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Marshall Laboratory
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MEMORANDUM REPORT NO. M-579

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TRIM AND SHUTTER WHITE

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Marshall Laboratory Release Letter #1321-A proposes the trial marketing of 87-894 Trim and Shutter White. The composition of 87-894 is primarily "Ti-Pure" R-610 at 21% pigment volume in RC-141, 63% linseed oil modified glycerol phthalate, with .5% Phenyl Mercury Oleate added to control mildew. There is no durability background on the above composition but there is available data on closely related compositions.

The purpose of this memorandum is to summarize the data on these closely related products.

Cleanliness:

The composition closest to the proposed 87-894 which has been on exposure is one having only .1% Phenyl Mercury Oleate but is the same in all other respects. This product (P-87-U-4027) has been on exposure in Series Nos. 12371 and 12416 for thirteen and nine months respectively. On Delaware north vertical, south vertical and 45° south and Florida 45°S exposures this product has averaged 1.5 ± 0.4 units (0 to 10 scale) dirtier than #40 Outside White (301-885). On Florida north vertical exposure it has been equal (-0.1 unit) to 301-885. A similar composition containing .2% Phenyl Mercury Oleate has been on limited exposure (Delaware NV and SV) in Series #12510 for 12 months and likewise has been dirtier than #40 Outside White. The principal cause of the discoloration on all these panels has been due to mildew and in an effort to assure maximum mildew inhibition in 87-894 a concentration of .5% Phenyl Mercury Oleate has been arbitrarily selected.

In areas where discoloration is primarily caused by dirt 87-894 is not expected to remain as clean as #40 Outside White. Earlier products which have been tested as Trim & Shutter Whites

N35471

have been pigmented with either "Ti-Pure" R-510, R-110 or R-200 - all faster chalking pigments than "Ti-Pure" R-610 which is used in 87-894 to obtain maximum gloss retention and minimum chalk running. A detailed summary of the exposure performance of these earlier compositions is located in Marshall Laboratory Research Report #1069 dated 2/5/51. Additional data from those series not yet completed at that time do not change the conclusions drawn then and are not included in this report.

Durability on Yellow Pine:

Trim and Shutter White is expected to have completely satisfactory resistance to cracking and flaking. The various analogs of 87-894 have been exposed on yellow pine in Texas numerous times and have shown somewhat superior durability under these conditions compared to #40 Outside White.

Moisture Blistering:

Again the exact composition of 87-894 has not been tested for moisture blistering but there have been many tests of very similar compositions on new wood which show the superiority of the Trim and Shutter paint over the orthodox system under these conditions. The primary difference between the compositions tested and 87-894 is that "Ti-Pure" R-110 was used instead of "Ti-Pure" R-610. There has been no indication of any difference in performance (blistering) between grades of TiO_2 . The tests have been made with and without mildew inhibitors but none have had as high a concentration as the proposed 87-894. A tabulation of the results of these tests in the "Ti-Pure" R-110 in RC-141 formula is shown in the attached Table II. Results from earlier tests of other pigments and other vehicles is recorded in Research Report #1069.

There is very limited information from controlled tests of blistering over old paint. The composition closest to 87-894 is "Ti-Pure" R-110 at 21% PV in RC-141. Tested in three different studies, its performance has been about equal to #40 Outside White over old paint. (See Table III)

This product (R-110; RC-141) was tested over old paint on the trim of 13 houses in 1948 and 1949. With #40 O.W. control unsuitably located on the body of 9 houses and on different windows on the other four houses it has been impossible to form any definite conclusions as to the comparative performance of the two paints. Eight of these houses have failed by moisture blistering and peeling. Trim and Shutter White has performed equal to or better than #40 O.W. on six houses and worse on two houses. A tabulation of these house tests is found in Table IV.

An alkyd body paint (603-901, Colonial red; iron oxide at 14% PV in RC-193, 63% Soya Oil modified alkyd) has been sold in the New England Area since 1949 and has given satisfactory

performance as regards blistering. Eleven houses painted with Colonial Red were examined in July 1952 and their conditions reported in Memorandum Report #M-493. Moisture blistering of Colonial Red was found on four of the eleven houses. On only one house, which had a history of bad moisture failure, 603-901 was peeling badly on one side which was not properly scraped and wire-brushed before painting. On another side which had been properly prepared, Colonial Red was showing good adhesion. On one house the Colonial Red had not blistered while House Paint Solar Yellow on an adjacent area was showing some blistering. On another house a few blisters developed a few days after painting and were described as being of the solvent type rather than moisture blistering. The ages of these houses ranged from 1 to 2 1/2 years. Conclusions from this inspection are that the incidence and degree of blistering of Colonial Red was no worse than would have been expected with an orthodox house paint.

The Pigments Department has tested for blister resistance a product pigmented with "Ti-Pure" PP and magnesium silicate at 30% PV in Aroplaz 1271, a 77% Linseed Oil modified alkyd. This product likewise has shown significantly better blister resistance than orthodox house paint controls over new wood. There was no blistering on eight panels of this product during eight weeks of exposure to blistering conditions whereas linseed oil house paints failed quite badly (24 panels averaged 4.4 ± 1.0 blister units using a 0 to 10 scale). When this product was used over other house paint systems (but not old weathered paint) its behavior was determined by the undercoat paint system and its average performance is equal (-0.1 ± 0.7) to the average performance of the unpainted undercoat system. Details of these tests are located in the booklet published by Pigments Department titled "1952 House Paint Exposure Tests".

MARSHALL LABORATORY

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4/27/53

TABLE ICLEANLINESS OF P-87-U-4027 TRIM AND SHUTTER WHITE

("Ti-Pure" R-610, 21% PV, RC-141, .1% H-454)

EXPOSURE	SERIES NO.	AGE	AVG. CLEANLINESS		DIFFERENCE
			301-885	P-87-U-4027	
Del. NV	12416	9mo.	9.0	8.0	-1.0)
	12371	13mo.	8.3	6.4	-1.9)
Del. 45°S	12416	9mo.	8.8	6.8	-2.0)
	12371	13mo.	7.9	6.6	-1.3)
Del. SV	12416	9mo.	9.0	8.1	-0.9)
	12371	13mo.	8.8	7.4	-1.4)
Fla. 45°S	12371	12mo.	9.2	7.7	-1.5)
Fla. NV	12416	10mo.	8.7	8.4	-0.3
	12371	11mo.	7.6	7.7	+0.1

-----: -1.5
±0.4

TABLE II

MOISTURE BLISTERING OF TRIM AND SHUTTER WHITE ON NEW WOOD

("T1-Pure" R-110, 21% PV, RC-141)

SERIES NO.	DAYS TO BLISTERING					
	2 MOS. FLORIDA			12 MOS. DELAWARE		
	NO. OF PANELS	T&S	#40 O.W.	NO. OF PANELS	T&S	#40 O.W.
9938	1	31+	14	1	36+	20
	1	31	11	1	36	20
	1	22	11	1	36+	20
10821	1	36+	20	1	28	23
	1	36	20	1	25	23
11536	1	37+	21	1	32	25
	1	37+	11	1	28	25
12423	1	42+	18			
	1	18	11			
12635*	1	52+	13			
	1	52+	17			
	1	52+	25			
	1	52+	13			
	1	52+	17			
	1	52+	13			
12636*	14	28+	7			
	1	10	7			
	1	10	5			
12637*	10	28+	7			
	4	28+	5			
	1	28+	14			
	1	28+	17			
	1	28+	28+			
	1	24	7			
	2	14	7			
12639*	1	52+	10			
	1	52+	13			
	1	52+	17			

Note: In all cases, Trim and Shutter White and #40 O.W. were tested side by side on the same panel.

* : These studies made on Blister test RM-104 Marshall Laboratory. Other studies made on Blister test House at Del. Exposure Station.

TABLE III

MOISTURE BLISTERING OF TRIM AND SHUTTER WHITE
OVER OLD PAINT

("T1-Pure" R-110, 21% PV, RC-141)

SERIES NO.	DAYS TO BLISTERING			
	2 MOS. FLA.		12 MOS. DEL.	
	T & S	#40 O.W.	T & S	#40 O.W.
9938	31	25	36+	36
	28	25	36	36
	31	25	36+	36+
11536	25	32	42	42+
	25	28	34	42+
12361	8	8		

Note: Trim and Shutter White and #40 O.W. were tested side by side on the same panel.

All tests were made on Moisture Test House at Delaware Exposure Station.

TABLE IV

HOUSE TESTS OF TRIM AND SHUTTER WHITE
 ("Ti-Pure" R-110, 21% PV, RC-141, 3% DOWICIDE G)

PT #	LOCATION	BEGUN	DURATION	CONTROL	CLEANLINESS	FILM INTEGRITY
1127	Phila.	6/ 1/48	2yrs.	301-864 on different windows	Heavier chalking and cleaner than 301-864	Failed by peeling on window sills. No failure on 301-864
1129	Phila.	7/ /48	2yrs.	Same	Cleaner & Whiter than 301-864	Failed by blistering - worse than 301-864
1155	Phila.	7/15/48	2yrs.	Same	Slt. cleaner & whiter than 301-864	Failed by blistering. Comparison with controls uncertain.
1147	Miami	6/12/48	3yrs.	Same	No mildew on trim - Slt. mildew on cream body paints.	No failure
1131	Louviers	8/ /48	4yrs.	None (Cream body paint)	V. Heavy chalking and clean	Slt. transverse cracking on corner boards over heavy old paint. Same failure by cream paints on body.
1134	Flint	6/25/48	3yrs.	301-864; 301-756 on body of house	Not recorded	Bad moisture cracking at 3yrs. corresponding to bad peeling on body of house.
1135	Flint	8/20/48	4yrs.	Same	Not recorded	No failure recorded. #400.W. bad moisture peeling at 3yrs.
1292	Flint	9/20/49	3yrs.	Same	Not recorded	No failure recorded. #400.W. Slt. moisture failure at 3yrs.
1293	Flint	9/18/49	3yrs.	Same	Slt. cleaner than #40 O.W.	No failure. Slt. moisture failure on #40 O.W.
1150	Phila.	10/ /48	4yrs.	Same	Trim cleaner, slightly yellow	Bad moisture peeling on trim. and bad moisture blistering & cracking on body.

TABLE IV (cont'd)

7 (b)

<u>FE #</u>	<u>LOCATION</u>	<u>BEGUN</u>	<u>DURATION</u>	<u>CONTROL</u>	<u>CLEANLINESS</u>	<u>FILM INTER</u>
1311	Atlanta	8/ /49	3yrs.	Same	Not recorded	Not record
1323	Miami	11/11/49	4yrs.	Same	Slt. more mildew & slt. yellow.	No failure
1324	Miami	9/ 1/49	4yrs.	Same	All clean - no differences	No failure flaking at