American Test Lab of South Florida
6801 NW 17 Ave Ft Lauderdale, FL 33309
office 954-972-6208 fax 954-972-6285
www.atlsf.com email:info@atlsf.com

Client: VHR Roof Tile Mfg.
1665 Bohm Drive
Little Chute, Wisconsin 54140
Att. Bruce Rouleau

Report Date: 8/3/18
ATLSF Report #: RT0803.01-18

Re: Calculations for Restoring Moment Due to Gravity and Aerodynamic Multiplier

References: Florida Building Code, 6th Edition (2017), section 1518.8.5; TAS 101-95, sections 10.1 & 10.2; TAS 102/102A, sections 9.1 & 9.2.

| | |
|---|---|
| Test Authorized by: | Bruce Rouleau |
| Sampled by: | Client |
| Date of Receipt: | 8/1/18 |
| ATLSF Item #: | 112461 |
| Referenced Test Method: | Florida Building Code, TAS 101-95 |
| Manufacturer: | VHR Roof Tile Mfg. |
| Model: | Flat Profile, Concrete Roof Tile |
| Quantity Received: | 6 tiles |
| Nominal Dimensions (in.): (l x w x h): | Specified by Supplier:15.375 x 10.625 x 0.938<br>Measured: 15.0 x 10.5 x 1.1 |
| Nominal Weight (lbf): specified by supplier: | 8.5 |
| Imprint: | VHR – on the underside, at the nose end of the tile |
| Classification: | FBC TAS 112-95: Type 3a- Flat Profile, Interlocking, Class III<br>ASTM C1492-03: Type II- Medium Profile, Interlocking, Normal Weight |

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Roof Tile: Flat Profile, Concrete Roof Tile
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Calculations:

1. Weight (W): (Weight obtained from ATLSF Report #: RT0618.02-18)
   $W = m \times \frac{1 \text{ lbf s}^2/\text{ft}}{32.174 \text{ lbm}} \times 32.2 \text{ ft/s}^2$
   $W = 8.5 \times 1.0008$
   $W = 8.507$ lbf

2. Restoring Moment Due to Gravity ($M_g$): (α: determined from mock-up layout in laboratory)

   **Direct Deck Application**
   $M_g = W \times \cos(\theta - \alpha) \times L_g$
   $M_g = 8.507 \cos(9.462° - 5.410) \times 0.641$
   $M_g = 5.439$ ft-lbf

| Pitch | Equation | Restoring Moment Due to Gravity ($M_g$) |
|---|---|---|
| 2:12 | $M_g = 8.507 \times \cos(9.462 - 5.410) \times 0.641$ | $M_g = 5.44$ |
| 3:12 | $M_g = 8.507 \times \cos(14.036 - 5.410) \times 0.641$ | $M_g = 5.39$ |
| 4:12 | $M_g = 8.507 \times \cos(18.435 - 5.410 \times 0.641$ | $M_g = 5.31$ |
| 5:12 | $M_g = 8.507 \times \cos(22.620 - 5.410) \times 0.641$ | $M_g = 5.21$ |
| 6:12 | $M_g = 8.507 \times \cos(26.565 - 5.410) \times 0.641$ | $M_g = 5.08$ |
| 7:12 | $M_g = 8.507 \times \cos(30.256 - 5.410) \times 0.641$ | $M_g = 4.95$ |

   **Batten Application**
   $M_g = W \times \cos(\theta - \alpha) \times L_g$
   $M_g = 8.507 \cos(9.462° - 5.410) \times 0.500$
   $M_g = 4.243$ ft-lbf

| Pitch | Equation | Restoring Moment Due to Gravity ($M_g$) |
|---|---|---|
| 2:12 | $M_g = 8.507 \times \cos(9.462 - 5.410) \times 0.500$ | $M_g = 4.24$ |
| 3:12 | $M_g = 8.507 \times \cos(14.036 - 5.410) \times 0.500$ | $M_g = 4.21$ |
| 4:12 | $M_g = 8.507 \times \cos(18.435 - 5.410 \times 0.500$ | $M_g = 4.14$ |
| 5:12 | $M_g = 8.507 \times \cos(22.620 - 5.410) \times 0.500$ | $M_g = 4.06$ |
| 6:12 | $M_g = 8.507 \times \cos(26.565 - 5.410) \times 0.500$ | $M_g = 3.97$ |
| 7:12 | $M_g = 8.507 \times \cos(30.256 - 5.410) \times 0.500$ | $M_g = 3.86$ |

3. Aerodynamic Multiplier (λ): For Direct Deck Application:
   b = 9.75"/12: l = 12"/12
   $\lambda = 0.156 \times b \times l^2$: $\lambda = 0.156 \times 0.813 \times 1.000^2$
   $\lambda = .13$

4. Aerodynamic Multiplier (λ): For Batten Application:
   b = 9.75"/12: l = 12"/12
   $\lambda = 0.144 \times b \times l^2$: $\lambda = 0.144 \times 0.813 \times 1.000^2$
   $\lambda = .12$

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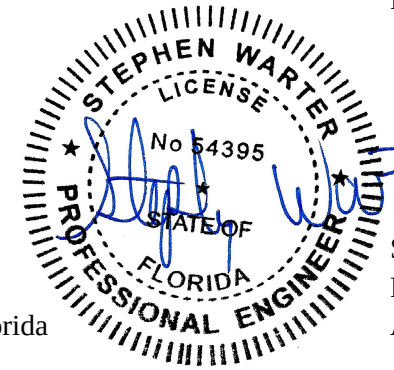
The above calculations were conducted in compliance with Florida Building Code sections referenced above with the values based on our laboratory measurements. Static uplift testing was not performed. It is our understanding that the client is a member of the Tile Roof Institute and that Uplift Resistance Values will obtained from their file data.

Disclaimer: This test report was prepared by American Test Lab of South Florida, (ATLSF), for the exclusive use of the above named client and does not constitute certification of this product. The results relate to the particular specimens tested and does not imply that the quality of similar or identical products manufactured or installed from specifications or shop drawings identical to the product tested. ATLSF is an independent testing laboratory and assumes that all information provided by the client is accurate and does not guarantee or warrant any product tested or installed. American Test Lab of South Florida, its employees, and witnessing engineers do not own, operate, or are controlled by any manufacturer and have no financial interest in the manufacture, manufacture of any related parts, specification, or installation of this or a competing product.

End of report.

Prepared by:

Tony Porcello, RRO
President
American Test Lab of South Florida




Reviewed by:

Stephen Warter Date: 2018.08.07 15:54:06 -04'00'

Stephen W. Warter, P.E.
Reg. State of Florida # 54395
American Test Lab of South Florida