



July 16, 2019

Mr. Tim Yeiser  
Dricrete  
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Marina Del Rey, CA 90292

**Final Compliance Report: Dricrete™ - Intelligent/Integral Concrete Waterproofing, 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. 29-20291

Dear Mr. Yeiser:

American Engineering Testing, Inc. (AET) is pleased to present this report of our compliance verification testing of Dricrete™ - Intelligent/Integral Concrete Waterproofing. The attached report presents the final test results of the referenced admixture. One 12-lb. bag sample of the admixture was received on May 25, 2018.

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, Dricrete™ - Intelligent/Integral Concrete Waterproofing, 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 one day. Three control mixtures and three test mixtures containing Dricrete™ - Intelligent/Integral Concrete Waterproofing, both meeting the requirements of AASHTO M194 and ASTM C494 for fresh concrete properties, were produced. 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.

A handwritten signature in black ink that reads 'Willy Morrison'.

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**Table 1. Admixture Information**

	Reference Admixture	Test Admixture
Manufacturer	Sika Corporation	Dricrete
Brand Name	Sika AER-C	Dricrete™ - Intelligent/Integral Concrete Waterproofing
Lot Number	3002150496	3003307603
Quantity Supplied	Partially-Full One Gallon	12 lb. Bag
Total Solids, %	21.42	99.48
Specific Gravity	1.061	Not Applicable
pH	11.85	12.3 <sup>See Note 1</sup>
Chloride, %	0.004	0.016 <sup>See Note 2</sup>

Note 1: Testing conducted with 5% solution by weight of deionized water

Note 2: Testing conducted by 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	Holcim (US) Inc.		
<i>Chemical Analysis, %</i>			
Silicon dioxide (SiO <sub>2</sub> )	19.8	Tricalcium silicate (C <sub>3</sub> S) (%)	61
Aluminum oxide (Al <sub>2</sub> O <sub>3</sub> )	4.5	Dicalcium silicate (C <sub>2</sub> S) (%)	8
Iron oxide (Fe <sub>2</sub> O <sub>3</sub> )	3.2	Tricalcium aluminate (C <sub>3</sub> A) (%)	6
Magnesium oxide (MgO)	2.7	Tetracalcium alumino ferrite (C <sub>4</sub> AF) (%)	9
Sulfur trioxide (SO <sub>3</sub> )	3.4	C <sub>3</sub> S + 4.75C <sub>3</sub> A (%)	90.7
Calcium oxide (CaO)	64.2		
Insoluble Residue (%)	0.47	Loss on Ignition (%)	2.6
Alkalies as Na <sub>2</sub> O (%)	0.54		
<i>Physical Analysis</i>			
Fineness, Blaine (m <sup>2</sup> /kg)	379	Air Content (%)	7
Vicat Time of Set (Initial), minutes	90	Autoclave Expansion (%)	0.04
Compressive Strength			
3 Day (psi)	4330	7 Day (psi)	5360
Mortar Bar Expansion (%) (C1038)	0.013		

**Table 3. Properties of Fine and Coarse Aggregates**

	<b>Fine Aggregate</b>	<b>Coarse Aggregate</b>
Manufacturer	Aggregate Industries	Martin Marietta
Aggregate type, ID	Natural Sand, Elk River	#57 Crushed Granite
Specific gravity, SSD	2.675	2.677
Absorption %	0.6	0.3

**Table 4. Gradations of Fine and Coarse Aggregates**

**ASTM C136, Gradation of fine aggregate**

<b>Percent passing</b>		
	<b>Fine Aggregate</b>	<b>ASTM C494/AASHTO M194 Requirements</b>
No. 4 [4.75 mm]	100	100
No. 16 [1.18 mm]	72	65 to 75
No. 50 [300 µm]	13	12 to 20
No. 100 [150 µm]	2	2 to 5

**ASTM C136, Gradation of coarse aggregate**

<b>Percent passing</b>		
	<b>Coarse Aggregate</b>	<b>ASTM C494 Requirements</b>
1.5 in. [37.5 mm]	100	100
1.0 in. [25.0 mm]	98	95 to 100
0.5 in. [12.5 mm]	45	25 to 60
No. 4 [4.75 mm]	6	0 to 10
No. 8 [2.36 mm]	4	0 to 5

Laboratory Data	Concrete Mixtures and Testing Results								Dricrete™ - Intelligent/Integral Concrete Waterproofing added at a rate of 10.3 pcy	
	Sika AER-C				Dricrete™				ASTM C494, Type S AASHTO M194	
	Batch No. Cast Date	Control #1 7/16/2018	Control #2 7/16/2018	Control #3 7/16/2018	AVER. (Test Value)	Test #1 7/16/2018	Test #2 7/16/2018	Test #3 7/16/2018		
Cement, pcy	519	517	517	<b>518</b>	514	516	516	<b>515</b>	<b>517 ± 5</b>	
Sand, pcy	1,282	1,278	1,278	<b>1,279</b>	1,271	1,275	1,275	<b>1,274</b>		
Gravel, pcy	1,770	1,765	1,765	<b>1,767</b>	1,755	1,760	1,760	<b>1,758</b>		
Water, pcy	285	284	284	<b>284</b>	282	283	283	<b>283</b>		
<b>Water Content (Percent of Control)</b>	---	---	---	---	99	100	100	<b>99</b>		
AEAName	Sika AER-C				Sika AER-C					
AEA Dosage, oz/cwt	0.5	0.5	0.5	<b>0.5</b>	0.5	0.5	0.5	<b>0.5</b>		
Admixture Name	---	---	---	---	Dricrete™					
Admixture Dosage, pcy	---	---	---	---	10.34	10.34	10.34	<b>10.3</b>		
WATER CEMENT RATIO	0.55	0.55	0.55	<b>0.55</b>	0.55	0.55	0.55	<b>0.55</b>		
Slump, inches	3.50	3.50	3.50	<b>3.50</b>	3.75	4.00	3.50	<b>3.75</b>	<b>3.5 ± 0.5</b>	
Air Content, %	6.0	6.1	6.0	<b>6.0</b>	6.5	5.7	6.0	<b>6.1</b>	<b>± 0.5</b>	
Density, pcf	142.8	142.4	142.4	<b>142.5</b>	141.6	142.0	142.0	<b>141.9</b>		
<b>SETTING TIME</b>										
Initial, hr:mn	3:41	3:37	3:38	<b>3:38</b>	3:41	3:36	3:47	<b>3:41</b>		
Final, hr:mn	5:05	4:56	5:03	<b>5:01</b>	5:11	5:01	5:21	<b>5:11</b>		
<b>TIME of SETTING (deviation from reference)</b>										
Initial, hr:mn	---	---	---	---	0:00	-0:01	0:09	<b>0:03</b>	<b>Not more than 1:00 earlier nor 1:30 later</b>	
Final, hr:mn	---	---	---	---	0:06	0:05	0:18	<b>0:10</b>	<b>Not more than 1:00 earlier nor 1:30 later</b>	
<b>COMPRESSIVE STRENGTH</b>										
3 Days, psi	3,550	3,140	3,010	<b>3,230</b>	3,180	3,240	3,080	<b>3,170</b>		
7 Days, psi	4,070	3,580	3,460	<b>3,700</b>	3,820	3,800	3,570	<b>3,730</b>		
28 Days, psi	5,070	4,530	4,600	<b>4,730</b>	4,810	4,880	4,540	<b>4,740</b>		
56 Days, psi	5,390	4,800	4,730	<b>4,970</b>	5,140	5,190	4,970	<b>5,100</b>		
90 Days, psi	5,820	5,230	5,020	<b>5,360</b>	5,450	5,370	5,130	<b>5,320</b>		
6 Months, psi	5,900	5,320	5,070	<b>5,430</b>	5,610	5,680	5,470	<b>5,590</b>		
1 Year, psi	5,940	5,500	5,160	<b>5,530</b>	5,650	5,690	5,620	<b>5,650</b>		
3 Days, % reference	---	---	---	---	90	103	102	<b>98</b>	<b>≥90%</b>	
7 Days, % reference	---	---	---	---	94	106	103	<b>101</b>	<b>≥90%</b>	
28 Days, % reference	---	---	---	---	95	108	99	<b>100</b>	<b>≥90%</b>	
56 Days, % reference	---	---	---	---	95	108	105	<b>103</b>	<b>N/A</b>	
90 Days, % reference	---	---	---	---	94	103	102	<b>99</b>	<b>N/A</b>	
6 Months, % reference	---	---	---	---	95	107	108	<b>103</b>	<b>≥90%</b>	
1 Year, % reference	---	---	---	---	95	103	109	<b>102</b>	<b>≥90%</b>	
<b>FLEXURAL STRENGTH</b>										
3 Days, psi	595	520	595	<b>570</b>	650	605	605	<b>620</b>		
7 Days, psi	695	675	720	<b>695</b>	725	710	670	<b>700</b>		
28 Days, psi	790	700	735	<b>740</b>	785	760	860	<b>800</b>		
56 Days, psi	820	760	755	<b>780</b>	790	780	900	<b>825</b>		
3 Days, % reference	---	---	---	---	109	116	102	<b>109</b>	<b>≥90%</b>	
7 Days, % reference	---	---	---	---	104	105	93	<b>101</b>	<b>≥90%</b>	
28 Days, % reference	---	---	---	---	99	109	117	<b>108</b>	<b>≥90%</b>	
56 Days, % reference	---	---	---	---	96	103	119	<b>106</b>	<b>N/A</b>	
<b>LENGTH CHANGE, %</b>										
Increase over control	-0.002	-0.008	-0.011	<b>-0.007</b>	-0.012	-0.009	-0.004	<b>-0.008</b>		
	---	---	---	---	0.010	0.001	-0.007	<b>0.001</b>	<b>≤0.010<sup>A</sup></b>	
<b>RESISTANCE TO FREEZING AND THAWING</b>										
Relative Dynamic Modulus, %										
	0	cycles	100/100	100/100	100/100	100	100/100	100/100	100/100	100
	32	cycles	100/98	100/100	100/98	99	99/99	100/100	100/99	100
	63	cycles	100/98	100/100	100/98	99	100/100	100/100	100/100	100
	99	cycles	99/98	100/99	100/98	99	100/100	100/100	100/100	100
	135	cycles	99/98	100/99	100/98	99	100/100	100/101	101/99	100
	171	cycles	99/98	100/99	100/98	99	100/101	100/101	101/100	101
	203	cycles	99/98	100/99	100/98	99	101/102	101/101	102/101	101
	238	cycles	99/98	100/99	99/98	99	100/101	101/101	102/100	101
	274	cycles	99/98	100/99	98/98	99	100/101	101/101	102/100	101
	300	cycles	99/98	100/99	98/98	99	100/101	101/101	102/100	101
<b>RELATIVE DURABILITY FACTOR</b>									<b>102</b>	<b>min 80</b>

A. Increased shrinkage over control.

**TABLE 6**  
**TESTS OF CHEMICAL ADMIXTURES FOR CONCRETE**  
**DRICRETE™ - INTELLIGENT/INTEGRAL CONCRETE WATERPROOFING**  
**ASTM SPECIFICATION C494 / AASHTO M194**  
**TYPE S, SPECIFIC PERFORMANCE**

MIXTURE DESIGNATION	<u>CONTROL</u>	<u>DRICRETE™</u>	<u>CHANGE vs. CONTROL</u>	<u>SPECIFICATION REQUIREMENT</u>
<b>MIXTURE PROPORTIONS</b>				
CEMENT, pcy	518	515	-3	<b>517 ± 5</b>
SAND, pcy	1,279	1,274		
GRAVEL, pcy	1,767	1,758		
NET WATER, pcy	284	283		
AEA (Vinsol Resin), oz/cwt	0.5	0.5		
ADMIXTURE DOSAGE, pcy	---	10.3		
<b>RATIO OF FINE TO TOTAL AGG., %</b>				
WATER/CEMENT RATIO, lb./lb.	42	42		
	0.55	0.55		
<b>SLUMP, inches</b>				
	3.50	3.75	0.25	<b>3.5 ± 0.5</b>
<b>ENTRAINED AIR, %</b>				
	6.0	6.1	0.1	<b>± 0.5</b>
<b>UNIT WEIGHT, pcf</b>				
	142.5	141.9		
<b>SET TIME, hr:min</b>				
INITIAL	3:38	3:41	0:03	<b>Not more than 1:00 earlier nor 1:30 later</b>
FINAL	5:01	5:11	0:10	<b>Not more than 1:00 earlier nor 1:30 later</b>
<b>COMPRESSIVE STRENGTH, psi</b>				
3 DAYS	3,230	3,170	98%	<b>≥90%</b>
7 DAYS	3,700	3,730	101%	<b>≥90%</b>
28 DAYS	4,730	4,740	100%	<b>≥90%</b>
56 DAYS	4,970	5,100	103%	<b>N/A</b>
90 DAYS	5,360	5,320	99%	<b>N/A</b>
180 DAYS	5,430	5,590	103%	<b>≥90%</b>
365 DAYS	5,530	5,650	102%	<b>≥90%</b>
<b>FLEXURAL STRENGTH, psi</b>				
3 DAYS	570	620	109%	<b>≥90%</b>
7 DAYS	695	700	101%	<b>≥90%</b>
28 DAYS	740	800	108%	<b>≥90%</b>
56 DAYS	780	825	106%	<b>N/A</b>
<b>LENGTH CHANGE</b>				
Increase over control	-0.007	-0.008	0.001	<b>≤0.010<sup>A</sup></b>
<b>RELATIVE DURABILITY FACTOR, %</b>				
			102	<b>≥80%</b>

A. Increased shrinkage over control.