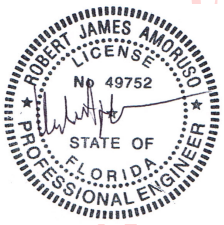
Product Evaluation Report

Client:	Solatube International, Inc. 2210 Oak Ridge Way Vista, CA 92081
Product:	Solatube “Solar Star” Solar Powered Attic Fan, Models RM-1200 & RM-1600 - HVHZ
Compliance Method:	Product Approval Rule 61G20-3.005(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.:	415-0316
Project Report No.:	1906
Revision:	3
Date:	June 19, 2015



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Evaluated by:
Robert J. Amoruso, PE
FL PE No. 49752

Project Scope

Evaluate Solatube "Solar Star" Solar Powered Attic Fan, Models RM-1200 & RM-1600 for conformance to the 2014 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 61G20-3.

- 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 61G20-3.005(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 61G20-3.005(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 61G20-3.005(3). See FBC Organization No. CER1523 and QUA1824 for approval under Rule 61G20-3.

Code Conformance – Structural Performance

The following structural and system performance criteria have been met. 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. Testing to TAS 202 satisfies Section 10.4.1 & Section 10.4.8 of TAS-100(A) thus allowing installations to heights not to exceed 75 feet.

Requirement	FBC Code Reference	Evaluation
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. 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.
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 1523.4	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.

The following installation restrictions are also applicable.

1) Installation anchors 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.

2) State type of roof surface that must be used with the vent/fan.
    a. Asphalt shingles per Reference 2.a and 2.b testing.
    b. High-Profile roof tiles not to exceed three inches (3") in height per Reference 2.a and 2.b testing.

3) The following shall be placed on the installation instructions.
    a. 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 +100/-340 psf.
- In accordance with the 2014 FBC, Section 1523.4 a Safety Factor of 2 is applied to arrive at Design Pressures of +50/-170 psf.

Code Conformance - Plastics

The 2014 FBC, Section 2614.2 Definitions: Approved Plastics and Section 2606.4, Light-Transmitting Plastics / Specifications 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 2014 Florida Building Code.

Solatube "Solar Star" Plastic Component

Polypropylene Fan Grill

Code-Compliance as follows:

1. Outdoor Exposure Testing (Reference 2.c) per Sections 2614.2, 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 the FBC. The average tensile strength change was determined to be -5.9%, which meets the FBC criterion of ±10%.
    b. Code Compliance: Sections 2614.2 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, Rev. C, dated 5/11/2015, *Solatube "Solar Star" High Profile RM-1200 Roof Fan – Installation Anchorage Details*, signed and sealed by Robert J. Amoruso, PE.
    b. SOLA0007, Rev. A, dated 5/11/2015, *Solatube "Solar Star" High Profile RM-1600 Roof Fan – Installation Anchorage Details*, signed and sealed by Robert J. Amoruso, PE.

2) Testing

    a. Architectural Testing Inc. Test Report No. C1439.01-109-18-R1, dated 8/23/12, "*Solar Star" Solar Powered Attic Fan to TAS-100(A)-95*, signed and sealed by Michael D. Stremmel, FL P.E.
    b. Architectural Testing Inc. Test Report No. C1439.02-109-18-R1, dated 8/23/12, "*Solar Star" Solar Powered Attic Fan to TAS-202-94*, signed and sealed by Michael D. Stremmel, FL P.E.

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. 2228540-3, 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) Reports

a. PTC Report No. 2143, Rev. 0, *Solatube "Solar Star" Solar Powered Attic Fan, Models RM-1200 & RM-1600 – HVHZ, Anchorage Engineering*, Dated 8/15/12, signed and sealed by Robert J. Amoruso, P.E.
b. PTC Report No. 1906-CofE, Rev. 3, *Solatube "Solar Star" Solar Powered Attic Fan, Models RM-1200 & RM-1600 – HVHZ, Equivalency Evaluation to 2014 FBC*, Dated 6/19/15, Signed and Sealed by Robert J. Amoruso, P.E.

4) 2014 Florida Building Code – Building Volume

a. Testing Requirements
    i. Section 1523.6.5.2.13
    ii. Section 1523.4
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 2612.2 Definitions: Approved Plastics
    ii. Section 2606.4, Light-Transmitting Plastics / Specifications