

Date September 29, 2004

Project No. 3063426
Report No. 1
Client No. 44891

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Description: Testing of Synthetic Slate ShinglesClient New Group Asia Building Products Inc.
2316 Timber Shadows, Suite 208
Kingwood, Texas. U.S.A. 77339

Attention: Mr. Terry Lam

Introduction

This report covers testing of synthetic slate shingles. An Intertek Testing Services representative sampled the shingles on August 16, 2004. The samples were received in new and undamaged condition on September 2, 2004. Testing was performed between the dates of September 13-22, 2004.

Samples were tested for Penetration according to section 4.5 of ICBO Evaluation Service, Inc., "Acceptance Criteria for Special Roofing Systems, AC07". Penetration tests were performed using a Baldwin/UTS Universal Testing Machine with 0-1" dial type deflection gauge. Uplift bend tests in accordance with section 4.4 were performed using a Chatillon 100N force gauge and a calibrated weight.

Product Description

The product identified as synthetic slate shingles were made from recycled plastic (PEP), being flexible and embossed to emulate a slate shingle. The shingles were gray in colour with an embossed slate-like finish. The shingles measured nominally 16-3/4" (425 mm) long by 12" (305 mm) wide and were 1/8" to 1/4" (3.2 mm to 6.4 mm) thick. The top corners of the shingles were cut off at an angle, 3-1/4" (83 mm) in from the side and 2-1/2" (63.5 mm) down from the top edge. The recommended nominal exposure was 6" (152 mm) to 7-1/2" (191 mm), depending on roof slope. The dimensional coverage was approximately 6" (152 mm) by 12" (305 mm) wide to 7-1/2" (191 mm) by 12" (305 mm) wide, giving an area coverage of 0.500 ft² (0.0464 m²) to 0.625 ft² (0.0583 m²).

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Product Description (contd)

The shingles were complete with two 1/4" (6.4 mm) radius semi-circular shaped spacing nubs per side edge, spaced 3-3/4" (95.3 mm) apart on centre. The shingles were intended for installation over solid decking and fastened with two corrosion resistant 1-1/2" (38 mm) 10 ga. hot dipped galvanized, stainless steel, or copper roofing nails with a 3/8" (10 mm) diameter head per shingle. Recommended gap between adjacent shingles is 3/8" (9.5 mm).

A copy of the installation guide for the product stamped "Intertek Testing Services NA Ltd." is appended to this report.

Test Methods

1. Penetration Tests- ICBO AC07 Section 4.5

Penetration tests were performed using a Baldwin/UTS Universal Testing Machine (Intertek Inventory No. 280-01-0015; calibration: current) and with 0-1" dial type deflection gauge (Intertek Inventory No. 280-01-0669; calibration: current). A 200 lb. (890N) load was centred on the "exposed" surface of the shingle. The 200 lb. (890N) load was applied 5 times to the shingle through a 3" (76 mm) diameter steel plate, the load being reduced to zero between load applications. The penetration under load, were taken at each load application, and the residual readings were taken following release of each load application.

2. Uplift Bend Tests- ICBO AC07 Section 4.4

Uplift bend tests were performed using a Chatillon 100N force gauge (Intertek Inventory No. 280-02-0017; calibration: current), and a calibrated weight. A roof section was fabricated from 2 x 4 wood studs on 24" (610 mm) and 1/2" plywood sheathing. The roof section was covered with a layer of asphalt saturated non-perforated felt. The shingles were installed on the roof section, four to five shingle per course and five courses high. Each shingle was installed using two 1-1/2" (38 mm) 10 ga. hot dipped galvanized roofing nails with 3/8" (10 mm) diameter heads. The nails were installed at the labeled nailing locations. Two roof sections were prepared, one with the minimum recommended 6" (152 mm) shingle exposure for roof pitches of 2:12 or greater, the other with the maximum recommended 7-1/2" (191 mm) shingle exposure for roof pitches greater than 6:12.

Each roof section was secured in the vertical position, with the required loads being applied horizontally. The horizontal load was applied at the centre of the butt edge of an inner shingle in the second course from the bottom of the test specimen. The loads required to lift the shingle 1/8" (3.2 mm) and 2" (51 mm) were recorded. This was repeated for the butt edge of an inner shingle in the top course of the test specimen. The test continued with a load equal to three times the shingle weight applied horizontally outward and vertically downward at the centre of the butt edge of an inner shingle in the second course from the bottom.

The uplift bend tests were performed "as installed" as well as following exposure to sunlight for eight days to promote the self-adhesive characteristics of the singles.

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Results

1. Penetration Tests ICBO AC07 Section 4.5

200-lb. (890N) load applied 5 times to a 3" (76 mm) diameter plate

Sample No.	Penetration No.	Indentation Under Load (in. {mm})	Residual Indentation (in. {mm})	Comments	Specified
1	1	0.015 (0.38)	0.004 (0.10)	No visual depression, tearing, cracking or excessive permanent deformation ¹ noted. Met requirement	No tearing or cracking causing exposure of glass fibers, foam or other compressible materials or excessive permanent deformation
	2	0.017 (0.43)	0.006 (0.15)		
	3	0.017 (0.43)	0.006 (0.15)		
	4	0.018 (0.46)	0.007 (0.18)		
	5	0.018 (0.46)	0.007 (0.18)		
2	1	0.010 (0.25)	0.003 (0.08)	No visual depression, tearing, cracking or excessive permanent deformation ¹ noted. Met requirement	No tearing or cracking causing exposure of glass fibers, foam or other compressible materials or excessive permanent deformation
	2	0.010 (0.25)	0.004 (0.10)		
	3	0.010 (0.25)	0.005 (0.13)		
	4	0.010 (0.25)	0.005 (0.13)		
	5	0.010 (0.25)	0.005 (0.13)		
3	1	0.017 (0.43)	0.005 (0.13)	No visual depression, tearing, cracking or excessive permanent deformation ¹ noted. Met requirement	No tearing or cracking causing exposure of glass fibers, foam or other compressible materials or excessive permanent deformation
	2	0.018 (0.46)	0.006 (0.15)		
	3	0.018 (0.46)	0.006 (0.15)		
	4	0.019 (0.48)	0.007 (0.18)		
	5	0.019 (0.48)	0.007 (0.18)		
4	1	0.014 (0.36)	0.004 (0.10)	No visual depression, tearing, cracking or excessive permanent deformation ¹ noted. Met requirement	No tearing or cracking causing exposure of glass fibers, foam or other compressible materials or excessive permanent deformation
	2	0.014 (0.36)	0.004 (0.10)		
	3	0.014 (0.36)	0.004 (0.10)		
	4	0.014 (0.36)	0.004 (0.10)		
	5	0.014 (0.36)	0.004 (0.10)		
5	1	0.012 (0.31)	0.003 (0.08)	No visual depression, tearing, cracking or excessive permanent deformation ¹ noted. Met requirement	No tearing or cracking causing exposure of glass fibers, foam or other compressible materials or excessive permanent deformation
	2	0.012 (0.31)	0.003 (0.08)		
	3	0.012 (0.31)	0.003 (0.08)		
	4	0.012 (0.31)	0.003 (0.08)		
	5	0.012 (0.31)	0.003 (0.08)		

contd.....

Results (contd)

1. Penetration Tests ICBO AC07 Section 4.5 (contd)

Note: 1. The standard indicates that the surface penetration should be measured to the nearest hundredth of an inch. The final permanent deformation of all samples tested was 0.01 inches or less. The amount of deformation was therefore judged to be not excessive and would not result in unsatisfactory performance of the roof covering.

2. Uplift-Bend Test

Average weight of shingle: 652 g. 13.8 N

6" (152 mm) exposure- "as installed"- No Self Adhesive Action

Location	Up lift Height	Load Direction	Load Applied	Specified	Comment
Second Course Center of Butt end. Inner shake	1/8" (3.2 mm)	Perpendicular and outward	Less than 0.2 lb (1 N)	2.87 lbs (12.8 N) Minimum ¹	Did not meet the requirement
	2" (50.8 mm)	Perpendicular and outward	0.2 lbs (1 N)	Force required to pull shake 2" (50.8 mm)	Considered by the Standard as the maximum load
Top Course Center of Butt end. Inner shake	1/8" (3.2 mm)	Perpendicular and outward	Less than 0.2 lb (1 N)	2.87 lbs (12.8 N)) Minimum ¹	Did not meet the requirement
	2" (50.8 mm)	Perpendicular and outward	Less than 0.2 lb (1 N)	Force required to pull shake 2" (50.8 mm)	Considered by the Standard as the maximum load
Second Course Center of Butt end. Inner shake	-	Perpendicular and outward	4.31 lbs. (19.2 N) ²	No cracking breaking or falling off the deck	No cracking breaking or falling off the deck
		Parallel and downward	4.31 lbs. (19.2 N) ²		

7-1/2" (191 mm) exposure- "as installed"- No Self Adhesive Action

Location	Up lift Height	Load Direction	Load Applied	Specified	Comment
Second Course Center of Butt end. Inner shake	1/8" (3.2 mm)	Perpendicular and outward	Less than 0.2 lb (1 N)	2.87 lbs (12.8 N) Minimum ¹	Did not meet the requirement
	2" (50.8 mm)	Perpendicular and outward	Less than 0.2 lb (1 N)	Force required to pull shake 2" (50.8 mm)	Considered by the Standard as the maximum load
Top Course Center of Butt end. Inner shake	1/8" (3.2 mm)	Perpendicular and outward	Less than 0.2 lb (1 N)	2.87 lbs (12.8 N) Minimum ¹	Did not meet the requirement
	2" (50.8 mm)	Perpendicular and outward	Less than 0.2 lb (1 N)	Force required to pull shake 2" (50.8 mm)	Considered by the Standard as the maximum load
Second Course Center of Butt end. Inner shake	-	Perpendicular and outward	4.31 lbs. (19.2 N) ²	No cracking breaking or falling off the deck	No cracking breaking or falling off the deck
		Parallel and downward	4.31 lbs. (19.2 N) ²		

Results (contd)

2. Uplift-Bend Test (contd)

6" (152 mm) Exposure- Conditioned in Sun- Self Adhesive Action of Shingles Activated

Location	Up lift Height	Load Direction	Load Applied	Specified	Comment
Second Course Center of Butt end. Inner shake	1/8" (3.2 mm)	Perpendicular and outward	3.8 lb (17 N)	2.87 lbs (12.8 N) Minimum ¹	Met requirement
	2" (50.8 mm)	Perpendicular and outward	8.1 lbs (36 N)	Force required to pull shake 2" (50.8 mm)	Considered by the Standard as the maximum load
Top Course Center of Butt end. Inner shake	1/8" (3.2 mm)	Perpendicular and outward	3.2 lb (14 N)	2.87 lbs (12.8 N) Minimum ¹	Met requirement
	2" (50.8 mm)	Perpendicular and outward	6.1lb (27 N)	Force required to pull shake 2" (50.8 mm)	Considered by the Standard as the maximum load
Second Course Center of Butt end. Inner shake	-	Perpendicular and outward	4.31 lbs. (19.2 N) ²	No cracking breaking or falling off the deck	No cracking breaking or falling off the deck
		Parallel and downward	4.31 lbs. (19.2 N) ²		

7-1/2" (191 mm) Exposure- Conditioned in Sun- Self Adhesive Action of Shingles Activated

Location	Up lift Height	Load Direction	Load Applied	Specified	Comment
Second Course Center of Butt end. Inner shake	1/8" (3.2 mm)	Perpendicular and outward	3.4 lb (15 N)	2.87 lbs (12.8 N) Minimum ¹	Met requirement
	2" (50.8 mm)	Perpendicular and outward	7.4 lb (33 N)	Force required to pull shake 2" (50.8 mm)	Considered by the Standard as the maximum load
Top Course Center of Butt end. Inner shake	1/8" (3.2 mm)	Perpendicular and outward	3.2 lb (14 N)	2.87 lbs (12.8 N) Minimum ¹	Met requirement
	2" (50.8 mm)	Perpendicular and outward	5.8 lb (26 N)	Force required to pull shake 2" (50.8 mm)	Considered by the Standard as the maximum load
Second Course Center of Butt end. Inner shake	-	Perpendicular and outward	4.31 lbs. (19.2 N) ²	No cracking breaking or falling off the deck	No cracking breaking or falling off the deck
		Parallel and downward	4.31 lbs. (19.2 N) ²		

Note 1 Minimum specified force to pull shake 1/8" (3.2 mm) is two (2) times average weight of the shake:
2.87 lbs (12.8 N)

Note 2 Specified forces applied to in a perpendicular and outward direction is three (3) times average weight of the
shake: 4.31 lbs. (19.2 N)

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Conclusion

The synthetic slate shingles met the requirements of the Penetration Test of ICBO Acceptance Criteria AC07.

The synthetic slate shingles did not meet the requirements of the Uplift-Bend Tests of ICBO Acceptance Criteria AC07 when not exposed to the heat of the sun. However, the synthetic slate shingles met the requirements of the Uplift-Bend Tests of ICBO Acceptance Criteria AC07 when exposed to the heat of the sun to activate the self-adhesion of the shingles.

Tested and reported by: David Wren

Respectfully submitted,
INTERTEK TESTING SERVICES NA LTD.



David Wren, P.Eng.
Physical Testing Services

DW/VWJ/dw
2 cc: client
Encl.

Reviewed By:



Vern W. Jones, C.E.T.
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