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Project 02NK25677

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REPORT

on

ROOFING SYSTEMS, UPLIFT RESISTANCE

Under The

CLASSIFICATION PROGRAM

Polyfoam Products Inc.
Sunrise, FL

GENERAL

INVESTIGATION:

The purpose of this investigation was to evaluate a new two-component spray applied urethane insulation adhesive that is used in the construction of roofing systems. Test data was developed in accordance with ANSI/UL 1897, "Uplift Tests for Roof Covering Systems."

DESCRIPTION

PRODUCT COVERED:

The product covered by this Report is the insulation adhesive designated "TITESET."

The product in this Report is Classified as to uplift resistance only.

USE:

The product is intended for use as a building material as permitted by authorities having jurisdiction.

TEST RECORD NO. 1

UPLIFT TESTS:

MATERIALS

The following is a description of the materials used in the assemblies:

Steel Deck - Galvanized, Type B, No. 22 MSG.

Insulation (Board) - Atlas "ACFoam II" polyisocyanurate, 1-1/2 in. thick.

Insulation (Spray Applied) - Two-component polyurethane designated "TITESET".

Insulation - Georgia-Pacific "High Density Wood fiberboard", 1/2 in. thick.

Barrier Board - G-P Gypsum Dens-Deck®, 1/2 in. thick.

Membrane - Firestone "Standard RubberGard" EPDM, 45 mil.

Membrane Adhesive - Firestone "BA-2004 Bonding Adhesive."

Base Sheet - GAF "GAFGLAS #75 Base Sheet" (Type G2).

CONSTRUCTION OF TEST ASSEMBLIES:

The assemblies were constructed under the observation of members of Underwriters Laboratories' technical staff.

Galvanized steel deck, No. 22 MSG, was used for both assemblies.

The adhesive was applied to every other crest of the steel deck, 12 in. OC, amounting to approximately 1/2 gal./sq. (finished application rate). The adhesive was applied to the insulation and Dens-Deck® in ribbons spaced 12 in. OC amounting to approximately 1/2 gal./sq. (finished application rate).

Unless otherwise noted all joints were offset a minimum of 6 in.

Assembly No. 1

G-P Gypsum Dens-Deck®, 1/2 in. thick, was adhered to the steel deck with "TITESET" adhesive. One layer of "ACFoam II", 1-1/2 in. thick was then adhered to the Dens-Deck® with "TITESET" adhesive. The wood fiberboard was then adhered to the "ACFoam II" with "TITESET" adhesive. Finally, two plies of "GAFGLAS #75 Base Sheet" were hot mopped to the wood fiberboard.

Assembly No. 2

One layer of "ACFoam II", 1-1/2 in. thick was adhered to the steel deck with "TITESET" adhesive. A second layer of "ACFoam II", 1-1/2 in. thick was then adhered to the first layer of insulation with "TITESET" adhesive. Firestone "Standard RubberGard" EPDM, 45 mil was then fully adhered to the insulation with Firestone "BA-2004" adhesive, 60 sq. ft./gal.

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 magnitude of the wind velocity across a roof deck and the resulting uplift pressures on a roof deck are dependent upon many factors such as wind gusts, the shape of the roof deck, edge configuration and the landscape surrounding the roof deck installation. A method to calculate the uplift pressures on roof decks is contained in ASCE 7-98, "Minimum Design Loads for Buildings and Other Structures".

The test apparatus consisted of two sections: a top section measuring 10 by 10 ft to create a uniform vacuum, and a bottom section measuring 11 by 11 ft. The chamber is provided with a static pressure tap located such that the pressure readings are not affected by the velocity of the air into or from the chamber. A manometer is used to determine the vacuum pressure.

The pressure differences were adjusted such that a stabilized 30 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.

RESULTS

Assembly No. 1 was subjected to uplift pressure in accordance with the loading schedule through a maximum of 120 psf. Prior to and during the attainment of the 120 psf pressure, there was no sign of separation of adhered parts. The mode of failure after 120 psf was failure of the wood fiberboard.

Assembly No. 2 was subjected to uplift pressure in accordance with the loading schedule through a maximum of 105 psf. Prior to and during the attainment of the 105 psf pressure, there was no sign of separation of adhered parts. The mode of failure after 105 psf was delamination of the top facer of the insulation from the polyisocyanurate core.

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 the Report are significant factors in the uplift resistance performance of the roofing systems.

CONCLUSION

The following conclusions represent the judgment of Underwriters Laboratories Inc. based upon the results of the examination, tests and data analysis presented in this Report, as they relate to established principles and previously recorded data.

The "TITESET" adhesive is judged to be eligible for Classification and Follow-Up Service of Underwriters Laboratories Inc. Under the Service, the manufacturer is authorized to use the UL Classification Marking on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the UL Classification Marking are considered as Classified by Underwriters Laboratories Inc.

The Classification Marking to be used for the adhesive product utilized in the above systems is illustrated below:

INSULATION ADHESIVE FOR
ROOFING SYSTEMS, UPLIFT RESISTANCE
AS TO UPLIFT RESISTANCE

Roofing System Classifications will be promulgated as shown below:

1. Uplift Resistance: 120 psf
Deck: Steel, min 22 MSG.
Barrier Board: G-P Gypsum Dens-Deck®, 1/2 in. thick, adhered to the steel deck with "TITESET" adhesive, approximately 1/2 gal./sq., applied to every other crest (12 in. OC).
Insulation: One layer of Atlas "ACFoam II", 1-1/2 in. thick, adhered to the Dens-Deck® with "TITESET" adhesive, approximately 1/2 gal./sq., applied in ribbons spaced a max of 12 in. OC.
Insulation: Any UL Classified high-density wood fiberboard, min 1/2 in. thick adhered to the insulation with "TITESET" adhesive, approximately 1/2 gal./sq., applied in ribbons spaced a max of 12 in. OC.
Roof Covering: Any UL Classified hot mopped or torch applied modified bitumen membrane system or hot mopped built-up system (See Roofing Systems, TGFU).

2. Uplift Resistance: 105 psf.
Deck: Steel, min 22 MSG.
Insulation: One layer of Atlas "ACFoam II", 1-1/2 in. thick adhered to the steel deck with "TITESET" adhesive, approximately 1/2 gal./sq., applied to every other crest (12 in. OC).
Insulation: One layer of Atlas "ACFoam II", 1-1/2 in. thick adhered to the first layer of insulation with "TITESET" adhesive, approximately 1/2 gal./sq., applied in ribbons spaced a max of 12 in. OC.
Membrane: Firestone "Standard RubberGard" EPDM, min 45 mil, fully adhered to the insulation with Firestone "BA-2004 Bonding Adhesive", 45-60 sq. ft./gal.

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