



NEMO|etc.

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EVALUATION REPORT

Owens Corning Roofing and Asphalt, LLC
One Owens Corning Parkway
Toledo, OH 43659
(740) 321-6345

Evaluation Report I11980.11.08-R8
FL11602-R7
Date of Issuance: 11/03/2008
Revision 8: 09/14/2018

SCOPE:

This Evaluation Report is issued under **Rule 61G20-3** and the applicable rules and regulations governing the use of construction materials in the State of Florida. The documentation submitted has been reviewed by Robert Nieminen, P.E. for use of the product under the Florida Building Code and Florida Building Code, Residential Volume. The products described herein have been evaluated for compliance with the **6th Edition (2017) Florida Building Code** sections noted herein.

DESCRIPTION: Titanium™ Roof Underlayments

LABELING: Labeling shall be in accordance with the requirements of the Accredited Quality Assurance Agency noted herein.

CONTINUED COMPLIANCE: This Evaluation Report is valid until such time as the named product(s) changes, the referenced Quality Assurance documentation changes, or provisions of the Code that relate to the product change. Acceptance of this Evaluation Report by the named client constitutes agreement to notify Robert Nieminen, P.E. of any changes to the product(s), the Quality Assurance or the production facility location(s). NEMO|etc. requires a complete review of this Evaluation Report relative to updated Code requirements with each Code Cycle.

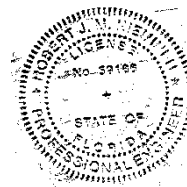
ADVERTISEMENT: The Evaluation Report number preceded by the words "NEMO|etc. Evaluated" may be displayed in advertising literature. If any portion of the Evaluation Report is displayed, then it shall be done in its entirety.

INSPECTION: Upon request, a copy of this entire Evaluation Report shall be provided to the user by the manufacturer or its distributors and shall be available for inspection at the job site at the request of the Building Official.

This Evaluation Report consists of pages 1 through 7.

Prepared by:

Robert J.M. Nieminen, P.E.
Florida Registration No. 59166, Florida DCA ANE1983



The facsimile seal appearing was authorized by Robert Nieminen, P.E. on 09/14/2018. This does not serve as an electronically signed document.

CERTIFICATION OF INDEPENDENCE:

1. NEMO ETC, LLC does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products it evaluates.
2. NEMO ETC, LLC is not owned, operated or controlled by any company manufacturing or distributing products it evaluates.
3. Robert Nieminen, P.E. does not have nor will acquire, a financial interest in any company manufacturing or distributing products for which the evaluation reports are being issued.
4. Robert Nieminen, P.E. does not have, nor will acquire, a financial interest in any other entity involved in the approval process of the product.
5. This is a building code evaluation. Neither NEMO|etc. nor Robert Nieminen, P.E. are, in any way, the Designer of Record for any project on which this Evaluation Report, or previous versions thereof, is/was used for permitting or design guidance unless retained specifically for that purpose.

ROOFING COMPONENT EVALUATION:
1. SCOPE:

Product Category: Roofing
Sub-Category: Underlayment
Compliance Statement: Titanium™ Roof Underlayments, as produced by Owens Corning Roofing and Asphalt, LLC, have demonstrated compliance with the intent of the following sections of the 6th Edition (2017) Florida Building Code through testing in accordance with applicable sections the following Standards. Compliance is subject to the Installation Requirements and Limitations / Conditions of Use set forth herein.

2. STANDARDS:

| <u>Section</u> | <u>Property</u> | <u>Standard</u> | <u>Year</u> |
|---------------------------------|--|-----------------------------|-------------|
| 1507.1.1, R905.1.1 Exception | Unrolling, Breaking Strength, Pliability | ASTM D226 | 2009 |
| 1507.1.1, R905.1.1 Exception | Tear Strength | ASTM D1970 | 2015 |
| 1507.1.1, T1507.1.1, 1507.2.9.2 | Physical Properties | ASTM D1970 | 2015 |
| 1507.3.3 | Physical Properties | FRSA/TRI April 2012 (04-12) | 2012 |
| TAS 110 | Accelerated Weathering | ASTM D4798 | 2011 |
| TAS 110 | Pull-through resistance | TAS 117(B) | 1995 |

3. REFERENCES:

| <u>Entity</u> | <u>Examination</u> | <u>Reference</u> | <u>Date</u> |
|---------------|--------------------------------------|----------------------|-------------|
| ERD (TST6049) | Physical Properties | I15010.04.09 | 04/29/2009 |
| ERD (TST6049) | Physical Properties | I15010.05.10 | 05/14/2010 |
| ERD (TST6049) | Physical Properties | I35520.06.11 | 06/15/2011 |
| ERD (TST6049) | ASTM D226 | I38010.08.11 | 08/11/2011 |
| ERD (TST6049) | Wind Uplift | I35520.08.11-1 | 08/12/2011 |
| ITS (TST1509) | ASTM D226 | 3118010COQ-003 | 04/26/2007 |
| ITS (TST1509) | ASTM D226 | 3130639COQ-002A | 08/21/2007 |
| ITS (TST1509) | Physical Properties | 3126617COQ-005 | 10/31/2007 |
| ITS (TST1509) | ASTM D226 | 101823107COQ-011 | 01/23/2015 |
| Owens Corning | Product equivalency | Declaration | 06/18/2018 |
| PRI (TST5878) | ASTM D1970 | OCF-341-02-01 | 09/20/2017 |
| PRI (TST5878) | ASTM D1970; Tear strength | OCF-331-02-02 | 10/03/2017 |
| PRI (TST5878) | ASTM D1970; Tear strength | OCF-332-02-02 | 10/03/2017 |
| PRI (TST5878) | ASTM D1970; Tear strength | OCF-334-02-02 | 10/03/2017 |
| PRI (TST5878) | FRSA/TRI April 2012 (04-12), partial | OCF-343-02-01 | 11/09/2017 |
| PRI (TST5878) | ASTM D4798 | OCF-341-02-01 | 11/27/2017 |
| PRI (TST5878) | TAS 117(B); Pull-through | OCF-422-02-02 | 04/03/2018 |
| PRI (TST5878) | FRSA/TRI April 2012 (04-12), partial | OCF-425-02-01 | 08/13/2018 |
| ITS (QUA1673) | Quality Control | ITS Listings | Current |
| ITS (QUA1673) | Quality Control | Service Confirmation | 09/30/2017 |

4. PRODUCT DESCRIPTION:
4.1 Self-Adhering Underlayments:

4.1.1 Titanium™ PSU-30 is an unreinforced polymer modified bitumen material adhered to the underside of a polymer-coated, synthetic woven sheet. The underside is backed with a release film. Unit weight 24 lbs/square. Meets ASTM D1970 and FRSA/TRI April 2012.

4.2 **Mechanically Fastened Underlayments:**

- 4.2.1 **Titanium™ UDL-25** is a synthetic sheet-type underlayment comprised of a woven core coated on one side with a polymer coating. Unit weight 2.5 lbs./square; meets FBC 1507.1.1 & R905.1.1 (Exception).
- 4.2.2 **Titanium™ UDL-30** is a synthetic sheet-type underlayment comprised of a woven core coated on both sides with a polymer coating. Unit weight 4.0 lbs./square; meets FBC 1507.1.1 & R905.1.1 (Exception).
- 4.2.3 **Titanium™ UDL-50** is a synthetic sheet-type underlayment comprised of a woven core coated on both sides with a polymer coating. Unit weight 4.7 lbs./square; meets FBC 1507.1.1 & R905.1.1 (Exception).

5. LIMITATIONS:

- 5.1 This is a building code evaluation. Neither NEMO ETC, LLC nor Robert Nieminen, P.E. are, in any way, the Designer of Record for any project on which this Evaluation Report, or previous versions thereof, is/was used for permitting or design guidance unless retained specifically for that purpose.
- 5.2 This Evaluation Report is not for use in FBC HVHZ jurisdictions.
- 5.3 Fire Classification is not part of this report; refer to current Approved Roofing Materials Directory for fire ratings of this product.
- 5.4 **Titanium™ Roof Underlayments** may be used with any prepared roof cover where the product is specifically referenced within FBC approval documents. If not listed, a request may be made to the Authority Having Jurisdiction for approval based on this evaluation combined with supporting data for the prepared roof covering.
- 5.5 **Allowable Roof Covers:**

| TABLE 1: ROOF COVER OPTIONS | | | | | | |
|---|------------------|-------------------------------------|-------------------------------------|-------|------------------------|-------|
| UNDERLAYMENT | ASPHALT SHINGLES | NAIL-ON TILE | FOAM-ON TILE | METAL | WOOD SHAKES & SHINGLES | SLATE |
| Titanium PSU-30 <i>(Dubai, UAE)</i> | Yes | Yes | Yes (See 5.5.1) | Yes | Yes | Yes |
| Titanium PSU-30 <i>(Brentwood, NH)</i> | Yes | Yes | No | Yes | Yes | Yes |
| Titanium UDL-25 | Yes | No | No | Yes | Yes | Yes |
| Titanium UDL-30 | Yes | Yes (Base Sheet in 2-ply system) | Yes (Base Sheet in 2-ply system) | Yes | Yes | Yes |
| Titanium UDL-50 | Yes | No | No | Yes | Yes | Yes |

- 5.5.1 "Foam-On Tile" is limited to use of following Approved tile adhesives / underlayment combinations.

| TABLE 1A: ALLOWABLE TILE ADHESIVE / UNDERLAYMENT COMBINATIONS ¹ | | |
|--|--------------------------|-------------------------------------|
| ADHESIVE | FLORIDA PRODUCT APPROVAL | UNDERLAYMENTS |
| Dow TileBond™ | FL22525 | Titanium PSU-30 <i>(Dubai, UAE)</i> |
| ICP Adhesives Polysset® AH-160 | FL6332 | Titanium PSU-30 <i>(Dubai, UAE)</i> |

¹ Refer to Tile Manufacturer's or Adhesive Manufacturer's Florida Product Approval for Overturning Moment Resistance Performance.

5.6 **Allowable Substrates; Titanium PSU-30:**

5.6.1 **Direct-Bond to Deck:**

- New untreated plywood;
- Existing untreated plywood, primed as needed with D41 primer to achieve bond.

5.6.2 **Bond to Mechanically Attached Base Sheet:**

- ASTM D226, Type I or II felt.
- Titanium UDL-30 (primed with D41 primer) or UDL-30 (inverted).

5.6.3 **Wind Resistance for Underlayment Systems in Foam-On Tile Applications:** FRSA/TRI April 2012 (04-12) does not address wind uplift resistance of all underlayment systems beneath foam-on tile systems, where the underlayment forms part of the load-path. The following wind uplift limitations apply to underlayment systems that are not addressed in FRSA/TRI April 2012 (04-12) and are used in foam-on tile applications. Maximum Design Pressure is the result of testing for wind load resistance based on allowable wind loads, and reflects the ultimate passing pressure divided by 2 (the 2 to 1 margin of safety per FBC 1504.9 has already been applied). Refer to FRSA/TRI April 2012 (04-12), Appendix A, Table 1A or FBC 1609 for determination of design wind loads.

#1 **Maximum Design Pressure = -45 psf:**

Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.
 Primer: (Optional) ASTM D41
 Underlayment: One or two plies, Titanium PSU-30 (*Dubai, UAE*), self-adhered and back-nailed max. 12" o.c. in accordance with Owens Corning Roofing and Asphalt, LLC published installation requirements.

#2 **Maximum Design Pressure = -30 psf*:**

Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.
 Base Sheet: Titanium UDL-30 (inverted)
 Fasteners: 12 ga. annular ring shank nails having not less than 20 rings per inch, heads not less than 3/8 inch diameter and length sufficient to penetrate through the thickness of deck not less than 3/16-inch with min. 32 ga., 1-5/8" diameter tin caps
 Spacing: 6-inch o.c. at 4-inch wide side laps and 12-inch o.c. at three (3), equally spaced center rows.
 Primer: ASTM D41 primer required at all tin-caps.
 Underlayment: One or two plies, Titanium PSU 30 (*Dubai, UAE*), self-adhered and back-nailed max. 12" o.c. in accordance with Owens Corning Roofing and Asphalt, LLC published installation requirements.

#3 **Maximum Design Pressure = -30 psf*:**

Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.
 Base Sheet: Titanium UDL-30 (printed side up)
 Fasteners: 12 ga. annular ring shank nails having not less than 20 rings per inch, heads not less than 3/8 inch diameter and length sufficient to penetrate through the thickness of deck not less than 3/16-inch with min. 32 ga., 1-5/8" diameter tin caps.
 Spacing: 6-inch o.c. at 4-inch wide side laps and 12-inch o.c. at three (3), equally spaced center rows.
 Primer: ASTM D41 primer required over printed side of UDL-30.
 Underlayment: One or two plies, Titanium PSU 30 (*Dubai, UAE*), self-adhered and back-nailed max. 12" o.c. in accordance with Owens Corning Roofing and Asphalt, LLC published installation requirements.

#4 **Maximum Design Pressure = -45 psf*:**

- Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.
- Base Sheet: Titanium UDL-30 (inverted)
- Fasteners: 12 ga. annular ring shank nails having not less than 20 rings per inch, heads not less than 3/8 inch diameter and length sufficient to penetrate through the thickness of deck not less than 3/16-inch with min. 32 ga., 1-5/8" diameter tin caps
- Spacing: 6-inch o.c. at 4-inch wide side laps and 8-inch o.c. at three (3), equally spaced center rows.
- Primer: ASTM D41 primer required at all tin-caps.
- Underlayment: One or two plies, Titanium PSU 30 (*Dubai, UAE*), self-adhered and back-nailed 12" o.c. in accordance with Owens Corning Roofing and Asphalt, LLC published installation requirements.

#5 **Maximum Design Pressure = -45 psf*:**

- Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.
- Base Sheet: Titanium UDL-30 (printed side up)
- Fasteners: 12 ga. annular ring shank nails having not less than 20 rings per inch, heads not less than 3/8 inch diameter and length sufficient to penetrate through the thickness of deck not less than 3/16-inch with min. 32 ga., 1-5/8" diameter tin caps.
- Spacing: 6-inch o.c. at 4-inch wide side laps and 8-inch o.c. at three (3), equally spaced center rows.
- Primer: ASTM D41 primer required over printed side of UDL-30.
- Underlayment: One or two plies, Titanium PSU 30 (*Dubai, UAE*), self-adhered and back-nailed 12" o.c. in accordance with Owens Corning Roofing and Asphalt, LLC published installation requirements.

5.6.4.1 For mechanically attached Base Sheet, the maximum design pressure for the selected assembly shall meet or exceed that required under FRSA/TRI April 2012 (04-12), Appendix A, Table 1A.

Alternatively, the maximum design pressure for the selected assembly shall meet or exceed the Zone 1 design pressure determined in accordance with FBC 1609. In this case, Zones 2 and 3 shall employ an attachment density designed by a qualified design professional to resist the elevated pressure criteria. Commonly used methods are ANSI/SPRI WD1, FM Loss Prevention Data Sheet 1-29 and Roofing Application Standard RAS 117. Assemblies marked with an asterisk* carry the limitations set forth in Section 2.2.10.1 of FM Loss Prevention Data Sheet 1-29 (January 2016) for Zone 2/3 enhancements.

5.7 **Exposure Limitations:**

Titanium UDL-25, Titanium UDL-30 or Titanium UDL-50 shall not be left exposed for longer than 30-days.
Titanium PSU-30 shall not be left exposed for longer than 180-days.

5.8 **Tile Slippage Limitations [per FRSA/TRI April 2012 (04-12)]:**

When loading roof tiles on the underlayment in direct-deck tile assemblies, the maximum roof slope shall be as follows. These slope limitations can only be exceeded by using battens during loading of the roof tiles.

| TABLE 2: TILE SLIPPAGE LIMITATIONS FOR DIRECT-DECK TILE INSTALLATIONS | | | |
|---|--|--------------------|---------------|
| UNDERLAYMENT | TILE PROFILE | STAGING METHOD | MAXIMUM SLOPE |
| Titanium PSU-30 (<i>Dubai, UAE</i>) | Flat | Max. 10-tile stack | 5:12 |
| | Lugged | Max. 10-tile stack | 6:12 |
| Titanium PSU-30 (<i>Brentwood, NH</i>) | Tiles shall be loaded and staged atop battens, regardless of tile profile or slope | | |

6. INSTALLATION:

6.1 **Titanium Roof Underlayments** shall be installed in accordance with **Owens Corning Roofing and Asphalt, LLC** published installation requirements subject to the Limitations set forth in Section 5 herein and the specifics noted below.

6.2 Re-fasten any loose decking panels, and check for protruding nail heads. Sweep the substrate thoroughly to remove any dust and debris prior to application, and prime the substrate (if applicable).

6.3 Titanium™ UDL-25, Titanium UDL-30 or Titanium UDL-50:

6.3.1 Shall be installed in compliance with the requirements for **ASTM D226, Type I or II** underlayment in **FBC Table 1507.1.1 or R905.1.1** for the type of prepared roof covering to be installed, considering the wider sheet-width.

6.3.2 Fasteners:

Mechanical attachment of **Titanium UDL-25** and **Titanium UDL-30** is limited to ring shank roofing nails with minimum 1-inch diameter plastic caps.

Mechanical attachment of **Titanium UDL-50** is limited to ring shank roofing nails with minimum 3/8-inch diameter heads; ring shank roofing nails with minimum 1-inch diameter plastic caps; screws and plates; or plastic cap staples.

6.3.2.1 **Code Reference:** The Exception statement in FBC 1507.1.1 and FBC R905.1.1 states: “...except metal cap nails shall be required where the ultimate design wind speed, V_{ult} , equals or exceeds 150 mph.”

Owens Corning Roofing and Asphalt, LLC has furnished data to permit the use of 1-inch diameter plastic cap nails in lieu of metal cap nails for these applications, when the **Titanium™ UDL-25, Titanium UDL-30 or Titanium UDL-50** underlayment is installed beneath mechanically fastened prepared roof covers referenced in FBC Table 1507.1.1 or R905.1.1.

6.3.3 Slopes of 4:12 or greater:

End (vertical) laps shall be minimum 6-inches and side (horizontal) laps shall be minimum 4-inches.

Minimum attachment shall be in accordance with **FBC Table 1507.1.1 or R905.1.1**. When batten systems are to be installed atop the underlayment, the underlayment need only be preliminarily attached pending attachment of the battens.

6.3.4 Slopes of 2:12 to less than 4:12:

Double layer application; begin by fastening a 25-inch wide strip along the eaves. Place a full-width sheet over the starter, completely overlapping the starter course. Continue as noted in 6.3.3, but maintaining minimum 25-inch side (horizontal) laps, resulting in a double-layer application.

6.4 Titanium™ PSU-30:

6.4.1 Non-Tile Installations:

Shall be installed in compliance with the codified requirements for **ASTM D1970** underlayment in **FBC Table 1507.1.1** for the type of prepared roof covering to be installed, and Owens Corning published requirements. Titanium™ PSU-30 shall be back-nailed max. 12” o.c. in accordance with Owens Corning Roofing and Asphalt, LLC published installation requirements.

6.4.2 Tile Applications:

Shall be installed in compliance with the requirements for Self-Adhered Membrane underlayment set forth in **FRSA/TRI April 2012 (04-12)**, and Owens Corning published requirements. Titanium™ PSU-30 shall be back-nailed max. 12” o.c. in accordance with Owens Corning Roofing and Asphalt, LLC published installation requirements.

Tile shall be loaded and staged in a manner that prevents tile slippage and/or damage to the underlayment. Refer to **Table 2** herein, and **Owens Corning Roofing and Asphalt, LLC** published requirements for tile staging.

6.5 Titanium 2-Ply System:

6.5.1 The **Titanium 2-Ply System** consists of a base layer of **Titanium UDL-30** (top-surface primed or sheet inverted) mechanically attached to the wood roof deck followed by **Titanium PSU-30**, self-adhered.

6.5.2 Non-Tile Applications:
Install **Titanium UDL-30** (top surface primed or sheet inverted) in accordance with Section 6.3 followed by **Titanium PSU-30** in accordance with Section 6.4.

6.5.3 Tile Applications:
For nail-on tile installations, install **Titanium UDL-30** (top surface primed or sheet inverted) in accordance with **FRSA/TRI April 2012 (04-12)**, using Section 6.3 as a guide, and considering the wider sheet width relative to ASTM D226 felt. Then apply Titanium PSU-30 in accordance with Section 6.4.
For adhesive-set tile roofing, refer to **Section 5.6.3** herein.
Tile shall be loaded and staged in a manner that prevents tile slippage and/or damage to the underlayment. Refer to **Table 2** herein, and **Owens Corning Roofing and Asphalt, LLC** published requirements for tile staging.

7. BUILDING PERMIT REQUIREMENTS:

As required by the Building Official or Authority Having Jurisdiction in order to properly evaluate the installation of this product.

8. MANUFACTURING PLANTS:

Contact the noted QA agency for information on product locations covered for **F.A.C. 61G20-3** QA requirements. The following plants have qualified products under their respective physical properties specifications.

| <u>Plant</u> | <u>Specification</u> | <u>Product(s)</u> |
|---------------------|-------------------------------|---|
| Mission, BC, Canada | FBC 1507.1.1 (Exception) | Titanium UDL-30; Titanium UDL-50 |
| Qingdao, China | FBC 1507.1.1 (Exception) | Titanium UDL-25; Titanium UDL-30; Titanium UDL-50 |
| Dubai, UAE | FRSA/TRI 04-12 (2-ply system) | Titanium PSU-30 (<i>Dubai, UAE</i>) |
| Brentwood, NH | ASTM D1970, FRSA/TRI 04-12 | Titanium PSU-30 (<i>Brentwood, NH</i>) |

9. QUALITY ASSURANCE ENTITY:

Intertek Testing Services NA Inc. – QUA1673; (604) 520-3321

- END OF EVALUATION REPORT -