

R-447

OFFICE MEMORANDUM



MICHIGAN
STATE HIGHWAY DEPARTMENT
JOHN C. MACKIE, COMMISSIONER

February 10, 1964
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To: E. A. Finney, Director
Research Laboratory Division

From: A. J. Permoda

Subject: Progress Report on "Tedlar" DuPont Polyvinyl Fluoride Film,
Pre-Finish Metals, Inc. Research Project R-63 NM-100.
Research Report No. R-449.

This DuPont plastic film, polyvinyl fluoride in composition, is currently being supplied in several colors and in several thicknesses up to 2 mils, for cementing to various substrates as a protective topcoat on galvanized steel, aluminum, plywood, roofing, decorative concrete, and less durable plastics. DuPont is projecting a service life of about 25 years for the film when exposed to weathering service.

Mr. Ralph C. Culliton of Pre-Finish Metals, Inc., submitted literature on "Tedlar" to Committee for Investigation of New Materials for review at its meeting of July 30, 1963. Subsequently the material was transmitted to Research Laboratory Division for review.

Mr. Culliton visited the Laboratory on November 1, 1963 to supplement information presented in the literature. He stated that his company is engaged in factory application of "Tedlar" and other vinyl films and coatings to sheet-metal stock, which subsequently can be formed if required. He stated, however, that his company currently can apply the film only to 16 gage or thinner stock, which rules out the possibility of evaluating the film as a coating on steel beam rails of 12-gage stock. He could think of no other highway use for this plastic film, factory applied. According to the literature, this film may be and is field applied to certain non-complex shapes, like roofing.


The literature also states that "Tedlar" is being evaluated on signs in California, presumably as a facing on less durable plastic. The Laboratory wrote California on December 9, 1963 concerning their experience and received a reply from Mr. John L. Beaton, Materials and Research Engineer, on December 31, as attached. Apparently, their use of the material is limited.

Recommendation

With the present limitation of factory application of "Tedlar" film only on 16-gage or thinner sheet stock, we cannot visualize any current highway use for this material as a protective coating.

However, because of "Tedlar's" projected 25-year life when exposed to weathering in service, and because of increasing consumption in industrial use, we suggest that progress of "Tedlar" film applications be reviewed in the future and that this project not be terminated but considered inactive in the interim. Even now, with this additional information at hand, it may be advisable to discuss this subject again at the next meeting of the Committee for Investigation of New Materials, to find possible highway applications here in Michigan.

OFFICE OF TESTING AND RESEARCH



A. J. Permoda, Supervisor
Materials Research Section
Research Laboratory Division

AJP:js

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

MATERIALS AND RESEARCH DEPARTMENT
5900 FOLSOM BLVD.
SACRAMENTO 19, CALIFORNIA

December 31, 1963

PLEASE REFER TO
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Mr. E. A. Finney
Michigan Highway Department
Research Laboratory Division
735 East Saginaw Street
Lansing 6, Michigan

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M. S. H. D.
OFFICE OF
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Dear Mr. Finney:

This is in response to your letter dated December 9, 1963, Reference No. 63NM-100, regarding the experimental usage of "Tedlar" PVF films in California.

This department has approximately 3 years of experimental signing experience with "Tedlar" (PVF - poly-vinyl fluoride) protective coatings. We have found this coating to be satisfactory with good resistance to weathering and fade and no problems of delamination when applied to soft materials such as plywood or plastics. However, when applied to metal backings, it is highly susceptible to mechanical abrasion.

To date, the only "Tedlar" application that has been incorporated into our signing program has been as an ultra-violet screening agent for white ABS plastic (Acrylonitrile, butadiene styrene) guide plates. However, because of cost, (approximately 50% higher than enameled aluminum on steel) these units have not been used extensively throughout the state. We have had very good success in locations such as on the coast where corrosion of metal guide plates is a problem and in desert regions where wind blown sand erodes the baked enamel in less than one day. Enclosed is our latest specification for these plastic guide plates.

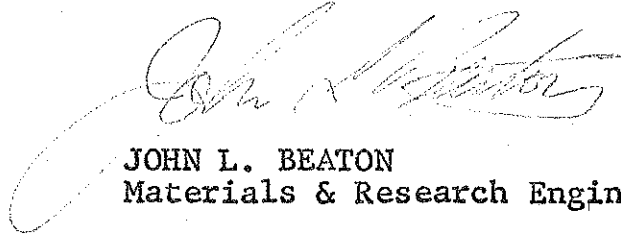
Mr. E. A. Finney

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December 31, 1963

We hope that this information will be of use to you. If we can be of further assistance, please let us know.

Very truly yours,

A handwritten signature in cursive script, appearing to read "John L. Beaton", is written over a faint, larger version of the typed name below it.

JOHN L. BEATON
Materials & Research Engineer

CL:lk

Enclosure (1)

MAY 1963

Specifications for Plastic Guide Plates

Plastic Guide Plates shall be made of white plastic materials that meet the following requirements. All plates are to be made in accordance with the attached drawing "Plastic Guide Plates", Service and Supply Department, dated July, 1960.

GENERAL REQUIREMENTS

Fabrication of all plastic parts shall be accomplished in a workmanlike manner. The plates shall be 8" x 24" (+ 1/16") chamfered one inch + 1/32" each corner and punched as directed on the drawing. All rivet holes shall be 3/16" in diameter, and their centers shall be not more than 1/32" from the detailed position.

Surfaces and edges of all plates shall be free from defects resulting from fabrication. The surfaces of all plates shall be flat and shall have a polished finish on both sides.

The successful bidder shall submit two (2) pre-production finished guide plates and two (2) 8" x 8" sheets of white poly-vinyl fluoride film within two weeks after receiving notice of award of the contract. These samples will be tested for conformance with the requirements specified herein.

The preliminary testing of the samples should be completed within ten (10) working days subsequent to the date of receipt by the Materials and Research Department.

If these tests indicate that the pre-production guide plates may conform to the requirements specified herein, production may be started.

One guide plate will be sampled by a State Representative from each 1000 plates or fraction thereof of each shipment delivered to the Service and Supply warehouses, and tested for compliance with the requirements specified herein.

If the plates sampled from the shipment do not conform, in every respect, with the requirements specified herein, the entire lot shall be rejected and returned at the expense of the vendor.

MATERIALS

1. The plates shall be fabricated by laminating a white pigmented 1 mil (.001) poly-vinyl fluoride surface film to both sides of a white ABS (Acrylonitrile, butadiene styrene) thermo-plastic substrate (core). Both surfaces of the poly-vinyl fluoride film shall be specially prepared to obtain maximum adherence to the substrate and for maximum adherence of stencil paint to the exposed surface.
2. The substrate shall be a solid extruded plastic or laminated from calendered plastic materials.

3. The adhesive for bonding the surface film to the substrate shall be furnished by or as recommended by the manufacturer of the poly-vinyl fluoride film, and shall be applied in strict accordance with the manufacturer's recommendations.

DETAILED REQUIREMENTS

1. The completed plates shall be opaque white. The yellowness factor shall not exceed .035 when measured according to Test Method 613.1 of Federal Specifications TT-P-141b.
2. The plates shall not discolor or yellow from exposure to weather, industrial fumes, or automotive combustion products.
3. Each plate shall be of uniform thickness throughout.
4. The thickness of the plates shall be as specified on the purchase order. If a thickness is not specified, then it shall not be less than 0.060" nor more than 0.075".
5. The plate shall be sufficiently flexible that a 1" x 8" strip shall withstand a 180° bend around a 2" diameter pin at 0°F without separation of the laminates, breaking, or cracking, and shall return to within 1/4" of its original form within five minutes when laid on a flat surface.
6. After exposure in a standard Fade-O-Meter for 1000 hours, there shall be no evidence of yellowing or delamination.
7. A 4" x 8" sample specimen shall be immersed in a 212° water bath for 8 hours. At the end of 8 hours, there shall be no evidence of warping, discoloring, or delamination.
8. Sample specimens from the finished plates shall comply with the following tests for tensile strength and for elongation:
 - a. Five test specimens shall be cut to conform to the dimensions shown in A.S.T.M. D 638-52T, Figure I, Type 1.
 - b. Specimens shall be preconditioned for 5 days at 73.4 ± 2°F. relative humidity 50 ± 2%.
 - c. Specimens shall be tested in a constant-rate-of-crosshead movement type of machine at a load speed of .20 to .25 inches per minute.
 - d. Specimens shall have a minimum tensile strength in any direction of 3800 psi, and a minimum elongation of 60%.

PACKAGING

Guide plates shall be packaged twenty-five (25) per package. Packaging shall be satisfactory for re-shipping and shall comply with Consolidated Freight Classification on packaging.