



MEMORANDUM

PLAINTIFF'S EXHIBIT

BIR-396

To Distribution

From J. A. Hixon - BB

Date March 23, 1977

Subject PRODUCT DEVELOPMENT PROGRESS REPORT
GLASS MAT VS. ORGANIC FELT SHINGLES - PROJECT #006, REPORT #8- 3/14/77

PERSONAL AND CONFIDENTIAL

The subject report, as released by C. J. Patenaude and J. A. Thohey, must be treated with extreme confidentiality. The information contained within this report is not to be discussed with anyone outside of those people listed on this distribution list.

JAH/1

Distribution

A. W. Schnizer
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cc: R. E. Heim

PRODUCT DEVELOPMENT PROGRESS REPORT

BUILDING MATERIALS DIVISION
BIRD & SON, inc.

BE- Dr. Schnizer
→BBQ- Mr. Homan
BBR- Mr. Frazier
BBR- Mr. Wood
BC- Mr. Niese

Project No. 006

Report No. 8

Date 3/14/77

Project Title: WORK ON ROOFING TO MEET U/L REQUIREMENTS

Subject: Glass Mat vs. Organic Felt Shingles

Object: To compare the physical properties of shingles made from organic felt with those made from Johns-Manville Dura-Glass 7106, 3.0 lbs./100 sq. ft.

Conclusions:

1. Generally, the asphalt shingles made with J-M 3.0 lb. glass mat are equally as good and in some cases exceed the physical properties of organic felt shingles.
2. A possible weakness in shingles made with this mat is its excessive flexibility when hot (150°F.)
3. J-M and Bird shingles made with the 3.0 lb. glass mat are more resistant to shattering at 0°F. than the organic felt shingles. They resist cracking when bent around a mandrel of 3/4" radius. They are equally as strong, and they are just as tear resistant as organic felt shingles.
4. When subjected to 60 mph wind speeds for 10 minutes, the unsealed 3.0 lb. glass mat shingle did not tear around the roofing nails. However, unsealed organic felt shingles tore badly around the roofing nails under identical conditions.

Recommendation:

Bird & Son should not delay in working towards the goal of being self-sufficient in the manufacture of 3.0 lb. glass mat.

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Discussions:

At the request of Mr. Niese, BBH ran tensile tests, mandrel bend tests, shatter tests, flexibility tests, tear tests, and wind tests on both organic felt shingles and glass mat shingles. An effort was made to determine the drawbacks, if any, that might be present in the glass mat shingle.

The glass mat shingles are more resistant to blow-offs than organic felt shingles, as recorded in Table 1. Excessive tearing around the roofing nails of the Wind Seal Shingle occurred with a sustained wind speed of 70 mph for 15 minutes, but only slight tearing for the Firescreen fg 3-tab shingle. The other test results are presented in Tables 2, 3, 4, 5, and 6 and show convincingly that organic felt shingles are generally inferior to those made with J-M's 3.0 lb. glass mat.

References:

Patenaude, C.J., Laboratory Notebook BBH #237, pp. 11-17

J. A. Twohey
CJPatenaude/
JATwohey/ rp

Attach.

TABLE 1

WIND TEST

Wind Speed mph	Time minutes	Firescreen fg 3-Tab Shingle FK, July 1, 1976, White J-M Dura-Glass 7106 3.0 lbs./100 sq. ft. Room Temp. 76°-78°F.	Wind Seal Shingle FS, Lot 5079S Room Temp. 76°-78°F.
20	5	1/32" lift, very sl. flutter	3/8" lift, sl. flutter
20	10	1/8" lift, consid. flutter	1/4" lift, sl. flutter
30	5	Target course tab 3 1/4" lift, other shingle tabs laying flat	1" lift, sl. flutter
30	10	Target course tab 3 1/2" lift, other shingle tabs laying flat	1 1/8" lift, sl. flutter
40	5	Target course tab 4 3/4" lift, other shingle tabs laying flat	2" lift, mod. flutter
40	10	Target course tab nearly perpendicular to board, other shingle tabs laying flat	2 1/4" lift, mod. flutter
50	5	Target course tab bending backwards, other shingle tabs laying flat	Target course tab 3 1/2" lift, other shingle tabs laying flat
50	10	Same as above	Same as above
60	5	Target course tab bending backwards, no tearing around nails	Target course tabs are vertical shingle tabs torn badly around two nails
60	10	Same as above	Same as above
----New Target Course----			
70	5	Starting to tear around two nails	Shingle tabs torn completely around one nail and slightly around two more nails
70	10	Slight tear around two nails	Shingle tabs torn badly around two nails.
70	15	Slight tear around two nails	Shingle tabs torn badly around four nails

TABLE 2

TEAR TEST

Scott Tester. 5" x 7" shingle samples with a center 4" long slit cut parallel to long direction of sample. Samples are held in Scott Tester with one end in top clamp and other end bent down and clamped in bottom clamp.

<u>Shingles</u>	(Ave. of 3, Room Temp., 12 inches/min.)	
	<u>Across Machine Direction</u>	<u>Machine Direction</u>
Wind Seal (thick butt), FB	3.7 lbs.	2.9 lbs.
Woodscape (flat), FK	2.9 lbs.	2.3 lbs.
Fire/Tech fg, FK (J-M Dura-Glass 7106, 3.0 lbs./100 sq. ft.)	2.7 lbs.	2.6 lbs.
Rampart, Johns-Manville (J-M Dura-Glass 7106 3.0 lbs./100 sq. ft.)	3.7 lbs.	3.4 lbs.

TABLE 3
TENSILE TEST

Scott Tester: size of sample 1" x 6"

<u>Shingles</u>	(Ave. of 3, Room temp., 12 inches/min.)	
	<u>Across Machine Direction</u>	<u>Machine Direction</u>
Wind Seal (thick butt), FB	79 lbs./sq. in.	117 lbs./sq. in.
Woodscape (flat), FK	84 lbs./sq. in.	115 lbs./sq. in.
Fire/Tech fg, FK (J-M Dura-Glass 7106 3.0 lbs./100 sq. ft.)	60 lbs./sq. in.	123 lbs./sq. in.
Rampart, Johns-Manville (J-M Dura-Glass 7106 3.0 lbs./100 sq. ft.)	75 lbs./sq. in.	118 lbs./sq. in.

TABLE 4

FLEXIBILITY TEST

Shingles are heated in oven set at 150°F. Support shingle only in the middle with your hand.

<u>Shingles</u>	<u>Comments</u>
Wind Seal (thick butt), FB	Bent without cracking
Woodscape (flat), FK	Bent and cracked near center cut-outs
Jet (thick butt), FB	Bent without cracking
Fire/Tech fg, FK (J-M Dura-Glass 7106, 3.0 lbs./100 sq. ft.)	Bent and cracked where supported
mpart, Johns-Manville (J-M Dura-Glass 7106, 3.0 lbs./100 sq. ft.)	Bent and cracked where supported

TABLE 5

MANDREL BEND TEST

Size of sample: 1" x 6"

Mandrel 3/4" radius (Ave. of 3)

<u>Shingles</u>	<u>Room Temperature</u>		<u>33°F.</u>	
	<u>Across Machine</u> <u>Direction</u>	<u>Machine</u> <u>Direction</u>	<u>Across Machine</u> <u>Direction</u>	<u>Machine</u> <u>Direction</u>
Wind Seal (thick butt), FB	Cracked	Cracked	Broke in half	Broke in half
Woodscape (flat), FK	Sl. cracked	Sl. cracked	Broke in half	Broke in half
Fire/Tech fg, FK (J-M Dura-Glass 7106 3.0 lbs./100 sq. ft.)	No cracks	Sl. cracked	Sl. cracked	Consid. cracked
Rampart, Johns-Manville (J-M Dura-Glass 7106 3.0 lbs./100 sq. ft.)	No cracks	No cracks	Sl. cracked	Sl. cracked

TABLE 6

SHATTER TEST

Cool shingle tab in freezer to 0°F.
Bang shingle tab against sharp metal edge.

<u>Shingles</u>	<u>Comments</u>
Wind Seal (thick butt), FB	Broke in half
Woodscape (flat), FK	Broke in half
Fire/Tech fg, FK (J-M Dura-Glass 7106, 3.0 lbs./100 sq. ft.)	Broke in half
Rampart, Johns-Manville (J-M Dura-Glass 7106; 3.0 lbs./100 sq. ft.)	Cracked from butt to center. Shingle tab did not break in half