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Subject: Procedure And/Or Report Material

The following material resulting from the investigation under the above numbers is enclosed.

Issue

<u>Date</u>	<u>Vol</u>	<u>Sec</u>	<u>Pages</u>	<u>Revised Date</u>
2012/01/03	1		Cover Page(s)	
2012/01/03	1		New Test Record 3-5,4-5,5-5	2012/05/04
2012/01/03	1		Revised Test Record 1-5,2-5	2012/05/04
2012/01/03	1		New Conclusion Page(s) C1	2012/05/04

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

NOTE: Follow-Up Service Procedure revisions DO NOT include Cover Pages, Test Records and Conclusion Pages. Report revisions DO NOT include Authorization Pages, Indices, Section General Pages and Appendixes.

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File R9734  
Project 11CA24526  
Project 12NK06288

Issued: January 3, 2012  
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REPORT

on

ROOFING SYSTEMS, UPLIFT RESISTANCE

Under The

CLASSIFICATION PROGRAM

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Waterbury, CT 06702

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## TEST RECORD NO. 1

Test results relate only to items tested.

## MATERIALS:

The following is a description of the materials used in the test assemblies attached to the concrete deck filed frame system described in the "General" portion of this Report.

Vapor Barrier: Modified bitumen Siplast 20TG base sheet and Paradiene 30FR TG cap sheet.

Insulation: 2-in thick polyisocyanurate (ISO) foamed plastic board.

Cover Board: Nominal ½-in thick National Gypsum Co. "PermaBase" Cementitious Backer Unit.

Membrane: A 60 mil EPDM, non-reinforced.

Sealant: 2001 Bonding Adhesive used to bond EPDM membrane directly to the cover board and to the concrete deck perimeter. A 6-in wide EPDM seam tape was used to secure the membrane lap seams.

Membrane Air Seal Attachment: The membrane is directly terminated (secured) to the perimeter of the concrete deck using butyl tape and extruded aluminum termination bars fastened with concrete fasteners spaced 6-in OC.

Pressure Relief Valve: Not used but represented with 2-in diameter hole extending through EPDM membrane, cover board, insulation to vapor barrier on the concrete deck.

## CONSTRUCTION OF TEST ASSEMBLIES:

The assembly measured 16 ft. by 32 ft. and was constructed under the observation of a member of Underwriters Laboratories' technical staff.

Test No. 1 - loose laid insulation was applied direct to the concrete deck that had the vapor barrier heat fused (torched) to its surface. The cover board was loose laid over the insulation. The EPDM membrane was fully adhered to the cover board and to the perimeter of the concrete deck with 2001 bonding adhesive. Pressure relief was established with a 3/4-in diameter hole.

Test No. 1A - Same as Test No. 1 except with the membrane air seal attachment as described above and a 2-in diameter pressure relieve hole was established.

## UPLIFT TEST:

The uplift test was conducted in accordance with the Standard UL 1897 entitled "Uplift Tests For Roof Covering Systems".

## METHOD

The standard test equipment of Underwriters Laboratories Inc. for roof deck constructions was used for the uplift tests.

The Classification for uplift resistance, expressed in PSF, is derived from tests conducted in accordance with the Standard, "Uplift Tests for Roof Covering Systems", UL 1897. The test method subjects a minimum 10 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 min. This process was repeated with maximum additional 15 psf maximum pressure increments, each held for 1 min.

Throughout the test, observations were made of the control of negative pressures on the topside of the 16 ft. by 32 ft. test assembly as well as the condition of the top surface.

## RESULTS

Test No. 1 -The assembly was subjected to uplift pressure in accordance with the loading schedule through a maximum of 285 psf. Prior to and during the attainment of the 285 psf pressure, there was some billowing of the membrane/cover board. After 285 psf the maximum capacity of the test equipment was reached.

Test No. 1A -The assembly was subjected to uplift pressure in accordance with the loading schedule through a maximum of 285 psf. Prior to and during the attainment of the 285 psf pressure, there was less billowing of the membrane/cover board than occurred in Test No. 1. After 285 psf the maximum capacity of the test equipment was reached.

## STUDY FOR CLASSIFICATION

A total of five uplift tests were conducted as described internally in Test Reference No. 1. Included in this information are the summary results provided by the client as well as the proposed TGIK systems Classification that require client review.

Based on subsequent discussions and review with the client the Systems Classifications were modified as shown under CLASSIFICATION AND FOLLOW-UP SERVICE described below.

## TEST RECORD SUMMARY:

\* The results of this investigation indicate that constructions evaluated comply with the applicable requirements of the Standard UL 1897, fifth ed., entitled "Uplift Tests For Roof Covering Systems" and therefore, such products are judged eligible to bear UL's Mark. Three additional tests were witnessed and are included in the Data Package Ill. 1.

## CLASSIFICATION AND FOLLOW-UP SERVICE:

The product covered by this Report has been judged to be eligible for Classification and Follow-Up Service of Underwriters Laboratories, Inc. Products identified in this Report as being Classified, are covered independently under Classification and Follow-Up Service. Only those products which properly bear the UL Mark are considered as Classified by Underwriters Laboratories Inc.

The Classification Mark for the TGIK category to be used on the "UC-3" panel is illustrated below:

Membrane FOR  
ROOFING SYSTEMS  
AS TO UPLIFT RESISTANCE

Roofing System, Uplift Resistance Classification will be promulgated as described below:

## MEMBRANE SYSTEMS

17. Uplift Resistance: 285 psf

Deck: Structural Concrete (poured in-place or pre-cast)

Deck Air Seals: Perimeter roof deck to vertical wall joints, through-roof-deck penetrations and deck joints are air sealed with reinforced EPDM, TPO or PVC membranes (See list under Membrane) fully adhered to the roof deck and flashed on to the perimeter and through deck penetrations.

Vapor Barrier (Optional): One or more layers of fully adhered UL Fire Classified Kelly Co-2001 Inc. Membranes.

Insulation (Optional): Any UL Classified rigid roof insulation, any thickness, tapered or flat stock, adhered, fully adhered, mechanically fastened or loose laid and weighted in place with a Cover Board (Weighted Cover Board).

Cover Board: Minimum ½" inch minimum thick National Gypsum "PermaBase" or USG "Durock Exterior" cement boards. Also could be minimum ½ " inch thick gypsum boards consisting of G-P Gypsum "DensDeck", USG "SECUROCK Glass Mat Board", or Certain Teed Gypsum "GlasRoc".

\*

Membrane: is Loose Laid or totally adhered to the Cover Board (Weighted Cover Board) with one of the following in Series One - 2001 TPA, 2001 TPA-FB, Kelly TPO, 2001 TPO, TPO-K, TPO-K FR, TPO-K Plus 1 fully adhered with 2001 Bonding Adhesive or TPO Bonding Adhesive. Laps are adhered with 2001 Splicing Cement and edges are sealed with 2110 Paste Sealant.

Any of the following in the Series Two-Kelly CPA (PVC) or 2001 CPA (PVC) fully adhered with Sarnacol 2121, 2170 or V949 adhesive at 1-3/4 to 2-1/4 gal/gal sq. ft.

Any of the following in Series Three- Standard EPDM, Premium Whaleskin/81 (black) or (white), C-EPDM (black), C-EPDM Type 1 (black), C-EPDM-C, C-EPDM-C, Type 1, C-EPDM-C Type 2, C-EPDM-C Type Reinforced adhered with Bonding Adhesive #8101, 2001 Bonding Adhesive, Rubber to Rubber Splicing Cement #8102 (black) or (clear), 2001 Splicing Cement, EPDM Paste Sealant #8103 (black) or (white), 210 Paste Sealant. Any of the following in Series Four- membranes (modified bitumen) M3.8MFR, M4.5CMFR, M4PMFR, M4GMFR, T4GMFR, T4.5CMFR hot-mopped or torched.

Membrane Air Seal Attachment: The roof membrane is directly terminated (secured) to the concrete deck with 2001 Co. air seal termination techniques using butyl gum tape and termination bars or structural "C" Channels fastened with concrete fasteners 6-in oc at perimeters and all roof through penetrations.

Perimeter and Penetrations: Finish Flashed onto the air sealed field of the roof membrane using Kelly Co.-2001 Inc. Flashing techniques.

Pressure Relief Valve: ---Kelly Co-2001 Inc. "Equalizer Valves™", are installed around the building perimeter in the wind uplift vortex intensity zones of the roof according to the Kelly Co.-2001 Inc. equalizer valve placement diagram. A 6-1/2 inch diameter hole is cut-out of the roof assembly down to the concrete deck under Equalizer Valves™ to transfer Wind Uplift pressure load through the roof assembly to the structural concrete deck.

18. Uplift Resistance: 285 psf

Deck: Structural Concrete (poured in-place or pre-cast)

Deck Air Seals: Perimeter roof deck to vertical wall joints, through-roof-deck penetrations and deck joints are air sealed with reinforced EPDM, TPO or PVC or Modified Bitumen membranes (See list under Membrane) fully adhered to the roof deck and flashed on to the perimeter and through deck penetrations.

Existing Roof Permeation: The existing roof systems are permeated by cutting through the membranes 2-ft o.c., by drilling a 1/2 - inch diameter hole every 2 sq. ft. to allow water vapor to migrate out roof systems and up into the new Kelly Co., 2001 Inc. Self Drying Wind Vented, Re-roof System.

Gravel Mat (Optional): Loose laid gravel mat (not UL Clasified) and covered with the Cover Board.

Insulation (Optional): Any UL Classified rigid roof insulation, any thickness, tapered or flat stock, adhered, fully adhered, mechanically fastened or loose laid and weighted in place with a Cover Board (Weighted Cover Board).

Cover Board: Minimum ½" inch thick National Gypsum "PermaBase" or USG "Durock Exterior" cement boards. Also could be minimum ½ " inch thick gypsum boards consisting of G-P Gypsum "DensDeck", USG "SECUROCK Glass Mat Board", or Certain Teed Gypsum "GlasRoc".

Membrane: is Loose Laid or totally adhered to the Cover Board (Weighted Cover Board) with one of the following in Series One - 2001 TPA, 2001 TPA-FB, Kelly TPO, 2001 TPO, TPO-K, TPO-K FR, TPO-K Plus 1 fully adhered with 2001 Bonding Adhesive or TPO Bonding Adhesive. Laps are adhered with 2001 Splicing Cement and edges are sealed with 2110 Paste Sealant. Series Two-Kelly CPA (PVC) or 2001 CPA (PVC) fully adhered with Sarnacol 2121, 2170 or V949 adhesive at 1-3/4 to 2-1/4 gal/gal sq ft. Any of the following in Series Three- Standard EPDM, Premium Whaleskin/81 (black) or (white), C-EPDM (black), C-EPDM Type 1 (black), C-EPDM-C, C-EPDM-C, Type 1, C-EPDM-C Type 2, C-EPDM-C Type Reinforced adhered with Bonding Adhesive #8101, 2001 Bonding Adhesive, Rubber to Rubber Splicing Cement #8102 (black) or (clear), 2001 Splicing Cement, EPDM Paste Sealant #8103 (black) or (white), 210 Paste Sealant. Any of the following in Series Four- membranes (modified bitumen) M3.8MFR, M4.5CMFR, M4PMFR, M4GMFR, T4GMFR, T4.5CMFR hot-mopped or torched.

Membrane Air Seal Attachment: The roof membrane is directly terminated (secured) to the concrete deck with air seal termination techniques using butyl gum tape and termination bars or structural "C" Channels fastened with concrete fasteners 6-in oc at perimeters and all roof through penetrations.

Perimeter and Penetrations: Finish Flashed onto the air sealed field of the roof membrane using Kelly Co.-2001 Inc. Flashing techniques.

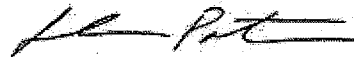
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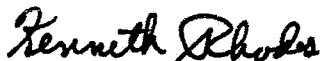
## CONCLUSION:

Samples of the products covered by this Report have been found to comply with the requirements covering the category and the product is found to comply with UL's applicable requirements. The description and test result in this Report are only applicable to the samples investigated by UL and does not signify the products described as being covered under UL's Follow-Up Service Program. When covered under UL's Follow-Up Service Program, the manufacturer is authorized to use the UL Classification Mark on such products which comply with UL's Follow-Up Service Procedure and any other application requirements of UL LLC. The Classification Mark of UL LLC on the product, or the UL symbol on the product and the Classification Mark on the smallest unit container in which the product is packaged, is the only method to identify products investigated by UL to published requirements and manufactured under UL's Classification and Follow-Up Service.

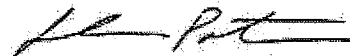
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