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Please file revised pages and illustrations in place of material of like identity. New material should be filed in its proper numerical order.

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NBK File

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Project 4788050447  
SR 4370884.1060127  
Issued: September 21, 2017  
**Revised: October 12, 2017**

REPORT

On

ROOFING SYSTEMS, UPLIFT RESISTANCE

Under the

CLASSIFICATION PROGRAM

Vada LLC  
Olney, IL

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Report provided it is reproduced in its entirety.

## TEST RECORD NO. 1

This Test Record provides a summary of all data used as a basis for evaluation.

The test assemblies measured 12 x 24 ft. and were constructed in accordance with the client's specifications.

## MATERIALS:

Test 1: (Assembly 1: VADA-001-02-01, Tested Dec 2014)

Deck: - 22 ga. Type B-deck Steel decks (min. Grade 33), attached with #12-24 x 1-1/4" DP5 HWH screws.

Insulation: - 1.5 in. John Manville ENERGY 3 is adhered to the steel deck with JM Roofing System Urethane Adhesive applied in 3/4in. to 1 in. wide ribbons spaced 12 in. o.c. Then John Manville's UltraFast Square Metal Plates and Fasteners rate of 12 per 4 ft. x 8 ft. board (1 fastener per 2.67 ft<sup>2</sup>).

Membrane: - John Manville TPO 60 mil, (1.5" wide heat weld at the 6" wide side lap) is adhered to the insulation with John Manville TPO adhesive (solvent based) at a rate of 50-90 sq. ft./gal. The adhesive was applied to both side. The 54" o.c. side laps fastened 12" o.c. through to the steel deck with High Load Plated and Fasteners.

Test 2: (Assembly 1: VADA-005-02-01, Tested Jan 2016)

Deck: - 22 ga. Type B-deck Steel decks (min. Grade 33), attached with #12-24 x 1-1/4" DP5 HWH screws.

Existing Roof: - Smooth BUR

Membrane: - John Manville TPO FB 115 mil, (1.5" wide heat weld at the 6" wide side lap) is adhered to the BUR with John Manville two part UIA applied in 3/4 - 1" ribbons spaced 12" o.c. The membrane was mechanically fastened with Extra High Load Seam Plates and Fasteners applied 12 o.c. through in-lap and through the membrane in rows spaced 57" o.c.

Test 3: (Assembly 1: VADA-007-02-01 Tested March 2017)

Deck: - Min. 2500 psi structural concrete, poured in place.

Membrane: - Sure-Weld TPO 45 mil loose laid , 1.5 in. wide heat weld at side laps

Vent: VADA vent 6" tall by 5.5" diameter. 60 mil. TPO flashing welded 1.5" on all four sides to the roof membrane.

## CONSTRUCTION OF TEST ASSEMBLIES:

The assembly measured 12 ft. by 24 ft. and was constructed under the observation of members of PRI's technical staff.

Test 1: (Assembly 1: VADA-001-02-01, Tested Dec 2014)

Deck: - 22 ga. Type B-deck Steel decks (min. Grade 33),

Insulation: - 1.5 in. John Manville ENERGY 3 is adhered to the steel deck with JM Roofing System Urethane Adhesive applied in  $\frac{3}{4}$  in. to 1 in. wide ribbons spaced 12 in. o.c.. The insulation boards fastened through to the steel deck with John Manville "UltraFast Square Metal Plates" and "High Load Fasteners" installed 12 per 4 ft. x 8 ft. board (1 fastener per 2.67 ft<sup>2</sup>).

Membrane: - John Manville "JM TPO" min. 60 mil, with 1.5 in. wide heat weld at the 6 in. wide side lap, adhered to the insulation with John Manville "JM Membrane Adhesive" at a rate of 50-90 ft<sup>2</sup>/gal (2-sided application). The membrane fastened through to the steel deck with John Manville "High Load Plates" and "High Load Fasteners" with 54 in. o.c. side laps fastened 12 in. o.c..

Test 2: (Assembly 1: VADA-005-02-01, Tested Jan 2016)

Deck: - 22 ga. Type B-deck Steel decks (min. Grade 33), attached with #12-24 x 1-1/4" DP5 HWH screws.

Existing Roof: - Smooth BUR

Membrane: - John Manville "JM TPO FB 115", with 1.5 in. wide heat weld at the 6" wide side lap adhered with John Manville "JM Two-Part UIA"  $\frac{3}{4}$  - 1" ribbons spaced 12 in. o.c.. The membrane fastened through to the steel deck with John Manville "Extra High Load Seam Plates" and "Extra High Load Fasteners" spaced 12 in. o.c. through in-lap and with the 57 in. o.c. side laps.

Test 3: (Assembly 1: VADA-007-02-01 Tested March 2017)

Deck: - Min. 2500 psi structural concrete, poured in place.

Membrane: - Sure-Weld TPO 45 mil loose laid , 1.5 in. wide heat weld at side laps

Vent: VADA vent 6" tall by 5.5" diameter. 60 mil. TPO flashing welded 1.5" on all four sides to the roof membrane.

## METHOD

Uplift tests were conducted on the above samples. These tests were conducted in accordance with the test standard ANSI/UL 1897, "Uplift Tests for Roof Covering Systems", Seventh Edition (latest revision date September 23, 2015) of the Standard.

The Classification for uplift resistance, expressed in psf, is derived from tests conducted in accordance with the Standard, "Uplift Tests for Roof Covering Systems", ANSI/UL 1897. The test method subjects a minimum 10 ft. by 10 ft. test sample to various short-term (1 min. increment) static pressures which represent the uplift forces imposed on a roofing system's securement to a specified roof deck when exposed to high velocity winds.

The pressure differences were adjusted such that a stabilized 15 psf uplift pressure was exerted upon the roofing system attachment and held for 1 minute. This process was repeated with maximum additional 15 psf maximum pressure increments, each held for 1 minute.

Throughout the tests, observations were made of the control of positive and negative pressures, and of the condition of the top surface and underside of the test assemblies.

## RESULTS

Test 1: (Assembly 1: VADA-001-02-01, Tested Dec 2014) was subjected to uplift pressure in accordance with the loading schedule and sustained a maximum of 120 psf. Prior to and during the attainment of the 120 psf. pressure, there was no sign of fastener withdrawal or membrane failure. The mode of failure occurred while attempting to reach 135 psf, facer delamination of the insulation.

Test 2: (Assembly 1: VADA-005-02-01, Tested Jan 2016) was subjected to uplift pressure in accordance with the loading schedule through a maximum of 180 psf. Prior to and during the attainment of the 180 psf. pressure, there was no sign of fastener withdrawal or membrane failure. The mode of failure occurred while attempting to reach 195 psf, fastener pulled out of the steel deck.

Test 3: (Assembly 1: VADA-007-02-01 Tested March 2017) was subjected to uplift pressure in accordance with the loading schedule through a maximum of 405 psf. Prior to and during the attainment of the 405 psf. pressure, there was no sign of fastener withdrawal or membrane failure. Test terminated at clients request.

## PRACTICABILITY:

The construction materials used in the roofing systems were readily installed by qualified workers with tools and methods commonly used for construction work of similar nature. Materials and installation procedures in accordance with those previously described in this Report are significant factors in the uplift resistance performance of the construction.

## TEST RECORD NO. 1 SUMMARY:

The results of this investigation indicate that the products evaluated comply with the applicable requirements of the standards listed below, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

| Standard     | Title                                               | Edition or Publication | Last Revision      |
|--------------|-----------------------------------------------------|------------------------|--------------------|
| ANSI/UL 1897 | Standard for Uplift Tests for Roof Covering Systems | 7 <sup>th</sup>        | September 23, 2015 |

## CERTIFICATION MARKINGS

The TGIK Certification Marking illustrated below can be used with the membranes listed below.

|                                                                                     |                                                                               |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|  | BUILDING UNIT FOR ROOFING SYSTEMS<br>AS TO UPLIFT RESISTANCE<br>(Control No.) |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|

Roofing System Classifications will be promulgated as described below:

1. **Uplift Resistance:** – 120 psf.

**Deck:** – Steel, min. 22 MSG.

**Base Sheet:** – Any UL Classified asphaltic smooth surfaced.

**Insulation:** – Min. 1.5 in. John Manville "ENERGY 3" adhered with Johns Manville "JM Roofing System Urethane Adhesive" 3/4 in. to 1 in. wide ribbons spaced max. 12 in. o.c.. The insulation boards fastened through to the steel deck with John Manville "UltraFast Square Metal Plates" and "High Load Fasteners" installed 12 per 4 ft. x 8 ft. board (1 fastener per 2.67 ft<sup>2</sup>).

**Membrane:** – John Manville "JM TPO" min. 60 mil, with min. 1.5 in. wide heat weld at the 6 in. wide side lap, adhered to the insulation with John Manville "JM Membrane Adhesive" at a rate of 50-90 ft<sup>2</sup>/gal (2-sided application). The membrane fastened through to the steel deck with John Manville "High Load Plates" and "High Load Fasteners" with max. 54 in. o.c. side laps fastened 12 in. o.c.

2. **Uplift Resistance:** – 180 psf.

**Deck:** – Steel, min. 22 MSG.

**Base Sheet:** – Any UL Classified asphaltic smooth surfaced.

**Membrane:** – John Manville "JM TPO FB 115", with 1.5 in. wide heat weld at the 6" wide side lap adhered with John Manville "JM Two-Part UIA" 3/4 - 1" ribbons spaced max. 12 in. o.c.. The membrane fastened through to the steel deck with John Manville "Extra High Load Seam Plates" and "Extra High Load Fasteners" spaced 12 in. o.c. through in-lap and with the max. 57 in. o.c. side laps.

3. **Uplift Resistance:** – 405 psf.

**Deck:** – Min. 2500 psi structural concrete, poured in place.

**Membrane:** – Any UL Classified single ply reinforced membrane loose laid with min. 1.5 in. wide heat weld at the min. 6 in. wide side lap.

**Membrane Field Attachment:** – The membrane in the field is loose laid over a sealed deck or existing roofing system.

**Perimeter Membrane Attachment:** – Any UL Classified single ply reinforced membrane 45 mil minimum, with min. 1.5 in. wide heat weld at the 6 in. wide side lap. The membrane adhered using UL Classified Adhesive for membranes and UL Classified Foam Adhesive 3/4 in. to 1 in. wide ribbons spaced max. 12 in. o.c., for Fleeceback membranes. The membrane fastened through to the Concrete deck with Metal Plates and Fasteners, min. 12 in o.c. Rows of fastener spacing max. 57 in. O.C..

**Perimeter and Penetrations:** – The field of the roof membrane is tied into the perimeter assembly using VADA LLC perimeter details. The membrane adhered at the perimeter and fastened every 12 in. O.C..

**Pressure Equalizing Vent:** – "VADA Vent" installed in accordance with manufacturer's installation instructions to transfer wind-generated vacuums to the substrate. Vents spaced a max. 50 ft.

4. **Uplift Resistance:** 120 psf.

**Deck:** – Steel, min 22 MSG. New construction or reroofing over an existing UL Fire and Uplift Classified roof assembly.

**Insulation (Optional):** – Any UL Classified polyisocyanurate insulation, min. 1.5 in thick adhered with UL Classified Foam Adhesive 3/4 in. to 1 in. wide ribbons spaced max. 12 in. o.c..

**Fasteners:** — No. 15 self-drilling screws (not UL Classified) with 2-3/8 in. diameter galvanized steel plates. A total of twelve fasteners per 4 by 8 ft. sheet (1 fastener per 2.67 ft<sup>2</sup>). Insulation is optional in reroofing applications.

**Membrane:** — Any UL Classified single ply reinforced membrane loose laid with min. 1.5 in. wide heat weld at the min. 6 in. wide side lap.

**Membrane Field Attachment:** — The membrane in the field is loose laid over a sealed deck or existing roofing system.

**Perimeter Membrane Attachment:** — Any UL Classified single ply reinforced membrane 45 mil minimum, with min. 1.5 in. wide heat weld at the 6 in. wide side lap. The membrane adhered using UL Classified Adhesive for membranes and UL Classified Foam Adhesive, 3/4 in. to 1 in. wide ribbons spaced max. 12 in. o.c., for Fleeceback membranes. The membrane fastened through to the steel deck with Metal Plates and Fasteners, min. 12 in o.c. Rows of fastener spacing max. 57 in. O.C..

**Perimeter and Penetrations:** — The field of the roof membrane is tied into the perimeter assembly using VADA LLC perimeter details. The membrane adhered at the perimeter and fastened every 12 in. O.C..

**Pressure Equalizing Vent:** — "VADA Vent" installed in accordance with manufacturer's installation instructions to transfer wind-generated vacuums to the substrate. Vents spaced a max. 50 ft.

**5. Uplift Resistance: 180 psf.**

**Deck:** — Steel, min 22 MSG. New construction or reroofing over an existing UL Fire and Uplift Classified roof assembly.

**Insulation (Optional):** — Any UL Classified polyisocyanurate insulation, min. 1.5 in thick adhered with UL Classified Foam Adhesive 3/4 in. to 1 in. wide ribbons spaced max. 12 in. o.c..

**Fasteners:** — No. 15 self-drilling screws (not UL Classified) with 2-3/8 in. diameter galvanized steel plates. A total of twelve fasteners per 4 by 8 ft. sheet (1 fastener per 2.67 ft<sup>2</sup>).

**Membrane:** — Any UL Classified single ply reinforced Fleeceback membrane loose laid with min. 1.5 in. wide heat weld at the min. 6 in. wide side lap.

**Membrane Field Attachment:** — The membrane in the field is loose laid over a sealed deck or existing roofing system.

**Perimeter Membrane Attachment:** — Any UL Classified single ply reinforced Fleeceback membrane 45 mil minimum, with min. 1.5 in. wide heat weld at the 6 in. wide side lap. The membrane adhered using UL Classified Foam Adhesive, 3/4 in. to 1 in. wide ribbons spaced max. 12 in. o.c.. The membrane fastened through to the steel deck with Metal Plates and Fasteners, min. 12 in o.c. Rows of fastener spacing max. 57 in. O.C..

**Perimeter and Penetrations:** — The field of the roof membrane is tied into the perimeter assembly using VADA LLC perimeter details. The membrane adhered at the perimeter and fastened every 12 in. O.C..

**Pressure Equalizing Vent:** — "VADA Vent" installed in accordance with manufacturer's installation instructions to transfer wind-generated vacuums to the substrate. Vents spaced a max. 50 ft.

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