



333 Pfingsten Road
Northbrook, Illinois 60062-2096
United States Country Code (1)
(847) 272-8800
FAX No. (847) 272-8129
<http://www.ul.com>

File R18920
Project 02NK2426

2002-10-29

REPORT

on

ROOFING SYSTEMS

Under The

CLASSIFICATION PROGRAM

EcoStar, Inc.
Vernon Hills, IL

Copyright © 2002 Underwriters Laboratories Inc.

Underwriters Laboratories Inc. authorizes the above named company to reproduce this Report provided it is reproduced in its entirety.

GENERAL

INVESTIGATION:

This investigation covered Class C molded plastic shingles for use with Type 30 felt underlayment over 15/32-in. plywood decks. This investigation covered 7-shingle designs with varying size and thickness.

Our engineering evaluation plan consisted of testing the "Seneca Cedar Shake Tiles" with an 8 in. exposure and "Titus Tile" with an 18 in. exposure for spread of flame and the "Majestic Slate Colonial" with an 7-in. exposure for the intermittent flame and burning brand tests.

DESCRIPTION

PRODUCT COVERED:

The products covered by this Report are Class C molded plastic shingles.

The products in this Report are Classified as to external fire exposure only.

USE:

The products are intended for use as building materials as permitted by Authorities Having Jurisdiction.

TEST RECORD NO. 1

EXAMINATION OF MATERIALS:

The materials used in this investigation were produced under the observation of a representative of Underwriters Laboratories Inc. The composition of the finished materials is of a proprietary nature. Data on the composition is on file at the Laboratories for use in the Follow-Up Service Program.

Various physical and chemical tests were conducted on the components and finished products. The results developed from these tests were employed in establishing specifications for use in the factory Follow-Up Service Program.

FIRE TESTS:

SAMPLES

System #1 - 15/32-in. plywood deck with Type 30 felt and the "Seneca Cedar ShakeTiles" (8-in. exposure).

System #2 - 15/32-in. plywood decks with Type 30 felt and the "Titus Tile" (18-in. exposure).

System #3 - 15/32-in. plywood decks with Type 30 felt and the "Majestic Colonial Slate" (7-in. exposure).

* Class C fire tests were conducted on the above samples. These tests were conducted in accordance with the Test Standard ANSI/UL 790, "Tests for Fire Resistance of Roof Covering Materials," (ASTM E-108, "Fire Tests of Roof Coverings").

In the spread of flame and intermittent flame tests described in this Report, the temperature of the test flame, as measured by a No. 14 gauge chromel-alumel wire thermocouple located as described in ANSI/UL Standard 790, was found to be $1300 \pm 50^{\circ}\text{F}$. The physical appearance of the test flame when the test apparatus was calibrated for flame temperature, was generally triangular in shape, being about 3 ft wide at the deck's leading edge and gradually narrowing to a width of approximately 6 in. at the top of the 52 in. long calibration deck, with licks of flame extending approximately another 1 ft.

The wind velocity required by ANSI/UL 790 was determined by taking readings on a smooth deck (40 in. wide and 52 in. long) midway up the deck at the center and 3 in. from each vertical edge with a vane type anemometer and timer. The velocity measured at an incline of 5 in./ft was found to be 1050 ± 50 ft/min ($12 \pm 1/2$ mi/h) with the carriage in position.

The results of these tests are summarized on the following pages:

SPREAD OF FLAME TEST

<u>Test No.</u>	<u>System No.</u>	<u>Slope of Deck, in./ft</u>	<u>Maximum Flame Spread, ft</u>	<u>Exposure of Roof Deck</u>
1	2	5	11	None
2	2	5	10-1/2	None
3	1	5	11-1/4	None
4	1	5	11	None

NA - Not applicable for systems limited to noncombustible deck.

At no time during these tests were any flying flaming brands of roof covering material produced. Also, there was no significant lateral spread of flame from the path directly exposed to the test flame.

INTERMITTENT FLAME TEST - CLASS C

<u>Test No.</u>	<u>System No.</u>	<u>Slope Of Deck, in./ft</u>	<u>Time of Smoke Underside, min:s</u>	<u>Asphalt Dripping Underside, min:s</u>	<u>Time of Glow Underside, min:s</u>	<u>Depth Of Char, in.</u>	<u>Duration Of Test, Min</u>
5	3	5	25:52	None	None	None	40
6	3	5	31:09	None	None	None	40

At no time during these tests were any flying flaming brands of the roof covering material produced or did exposure of the roof deck occur. Also, at no time during these tests were any sparks or flames noted on the underside of the deck.

BURNING BRAND TEST - CLASS C

<u>Test No.</u>	<u>System No.</u>	<u>Slope Of Deck, in./ft</u>	<u>Time of Smoke Underside, min:s</u>	<u>Asphalt Dripping Underside, min:s</u>	<u>Time of Glow Underside, min:s</u>	<u>Depth Of Char, in.</u>	<u>Duration Of Test, Min</u>
10	3	5	None	None	None	None	40
11	3	5	None	None	None	None	60

At no time during these tests were any flying flaming brands of the roof covering material produced or did exposure of the roof deck occur. Also, at no time during these tests were any sparks or flames noted on the underside of the deck.

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 exterior fire performance of the construction.

CONCLUSION

The following conclusion represents 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 products covered by this Report are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the UL Listing Marking as shown below on such products which comply with the Follow-Up Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the UL Listing Marking are considered as Listed by Underwriters Laboratories Inc.

LISTING MARKING

The Listing Marks to be used with the Class C shingles are illustrated below:


LISTED
PREPARED ROOFING MATERIAL
SHINGLES - CLASS C
DEGREE OF RESISTANCE TO EXTERNAL
FIRE AND FLAMMABILITY LIMITS
IN ACCORDANCE WITH UL STANDARD 790
WHEN APPLIED IN ACCORDANCE WITH
INSTRUCTIONS INCLUDED WITH THIS ROOFING

LISTING:

The Listing will be promulgated as described below:

Molded plastic shingles, for installation as Class C prepared roof covering. Limited to 15/32 in. plywood decks and one ply of Type 30 felt.

Report by:


JAMES M. O'SHEA
Senior Engineering Associate
Fire Protection Div.

Reviewed by:



DOUGLAS C. MILLER
Engineering Group Leader
Fire Protection Div.

Table 1

Sample Description	Heat Flux kW/m ²	Sample Area m ²	Mounting	Test #	Ignition Time, s	Initial Wt Grams	Total Wt Loss Grams	Heat of Comb. kW/m ²	Avg HRR at 180s KW/m ²	Peak HRR kW/m ²	Total Heat MJ/m ²	Peak SRR m ² /s	Total Smoke m ²	Ext Cross-sectional Area m ² /g	Test Code
Colonial Slate	35	0.01	HEG	1	69	48.34	40.5	35.0	303.9	360.1	141.6	0.057	20.28	0.501	2150208
Colonial Slate	35	0.01	HEG	2	68	47.45	39.5	35.2	311.2	362.0	139.2	0.061	19.30	0.488	2150209
Colonial Slate	35	0.01	HEG	3	67	47.26	40.0	35.4	319.7	384.1	141.4	0.059	18.63	0.466	2150210
Colonial Slate	35	0.01	HEG	4	69	46.57	39.1	36.5	323.0	382.6	142.4	0.059	18.45	0.472	2150211
Colonial Slate	35	0.01	HEG	5	64	45.14	38.6	37.4	322.3	386.0	144.1	0.061	19.79	0.513	2150212
					Range										
					Standard Deviation										
					Avg										
					3 Sigma										
					Acceptable FUS Range (Avg ± 3 sigma)										

Time to Ignition (s)	Peak HRR (kW/m ²)	Avg Heat of Combustion (kJ/g)	Extinction Cross-sectional (m ² /g)
High Limit 74++	413	39	0.55++
Low Limit 61	337++	33++	0.47++

Based on original tests 021502 to 2150212

Orientation - HEG

Heat Flux (kW/m²) - 35

Test Duration (Min) - 25

++ - Results which exceed indicated limited do not necessarily constitute failure, - advise Fire Protection, 3019E