

MEMPHIS  
STATE HIGHWAY DEPARTMENT  
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INVESTIGATION OF FEM-ACET  
"FEM" MAINTENANCE PAINT

by  
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Research Project 48. G-21

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Research Laboratory  
Testing and Research Division  
Report F-66  
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## INVESTIGATION OF FEN-LOTE "500" MAINTENANCE PAINT

Research Project 48 D-11

Samples of Fen-Lote "500" were submitted to the Research Laboratory by T. E. McLaughlin March 20, 1948 for investigation with respect to the performance features recommended by the manufacturer, the Feninole Chemical Products Company, 4726 East Nine Mile Road, Van Dyke, Michigan.

The purpose of the investigation was to determine if this material could be applicable to special paint conditions existing within the scope of activities of the Highway Department, such as surfaces on ferry boats exposed to heat and moisture, maintenance equipment, highway signs, moisture rooms in laboratories, protection of concrete surfaces against penetration of acids and moisture, etc.

### Outstanding Features of Material:

Manufacturer's literature cites the following outstanding features of Fen-Lote "500" Maintenance Paint:

(1) Extremely Resistant to Acids, Alkalis, Water, Alcohols, Salt Brines, Greases, Oil, and many Solvents.

The above features were tested in the laboratory by painting metal strips and steel angles with Fen-Lote under various conditions and placing them in contact with laboratory solvents. Strips and angles were 2" by 1/2". Additional surfaces were painted to test resistance to water, such as the inside of the door to the laboratory moist room, the inside of a hot water bath, specimens of wood, steel and concrete placed in the moist room, and the concrete floor of the laboratory in a location subject to periodic covering with moisture.

Limits of the metal strip and wood sample tests may be seen in the accompanying photograph. The metal strips comprise the upper row, the wood samples the lower row. Both are lettered A through H from left to right. All metal strips were cleaned and treated with Pen-Tote "60X" conditioner prior to painting. These were then given one coat of black Pen-Tote and air-dried for 24 hours. All wood samples were painted with black Pen-Tote and dried for 24 hours with the exception of samples B and C, which were painted with white Pen-Tote, No. 0 being painted over freshly-applied bar.

a. Acids

Steel panel B was immersed for 24 hours in 60% hydrochloric acid. Inspection showed considerable wrinkling and peeling of the paint film.

Steel panel C was immersed for 24 hours in 40% sulfuric acid. Inspection showed peeling of the paint film at the edges only.

Wood panel B was immersed for 24 hours in 50% hydrochloric acid. Examination indicated no failure.

Wood panel C was immersed for 24 hours in 60% sulfuric acid. Examination disclosed no failure other than a moderate discoloration of gloss.

b. Alkali

Steel panel B was immersed for 24 hours in a 10 cc./gal. solution of sodium hydroxide. Inspection showed moderate blistering of the painted surface and peeling at the edges.

Steel panel C was immersed for 24 hours in 50% ammonia hydroxide. Examination showed intense uniform peeling and chipping of the entire paint film.

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Wood panel 7 was immersed for 24 hours in a 10 oz./gal. solution of sodium hydroxide. Inspection showed no failure. White areas in photograph was produced by evaporation of solid NaOH.

Wood panel 8 was immersed for 24 hours in 50% ammonium hydroxide. Examination disclosed no failure other than slight drop in gloss.

#### c. Water

Wood panel 8 was immersed for 24 hours in water. This panel was painted white. Inspection after immersion period showed no failure other than very slight discoloration of gloss.

#### d. Alcohol and Gasoline

Steel panel 1 (not shown in photograph) was immersed for 24 hours in alcohol, then for 24 hours in gasoline. Inspection showed no failure.

#### e. Salt Brine

Steel panel 2 was subjected to salt spray for 24 hours. Examination disclosed no failure.

Wood panel 2 was subjected to salt spray for 24 hours. Examination disclosed no failure.

#### 3. Non-Inflammable: Will not Support Combustion: Safe to Use and Store Under All Conditions.

This feature was tested in the case of steel panels A and C. Panel A was painted and air dried, then heated to 500°F, and flamed. Partial peeling and blistering occurred.

Panel C was heated to 500°F, and painted hot. This surface did not fail.

It was determined that Pan-Late either as received or in use will not burn nor support combustion.

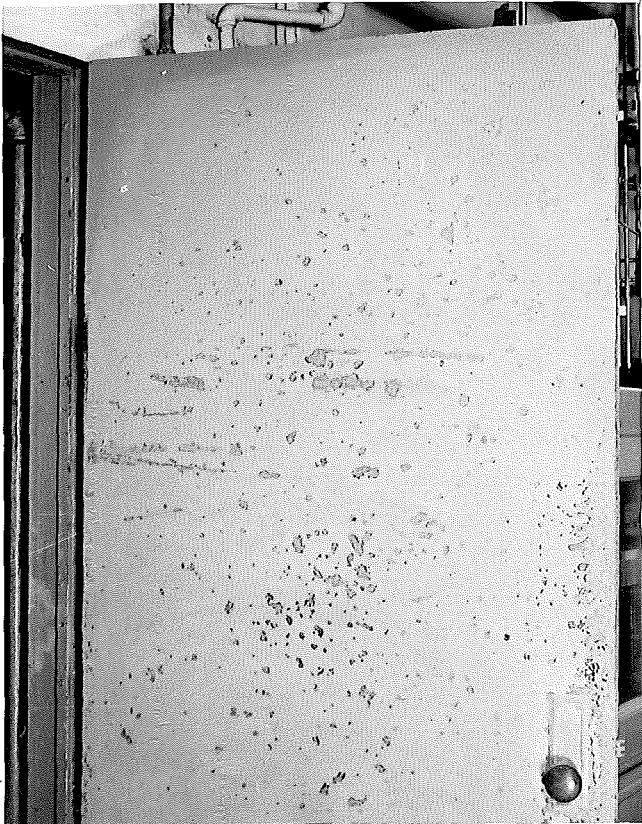
2. ~~Covers All Surfaces - 100% OF SURF - 100% OF SURF - With Final Coat and Effectiveness.~~

This feature was substantiated in the cases of steel panels F and G, F being wet at 85°F, when painted, and G being 300°F, when painted. No failure occurred.

The interior of the hot water bath was brushed with one coat of gray Pen-Kote. After 2 months, this surface was in good condition except over previous paint which blistered, over rusted areas and in areas subject to continued abrasion.

Hot areas in the moist room comprising steel, wood and concrete surfaces painted wet with 1 coat laid up wall with the exception of one spot painted over tar, which blew through in 3 days, and of the interior surface of the moist room door. Examination of Figures 2 and 3 show the condition of this door 2-1/2 months after painting with Pen-Kote Conditioner and Pen-Kote "500" gray Maintenance Paint in accordance with the manufacturer's instructions. At the end of 2-1/2 months the paint had blistered and peeled off badly near the bottom of the door and irregularly over the remaining area. The old paint had not been entirely removed from the door prior to applying Pen-Kote, and this evidence together with that offered by the water bath would indicate that Pen-Kote applied over previous coatings of ordinary paints tends to react unfavorably with the previous coatings, causing them to lose adhesion to the underlying surface. No abrasion entered into consideration here.

The concrete floor of the laboratory was painted with 1 coat over old paint in a wet area and covered by a rubber mat 24 hours later. This area stripped rapidly and practically no adhesion occurred. Intermittent abrasion had to be considered here.



Condition of Moist Room Door  
2-1/2 months after painting  
with Pan-Kote Conditioner and  
Pan-Kote "500" Gray Maintenance  
Paint.



Blistering and peeling of  
bottom of Moist Room Door  
after having been painted  
2-1/2 months with Pan-Kote  
Conditioner and Pan-Kote  
"500" Gray Maintenance  
Paint.



Test panel C, painted with 1 coat of white Fun-Kote applied by brush over a coating of tar showed extreme cracking and discoloration in 24 hours.

4. High Adhesive Flexibility, Durable, Withstands Abrasion and Shock.

About the only quality under this heading that could be substantiated in the laboratory was that the material is flexible. Reported tests indicated poor resistance to abrasion and wear, whether the surface was wet or dry over the "wet" paint film.

5. Exceptionally Easy to Apply by Brush, Roll or Spray as Free-Running or Regular House Paint.

Evidence obtained during the investigation indicated that brushing, while not difficult, is by no means as easy as in the case of ordinary paint. As received, the paint is too thick to spray easily. Flipping is satisfactory undiluted, full strength.

6. Never More Than Two Coats Required; A Single Coat Often Gives Full Protection.

Little difference could be found between results obtained with 1 or 2 coats.

7. Sets in 30 minutes or Less to a Hard but Flexible Film of Plastic.

Investigation indicated a rapid set in the case of Fun-Kote, being in the neighborhood of 45 minutes to 1 hour. The film is not hard in the ordinary sense of the word, except in comparison with softer materials. The word "plastic" is probably acceptable.

8. Odorous: No Discomfort or Rash Observed in Painters or Plant Personnel.

This quality was fully substantiated to the extent possible during the investigation.



4. A Perfect Solvent, Acetone, Tar and Other Solvents Will Not Dissolve  
Par-Lote "300".

This statement was found to be incorrect. When painted over old paint, Par-Lote did not usually stand up well. Examination of steel panel C shows what happened 24 hours after painted over tar. The paint film had checked severely and was discolored due to bleeding of the tar underneath.

Conclusions:

Par-Lote "300" is a rapidly setting paint which will dry in the presence of moisture. Investigation has been made as to its ability to withstand abrasion and wear. Certain solvents including water and gasoline are without apparent injurious effect on the dried film. Durability is only moderate.

On the basis of this investigation it is the recommendation of the Research Laboratory that in those cases where it is desired to use Par-Lote "300" maintenance paint, a trial coating be employed under conditions as near as possible to conditions which will be met by the permanent coating. The trial coating will then serve as a guide to the probable value of the proposed permanent coat.

## APPENDIX

Manufacturer's literature gives the following instructions for using Pen-Kote "500". (Note: the Pen-Kote "500-P" Conditioner mentioned below was analyzed and found to consist of a solution of ortho-phosphoric acid of approximately 10 percent concentration).

### Instructions for Using

Manufacturer's literature gives the following instructions for using Pen-Kote "500":

Pen-Kote "500" is an aqueous dispersion of an extremely inert chemical-resistant and insoluble plastic, together with suitable plasticizers, pigment, etc. As water is the only medium employed, this paint can be applied rapidly and efficiently to fabric, paper, and all constructional materials such as wallboard and plaster, in addition to such conventional surfaces as wood, concrete, metal, and painted surfaces.

Surfaces to be painted should be free from grease, oil and loose dirt, but need not be either cold or dry. Hot iron or steel (either clean or rusty) and galvanized metal should first be treated with Pen-Kote "500-P" Conditioner as described below.

Use a clean, soft brush, and always have the brush well filled with paint. Work from unpainted to freshly painted areas, leveling with light strokes of the brush.

Pen-Kote "500" dries in 30 minutes or less, so wash the brush in clean water immediately after using. If interrupted while painting, keep the bristles of the brush completely immersed in water, and when ready to continue, merely shake out the water and resume painting. If the brush should accidentally become hard and unusable it can be cleaned with lacquer thinner.

Note: Do not mix Pen-Tek's "500" with any other material - and do not use a thinner of any kind, as it will dilute, brush or spray perfectly just as received. Keep tightly covered when not in use.

Pen-Tek's "500-P" Conditioner

In protecting bare iron or steel, galvanized metal and all badly rusted surfaces with Pen-Tek's "500" Maintenance Paint, an initial application of Pen-Tek's "500-P" Conditioner is recommended to inhibit corrosion and ensure maximum adhesion.

The Conditioner may be applied by brush or wiped on with a cloth. With rusty surfaces, use a wire brush or steel wool to remove loose rust and scale while the surface is still wet; then wipe clean with a second application of Conditioner. After 10 or 15 minutes, wipe with a wet cloth or wipe with water. The surface is then ready for painting with Pen-Tek's "500" Maintenance Paint.

Except for rusted or bare metal surfaces as noted above, Pen-Tek's "500-P" Conditioner should not be used.