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Marshall Laboratory
March 28, 1969

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MARSHALL DEVELOPMENT LABORATORY RELEASE LETTER NO. 2152
752 LINE DULUX® ENAMEL (KITCHEN CABINETS, ACCENT
FURNITURE, AND JUVENILE FURNITURE)

PROJECT:: 511093

PROPOSAL AND EXTENT OF RELEASE:

This letter proposes the sale of 752 Line "Dulux" Enamels to the wood furniture industry. This line is primarily intended for use on kitchen cabinets, although it can be used wherever pigmented topcoats are required for furniture.

Eleven colors have already been developed and are being offered to Mutschler Brothers. Another product has been used at Bassett since late 1966. Nine colors have been or are being developed for Eisen Brothers.

MANAGEMENT DECISION REQUESTED:

Management is requested to decide whether 752 Line "Dulux" Enamels of the type described here should be released to the industry. The following should be considered:

- 1) Volume will be relatively small for the near future - from 50 to 350 gals. annually per item.
- 2) The 151 Line Air Dry Enamels at Mutschler Brothers have already been obsoleted and replaced by this line.
- 3) Not all stability and durability data are complete, although no problems are expected.
- 4) Some manufacturing problems have arisen, mainly having to do with gloss control. The problems now seem to be resolved.
- 5) Every composition developed for juvenile furniture so far (e.g. Eisen's 752-67379) contains some lead, but the lead does not exceed the 0.05% Pb on solids limit specified in the Industrial Sales Standard Practice HH/4 - 4.1 (1/17/69 revision).

TECHNICAL OPINION:

The Marshall Development Laboratory favors approval of this release. We are aware of the limited gloss and color stability of the catalyzed material (1 day), but no field problems have been encountered because of this. Limited data on stability and cold crack and humidity crack resistance indicate satisfactory performance, and we are in the process of more comprehensive tests.

Some manufacturing problems having to do with gloss control have arisen with several batches but formula revisions of the paints and the flatting base (VM-39.9) seem to have improved control.

Our customers are generally satisfied with application and performance of this line.

We are now writing a Formulating Practice to standardize the composition and development of future colors.

DESCRIPTION OF PRODUCT:

This type of 752 Line "Dulux" Enamel is based on Type "F" Furniture "Dulux" topcoats and 42 Line. It is designed to be sprayed over vinyl sealer or primer (e.g. 170-63724) and cured by forced drying. No reduction is needed, but addition of 2-4% 4502 Accelerator is required.

The composition of the binder is roughly G-1161/RC-718/RC-305/RC-6000 = 0.5/10/5.4/13.2, and the range of forced drying temperatures used is from 130 - 160°F. Some formulas have small amounts of RC-262 introduced from certain 42 Line bases.

Three colors developed for Eisen Brothers with 732-Line mill bases have a higher UF/alkyd ratio and, as a result, have poorer cold crack resistance properties (refer R. L. #2044 concerning 752-63951). Further development along these lines has been stopped in favor of the 42 Line mill base route.

Pencil hardness is adequate and varies from 3B to F depending on resin ratio. Kitchen cabinet fume resistance (as per TD-253A) is superior to that of a pigmented nitrocellulose primer/nitrocellulose clear topcoat system but equivalent to a pigmented nitrocellulose topcoat (e.g. 266 Duco® Line). Chemical and abrasion resistance is generally better than those of lacquer systems, but repair compatibility is inferior.

The color range available is that offered by the 42 Line, although hiding may be deficient with some colors such as Eisen's 752-67334 Avocado Green. Due to flatting base limitations, the available gloss range is from 35 - 75/60°.

COMPETITIVE SITUATION:

We have encountered no competitive pigmented UF/alkyd products. The kitchen cabinets products we have seen in the field are nitrocellulose or CAB lacquers.

Much of the market uses a "natural finish," or a stain, sealer and clear topcoat (nitrocellulose) system for kitchen cabinets.

TABULATION OF COMPOSITION:

One representative formula is described below:

752-67292 Synthetic Enamel - Antique White 2/26/69 Formula

RC-718	Urea-formaldehyde resin	15.95%	(1)
G-1161	Cymel 300	0.41	(1)
RC-6000	Styrenated DCO alkyd	29.24	(1)
42-185	White mill base	28.98	
42-630	Ferrite yellow mill base	0.24	
42-224	Black mill base	Trace	
42-785	Green mill base	Trace	
VM-399	Flatting base	16.68	(2)
H-583	Xylene	6.17	(3)
H-12	n-butanol	1.41	(4)
VG-332	Nylon solution (5%)	0.34	(5)
VH-5379	Silicone solution (2%)	0.40	(6)
VH-965	Hydroquinone inhibitor (7.8%)	0.18	(7)
		<u>100.00%</u>	

NOTES:

1. Principal film formers. A large proportion of additional resin, mostly RC-305, is introduced with the 42 Line.
2. Special flatting base used to control gloss.
3. Primary viscosity control solvent.
4. About 1.5% H-12 is used to keep the RC-718 stable.
5. Anti-silking agent.
6. Leveling agent.
7. Anti-yellowing agent.

REPRODUCIBILITY:

Several dozen laboratory batches involving fifteen colors have been made satisfactorily. The major problem has been gloss variations as the result of the VM-399 flatting base: the control testing procedure in the base manufactured had not been sufficient to prevent changes in flatting strength from batch to batch. The tests methods have now been improved.

CONTINUING LABORATORY WORK:

Stability tests are being run at room temperature and 120°F. for one, three and six months. (Refer to N. B. 9175, p. 46).

Seven cycles of humidity crack show no failures as of 3/11/69. Cold crack tests will be run. If negative results occur, they will be reported in a Supplement. All tests results are due 10/1/69.

New colors will be developed by the Task Force as needed. A Formulating Practice is being written to simplify new developments (due 5/1/69).

COST INFORMATION:

Official costs may be obtained through regular channels. Bulk mill cost is in the order of \$1.94 per gallon, which is equivalent to 6.13¢/% volume solids or 0.38¢/sq. ft. mil.

MANUFACTURING PROBLEMS:

Some difficulty has resulted from gloss control. We have revised formulas for the finished products and flatting base to correct the situation. No new problems have shown up.

One formula, 752-67350 Hyacinth, was STOPPED when the plant found that a 1000% overdose of 4502 Accelerator caused a dramatic color change. If volume warrants it, this formula will be reformulated to replace the acid-sensitive pigment.

TOXICITY OR OTHER HAZARDS:

Toxicity in general is no worse than most solvent based paints.

For the special case of juvenile furniture (e.g. Eisen Brothers baby cribs), a toxic metals concentration limit must be observed. The range of % Pb on solids calculated is from 0.0088 to 0.0145, well within the 0.05 limit specified by the Industrial Sales Standard Practice HH/4 - 4.1.

SIMPLIFICATION:

No unusual effect.

PATENT INFORMATION:

There are no currently known U. S. patents which would interfere with the manufacture and sale of the defined typical 752 Line enamel formulated with a film-forming composition consisting of a combination of urea/formaldehyde resin, hexamethoxymethyl melamine ("Cymel" 300), styrenated DCO alkyd resin and short oil length soya alkyd resin. If use of a Du Pont manufactured melamine/formaldehyde condensate equivalent as a replacement for "Cymel" 300 is contemplated, a license under American Cyanamid's "Cymel" patents may be required. In consequence of a consent decree, American Cyanamid's melamine patents are made available royalty free in United States.

CONFORMANCE WITH AIR POLLUTION CONTROL DIRECTIVE:

This line is not designed to conform with Rule 66.

CONFIDENTIAL INFORMATION:

There is no unusually confidential information in this letter.
This letter is for Du Pont use only.

FORMULA CARDS:

752-67292.

MARSHALL DEVELOPMENT LABORATORY

L. W. Young

LWY:hfm

L. W. YOUNG

APPROVED

N. Repp

DATE

Apr. 2, 1968

APPROVED

DATE

101	Code	752	67292	NAME	SYNTHETIC ENAMEL - ANTIQUE WHITE	DATE	22665
202	Cont.	MUTSCHLER BROS.	Loc.	NAPPANEE IND.	Prod. & D.	GRNSBORO IND.	
203	Prod. Use	WOOD FURNITURE	Type	TEMP	Color	WHITE	
204	Prod.	J J CANTWELL/ERH	R.L.-2	12-12-68	M. B. & P.	8209-143	
205	Supplier	L W YOUNG/CLH	S. Cont.	FCP-D	Plant	PHILA	
206	Prod. No.	T-11-7-88-P	T.C. Cont.	P	Appl.	RQK-WPC-WFG	
307	R.R.I.	REVISE GLOSS LIMITS + MFG. DIRECTIONS //					
208	S.T.P.		Final Std.	752-67331-P	Col. Std.	6-0034-B	
309	I	2% 4502 ACCELERATOR MUST BE ADDED BY WEIGHT TO BOTH BATCH					
310	N	SAMPLE AND STD. AND SHAKEN THOROUGHLY PRIOR TO TESTING //					
311	T	GLOSS TM-204-F 60/46-56. TP-338-B 0-0070 BRID FILM					
312	E	APPLICATOR DRAWN DOWN ON GLASS. A.D. 45 MINS. THEN BAKE 1 HR					
313	S	AT 150 DEG F. // FILM PROPS TM-340-A = STD. // COLOR - SPRAY					
314	T	TM-349-X TO COMPLETE HIDING ON STEEL. A.D. 30 MINS. BAKE					
315	I	1 HR. AT 150 DEG F. //					
	A						
	T						
	G						
	I						
	O						
	N						
420	Vol. Sol.	3206%	Prod. Vol.	1621%	Vol. Sol.	4732%	
321		COMPUTER PROGRAMMED //					
322	O	PATTERNED AFTER 752-B 88502 EXCEPT FOR GLOSS // COLOR MATCH					
323	T	TO 151-9896					
324	H	SFMC = 514 //					
325	E						
326	R	BINDER SOLIDS RATIO = G-1161/RC-305/RC-718/RC-6000 =					
327	O.	0.412/4.424/9.908/13.666 //					

529	Code	752	67292	NAME	SYNTHETIC ENAMEL - ANTIQUE WHITE	DATE	22665
230	Prod. No.	COS	Vol.	7C 45-55"	Prod.	1.25-1.50 1GA	
231	Cont.	B-K-X AGITATOR	Cal. Wt.	911 ± 5	Net Wt.	+ 80L	
632	I	ZINC REACTIVE //	WASH	BEFORE LOADING WITH H-583 //			
734	N	RC	718	145:31			
735	G	G	1161	3:74			
736	R	VM	399	51 151:96			
637	E				MIX 30 MINS.		
738	D	RC	6000	63:68			
739	I	VH	5379	3:64			
740	T	VH	965	52 1:64			
641	T				ADD WITH MIXER RUNNING //		
642	S	MIX 45 MINS.					
744	A	42	185	263:96			
645	M				ADD SLOWLY WITH MIXER RUNNING.		
746	O	VG	332	3:10			
647	U				ADD SLOWLY WITH MIXER RUNNING //		
648	R	*MAKE	POUR OUT ON GLASS PLATE OF VG-332 PRIOR TO ADDING TO				
649	E	BATCH //	IF SEEDY HEAT TO 130-140 DEG F. FOR 15 MINS. OR				
650	T	UNTIL	CLEAR WHEN POURED ON GLASS.				
752	A	RC	6000	202:71			
653	N				ADD SLOWLY WITH MIXER RUNNING.		
754	H	12	52	12:85			
655	C				ADD SLOWLY WITH MIXER RUNNING.		

756	42	630		2:19			
757	42	224		-TRA:CE-			
758	42	785		-TRA:CE-			
759	VM	399	*51	-TRA:CE-			
760	H	583		56:22			
661					SHADE TO STD. WITH BASES SHOWN //		
662					THIN TO VISC. // *TO LOWER GLOSS ADD VM-399 //		
663					TO RAISE GLOSS ADD RC-718/RC-6000 BLEND = 30/70 //		
664							
765		TOTAL		911:00			
667					MARK SHIPPING CONTAINERS "ACCELERATOR MUST BE ADDED.		
668					STIR WELL".		
669					FORMULA CONTAINS VM-5379. FLUSH EQUIPMENT THOROUGHLY BEFORE		
670					USING FOR BATCH OF ANOTHER CODE //		

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