



Product Evaluation Report

Client: Solatube International, Inc.
2210 Oak Ridge Way
Vista, CA 92081

Product: Solatube "Solar Star" Solar Powered Attic Fan - HVHZ

Project Description: Evaluate Solatube "Solar Star" Solar Powered Attic Fan for conformance to the 2007 Florida Building Code – Building and Residential Volumes.

Compliance Method: Product Approval Rule 9N-3.005(1)(d) – Product Evaluation Report by a Licensed Professional Engineer

Product Category: Roofing

Product Sub-Category: Roofing Accessories that are an Integral Part of the Roofing System

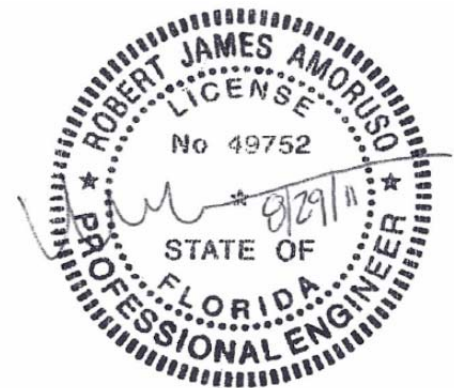
Prepared By: Robert J. Amoruso, P.E.
Florida P.E. License Number 49752
PTC Product Design Group, LLC
FBPE Certification of Authorization No. 25935

Project No.: 411-0702

Project Report No.: 1906

Revision: 0

Date: August 29, 2011



Project Scope

Evaluate Solatube “Solar Star” Solar Powered Attic Fan for conformance to the 2007 Florida Building Code – Building and Residential Volumes including the High Velocity Hurricane Zone (HVHZ). Prepare the following:

- Product Installation Details/Drawings (Reference 1)
- Installation Anchorage Evaluation (Reference 3)
- Product Evaluation Report (this report)

Description of Product – Installation Requirements

See Reference 1 for a description of the product, its installation and other pertinent data related to its approved use.

Limitations and Conditions of Use

This product evaluation report contains or makes reference to specifications, technical details and installation details and/or methods that pertain to the proper use and/or installation of the product specified herein. Specific limitations and conditions of its use including but not limited to the following are contained in Reference 1 and are the subject of Product Approval in accordance with the State of Florida Product Approval Rule 9N-3.

- Design Pressure Rating (psf)
- Installation substrate requirements.
- Installation anchor requirements.
- Installation restrictions.
- Product description.
- Product components.

Applications/Installations outside the Limitations and Conditions of Use of this Product’s Approval

Rule 9N-3.005(1)(e) states “Rational engineering analysis cannot be used in lieu of a standard test required by the Code for approval of products within the scope of the standard, except that project specific approval by the local authorities having jurisdiction in accordance with alternate methods and materials authorized in the Code.”

Any modification to this product as evaluated in this report and approved by the Florida Building Commission is outside the scope of this evaluation and will be the responsibility of others. As allowed in Rule 9N-3.005(1)(e), a project specific approval by the local authorities having jurisdiction may be used given an appropriate rational analysis is conducted and deemed acceptable to the local authorities having jurisdiction.

Quality Assurance

This product is manufactured under a quality assurance program audited by an approved Certification and Quality Assurance Entity **Keystone Certifications Inc. (KCI)** as required in Rule 9N-3.005(3). See FBC Organization No. CER1523 and QUA1824 for approval under Rule 9N-3.

Code Conformance – Structural Performance

The following structural and system performance criteria have been met. Miami-Dade Building and Neighborhood Compliance (BNC) Department Checklist No. 0155 and No. 0463 have been used in determining code conformance requirements. Additionally, and as required by TAS-100(A) for increased wind resistance of vents exceeding the dimensional limitations of Section 10.4.1 of TAS-100(A), a uniform static air test in accordance with TAS-202 was performed per Checklist No. 0463. Correspondence with MD Product Control (see Appendix No. 1) provided direction on satisfying Section 10.4.1 & Section 10.4.8 of TAS-100(A) by testing to TAS 202 thereby meeting Section 10.4.1 of TAS-100(A) and allowing installations to heights not to exceed 75 feet.

MD Checklist	Requirement	FBC Code Reference	Evaluation
0155	TAS 100(A) test. Roof height limitations must be shown in drawing.	Section 1523.6.5.2.13	TAS 100(A) testing conducted. See Reference 2.a for results.
	Metal thickness must comply with Chapter 15.	Table 1503.2 Metal Flashing Material – see table below. Section 1507.2.9 Flashings - asphalt shingles. Section 1518.9 Metal panels/shingles	Metal flashing and housing comprised of Aluminized Steel EDDS T1-25 (Type 1) meeting ASTM A463 (Aluminum-coated sheet steel) . Thickness is 0.028” which exceeds the both galvanized steel and aluminum thickness requirements.
0463	Impact to TAS 201, Optional	n/a	Optional impact testing was not performed.
	Uniform Static Air Test to TAS 202. Safety Factor of 2 applied to results.	Required by TAS 100(A) to obtain increased wind speed testing to maximum height of 75 feet. Section R4403.12.4.	TAS 202 testing conducted. See Reference 2.b for results. Safety Factor of 2 applied to results (see below).
	Wind Driven Rain to TAS 100(A) – Optional	Section 1523.6.5.2.13	TAS 100(A) testing conducted. See Reference 2.a for results.
	One specimen of each model required and rated to the lowest of all tested.	n/a	Only one model evaluated.

The following installation restrictions are also applicable.

Checklist No. 0115 conditions below:

- 1) Installation must match the test conditions.
 - a. Anchor same size.
 - i. No. 10 Tapping Screws
 - b. Same quantity of anchors as tested.
 - i. Eight screws minimum required by testing. Anchor calculations (Reference 3) performed.
 - c. Plywood test bed of 15/32" min. must be drawing minimum.
 - i. Installation Instructions lists this thickness as minimum
- 2) State type of roof surface that must be used with the vent/fan.
 - a. Asphalt shingles.
- 3) Protective cap requirements.
 - a. Not applicable to this unit.

Checklist No. 0463 conditions below:

- 1) The following shall be placed on the installation instructions.
 - a. Add a note stating the following: This approval is for the structural performance only. Impact resistance was not tested. Interior mechanism and/or electrical circuitry are outside the scope of this approval.

DESIGN PRESSURE LIMITATIONS

- From Reference 2.b, Uniform Load Structural Test Pressures where +75/-165 psf.
- Applying a Safety Factor of 2 to arrive at Design Pressures of +37.5/-82.5 psf.

Code Conformance - Plastics

The 2007 Florida Building Code, Sections 2612 and 2612.2 Definitions: Approved Plastics and Miami-Dade Building and Neighborhood Compliance (BNC) Department Checklist No. 0445 require plastics to meet certain fire-related and outdoor exposure requirements. The fan grill is comprised of Polypropylene.

Based on outdoor exposure testing and fire-related testing to ASTM D 1929, E 84 and D 635, the product described herein has demonstrated compliance with the 2007 Florida Building Code.

Solatube "Solar Star" Plastic Component

Polypropylene Fan Grill

Code-Compliance as follows:

1. Outdoor Exposure Testing (Reference 2.c) per Section 2612.2, Approved Plastics
 - a. Documented Characteristics (from Reference 2.c): Architectural Testing, Inc. was contracted by Solatube International, Inc. to evaluate the tensile strength of their Solar Star Fan Grill before and after 4500 hours of Xenon Arc weathering for compliance with Miami-Dade Checklist #0445. The average tensile strength change was determined to be -5.9%, which meets the checklist criterion of $\pm 10\%$.
 - b. Code Compliance: Section 2612.2 is met.
2. ASTM D 1929 testing (Reference 2.d)
 - a. Documented Characteristics: A self-ignition temperature of 880°F
 - b. Code Compliance: A self-ignition temperature of 650°F (343°C) or greater was met.
3. ASTM E 84 testing (Reference 2.e)
 - a. Documented Characteristics (tested in manner to be used): Smoke Developed (Smoke Density Index) 250
 - b. Code Compliance: Smoke Developed (Smoke Density Index) not greater than 450 was met.
4. ASTM D 635 testing (Reference 2.f)
 - a. Documented Characteristics: A CC2 Combustibility classification was received.
 - b. Code Compliance: Combustibility classification of either CC1 or CC2 was met.

Performance and Testing Standards

Reference 2 conducted testing to the following standard(s)

- 1) TAS-100(A)-95, *Test Procedure for Wind and Wind Driven Rain Resistance and/or Increased Windspeed Resistance of Soffit Ventilation Strip and Continuous or Intermittent Ventilation System Installed At the Ridge Area*
- 2) TAS-202-94, *Criteria for Testing Impact & Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure*
- 3) ASTM G 155-04, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*
- 4) ASTM D 638-03, *Standard Test Method for Tensile Properties of Plastics.*

- 5) ASTM D 1929 - 96(2001)e1, *Standard Test Method for Determining Ignition Temperature of Plastics*
- 6) ASTM E 84 - 09a, *Standard Test Method for Surface Burning Characteristics of Building Materials*
- 7) ASTM D 635 - 06, *Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position*

References and Supporting Documents

- 1) Drawings
 - a. SOLA0006, Original Issue, dated 8/29/11, *Solatube "Solar Star" Solar Powered Attic Fan – Installation Anchorage Details.*
- 2) Testing
 - a. Architectural Testing Inc. Test Report No. B1574.01-109-18, dated 8/25/11, *"Solar Star" Solar Powered Attic Fan to TAS-100(A).*
 - b. Architectural Testing Inc. Test Report No. 95385.02-301-18, dated 8/02/11, *"Solar Star" Solar Powered Attic Fan to TAS-202.*
 - c. Architectural Testing Inc. Test Report No. A6443.01-106-31, dated 8/23/11, *"Solar Star" Solar Powered Attic Fan Grill testing to ASTM G155 and D638.*
 - d. SGS U.S. Testing Company Inc., Test Report No. 2228541-3, dated 12/1/10, *"Solar Star" Solar Powered Attic Fan Grill testing to ASTM D1929.*
 - e. SGS U.S. Testing Company Inc., Test Report No. 2228540-1, dated 12/1/10, *"Solar Star" Solar Powered Attic Fan Grill testing to ASTM E84.*
 - f. SGS U.S. Testing Company Inc., Test Report No. 2228540-2, dated 12/6/10, *"Solar Star" Solar Powered Attic Fan Grill testing to ASTM D635.*
- 3) Calculations
 - a. PTC Report No. 1905, Rev. 0, *Solatube "Solar Star" Solar Powered Attic Fan - Anchorage Engineering*, Dated 8/29/11, signed and sealed by Robert J. Amoruso, P.E.
- 4) 2007 Florida Building Code
 - a. Testing Requirements
 - i. Section 1713
 - ii. Section 1523.6.5.2.13
 - iii. Section R4403.12.4
 - b. Material Requirements
 - i. Table 1503.2 Metal Flashing Material
 - ii. Section 1507.2.9 Flashings - asphalt shingles
 - iii. Section 1518.9 Metal panels/shingles
 - c. Plastics Requirements
 - i. Section 2612
 - ii. Section 2612.2 Definitions: Approved Plastics

Appendix 1 – Email

From: Gascon, Jaime (BNC) [mailto:Gascon@miamidade.gov]
Sent: Thursday, July 28, 2011 7:28 AM
To: Robert J. Amoruso
Cc: Utrera, Carlos (BNC)
Subject: RE: Solar Powered Roof Fan - MD Requirements

Mr. Amoruso:

Checklist #463
<<http://www.miamidade.gov/building/library/productcontrol/checklist/Rooftop%20Mechanical.pdf>> on our website can be used to qualify these units.

Regards,

Jaime D. Gascon, P.E., Product Control Section Supervisor
Miami-Dade County Building and Neighborhood Compliance Department
11805 SW 26 Street
Miami, Florida 33175
(786) 315-2590
(786) 315-2599 (Fax)

From: Robert J. Amoruso [mailto:robert@ptc-corp.com]
Sent: Wednesday, July 27, 2011 2:35 PM
To: Gascon, Jaime (BNC); Utrera, Carlos (BNC)
Cc: robert@ptc-corp.com
Subject: Solar Powered Roof Fan - MD Requirements
Importance: High

Gentlemen,

I hope you can help me out with the following.

Our client, SolarTube has a Solar Powered Roof Mounted Attic Fan we are revising the Florida Product Approval for. I have attached the existing drawing for the unit.

As we wish to extend the unit's approval to the HVHZ, I consulted the MD Vents Checklist. TAS 100(a) is the required test for the HVHZ. In reading through TAS 100(a), I found section 10.4.8 references TAS 100(b) which does not exist. The online code links to TAS 100. As you can see in the attached, the vent is 25.3" wide and that exceeds 18" thus Section 10.4.8 appears to be applicable.

I looked at TAS 100(a) code changes for the 2010 FBC and found the following change submitted:

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PO Box 520775
Longwood, FL 32752-0775
Phone: 321-690-1788 Fax: 321-690-1789
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Project No. 411-0702
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As the vent is 25.3" wide and that exceeds 18", I construe additional wind load testing to TAS 202 is required.

Please confirm what testing is required for the product in the HVHZ. Thank you.

Robert J. Amoruso, P.E.
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PTC Product Design Group, LLC
PO Box 520775
Longwood, FL 32752-0775
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