



## Product Evaluation Report

|                       |  |
|-----------------------|--|
| Client:               | Solatube International, Inc.<br>2210 Oak Ridge Way<br>Vista, CA 92081  |
| Product:              | Solatube "Solar Star" Solar Powered Attic Fan, Models RM-1500 & RM-2400 - 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.<br>Florida P.E. License Number 49752<br>PTC Product Design Group, LLC<br>FBPE Certification of Authorization No. 25935 |
| Project No.:          | 422-0615   |
| Project Report No.:   | 1906-PER   |
| Revision:             | 6  |
| Date:                 | August 3, 2023   |

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

# Project Scope

Evaluate Solatube “Solar Star” Solar Powered Attic Fan, Models RM-1500 & RM-2400 for conformance to the 8th Edition (2023) 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 refers 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.

## 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.<br>Section 1507.2.9 Flashings - asphalt shingles. | Metal flashing and housing comprised of Aluminized Steel EDDS T1-25 (Type 1) meeting ASTM A463 (Aluminum-coated sheet |

|  |  |  |
|--|--|--|
|  | Section 1518.9 Metal panels/shingles   | 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 8th Edition (2023) FBC, Section 1523.4 a Safety Factor of 2 is applied to arrive at Design Pressures of +50/-170 psf.

**SOLAR PANEL SUBSTITUTION EVALUATION**

Intertek/Architectural Testing; the testing laboratory that tested the original fan versions in Reference 2.a and 2.b has reviewed (Reference 5) changes requested by the manufacturer for substituting a newly designed solar panel and offered the determination that the changes do not affect the results of the TAS 100(A) and TAS 202 testing conducted in Reference 2.a and 2.b respectively.

This evaluator has also reviewed the changes and arrives at the same conclusions. Note that manufacturer has revised the series identification of the attic fans from RM-1200 to RM-1500 and RM-1500 to RM-2400

**Code Conformance - Plastics**

The 8th Edition (2023) FBC, Section 2615.2 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 8th Edition (2023) Florida Building Code.

**Solatube “Solar Star” Plastic Component**

Polypropylene Fan Grill

**Code-Compliance as follows:**

- 1. Outdoor Exposure Testing (Reference 2.c) per Sections 2615.2, 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 2615.2 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. D, dated 2/6/18, *Solatube "Solar Star" High Profile RM-1500 Roof Fan – Installation Anchorage Details*, signed and sealed by Robert J. Amoruso, PE.
- b. SOLA0007, Rev. C, dated 2/6/18, *Solatube "Solar Star" High Profile RM-2400 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-1500 & RM-2400 – HVHZ, Anchorage Engineering*, dated 8/15/12, signed and sealed by Robert J. Amoruso, P.E.
- b. PTC Report No. 1906-EER, Rev. 6, *Solatube "Solar Star" Solar Powered Attic Fan, Models RM-1500 & RM-2400 – HVHZ, Equivalency Evaluation to 8th Edition (2023) FBC*, Signed and Sealed by Robert J. Amoruso, P.E.

### 4) 8th Edition (2023) 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 2615.2 Definitions: Approved Plastics
  - ii. Section 2606.4, Light-Transmitting Plastics / Specifications

- 5) Intertek/ATI Letter dated 1/15/18 from Timothy J. McGill/Manager of Product Testing Intertek/ATI to Todd Anderson/Solatube related to substitution of new solar panels for those tested in Reference 2.a and 2.b. See following for this letter.

January 15, 2018

Mr. Todd Anderson  
Solatube International, Inc. ("Customer")  
2210 Oak Ridge Way  
Vista, California 92081

RE: LETTER OF EQUIVALENCY  
SOLAR STAR HVHZ HIGH PROFILE EVALUATED TO THE SOLAR STAR HVHZ RM 1500 HIGH (16W)  
SOLAR STAR HVHZ RM 1600 HIGH EVALUATED TO THE SOLAR STAR HVHZ RM 2400 HIGH (35W)

Dear Mr. Anderson:

Pursuant to your request, Intertek Building & Construction (B&C) was contracted to review modifications to the as tested products (C1439.01-109-18 and C1439.02-109-18). The testing for the products included TAS 202 and TAS 100(A). The changes for the purpose of this letter from the tested products to the new designed solar panels are limited to:

| PRODUCT                            | TESTED | DRAWING NO. | WIDTH (INCHES) | LENGTH (INCHES) |
|------------------------------------|--------|-------------|----------------|-----------------|
| Solar Star HVHZ High Profile       | Yes    | 900830      | 10.32          | 16.14           |
| Solar Star HVHZ RM 1500 High (16W) | No     | 122290      | 10.39          | 16.21           |

**NOTE:** THE ONLY CHANGE WAS TO THE SOLAR PANEL AND THE FASTENING METHOD WAS THE SAME FOR BOTH UNITS.

| PRODUCT                            | TESTED | DRAWING NO. | DIAMETER (INCHES) | THICKNESS (INCHES) |
|------------------------------------|--------|-------------|-------------------|--------------------|
| Solar Star HVHZ RM 1600 High       | Yes    | 900835      | 20.47             | 0.78               |
| Solar Star HVHZ RM 2400 High (35W) | No     | 122440      | 20.47             | 0.59               |

**NOTE:** THE ONLY CHANGE WAS TO THE SOLAR PANEL AND THE FASTENING METHOD WAS THE SAME FOR BOTH UNITS.

Based on the drawings provided by Mr. Anderson from Solatube International, Inc. it is my professional opinion that the above changes would not alter any results of the physical testing specified and therefore the evaluated products are equivalent as it relates to the physical testing referenced above.

For ARCHITECTURAL TESTING, INC.

  
Digitally Signed by: Timothy J. McGill

Timothy J. McGill  
Manager - Product Testing

TJM:vjm  
cc: H8971.01-109-18, C1439.01-109-18, C1439.02-109-18

