July 30, 2018

This document provides links to third party testing reports and other documentation and discussion of the results. Intertek did testing for the former EternaTile, Inc and has re-recorded tests in the name of 3 IN 1 ROOF. Inc.

intertek
Total Quality. Assured.

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October 11, 2017

Carmen Bellavia
3 in 1 Roof, Inc.
5041 Kitridge Rd.
Huber Heights, OH 45424

Phone: 833-361-7663
Email: Carmen.CEO@3in1ROOF.com

Dear Mr. Bellavia,

Subject: Change of Company Name

In response to your letter of October 10, 2017, we will revise your records such that 3 in 1 Roof, Inc. will replace EternaTile, Inc. as the Applicant for all Listing Reports that will be issued. As such, the test reports issued to EternaTile, Inc. and provided as supporting data for the pending Listing Reports will be acceptable for use in the 3 in 1 Roof, Inc., listings. Additional forms may be required.

I trust this will meet your needs, however, if you have any questions regarding this letter, please do not hesitate to contact me.

Sincerely,

INTERTEK TESTING SERVICES NA INC.

Michael Beaton

Michael Beaton, P.E.
Vice President, Certification Services

cc: BP HelpDesk, Arlington Heights

Table of contents

Intertek Testing Reports

Other Documentation and Simulation Reports

Intertek Testing Reports

Thermal Performance

Summary of Results	
Test Unit	R-Value of Siding Only
Test #1: EternaTile Panels (exterior seams un-sealed)	9.6
Test #2: EternaTile Panels (exterior seams sealed)	22.0

Discussion:

3 IN 1 Roof tiles are 3 lb closed cell polyurethane with R-6.5 per inch. The average thickness of 3 IN 1 Roof tiles is 2.25 inches resulting in R value of 14.62. Top coat R value is 0.02. Densdeck R value is 0.52 and Granulated cap sheet (Flintlastic or Mulehide) R value is 0.55, and plywood/OSB R value is 0.62. Total R-value of 3 IN 1 Roof system is 16. When 2" of SPF closed cell foam is added to the underside of roof deck at rafters the total R value of the system is R-22 which is validated by Test #2, installation with exterior seams sealed. For Test #1 with exterior seams un-sealed the 3 IN 1 Roof system is effective preventing radiant solar gain into the attic. But, in winter, heat from the living space that rises into the attic penetrates and heats up the SPF foam & above decking. This heat can then be wicked away by a breeze if 3 IN 1 Roof tiles are unsealed. This is validated by Test 2. In practice, this will likely result in higher energy savings for 3 IN 1 ROOF customers who live in tropical or moderate climates where summer temperatures are high and winters are mild.

3 IN 1 ROOF will complete a spread of flame test on a sealed installation test roof in order to secure full R-value of R-16 for the system.

Static Uplift Resistance

Introduction: Intertek-ATI was contracted by EternaTile to conduct TAS 101 and TAS 102 testing in accordance with Miami-Dade County requirements. The tiles were tested as uplift based systems at a 4:12 slope. The results are summarized in Table 1.

Table 1: Summary of Test Results

Attachment Method	Test Protocol	Average Ultimate Load
Adhesive	TAS 101	295.2 lb_f
Mechanical	TAS 102	152.4 lb_f

Discussion: 3 IN 1 ROOF will focus on the adhesive installation which produces 200mph wind resistance. 3 IN 1 ROOF has no plans to market the mechanical installation at this time.

Reflectance

2 Introduction

Intertek has conducted testing for Eterna Tile, Inc. on Eterna Tile Inc. 3-lbs foam @ 50-55 mils proprietary coating to calculate the Solar Reflectance Index (SRI) at standard conditions. Testing was conducted in accordance with ASTM C1371-04a (reapproved 2010) Standard Test Method for Determination of Emittance of Material Near Room Temperature Using Portable Emissometers, ASTM C1549-09 Standard Test Method for Determination of Solar Reflectance Near Ambient Temperatures Using a Portable Solar Reflectometer; and ASTM E1980-11 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces. This evaluation began November 25, 2014 and was completed November 25, 2014.

ASTM E1980-11 Solar Reflectance Index (SRI) Results

Convective Coefficient	SRI
Low	**38**
Medium	**43**
High	**46**

Discussion:

Reflectance is the percentage of incoming visible light that is reflected by the roof and not absorbed. 3 IN 1 ROOF SRI of 43 is well within the Cool Roof Rating Council requirements for a cool roof.

Certification requirements for different cool roof programs

Slope	Min. solar reflectance	Min. emittance	Min. solar reflectance index
ENERGY STAR			
Low, initial	0.65		
Low, aged	0.50		
Steep, initial	0.25		
Steep, aged	0.15		

Wikipedia

Emittance is the ability of a hot roof to lose heat. 3 IN 1 ROOF's insulative property prevents solar gain into the attic during the daytime by preventing the tile itself from getting hot. Hence emittance Is not a relevant factor in a 3 IN 1 ROOF being considered a "cool roof". 3 IN 1 ROOF is an entirely different product class from a conventional shingle or tile roof and 3 IN 1 ROOF will work with the CRRC to determine how to best represent 3 IN 1 ROOF in its CRRC cool roof database.

Fire Tests (ASTM e108)

The plywood decks were constructed by Intertek technicians according to the specifications of test standard ASTM E108 (2010) *"Standard Test Methods for Fire Tests of Roof Coverings"*.

1. The test material was submitted by the client.
2. Test samples were installed by Intertek technicians and the client.

The tests were conducted in accordance with ASTM E108 (2010) *"Standard Test Methods for Fire Tests of Roof Coverings"* and UL 790 (2004). Below is a summary of the test results.

Sample #	Test	Results
1	Spread of Flames	Class "A"
2	Spread of Flames	Class "A"
3	Intermittent Flames	Class "A"
4	Intermittent Flames	Class "A"
5	Burning Brand	Class "A"
6	Burning Brand	Class "A"
7	Burning Brand	Class "A"
8	Burning Brand	Class "A"

Discussion: "Materials and Methods" The 3 IN 1 ROOF system achieved Class A fire test results for all three categories of test with "room to spare". The system achieves this result through a proprietary topcoat that reduces the effect of spread of flame. The system achieves Class A results with intermittent flames based on the top coat and the property of polyurethane foam that, when burned produces an ash that covers unburned foam and prevents reignition. The system produces Class A results with burning brand based on top coat, ash, and the fire retardance of the Densdeck layer.

"Materials"

Achieving Class A ASTM-e108 fire resistance tests enables foam to be used to emulate premium cement, slate, and wood shake flat tiles. Foam as a roofing material is a proven material having been used for flat roofs on big box and industrial building for many decades. Foam as a step sloped roofing tile emulation "material" is an innovation.

"Methods"

These premium looking and light weight roofing tiles then open up new roofing construction "methods" which produce a high performance roof. Extreme wind resistance, Insulation, and Integrated PV Solar are the 3 IN 1 ROOF features.

1) Extreme wind protection comes from using adhesive foam instead of nails to adhere the tiles to the roof deck. The tile is bonded to the roof deck at the granulated cap sheet layer. This produces bonding like thousands of Velcro hooks on each tile. The adhesive foam is insulated from heat and cold swings by the tiles and hence the bond does not deteriorate like nails that work themselves loose from the underlayment over years of temperature cycling. Adhesive foam can be applied to multiple surface areas of the tile and thus minimize any mechanical loosening of nails from wind or foot traffic driven movement of the tile.
2) The Insulation reduces the heat in the attic much closer to living space temperatures and reduces the need for solar power to produce for HVAC purposes, hence a smaller solar installation is required. Cooler attic space is

especially true for an unvented attic. A cooler attic also increases the efficiency of AC vents in the attic and enables installation of battery storage in the attic.

3) Use of foam as a platform for solar enables 3 IN 1 ROOF to use conventional mono or poly silicon solar modules, the most tried and true solar technology available. 3 IN 1 ROOF can be agnostic about specific solar module suppliers, can shop the market for the best price-performance value for the customer and can easily enable the homeowner to “upgrade” solar modules when needed over time since the 3 IN 1 ROOF will outlast the traditional warranted life of solar modules.

Salt Spray

TEST RESULTS
ASTM B117 - Salt Fog Exposure (90 hours)

SPECIMEN NO.	HOURS IN QFOG-B117	DIMENSIONS	OBSERVATIONS
1	90	14" x 23"	No Surface Area Compromised
2	90	14" x 23"	No Surface Area Compromised
3	90	14" x 23"	No Surface Area Compromised

2000 hr weather

Table 1. Test Results		
Test Description	**Results**	**Observations**
Xenon Arc UV Exposure	2000 hours complete	Red color of tiles has faded in all samples.

Compression Tensile

Table 1. Test Results	
Property	**Test Result**
Tensile Strength, psi • As Received	29.2
Compressive Strength @ 10% Deformation, psi • As Received	43.5

Wind and Wind Driven Rain (TAS 100)

WIND SPEED	OBSERVATIONS
35 mph	No water leakage
70 mph	No water leakage
90 mph	No water leakage
110 mph	No water leakage

Concrete Tile Testing (TAS 112)

DIMENSION AND WEIGHT PROPERTIES RESULTS

SAMPLE	LENGTH (IN)	WIDTH (IN)	WEIGHT (LBS)
1	22.44	13.31	1.656
2	22.47	13.25	1.810
3	22.41	13.28	1.804
4	22.50	13.25	1.567
5	22.44	13.22	1.559
AVERAGE	**22.45**	**13.26**	**1.679**
PUBLISHED VALUE	22.50	13.25	1.700

TRANSVERSE STRENGTH RESULTS

SAMPLE	PEAK LOAD (LBF)	PEAK LOAD (N)
1	204.0	907.0
2	228.0	1014.0
3	191.0	850.0
4	148.0	658.0
5	167.0	743.0
AVERAGE	**191.6**	**834.4**

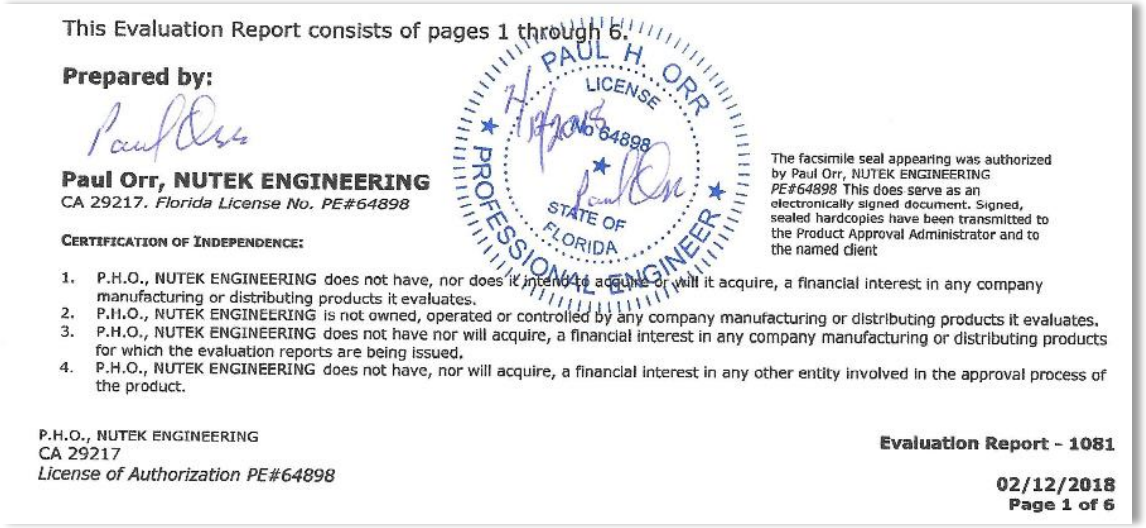
ABSORPTION RESULTS

SAMPLE	Measured Weights (lb)			Water Absorption (lb/ft^3)
	Wet	Immersed	Dry	
1	2.054	0.000	1.704	10.6
2	2.190	0.000	1.880	8.8
3	2.074	0.000	1.742	10.0
4	1.958	0.000	1.652	9.8
5	1.936	0.000	1.628	9.9
AVERAGE	**2.042**	**0.000**	**1.721**	**9.8**

Other Documentation and Simulation Reports

3 IN 1 ROOF System Technical Guide

[Florida Evaluation]



This Evaluation Report consists of pages 1 through 6.

Prepared by:

Paul Orr, NUTEK ENGINEERING
CA 29217. *Florida License No. PE#64898*

PAUL H. ORR LICENSE No 64898 STATE OF FLORIDA PROFESSIONAL ENGINEER

The facsimile seal appearing was authorized by Paul Orr, NUTEK ENGINEERING *PE#64898* This does serve as an electronically signed document. Signed, sealed hardcopies have been transmitted to the Product Approval Administrator and to the named client

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CA 29217
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02/12/2018
Page 1 of 6

[Florida Product Approval]

Florida Building Code Online

Page 1 of 1

FLORIDA DEPARTMENT OF Business & Professional Regulation

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Florida dbpr

Product Approval
USER: Public User

Product Approval Menu > Product or Application Search > **Application List**

OFFICE OF THE SECRETARY

Search Criteria

Refine Search

Code Version	2017	FL#	ALL
Application Type	ALL	Product Manufacturer	3 in 1 Roof inc.
Category	ALL	Subcategory	ALL
Application Status	ALL	Compliance Method	ALL
Quality Assurance Entity	ALL	Quality Assurance Entity Contract Expired	ALL
Product Model, Number or Name	ALL	Product Description	ALL
Approved for use in HVHZ	ALL	Approved for use outside HVHZ	ALL
Impact Resistant	ALL	Design Pressure	ALL
Other	ALL		

Search Results - Applications

FL#	Type	Manufacturer	Validated By	Status
FL19997	New	3 in 1 Roof Inc. **Category:** Roofing **Subcategory:** Roofing Tiles	Don Arpin (954) 772-8345	Approved

*Approved by DBPR. Approvals by DBPR shall be reviewed and ratified by the POC and/or the Commission if necessary.

[Florida Solar Energy center Simulation of BTU savings by re-roofing older home with 3 IN 1 ROOF]

Table 4. EternaTile Roof Construction

Layer	Material	Conductivity	Thickness	Thickness	Density	Specific Heat	Rvalue
		Btu/hr-ft2-F	Inches	Feet	lbs/ft3	Btu/lb-F	$h \cdot ft^2 \cdot °F/Btu$
Attic Air	Air Film Coefficient						0.728
Existing Decking	Plywood	0.0667	0.5	0.0417	34	0.29	0.62
DensDeck	Dense Board	0.0801	0.5	0.0417	48	0.29	0.52
Peel and stick	Flintastic	0.0473	0.3125	0.0260	70	0.3	0.55
ETERNATILE	R-14 Foam	0.0128	2.1538	0.1795	4.3335*	0.38	14.00***
Top Coat	Finish	0.4200	0.1	0.0083	49**	0.2	0.02
Outside air	Air Film Coefficient						0.25
Total Roof							16.69
* based on manufacturer indicating the finished product is 5.5 lbs and a volume of 0.808 cu. ft., applied 3.5 lbs to foam tile							
** have created the top coat layer to account for two pounds							
*** Rvalue of 14.00 for foam based on test of 6.5 for one inch: http://www.gaco.com/products/PDS-GacoFlashFoam.pdf							

Simulation Results

EnergyGauge USA annual simulation runs included the above R-11 and R-19 vented attic base-case configurations and EternaTile configurations for the 13 cities shown in Table 1. Simulation runs for each city included:

- R-11 and R-19 Vented Attic Base Cases
- R-11 and R-19 Vented Attics with R-14 EternaTile
- R-11 and R-19 Sealed Attics with R-14 EternaTile

The applicability of the savings results is limited to houses of similar efficiency as those indicated in the House Characteristics section. **Savings will be lower for more efficient houses.**

Summer attic temperatures are greatly reduced with foam roofs as modeled. Peak attic temperature reductions ranged from 30 to 52°F. The solar reflectance of 0.43 is a large improvement over a typical shingle or dark tile roof. Furthermore, the foam roof configuration has R-14 level of insulation protecting the attic. Some cities were modeled with ductwork in the attic, and the cooler attic for those cases is a significant benefit in summer; in winter however, there are times when a cooler attic may increase the need for heating. Prior to installation of a cool roof product, it is recommended that ducts be inspected for sections that may be uninsulated. Uninsulated supply ducts in cooler attics may lead to condensation (condensation may also occur in in hotter attics, but cooler attics may not dry out as well).

As expected, the R-0 ceiling insulation simulations showed increased EternaTile savings compared with R-11 and R-19 ceiling insulation cases for both Miami and New York. The New York savings increased the most, going from 4.0% for an R-14 EternaTile roof with R-11 vented attic to 19.1% for an R-14 EternaTile roof with an R-0 vented attic, both compared with base vented attics. Similarly, savings for a New York R-14 EternaTile roof with a sealed attic increased from 8.3% with R-11 ceiling insulation to 33.5% for the same sealed attic with R-0 ceiling insulation, again both compared with base vented attics with composition shingle roof.

EternaTile, as modeled, offers great potential to reduce energy use in many older homes. It will also create a much cooler attic compared with traditional vented attics.