5.5	6.2	**5.9**	**± 0.5**
	Density, pcf	142.8	143.6	143.2	**143.2**	143.2	143.2	143.2	**143.2**	
Setting Time	Initial, hr:min	4:04	3:47	4:31	**4:07**	4:04	3:49	4:40	**4:11**	
	Final, hr:min	5:40	5:22	6:21	**5:47**	5:38	5:18	6:28	**5:48**	
	Deviation from Reference				Initial, hr:min	0:00	0:02	0:09	**0:04**	**Not More than 1:00 Earlier nor 1:30 Later**
					Final, hr:min	-0:02	-0:04	0:07	**0:01**	**Not More than 1:00 Earlier nor 1:30 Later**
Compressive Strength	3 Days, psi	3,220	3,040	2,990	**3,080**	3,210	3,520	3,190	**3,310**	
	7 Days, psi	3,630	3,630	3,640	**3,630**	3,860	5,050	3,990	**4,300**	
	28 Days, psi	4,980	4,460	4,510	**4,650**	5,130	5,230	4,850	**5,070**	
	56 Days, psi	5,210	5,090	5,160	**5,150**	5,240	5,630	5,220	**5,360**	
	90 Days, psi	5,420	5,190	5,500	**5,370**	5,390	6,150	5,850	**5,800**	
	6 Months, psi	5,890	5,240	5,660	**5,600**	5,870	6,450	6,210	**6,180**	
	1 Year, psi	5,910	5,590	5,710	**5,740**	6,030	6,670	6,340	**6,350**	
	% Reference				3 Days	100	116	107	**107**	**≥ 90%**
					7 Days	106	139	110	**118**	**≥ 90%**
					28 Days	103	117	108	**109**	**≥ 90%**
					56 Days	101	111	101	**104**	**N/A**
					90 Days	99	118	106	**108**	**N/A**
					6 Months	100	123	110	**110**	**≥90%**
					1 Year	102	119	111	**111**	**≥ 90%**
Flexural Strength	3 Days, psi	605	590	560	**585**	580	665	600	**615**	
	7 Days, psi	605	700	580	**630**	640	675	615	**645**	
	28 Days, psi	675	730	630	**680**	695	690	690	**690**	
	56 Days, psi	700	625	635	**655**	605	820	745	**725**	
	% Reference				3 Days	96	113	107	**105**	**≥ 90%**
					7 Days	106	96	106	**102**	**≥ 90%**
					28 Days	103	95	110	**101**	**≥ 90%**
					56 Days	86	131	117	**111**	**N/A**
Length Change, %		-0.015	-0.003	0.000	**-0.006**	-0.009	-0.006	-0.011	**-0.009**	
		Increase Over Control				-0.006	0.003	0.011	**0.003**	**≤ 0.010**[B]
Resistance to Freezing and Thawing	**Relative Dynamic Modulus, %** 0 cycles	100/100	100/100	100/100	100	100/100	100/100	100/100	100	
	34 cycles	96/96	95/97	98/99	97	96/96	95/97	98/97	97	
	70 cycles	96/96	97/97	98/99	97	98/98	97/97	99/98	97	
	103 cycles	98/98	98/97	96/98	98	96/96	98/98	98/98	97	
	139 cycles	98/99	99/99	99/100	99	98/98	99/99	99/98	98	
	171 cycles	99/99	99/98	98/99	99	96/96	99/99	99/98	98	
	207 cycles	99/99	99/99	99/100	99	98/98	99/99	98/98	98	
	243 cycles	99/99	100/99	99/100	99	98/98	100/100	99/98	99	
	279 cycles	99/98	99/99	99/100	99	98/98	99/99	98/98	98	
	300 cycles	99/98	100/100	99/100	99	98/96	99/99	98/98	98	
									99	**≥ 80%**

[A] Alternative requirement. If any of the measured relative strengths are greater than the requirement in parentheses, the admixture shall be considered provisionally qualified until the 1-year strength results are obtained.

[B] Increased shrinkage over control.

TABLE 6. ASTM C494/AASHTO M 194 Test Results of Chemical Admixtures for Concrete
Super Slump Buster, Type S, 0.02 lb/cwt

Mixture Designation	Control	Super Slump Buster	Change vs. Control	ASTM C494/AASHTO M 194 Requirements, Type S
Mixture Proportions				
Cement, pcy	520	520	0	**517 ± 5**
Fine Aggregate, pcy	1,285	1,285		
Coarse Aggregate, pcy	1,775	1,775		
Water, pcy	286	286		
AEA (Vinsol Resin), oz/cwt	0.8	0.8		
Test Admixture, lb/cwt	--	0.02		
Ratio of Fine to Total Aggregate, %	42	42		
Water-to-Cement Ratio	0.55	0.55		
Plastic Properties				
Slump, inches	3.75	3.75	0.00	**3.50 ± 0.50**
Air Content, %	6.0	5.9	-0.1	**± 0.5**
Density (Unit Weight), pcf	143.2	143.2		
Setting Time				
Initial, hr:min	4:07	4:11	0:04	**Not More than 1:00 Earlier nor 1:30 Later**
Final, hr:min	5:47	5:48	0:01	**Not More than 1:00 Earlier nor 1:30 Later**
Compressive Strength, psi				
3 Days, psi	3,080	3,310	107	**≥ 90%**
7 Days, psi	3,630	4,300	118	**≥ 90%**
28 Days, psi	4,650	5,070	109	**≥ 90%**
56 Days, psi	5,150	5,360	104	**N/A**
90 Days, psi	5,370	5,800	108	**N/A**
6 Months, psi	5,600	6,180	110	**≥90%**
1 Year, psi	5,740	6,350	111	**≥ 90%**
Flexural Strength, psi				
3 Days, psi	585	615	105	**≥ 90%**
7 Days, psi	630	645	102	**≥ 90%**
28 Days, psi	680	690	101	**≥ 90%**
56 Days, psi	655	725	111	**N/A**
Length Change by Drying Shrinkage				
Length Change, %	-0.006	-0.009	0.003	**≤ 0.010**[B]
Resistance to Freezing and Thawing, Procedure A				
Relative Durability Factor, %			99	**≥ 80%**

[A] Alternative requirement. If any of the measured relative strengths are greater than the requirement in parentheses, the admixture shall be considered provisionally qualified until the 1-year strength results are obtained.

[B] Increased shrinkage over control.