



*Not to be distributed outside of FM Global except by Customer*

# APPROVAL REPORT

## ELASTOSPRAY 096B 2.5R INSULATION ADHESIVE FOR USE IN INSULATED ROOF DECK CONSTRUCTIONS

**Prepared for:**

**BASF Corporation  
1609 Biddle Avenue  
Wyandotte, MI 48192**

**Project ID. 3012836  
Class 4470  
Date: March 26, 2003**

FM Approvals  
1151 Boston-Providence Turnpike  
P.O. Box 9102  
Norwood, MA 02062

**ELASTOSPRAY 096B 2.5R INSULATION ADHESIVE FOR USE IN INSULATED ROOF DECK  
CONSTRUCTIONS**

**March 26, 2203**

**From**

**BASF Corporation  
1609 Biddle Avenue  
Wyandotte, MI 48192**

**I INTRODUCTION**

- 1.1 BASF Corporation submitted their Elastospray 096B 2.5R insulation adhesive to determine if it meets the approval requirements of the **Standard** listed below for use in Class 1 insulated roof deck assemblies.
- 1.2 This Report may be reproduced only in its entirety and without modification.
- 1.3 **Standard:**

<b>Title</b>	<b>Class Number</b>	<b>Date</b>
Class 1 Insulated Steel Deck Roofs	4450	February, 1989

- 1.4 Examination included delamination and simulated wind uplift pull testing.
- 1.5 Tests show that Elastospray 096B 2.5R insulation adhesive, as tested, meets the Approval requirements of the **Standard** listed above for use in selected constructions.
- 1.6 **Listings:** The tested constructions meet the Approval criteria of FM Approvals when installed as specified in the **CONCLUSIONS** of this report and when Approval is effective will be listed in the FM Approval Guide.

**II DESCRIPTION**

- 2.1 Elastospray 096B 2.5R insulation adhesive is a polyurethane based two-component adhesive which is spray applied to the substrate at full coverage with the insulation walked in.
- 2.2 All other materials are as described in the current edition of the FM Approval Guide. Proprietary formulations and specifications are on file at FM Approvals.

**III EXAMINATIONS AND TESTS**

- 3.1 Samples were submitted for examination and testing as follows:
- 3.1.1 Tests conducted were as required by the **Standard** listed in paragraph 1.3 above. FM Approvals

FM APPROVALS  
3012836

Calorimeter testing for the potential for fire spread below the roof deck and ASTM E108 testing for fire spread above the roof deck were waived because of previous satisfactory performance of the insulations and membranes in more combustible constructions in prior Approval programs.

- 3.1.2 The insulation and membrane samples were produced under the FM Approvals Facilities and Procedures Audit program as indicated by FM Approvals labels. All samples were considered to be representative of standard production and were examined and tested as indicated below.
- 3.1.3 Roof covers, insulations and adhesives incorporated into test samples were selected by FM Approvals personnel. Test samples were prepared by, or under the supervision of, FM Approvals personnel.
- 3.1.4 All data is on file at FM Approvals under J.I 3012836 along with other documents and correspondence applicable to this program.

3.2 Comparative Insulation Delamination Tests

- 3.2.1 Insulation delamination tests were conducted on samples of the various insulation boards to determine the comparative performance of the insulation boards in resisting delamination. The results were compared and used as the basis for selection of the most critical insulation board to be used in the simulated wind uplift tests.
- 3.2.2 Tests were conducted using a Tinius Olsen tensile testing machine. Two 6 by 6 in.(150 by 150 mm) pieces of each insulation sample were adhered to each other with Elastospay 096B 2.5R insulation adhesive. Pieces of plywood 6 by 6 in.(150 by 150 mm) were then adhered to both sides of each insulation sample. Metal plates 6 by 6 in.(150 by 150 mm) were attached to the plywood with screws. Bolts through the metal plates were held in the upper stationary jaws of the tester and the moving head. Force was exerted in a direct line perpendicular to the insulation facers at a crosshead speed of 2 in./min (51 mm/min) until failure occurred.
- 3.2.3 Nine samples (three for each insulation) were prepared as noted above.
- 3.2.4 The results (average of three) of the facer delamination tests were as follows:

<u>Insulation</u>	<u>lbf (N)</u>
H-Shield	483 (2148)
ACFoam II	449 (1997)
Pyrox	437 (1944)

3.3 FM Approvals Simulated Wind Uplift Pull Tests

- 3.3.1 Tests were conducted using the FM Approvals Uplift Pull Test Apparatus to evaluate the ability of the above deck components of the roofing system to resist a minimum simulated wind uplift pressure of 60 psf (2.9 kPa) without failure of the assemblies.
- 3.3.2 The simulated wind uplift pull tests utilized a threaded rod assembly supported by a steel frame to apply an uplift force to each test sample via a 2 by 2 ft (0.6 by 0.6 m) plywood form secured to the top of the test panel with an adhesive. The uplift force was applied perpendicular to the test panels and was monitored with a calibrated load cell.

FM APPROVALS  
3012836

3.3.3 A net uplift force equivalent to an uplift pressure of 30 psf (2.9 kPa) was applied to the each sample and maintained for 1 minute. The force was increased to the equivalent of 45 psf (4.3 kPa), then to the equivalent of 60 psf (5.7 kPa) and held for 1 minute at each increment. The force was increased in increments equivalent to 15 psf (0.7 kPa) every minute until failure occurred.

3.3.4 Three test samples were prepared. The components, sequence of installation and test results were as follows:

Sample No. 1: - 54 x 54 x 7 in. (1.37 x 1.37 m x 180 mm) concrete slab.  
- 24 x 24 x 1.5 in. (610 x 610 x 38 mm) Pyrox roof insulation adhered to the concrete with Elastospray 096B 2.5R insulation adhesive and walked in.  
- Sarnafil G410 Felt Backed roof cover fully adhered with Sarnacol 2170 adhesive.

**Test Result:** The test sample met the equivalent 225 psf (10.8 kPa) minimum FM Approvals requirement for Class 1-225 windstorm classification. The construction failed during the next pressure level. Insulation board fracture and facer delamination were the failure modes.

Sample No. 2: - 54 x 54 x 7 in. (1.37 x 1.37 m x 180 mm) concrete slab.  
- 2 ply organic BUR  
- 24 x 24 x 1.5 in. (610 x 610 x 38 mm) Pyrox roof insulation adhered to the BUR with Elastospray 096B 2.5R insulation adhesive and walked in.  
- Sarnafil G410 Felt Backed roof cover fully adhered with Sarnacol 2170 adhesive.

**Test Result:** The test sample met the equivalent 480 psf (22.9 kPa) minimum FM Approvals requirement for Class 1-480 windstorm classification. The construction failed during the next pressure level. Insulation board delaminating from the BUR was the failure mode.

Sample No. 3: - 54 x 54 x 7 in. (1.37 x 1.37 m x 180 mm) concrete slab.  
- Mineral surfaced cap sheet adhered with hot asphalt.  
- 24 x 24 x 1.5 in. (610 x 610 x 38 mm) Pyrox roof insulation adhered to the cap sheet with Elastospray 096B 2.5R insulation adhesive and walked in.  
- Sarnafil G410 Felt Backed roof cover fully adhered with Sarnacol 2170 adhesive.

**Test Result:** The test sample met the equivalent 105 psf (5.0 kPa) minimum FM Approvals requirement for Class 1-105 windstorm classification. The construction failed during the increase to the next pressure level. Roof cover delaminating from the insulation was the failure mode.

#### **IV MARKING**

4.1 The manufacturer shall mark each packing container with the manufacturer's name and product trade name. In addition, the container must be marked with the Approval Mark of FM Approvals and the words "Subject to the conditions of Approval as an insulation adhesive when installed as described in the current edition of the FM Approval Guide".

4.2 Markings denoting Approval by FM Approvals shall be applied by the manufacturer only within and on the premises of manufacturing locations that are under the FM Approvals Facilities and Procedures Audit program.

FM APPROVALS  
3012836

- 4.3 The manufacturer agrees that use of the FM Approvals name or Approval Mark is subject to the conditions and limitations of the Approval by FM Approvals. Such conditions and limitations must be included in all references to Approval by FM Approvals.

**V REMARKS**

- 5.1 The securement of the roof system must be enhanced at the building corners and perimeter as outlined in FM Global Property Loss Prevention Data Sheet 1-29.
- 5.2 The roof covers must be installed using a roof perimeter flashing system Approved by FM Approvals. See the current edition of the FM Approval Guide.

**VI FACILITIES AND PROCEDURES AUDITS**

The BASF Corporation manufacturing location in Carrollton, TX is subject to periodic audit inspections to determine that the quality and uniformity of the materials have been maintained and will provide the same level of performance as originally Approved. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report.

**VII MANUFACTURER'S RESPONSIBILITIES**

- 7.1 To assure compliance with his procedures in the field, the manufacturer shall supply to the roofer such necessary instruction or assistance required to produce the desired performance achieved in the tests.
- 7.2 The manufacturer shall notify FM Approvals of any planned change in the Approved product, prior to general sale or distribution, using Form 797, Approved Product Revision Report.

**VIII DOCUMENTATION**

The following documents describe the Elastospray 096B 2.5R and are filed under J.I. 3012836.

<b>Document</b>	<b>Issue or Revision</b>	<b>Description</b>
Proprietary and Confidential Formulation	January, 2002	Product formulation

**IX CONCLUSIONS**

- 9.1 Test results from this program indicate that BASF Corporation's Elastospray 096B 2.5R insulation adhesive meets the FM Approvals Standard 4450 (1989) Approval requirements for Class 1 Fire and various Windstorm Classifications when installed as follows:

FM APPROVALS  
3012836

- 9.2 Concrete (New): ACFoam II, Pyrox or H-Shield insulation is adhered to the deck with a full application of Elastospray 096B 2.5R insulation adhesive and walked in. The insulation is covered with Sarnafil G410 or G410 Felt Backed membrane fully adhered with Sarnacol 2170 or 2121 adhesive. Meets Class 1-225.
- 9.3 Concrete (Recover): ACFoam II, Pyrox or H-Shield insulation is adhered to an existing smooth BUR with a full application of Elastospray 096B 2.5R insulation adhesive and walked in. The insulation is covered with Sarnafil G410 or G410 Felt Backed membrane fully adhered with Sarnacol 2170 or 2121 adhesive. Meets wind classification of the existing roof to a maximum of Class 1-480 except meets maximum Class 1-465 with G410 membrane and 2170 adhesive.
- 9.4 Concrete (Recover): ACFoam II, Pyrox or H-Shield insulation is adhered to an existing granular surface cap sheet with a full application of Elastospray 096B 2.5R insulation adhesive and walked in. The insulation is covered with Sarnafil G410 or G410 Felt Backed membrane fully adhered with Sarnacol 2170 or 2121 adhesive. Meets wind classification of the existing roof to a maximum of Class 1-105.
- 9.5 Consult the current edition of the FM Approval Guide for details on the Approved constructions including ASTM E108 and hail ratings.
- 9.6 Tests show that the tested roof constructions in and of themselves would not create a need for automatic sprinklers.
- 9.7 Approval is effective when the Approval Agreement is signed and received by FM Approvals.
- 9.8 Continued Approval will depend upon satisfactory field experience and periodic Facilities and Procedures Audits.

**TESTING SUPERVISED BY:** Phillip J. Smith, PE

**PROJECT DATA RECORD:** 3012836

**ORIGINAL TEST DATA:** none

**ATTACHMENTS:** none

**REPORT BY:**

  
Phillip J. Smith, PE  
Technical Team Manager - Materials Group

**REPORT REVIEWED BY:**

  
L. N. D'Angelo  
Technical Team Manager- Materials Group