PRI Construction Materials Technologies LLC

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Laboratory Test Report

Report for:	Steve Clarke EcoStar LLC 42 Edgewood Drive Holland, NY 14080
Product Name:	Empire Slate
Project No.:	1993T0022
Dates Tested:	Oct. 28 – Nov. 30, 2021
Test Methods:	TAS 125-03 UL 580-06 UL 1897-12
Results Summary:	Specimen No. 1, 2 nails/tile, 15/32" plywood sheathing: -105psf, UL 580 Class 90 Specimen No. 2, 2 nails/tile, 15/32" plywood sheathing: -105psf, UL 580 Class 90 Specimen No. 3, 4 nails/tile, 15/32" plywood sheathing: -195psf, UL 580 Class 90

Purpose: Determine the uplift resistance of Empire Slate in accordance with **Florida Building Code Test Protocols for the High Velocity Hurricane Zone (HVHZ) Testing Application Standard (TAS) 125-03: Standard Requirements for Metal Roofing Systems, Section 8: UL 580 (as modified for the *Florida Building Code, Building),* UL 580-06 *Test for Uplift Resistance of Roof Assemblies*** and **UL 1897-12 *Uplift Tests for Roof Covering* Systems**

Test Methods: Testing was completed as described in Florida Building Code Test Protocols for the High Velocity Hurricane Zone (HVHZ) Testing Application Standard (TAS) 125-03: Standard Requirements for Metal Roofing Systems, Section 8: UL 580 (as modified for the *Florida Building Code, Building),* UL 580-06 *Test for Uplift Resistance of Roof Assemblies* and UL 1897-12 *Uplift Tests for Roof Covering* Systems. Specimens were tested to the loading schedule as described in UL 580, and where applicable, incrementally loaded in accordance with UL 1897 until failure.

Sampling: The following materials were received by PRI.

Product	Source	Date	Sampling
Empire Slate (12")	Holland, NY	Sep. 8, 2021	EcoStar LLC
1-3/4" RS nails	Holland, NY	Jul. 19, 2021	EcoStar LLC

All other roofing components were procured by PRI Construction Materials Technologies LLC through local distribution.

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Product Description:	Empire Slate:	12" wide x 18" long, tapered, molded, synthetic shake roofing tile installed with 8" exposure;
	1-3/4" RS Nail:	0.120" x 1-3/4", 304 stainless steel, ring shank roofing nails
Deck Description:	Underlayment:	ASTM D 226 Type II felt installed with minimum 4" side-lap and 6" end-laps and fastened using 12 ga., 1-1/4" ring shank nails and 32 ga., 1-5/8" tin caps spaced 6" o.c. along the laps and two staggered rows 12" o.c. in the field of the roll.
	Deck:	CAT 15/32 PS 1-09, APA span rated CDX plywood sheathing installed over No. 2 lumber supports spaced 24" o.c. Decking attached with 0.113" x 2-3/8" ring shank nails spaced 6" o.c. along the perimeter and intermediate supports.
	Specimen Sealing:	Polyethylene film placed under the metal roof panels; tape[1]

[1]It is the judgment of the test engineer that the film and tape used to seal the specimen against air leakage did not influence the results of the test.

Results: Test data are contained in Appendix A. Photographs after testing are shown in Appendix C.

Table 1. Summary of Test Results

Specimen No.	Roof Covering	Attachment	Passing Uplift Pressure (psf)	Failure Mode
1	Empire Slate	Two (2) 1-1/2" RS nails in each slate: Nails are at each of the two pre-marked locations; Slates installed with 8" exposure and 3/8" gap between adjacent slates; Courses are offset one-half tile from the preceding course;	105	Fastener Withdrawal
2	Empire Slate	Two (2) 1-1/2" RS nails in each slate: Nails are at each of the two pre-marked locations; Slates installed with 8" exposure and 3/8" gap between adjacent slates; Courses are offset one-half tile from the preceding course;	105	Fastener Withdrawal
3	Empire Slate	Four (4) 1-1/2" RS nails in each slate: Two (2) nails are spaced 1" apart at each of the two pre-marked locations; Slates installed with 8" exposure and 3/8" gap between adjacent slates; Courses are offset one-half tile from the preceding course;	195	Fastener Withdrawal

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Classification:

Specimen Nos. 1, 2, and 3 installed as described herein meet ***Class 90*** requirements.

Statement of Attestation:

Testing was conducted in accordance with **Florida Building Code Test Protocols for the High Velocity Hurricane Zone (HVHZ) Testing Application Standard (TAS) 125-03: Standard Requirements for Metal Roofing Systems, Section 8: UL 580 (as modified for the *Florida Building Code, Building*), UL 580-06 *Test for Uplift Resistance of Roof Assemblies* and UL 1897-12 *Uplift Tests for Roof Covering Systems*.** The test results and interpretations presented herein are representative of the materials supplied by the client.

Signed: _____

Zachary R. Priest
Florida Registered Professional Engineer 12/01/2021
PE No.: 74021

ZACHARY R. PRIEST LICENSE No. 74021 STATE OF FLORIDA PROFESSIONAL ENGINEER

Report Issue History:

Issue #	Date	Pages	Revision Description (if applicable)
Original	12/01/2021	13	NA

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Specimen No. 1 (UL 580 Load Schedule)

Class 30 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	16.2	0.033	0.024	0.010	0.013	Pass
5	13.8	16.2	0.048	0.039	0.023	0.022	Pass
60	13.8	8.1-27.7[1]	0.150	0.270	0.113	0.371	Pass
5	0.0	24.2	0.210	0.364	0.054	0.347	Pass
5	20.8	24.2	0.292	0.429	0.172	0.483	Pass
		Permanent Set	0.025	0.058	0.047	0.141	Pass

Class 60 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	32.3	0.272	0.310	0.289	0.341	Pass
5	27.7	32.3	0.369	0.421	0.529	0.603	Pass
60	27.7	16.2-55.4[1]	0.383	0.566	0.716	0.780	Pass
5	0.0	40.4	0.168	0.435	0.638	0.667	Pass
5	34.6	40.4	0.386	0.641	0.743	0.842	Pass
		Permanent Set	0.058	0.202	0.185	0.330	Pass

Class 90 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	48.5	0.131	0.263	0.357	0.585	Pass
5	41.5	48.5	0.164	0.442	0.437	0.660	Pass
60	41.5	24.2-48.5[1]	0.194	0.611	0.485	0.730	Pass
5	0.0	56.5	0.176	0.524	0.419	0.692	Pass
5	48.5	56.5	0.383	0.606	0.448	0.698	Pass
		Permanent Set	0.069	0.213	0.285	0.458	Pass

Notes: 1) Oscillation frequency is 10±2 sec per cycle

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Specimen No. 1 (UL 1897 Load Schedule)

Ultimate Loading Sequence (UL 1897)						
Duration (min)	Combined Test Pressure (psf)	Max Deflection Under Load (in.)				Result
		1	2	3	4	
15s	120	-	-	-	-	Fail

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Specimen No. 2 (UL 580 Load Schedule)

Class 30 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	16.2	0.019	0.055	0.069	0.074	Pass
5	13.8	16.2	0.041	0.079	0.103	0.108	Pass
60	13.8	8.1-27.7[1]	0.100	0.149	0.151	0.160	Pass
5	0.0	24.2	0.011	0.122	0.144	0.121	Pass
5	20.8	24.2	0.142	0.199	0.186	0.283	Pass
		Permanent Set	0.066	0.070	0.071	0.054	Pass

Class 60 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	32.3	0.129	0.298	0.274	0.198	Pass
5	27.7	32.3	0.191	0.355	0.368	0.320	Pass
60	27.7	16.2-55.4[1]	0.211	0.443	0.386	0.472	Pass
5	0.0	40.4	0.180	0.332	0.370	0.371	Pass
5	34.6	40.4	0.322	0.458	0.489	0.484	Pass
		Permanent Set	0.157	0.176	0.138	0.113	Pass

Class 90 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	48.5	0.238	0.497	0.287	0.207	Pass
5	41.5	48.5	0.315	0.531	0.493	0.279	Pass
60	41.5	24.2-48.5[1]	0.359	0.562	0.808	0.374	Pass
5	0.0	56.5	0.313	0.468	0.761	0.306	Pass
5	48.5	56.5	0.481	0.514	0.912	0.563	Pass
		Permanent Set	0.185	0.209	0.159	0.234	Pass

Notes: 1) Oscillation frequency is 10±2 sec per cycle

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Specimen No. 2 (UL 1897 Load Schedule)

Ultimate Loading Sequence (UL 1897)						
Duration (min)	Combined Test Pressure (psf)	Max Deflection Under Load (in.)				Result
		1	2	3	4	
30s	120	-	-	-	-	Fail

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Specimen No. 3 (UL 580 Load Schedule)

Class 30 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	16.2	0.013	0.036	0.033	0.048	Pass
5	13.8	16.2	0.065	0.129	0.127	0.141	Pass
60	13.8	8.1-27.7[1]	0.092	0.205	0.213	0.208	Pass
5	0.0	24.2	0.010	0.150	0.161	0.184	Pass
5	20.8	24.2	0.104	0.279	0.259	0.281	Pass
		Permanent Set	0.013	0.043	0.043	0.044	Pass

Class 60 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	32.3	0.089	0.200	0.187	0.182	Pass
5	27.7	32.3	0.154	0.359	0.330	0.455	Pass
60	27.7	16.2-55.4[1]	0.179	0.473	0.426	0.469	Pass
5	0.0	40.4	0.109	0.462	0.413	0.381	Pass
5	34.6	40.4	0.194	0.589	0.437	0.534	Pass
		Permanent Set	0.033	0.100	0.064	0.154	Pass

Class 90 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	48.5	0.127	0.415	0.211	0.192	Pass
5	41.5	48.5	0.340	0.517	0.464	0.346	Pass
60	41.5	24.2-48.5[1]	0.364	0.551	0.480	0.508	Pass
5	0.0	56.5	0.321	0.470	0.417	0.441	Pass
5	48.5	56.5	0.458	0.663	0.580	0.611	Pass
		Permanent Set	0.074	0.109	0.074	0.155	Pass

Notes: 1) Oscillation frequency is 10±2 sec per cycle

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Specimen No. 3 (UL 1897 Load Schedule)

Ultimate Loading Sequence (UL 1897)						
Duration (min)	Combined Test Pressure (psf)	Max Deflection Under Load (in.)				Result
		1	2	3	4	
1	120	0.112	0.736	0.640	0.623	Pass
1	135	0.177	0.831	0.690	0.643	Pass
1	150	0.213	0.863	0.706	0.664	Pass
1	165	0.254	0.962	0.745	0.682	Pass
1	180	0.313	1.040	0.780	0.710	Pass
1	195	0.422	1.059	0.710	0.724	Pass
20s	210					Fail

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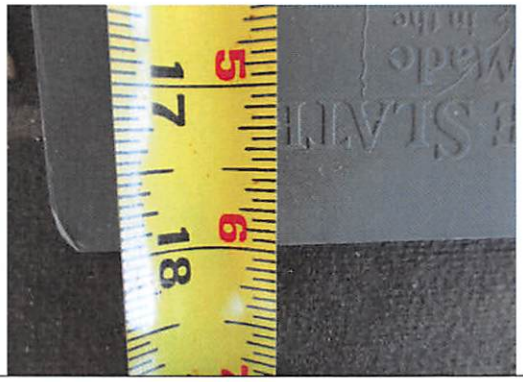
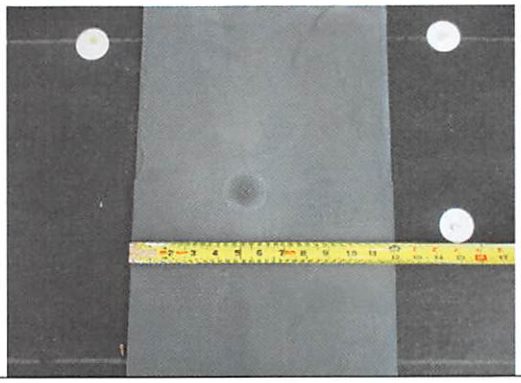
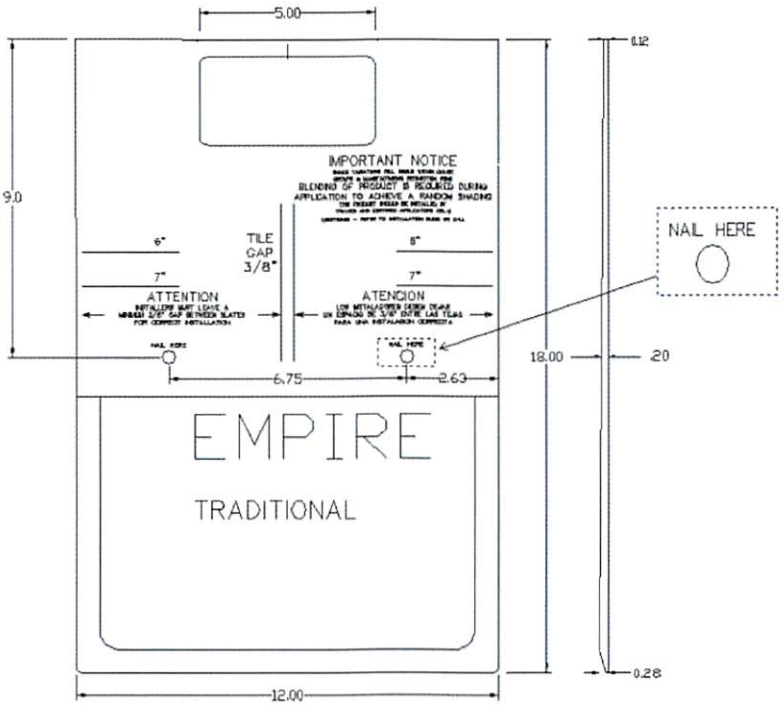
Photographs and Drawings of Empire Slate







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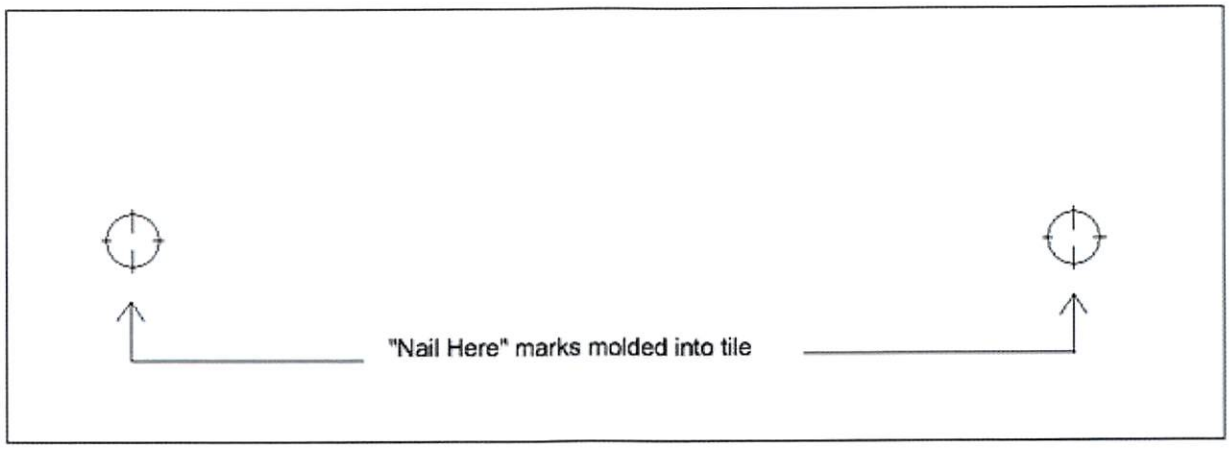
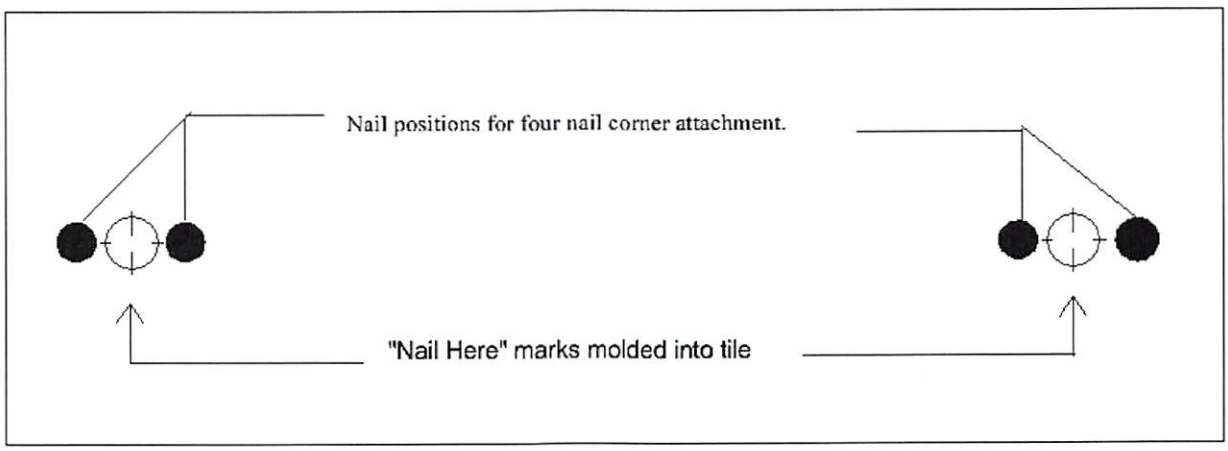
Field Fastening



Perimeter and Corner Fastening



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Specimen No. 1 After Testing

Specimen No. 2 After Testing

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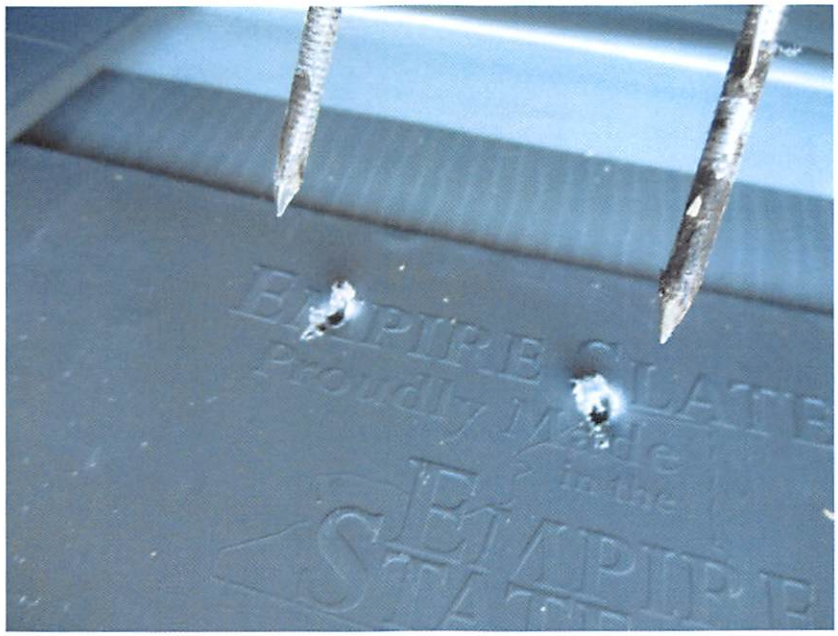

Specimen No. 3 After Testing

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