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APPROVAL REPORT

APPROVAL EXAMINATION OF THE STRATASEAL HR ROOF SYSTEM OVER CONCRETE ROOF DECK

Prepared for:

**CETCO
1500 West Shure Drive
Arlington Heights, IL 60004**

Project ID: 3028111

Class: 4470

Date of Approval:

January 3, 2008

Authorized by:

[Signature]

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**APPROVAL EXAMINATION OF THE STRATASEAL HR
ROOF SYSTEM OVER CONCRETE ROOF DECK**

from

**CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS, IL 60004**

I INTRODUCTION

- 1.1 CETCO submitted their StrataSeal HR Roof System to determine if it meets the approval requirements of the **Standard** listed below for Class 1 roof covers over concrete roof deck constructions described in the **EXAMINATION AND TESTS** section of this report.
- 1.2 This report may be reproduced only in its entirety and without modification.
- 1.3 **Standard:**

Title	Class Number	Date
Class 1 Roof Covers	4470	April, 1986

- 1.4 Examination included simulated wind uplift pull tests, external spread of flame tests, leakage tests and foot traffic tests.
- 1.5 Tests show that the StrataSeal HR Roof System, as tested, meets the Approval requirements of the **Standard** listed above for Class 1 roof covers.
- 1.7 **Listings:** The tested constructions meet the Approval criteria of FM Approvals when installed as specified in the **CONCLUSIONS** of this report. The product will be listed in RoofNav.

II DESCRIPTION

- 2.1 StrataPrime SB is an asphaltic primer used on structural concrete decks prior to the application of StrataSeal hot-applied rubberized asphaltic membrane waterproofing membrane
- 2.2 StrataSeal HR is a single component, 100% solids, hot-applied rubberized asphalt membrane used for waterproofing and protected roof applications. StrataSeal HR Basic Assembly consists of 180 mils (4.6 mm) thick coat of StrataSeal HR applied to the primed concrete deck.
- 2.3 StrataSeal HR Reinforced Assembly is a flexible waterproofing membrane that incorporates a reinforcing fabric for enhanced durability and physical properties. Reinforcing fabric is layed over a tacky 90 mil (2.3 mm) thick base layer of StrataSeal HR, covered by a second layer 125 mils (3.2 mm) thick.
- 2.4 StrataBond 100 polyester sheeting is a membrane that is imbedded in StrataSeal HR waterproofing to create a reinforced assembly.

FM APPROVALS
Project ID: 3028111

- 2.5 RAP 100 is 60 mil (1.6 mm) thick rubberized asphalt protection sheet sanded on both sides, reinforced with non-woven synthetic fibers.
- 2.6 RAP 200 is 90 mil (2.3 mm) thick rubberized asphalt protection sheet sanded on both sides, reinforced with non-woven synthetic fibers.
- 2.7 All other products are as described in RoofNav. Proprietary formulations, specifications, and drawings 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. All other testing was waived because of the previous satisfactory performance of the components in prior Approval programs.
 - 3.1.2 All components incorporated into the test sample were selected by FM Approvals personnel. The test samples were prepared by, or under the supervision of, FM Approvals personnel.
 - 3.1.3 All data is on file at FM Approvals under Project ID 3028111 along with other documents and correspondence applicable to this program.
- 3.2 ASTM E 108 Spread of Flame Tests
 - 3.2.1 The fire tests from above the roof cover were conducted in accordance with ASTM E108 Spread of Flame Tests.
 - 3.2.1.1 Sample size was 3-1/3 by 8 ft. (1.0 by 2.4 m).
 - 3.2.1.2 The wind velocity over the top of the standard panel was adjusted to 12±0.5 mph (5.3±0.2 m/s).
 - 3.2.1.3 Flame exposure: The flame was adjusted to 1400±50°F (760±28°C) for Class A tests. The flame temperature was measured by a thermocouple located 1 in. (25.4 mm) above the surface of the standard panel and 1/2 in. (13 mm) toward the flame source from the lower edge of the standard panel. The flame was applied to each test panel for 10 minutes.
 - 3.2.1.4 During and after the application of the flame, each panel was observed for the distance of maximum flame spread, glowing brands and other damage.
 - 3.2.2 Two 3-1/3 by 8 ft. (1.0 by 2.4 m) test samples were prepared. The components and sequence of installation were as follows:

Samples 1, 2:

- 1/2 in. (12.7 mm) plywood primed with StrataPrime SB applied at 400 sq ft/gal (9.82 sq m/L)
- 180 mils (4.6 mm) StrataSeal HR over primed deck
- RAP 100 asphalt protection sheet
- 90 mil (2.3 mm) thick tack coat of StrataSeal HR

FM APPROVALS
Project ID: 3028111

- 2 in. (50.8 mm) thick FM Approved extruded polystyrene (XPS) insulation set into tack coat
- 2 in. (50.8 mm) thick concrete paving stones

3.2.3 The results of the ASTM E108 Spread of Flame tests were as follows:

<u>Sample No.</u>	<u>Slope</u>	<u>Max. Flame Spread</u>	<u>Rating</u>
1	.25 in 12	No ignition	Class A
2	.25 in 12	No ignition	Class A*

*confirming test of Class A rating for a .25 in 12 slope

Deck exposure, flying brands and significant lateral flame spread were not observed during the tests.

3.3 FM Approvals 2x2 ft (0.61x0.61 m) Simulated Wind Uplift Pull Tests

3.3.1 Testing was 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 assembly.

3.3.1.1 The simulated wind uplift pull test utilized a loading device supported by a steel frame to apply an uplift force to each test sample via a 2x2 ft (0.6x0.6 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.

3.3.1.2 A net uplift force equivalent to an uplift pressure of 30 psf (2.9 kPa) was applied to the test 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.

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

Sample 1:

- Structural concrete deck primed with StrataPrime SB applied at 400 sq ft/gal (9.82 sq m/L)
- 180 mils (4.6 mm) StrataSeal HR over primed deck
- RAP 100 asphalt protection sheet
- 90 mil (2.3 mm) thick tack coat of StrataSeal HR
- 2 in. (50.8 mm) thick XPS insulation set into tack coat
- 3/4 in. (19.1 mm) thick plywood adhered to the XPS

Test Result: The test sample met the 150 psf (7.2 kPa) minimum FM Approvals requirement for Class 1-150 windstorm classification. The StrataSeal HR pulled away from the primer on the increase to 165 psf (7.9 kPa).

Sample 2:

- Structural concrete deck primed with StrataPrime SB applied at 400 sq ft/gal (9.82 sq m/L)
- 180 mils (4.6 mm) StrataSeal HR over primed deck

FM APPROVALS
Project ID: 3028111

- RAP 100 asphalt protection sheet
- 3/4 in. (19.1 mm) thick plywood adhered to the RAP 100

Test Result: The test sample met the 135 psf (6.5 kPa) minimum FM Approvals requirement for Class 1-135 windstorm classification. The RAP 100 pulled away from the StrataSeal HR at 34 seconds into 150 psf (7.2 kPa).

3.4 FM Approvals Susceptibility to Leakage Test

3.4.1 A test was conducted in accordance with the FM Approvals Susceptibility to Leakage Test Procedure to evaluate the ability of the roof cover to resist leakage of water under the conditions of the test.

3.4.1.1 The test apparatus consists of top and bottom sections which are bolted or clamped together with the specimen being evaluated placed as a diaphragm between the sections. The top and bottom sections consist of 9-1/4 in. (235 mm) diameter cap cemented to 7-3/4 in. (197 mm) clear acrylic pipe. An 11-5/8 in. (295 mm) diameter pipe flange is cemented to the other end of each pipe section. Both top and bottom sections are bolted or clamped together at the flanges with the cover being evaluated placed between them. The apparatus is fabricated to allow both a standing head of water above and additional air pressure below the test sample. Each section is fabricated with two 1/2 in. (13 mm) diameter pipe outlets to allow connection of an air pressure source and a pressure gauge.

3.4.1.2 After conditioning (weathering) for 1000 hours in the FM Approvals Ultraviolet Weatherometer, a 10 in. (254 mm) diameter specimen was cut from the sample and bolted or clamped in place between the flanges of the test apparatus. Water was placed over the sample to a depth of 6 in. (152 mm) and maintained for a period of 7 days. At the end of the 7 day period, air was introduced below the sample at a pressure of 1 psi (6.3 kpa) and cycled 25 times from 1 psi (6.3 kpa) to ambient.

3.4.1.3 There must be no signs of water leakage during the 7 day period or during or after the pressure cycles following the exposure.

3.4.2 One test sample was prepared. The components and sequence of installation are as follows.

Sample No.1:

- RAP 100 adhered to RAP 100 in a 3 in (76.2 mm) lap with StrataSeal HR
- 90 mil (2.3 mm) thick tack coat of StrataSeal HR

3.4.3 No signs of water leakage through the RAP 100 test sample described in 3.4.2 above was observed during the 7 day exposure to a head of water during or after the pressure cycles following the exposure.

IV MARKING

4.1 The manufacturer shall mark each packing container with the manufacturer's name and product trade name. In addition, the packing container must be marked with the Approval Mark of FM Approvals.

4.2 Markings denoting Approval by FM Approvals shall be applied by the manufacturer only within

FM APPROVALS
Project ID: 3028111

and on the premises of manufacturing locations that are under the FM Approvals Facilities and Procedures Audit program.

- 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. Additionally, paving blocks and the application of the paving blocks are limited to use in accordance with FM Global Loss Prevention Data Sheet 1-29.
- 5.2 The roof covers must be installed using an FM Approved roof perimeter flashing system. See the current edition of the Approval Guide.

VI FACILITIES AND PROCEDURES AUDITS

CETCO manufacturing locations in Chicago, IL; Reading, PA; Cheyenne, WY; Durham, NC; Charlotte, NC; Kansas City, KS; and Macon, GA are 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 FM 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 FM Approved products, prior to general sale or distribution, using Form 797, FM Approved Product Revision Report.

VIII DOCUMENTATION

The following documents describe the products and are filed under Project ID 3028111.

Documents	Issue or Revision	Description
Facilities and Procedures Audit Manuals (Chicago, IL; Reading, PA; Cheyenne, WY; Durham, NC; Charlotte, NC; Kansas City, KS; and Macon, GA)	December, 2007	FPA Manuals

FM APPROVALS
Project ID: 3028111

IX CONCLUSIONS

9.1 Test results from this program indicate that the CETCO StrataSeal HR Roof System meets the Standard 4470 Approval requirements for Class 1 Roof Covers when installed over concrete decks in the following constructions.

Roof Cover:	StrataSeal HR
Application:	<u>Basic Assembly</u> : 180 mils (4.6 mm) thick coat of StrataSeal HR applied to the primed concrete deck. <u>Reinforced Assembly</u> : 90 mils (2.3 mm) thick StrataSeal HR coat applied to the primed concrete deck. Press on StrataBond 100 reinforcing fabric while the first layer is still warm. Follow with 125 mils (3.2 mm) thick coat of StrataSeal HR. Based on wet thicknesses.
Substrate:	Concrete primed with StrataPrime SB applied at 400 sq ft/gal (9.82 sq m/L)
Hail:	SH
ASTM E108:	Class A at .25 in 12
Surfacing:	Paving blocks or concrete slab

Construction #1: Concrete. The deck is primed with StrataPrime primer. StrataSeal HR Basic Assembly is applied to the primed concrete deck. While the StrataSeal HR is still warm, apply one layer of RAP 100 or RAP 200 asphaltic protection sheet. Coat the RAP protection sheet with a tack coat of StrataSeal HR, and allow to cool to 225 to 250 F (107 to 121 C) and walk-in 2 in. (50.8 mm) thick STYROFOAM insulation. The insulation is then surfaced with paving blocks applied in accordance with Data Sheet 1-29. Meets Class 1-90

Construction #2: Concrete. The deck is primed with StrataPrime primer. StrataSeal HR Reinforced Assembly is applied to the primed concrete deck. While the StrataSeal HR is still warm, apply one layer of RAP 100 or RAP 200 asphaltic protection sheet. Coat the RAP protection sheet with a tack coat of StrataSeal HR, and allow to cool to 225 to 250 F (107 to 121 C) and walk-in 2 in. (50.8 mm) thick STYROFOAM insulation. The insulation is then surfaced with paving blocks applied in accordance with Data Sheet 1-29. Meets Class 1-90

Construction #3: Concrete. The deck is primed with StrataPrime primer. StrataSeal HR Basic Assembly is applied to the primed concrete deck. While the StrataSeal HR is still warm, apply one layer of RAP 100 or RAP 200 asphaltic protection sheet. The protection sheet is then surfaced with minimum 2500 psi (17.24 MPa) structural concrete slab. Meets Class 1-150

Construction #4: Concrete. The deck is primed with StrataPrime primer. StrataSeal HR Reinforced Assembly is applied to the primed concrete deck. While the StrataSeal HR is still warm, apply one layer of RAP 100 or RAP 200 asphaltic protection sheet. The protection sheet is then surfaced with minimum 2500 psi (17.24 MPa) structural concrete slab. Meets Class 1-150

- 9.2 Tests show that the tested roof constructions in and of themselves would not create a need for automatic sprinklers.
- 9.3 Since a duly signed Master Agreement is on file for this customer, Approval is effective as of the date of this report.
- 9.4 Continued Approval will depend upon satisfactory field experience and periodic Facilities and Procedures Audits.

FM APPROVALS
Project ID: 3028111

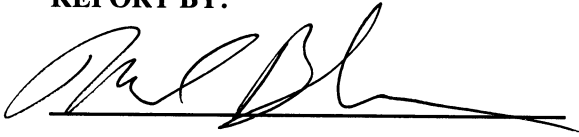
TESTING SUPERVISED BY: Suzanne Brunetti-Moreau, William Meyring, Michael Burke

PROJECT DATA RECORD: 3028111

ORIGINAL TEST DATA: None

ATTACHMENTS: None

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