Evaluation Report

Loadmaster Systems
"Heavy Duty Deck" – Tile Roof Assembly

Manufacturer

Loadmaster Systems, Inc.
3100 Northwoods Place, Suite E
Peachtree Corners, GA 30071
(800) 527-4035

for

Florida Product Approval

FL 7230.1 R5

Florida Building Code 8th Edition (2023)
Per Rule 61G20-3
Method: 2 – B
Category: Roofing
Sub - Category: Roofing Tiles

This item has been electronically signed and sealed by James L. Buckner, P.E., on this date using a Digital Signature. Printed copies of this document are not considered signed and sealed, and the signature must be verified on any electronic copies.

Prepared by:
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Florida Professional Engineer # 31242
Florida Evaluation ANE ID: 1916
Report No. 01_23-562-LM-HDD-Tile-ER8
Date: 10 / 20 / 23

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PROFESSIONAL ENGINEER

2023.10.20 14:47:50 -04'00'

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1.0 Product

1.1 **Manufacturer**: Loadmaster System, Inc.

1.2 **Assembly Name:** **"**Heavy Duty Deck" – Tile Roof Assembly

2.0 Evaluation Scope:

2.1 **Compliance with the following**
Florida Building Code 8th Edition (2020), section 1708.2
International Building Code (IBC) 2021, section 1708.2.2

2.2 **Evaluation Method:**
Florida Product Approval Rule 61G20-3.005 (2) (b)

2.3 **Evaluation Classification:**
Category: Roofing
Sub Category: Roofing Tiles

2.4 **Properties Evaluated**
Structural Properties

2.5 **Limits of Evaluation:**
This product assembly evaluation is limited to compliance with section 2.1 to section 2.4 of this report.

3.0 Product Assembly as Evaluated:

- **Roof Tile:** Monier Vanguard Roll
- **Tile Adhesive:** Polyfoam Polypro AH 160
- **Underlayment:** Loadmaster Duraclad Self-Adhered Roofing Underlayment
- **Mineral/Composite Board:** Loadmaster Duraflex Mineral Board
- **Insulation Board:** Loadmaster Isocynurate Rigid Insulation Board
- **Deck:** Loadmaster Heavy Duty 25 Gauge Steel Deck

4.0 Support:

4.1 **Option 1:**

Type:	Joist or Beam
Material:	Steel
Top Flange Thickness:	18 Ga. Minimum
Yield Strength:	33 ksi Minimum
Spacing:	48" o.c. Maximum

4.2 **Option 2:**

Type:	Joist or Beam
Material:	Wood
Size:	Dimensional Lumber
Density:	0.42 Minimum
Spacing:	48" o.c. Maximum

(Design of support system is outside the scope of this evaluation)

5.0 Product Assembly Structural Performance:

5.1 Wind Uplift Resistance:

* Design Uplift Resistance: **- 52.5 PSF**

** Allowable design pressure for allowable stress design (ASD)*

Refer to Engineering Properties on page 7 For Supplemental Roof Tile Resistance Data

6.0 Performance Standards Used for Evaluation:

6.1 The following test protocols were performed to demonstrate compliance with the intent of the code as this product is not addressed specifically in the code.

- SBCCI SSTD 11-97 – *Determining Wind Resistance of Concrete or Clay Roof Tiles*
- UL580-94 – *Test for Uplift Resistance of Roof Assemblies—with Revisions through February 1998*

7.0 Standard of Equivalence:

7.1 The UL 580-94 standard version used to test the deck assembly meets the prescribed standards in UL580-06 standard version adopted by the Florida Building Code 8th Edition (2023) for use as evaluated in this report.

8.0 Code Compliance:

8.1 The product described herein has demonstrated compliance with Florida Building Code 8th Edition (2023), Section 1708.2 & International Building Code (IBC) 2021, section 1708.2.2

9.0 Limitations and Conditions of Use:

9.1 Minimum Slope shall be 2:12, and in accordance with the Manufacturers recommendations.

9.2 This evaluation report for "Optional Statewide Approval" contains technical documentation, specifications and installation method(s) which include "Limitations and Conditions of Use" throughout the report in accordance with Rule 61G20-3.005. Per Rule 61G20-3.004, the Florida Building Commission is the authority to approve products under "Optional Statewide Approval".

9.3 Option for application outside "Limitations and Conditions of Use"
Rule 61G20-3.005(1)(e) allows engineering analysis for "project specific approval by the local authorities having jurisdiction in accordance with the alternate methods and materials authorized in the Code". Any modification of the 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.

9.4 This report is a building code product evaluation per FLPE rule (FAC) 61G15-36 to comply with Florida product approval rule (FAC) 61G20-3. This evaluation report is part of the Florida Building Commission approval for the listed code related criteria. This report by James Buckner, P.E. and CBUCK Engineering is not a design certification of code compliance construction submittal documentation, per FBC section 107, for any individual structure, site specific or permit design.

9.5 Fire Classification and Thermal Properties are outside the scope of Rule 61G20-3, and are therefore not included in this evaluation.

9.6 This report does not evaluate the use of this product for use in the High Velocity Hurricane Zone code section. (Dade & Broward Counties)

10.0 Quality Assurance:

The manufacturer has demonstrated compliance of roof panel products in accordance with the Florida Building Code and Rule 61G20-3.005 (3) for manufacturing under a quality assurance program audited

by an approved quality assurance entity through Keystone Certifications, Inc. (FBC Organization ID# QUA 1824).

11.0 Components / Material Standards

11.1 Roof Tile (Used in Full Assembly):

Product Identification:	Vanguard Roll Roofing Tile
Manufacturer:	Monier Lifetile, LLC.
Material:	Concrete
Profile:	Medium
Standard:	Per ASTM C1492

11.2 Roof Tile Adhesive:

Product Identification:	Polypro® AH-160
Manufacturer:	Polyfoam Products, Inc.

11.3 Underlayment:

Product Identification:	Loadmaster Duraclad Roofing Underlayment
Standard:	Per FBC, Section 1507.3.3

11.4 Mineral Board:

Product Identification:	Loadmaster Duraflex Mineral Board
Material:	Mineral Paper Surfaced Gypsum
Dimension:	48” × 150”
Thickness:	1/2" Minimum
Standard:	Per ASTM C79

11.5 Insulation (Optional):

Product Identification:	Loadmaster Isocyanurate Rigid Insulation Board
Dimension:	48” × 96”
Thickness:	Up to 5” Maximum
Density:	1 pcf Minimum

11.6 Deck:

Product Identification:	Loadmaster Heavy Duty Deck
Profile:	Trapezoidal
Material:	Steel
Thickness:	25 Ga. Min.
Rib Height:	15/16” or 0.94”
Yield Strength:	80 ksi Minimum
Standard:	Per AISI Cold-Formed Steel Specification

11.7 Fastener #1:

Function:	Attach Steel Deck to Steel Support *(For Attachment Option #1)*
Type:	Hex-Head, Self-Drilling Screw
Size:	#12 - 14 × 3/4” Minimum Penetrate thru
Corrosion Resistance:	Per FBC Section 1506.6 or 1507.4.4
Standard:	Per SAE J78-1979

11.8 Fastener #2:

Function:	Attach Steel Deck to Wood Support *(For Attachment Option #2)*
Type:	Hex-Head, Wood Screw
Size:	#9 - 12 × 2” Minimum with washer

Corrosion Resistance: Per FBC Section 1506.6 or 1507.4.4
Standard: Per ANSI/ASME B18.6.4

11.9 Fastener #3:
Function: Deck to Deck Side Lap Stitching *(For Attachment Options #1 & #2)*
Type: Hex-Head, Self-Drilling Screw
Size: #12 - 14 × 1" Minimum
Corrosion Resistance: Per FBC Section 1506.6 or 1507.4.4
Standard: Per SAE J78-1979

11.10 Fastener #4 & Washer:
Function: Simultaneously Attach Mineral Board and Insulation Board to Steel Deck
Product Identification: Loadmaster Bugle Roofgrip
Size: #12" (× length to meet min. penetration through steel deck)
Penetration Through: 1/2" min. through steel deck
Corrosion Resistance: Per FBC Section 1506.6 or 1507.4.4
Standard: Per SAE J78-1979

Washer Type:	Loadmaster Roof Deck Plate	**OR** Loadmaster Compression Disc
Washer Size & Shape:	3" Dia. Circular or 3" × 3" Square Plate	1-5/16" Dia. Hexagonal Disc
Washer Material:	Steel	Steel
Washer Thickness:	25 Ga. Minimum	25 Ga. Minimum
Corrosion Resistance:	In compliance with FBC Section 1507.4.3 ASTM A792 coated, or ASTM A653 G90 galvanized steel	In compliance with FBC Section 1507.4.3 ASTM A792 coated, or ASTM A653 G90 galvanized steel

12.0 General Installation Method:

12.1 Deck Attachment:

DECK TO SUPPORTS:

Option 1: Mechanically Attach Steel Deck To Steel Supports as follows:
Fastener Type: Fastener #1
Fastener Spacing: **7-1/2" o.c.**

Option 2: Mechanically Attach Steel Deck To Wood Supports as follows:
Fastener Type: Fastener #2
Fastener Spacing: **3-3/4" o.c.**

DECK SIDELAP STITCHING

Option 1 & Option 2:
Fastener Type: Fastener #3
Fastener Spacing: **16" o.c.**

12.2 Insulation Board Attachment: Loose Laid
Insulation Board is Simultaneously attached to Steel Deck with Mineral Board (Refer to Section 12.3 of this report)

12.3 Mineral Board Attachment: Mechanically Attached To Steel Deck as follows:
Fastener Type: Fastener #4 & Washer
Fastener Density: **1 : 1.33** fastener / ft^2

12.4 Underlayment: Method of Attachment: Self-Adhered to Mineral Board

Sidelap Width: 2-1/2" Nominal

12.5 Roof Tile Adhesive Application:

Paddy size: Large
Measured 2" Wide × 10" Long × 3/4" Deep
Paddy Width: 43 grams (beneath each Tile)

12.6 Tile Application:

Attach roof tile to underlayment with large paddy placement (43 grams) of Polyfoam Polypro® AH-160 two part tile roof adhesive. The tile must fully engage the bed of foam. The tile shall be applied to the foam within 1 – 2 minute of the foam application.

Refer to page 7 of this report for Engineering Properties.

Install the "Loadmaster Heavy Duty Deck" Tile Roof Assembly in compliance with the installation method listed in this report and applicable code sections of FBC 8th Edition (2023). The installation method described herein is in accordance with the scope of this evaluation report. Refer to manufacturer's installation instructions as a supplemental guide for attachment.

13.0 Evaluation Reference Data:

13.1 SBCCI SSTD 11-97 – Test Standard for Determining Wind Resistance of Concrete or Clay Roof Tile
By PRI Asphalt Technologies: Test Lab (TST ID: 1556)
Report Project ID: LMS-001-02-02, Report Date: 10/8/02

13.2 UL580-94 (with 1998 Revisions) – Uplift Class 90 (Reference for Steel Deck)
By Underwriter's Laboratories, Inc. (FBC Organization #CER ID: 1739)
UL File #TGKX.76

13.3 Quality Assurance
Keystone Certifications, Inc. (FBC Organization ID# QUA 1824)
Loadmasters Systems, Inc. Licensee #877

13.4 Certification of Independence
By James L. Buckner, P.E. @ CBUCK Engineering (FBC Organization # ANE 1916)

3.1 Engineering Analysis
By CBUCK Engineering
Report #C06-222-RM-T, Dated: 6 / 8 / 06
Report #C06-222-ADM-T, Dated: 7 / 7 / 06

Supplemental Data
For Tile as Tested in Assembly Test

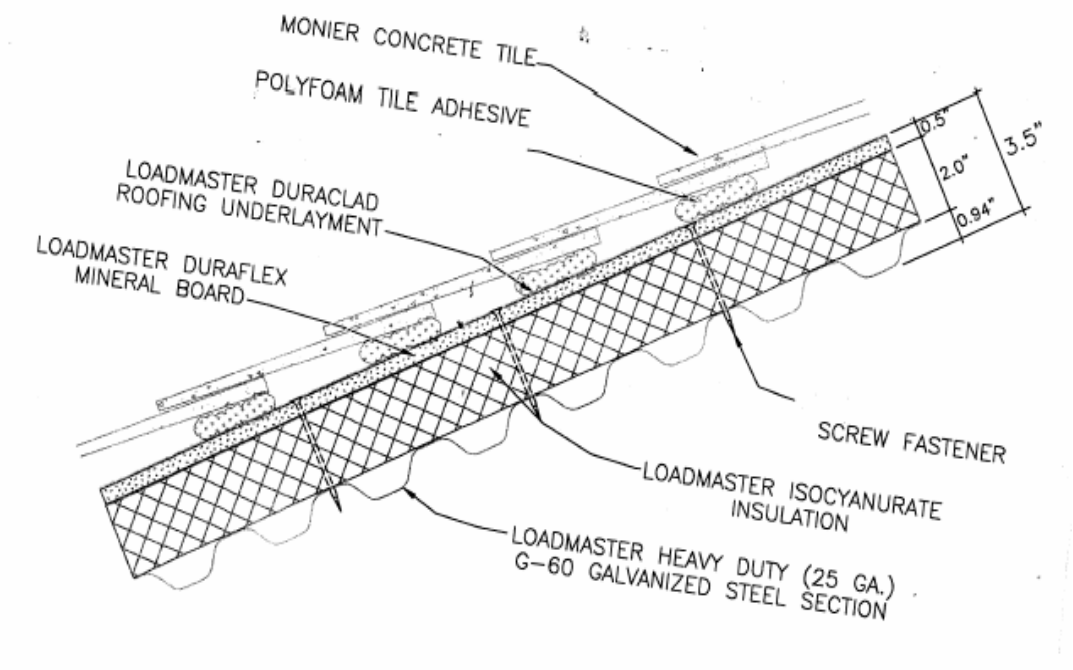
TABLE 1: Average Weight (W) and Dimensions (l x w)			
Tile Profile	Weight-W (lbf)	Length-l (ft)	Width-w (ft)
Monier Vanguard Roll Concrete Tile	10.6	1.37	1.10

TABLE 2: Aerodynamic Multipliers – λ (ft^3)	
Tile Profile	λ (ft^3) Direct Deck Application
Monier Vanguard Roll Concrete Tile	0.321

TABLE 3: Restoring Moments due to Gravity - M_g						
Tile Profile	2” : 12”	3” : 12”	4” : 12”	5” : 12”	6” : 12”	7” : 12” or greater
Monier Vanguard Roll Concrete Tile	Direct Deck	Direct Deck	Direct Deck	Direct Deck	Direct Deck	Direct Deck
	7.23	7.15	7.04	6.89	6.71	6.52

TABLE 4: Attachment Resistance Expressed as a Moment – M_f (ft-lbf) For Foam Set System		
Tile Profile	Fastener Type	Direct Deck
Monier Vanguard Roll Concrete Tile	Polyfoam Polypro AH160 Large Paddy[1]	82.6
1. Large paddy placement of 43 grams of Polypro AH 160		

Installation Method
Loadmaster Systems, Inc.
Heavy Duty Deck – Tile Roof Assembly



Notes:

- Apply 43 grams (Large Paddy) of Polyfoam Polypro AH 160 foam adhesive beneath each Monier Vanguard Roll tile. The paddy should measure 2" Wide × 10" Long × 3/4" Deep

- **DECK ATTACHMENT TO SUPPORTS:**

  Option 1:

  (A) Steel Deck To **Steel Supports**:
  Fastener Type: Fastener #1
  Fastener Spacing: **7-1/2" o.c.**

  (B) Deck Sidelap Stitching
  Fastener Type: Fastener #3
  Fastener Spacing: **16" o.c.**

  Option 2:

  (A) Steel Deck To **Wood Supports**
  Fastener Type: Fastener #2
  Fastener Spacing: **3-3/4" o.c.**

  (B) Deck Sidelap Stitching
  Fastener Type: Fastener #3
  Fastener Spacing: **16" o.c.**