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DATA REPORT NO. 69

EVALUATION OF FLUOREL COATING FOR AIRCRAFT INTERIOR MATERIALS

PROJECT NO. 510-001-11X

John F. Marcy
Richard M. Johnson

INTRODUCTION

Purpose

The test program was conducted to evaluate the effectiveness of Fluorel as a coating agent to increase the flame resistance of typical cabin interior materials.

Background

Fluorel has been given considerable publicity in the press during recent months as one of the more promising materials developments of the Space Age with superior resistance to fire. Recently, this material was brought to the attention of the FAA by NASA for possible use in improving fire safety in air transports. Initial information regarding this product was obtained early as July 1969 through a visit by Raybestos-Manhattan, Inc. of North Charleston, S. C. At that time, Mr. Jack V. Owens of that company furnished literature and Fluorel-coated samples of Beta glass and asbestos fabrics. No follow-up action was taken at that time. Recently, in view of increasing interest in fallout benefits to be derived from the advanced materials technology of the Space Program, a decision was made to proceed with an evaluation of Fluorel at this time.

Fluorel is an elastometer (i.e. flexible) type of plastic. Chemically it is a copolymer of hexafluoropropene and vinylidene manufactured by the Minnesota Mining and Manufacturing Company (3M). An equal mixture of the two compounds in the copolymer would contain 60% Fluorine by weight, hence the acronym Fluorel. The Fluorel copolymer itself varies

in its exact formulation according to type and manufacturer. The two principal suppliers of this material are the Raybestos-Manhattan and Mosites companies. According to a NASA report (NASA Program Apollo Working Paper No. 1337, titled, "Non-Flammable Fluorel Compounds") formulations of the basic 3M material have been developed that are completely non-flammable in 100% oxygen atmospheres at 16.5 psia. The superior self-extinguishing properties of Fluorel are borne out by extensive data reported by NASA (Report MSC-NA-D-68-1, titled, "Nonmetallic Materials Design Guidelines and Test Data Handbook") which lists flame propagation rates of zero for various Fluorel formulations designated under different type numbers.

The main interest of this investigation of the properties of Fluorel was that with the use of this plastic as a protective coating on aircraft cabin interior materials that are to some degree flammable. During the past three years FAA flammability requirements for interior materials were made significantly more severe. From the slow horizontal burn requirement of 4 inches per minute or less, established in 1947, present regulations now in use for ceiling and sidewall materials require that these be self-extinguishing in a vertical position within a burn length of 8 inches when exposed to a Bunsen burner flame for 12 seconds. Proposed changes to the regulations (NPRM34FR 13036, dated 12 August 1969) would require an even more severe test of 60 seconds burner exposure with a shorter burn length of 6 instead of 8 inches. While only a few of the materials already installed in air transports had difficulty meeting the latest regulations effective in October of 1968, it can be forecast that many of the cabin materials now in the older air transports would fail to meet the more severe test proposed for a 60-second burner exposure with the shorter burn length. With this as a background, the main interest in Fluorel would appear at this time to be as a coating to increase the flammability ratings of deficient materials so that these may meet proposed new and existing standards.

DISCUSSION

Fluorel Coating Characteristics

The coating material consisted of an air-dried solution of Fluorel RL-3788 (NASA L-3203-6), 20% solids in methyl ethyl ketone (Flash-point 34°F). The solution was sprayed onto the specimen surface to the desired thickness which was usually 5 mils as recommended by the manufacturer. The applied coating when dried retains the elasticity of

a rubber film. This film has very poor abrasion resistance and can be easily peeled off by one's fingernail from the specimens prepared for tests.

Interior Materials Description

The interior materials selected for coating with Fluorel were primarily materials received from Boeing and Douglas and had been used in a previous investigation. A description of these materials with flammability, smoke and toxic gases data are contained in Reports NA-68-30 and NA-68-36. Except for urethane foam, these materials would be used for cabin ceiling, hatrack and sidewalls and would thus be designated as Class (a) materials under FAR 25.853.

Test Procedure

1. Vertical Burn Apparatus - Method 5903. This is the required test for showing compliance to present FAR 25 regulations. In the test for self-extinguishing criteria, the specimen was suspended over a Bunsen burner flame for a period of either 12 or 60 seconds depending on the material classification. Complete description of the apparatus and test procedures are contained in Report NA-68-60. It should be noted that this test method provides equal fire exposure to both sides of the test specimen. Specimens were coated for some tests on one side only, since for most practical applications in use only the exposed surface in the cabin would be coated.

2. Radiant Panel Burn Apparatus - Method ASTM E-162. This is considered a much more severe test for surface flammability than that of the Bunsen burner exposure test. In this test the specimen is exposed to the heat (Max. 4 Btu/ft^2/sec) of a radiant panel while at the same time being exposed at the top to the flames of an acetylene torch. A complete description of the apparatus and test procedures is contained in Report NA-68-30.

3. Standard Kerosene Torch - 2 gph. This apparatus produces flames of 2000°F from an 8- by 11-inch elliptical burner used to test fireproof materials and powerplant components. The apparatus was used to fire test a 2-foot square specimen of an asbestos reinforced steel wire Fluorel (RL-641) coated fabric (weight 45 oz/yd and 0.048 inches thick).

4. NBS Smoke Measuring Apparatus.- This apparatus is finding

increasing use in aviation for the selection of low smoke producing cabin interior materials. Smoke was measured by the attenuation of a vertical beam of light 3 feet in height. A smoke index (D_s) was obtained for both flaming and non-flaming combustions of 3-inch square test specimens of a 0.020-inch thick Fluorel coating on aluminum foil. Complete description of the apparatus and test procedures are contained in Report NA-68-36.

TEST RESULTS

Vertical Burn Tests

A description of the test specimens with their location and use in cabin interiors is presented in Table I. Their selection is considered to be fairly representative of materials in present air transports.

Comparative data for the vertical burn tests between uncoated and Fluorel coated specimens of different thicknesses on one side and both sides of the specimen are given in Table II.

A total of 9 different materials was tested. The most flammable of the sheet material for sidewall use (No. 66) burned completely when exposed to the Bunsen burner for a 12-second period. In the 6 tests conducted on this material when coated with Fluorel on either one side or both sides in thicknesses of from 2 1/2 to 5 mils, all the coated specimens were shown to be self-extinguishing for the 60 seconds fire exposure test. In these tests, the burn length of the protected side with Fluorel in all cases was less than the 6 inches proposed requirement. Since both sides of the specimen are equally exposed to fire, the difference in the burn lengths for face and back given in the table provides a direct indication of the effectiveness of the coating in arresting flame propagation. In addition, these data show that the coating on the front surface also protected the back surface since in other tests the entire specimen burned completely to the top when not coated.

A vinyl-coated cotton fabric (Naugahyde) used as a headliner (No. 80) was also one of the more flammable materials tested. The test data also showed that the Fluorel coating was effective in helping the material meet the more severe self-extinguishing criteria.

The fire damage sustained by Material No. 66 is shown for both a coated and uncoated specimen in Figure 1. For the coated specimen both the coated and uncoated sides are shown in the photographs.

The most spectacular of the tests was that on Fluorel coated regular urethane foam which is the most flammable of the cabin materials (No. 128B). The test data show that the coating (0.3 oz weight) was extremely effective in limiting flame propagation. Also, the Fluorel coating induced a char formation and the urethane foam did not form flaming droplets of molten material and burn completely. The Fluorel coating increased the flame resistance of the foam to that of the FR foam (Report NA-68-30 Mat. No. 128A).

One of the most flame-resistant of the plastics tested was a polysulfone sheet (No. 141) which has been finding increasing use in new jet transports as a low smoke thermoplastic capable of meeting the latest flammability requirements. The Fluorel coating on this material showed that it could improve the flame resistance of this plastic as shown by a decrease in the burn length from 4.5 to 3.0 inches. Within a 3-inch distance from the exposed edge of the specimen in contact with the 60-second Bunsen burner ignition source, the Fluorel coating was completely destroyed and was ineffective in protecting the base material.

Radiant Panel Burn Tests

A description of the test specimens is contained in Table I. Comparative data between uncoated and Fluorel coated materials are presented in Table III.

A total of 8 different materials coated on only the one side exposed to the fire was tested. For most tests the back of the specimen was unsupported and a 1/2-inch air gap provided between the specimen and the cement board backing. A wire screen with a 1-inch mesh was normally used in front of the test specimen to prevent the more thermoplastic specimens from falling out of their holders. A comparison of the data shows that the Fluorel coating was effective in (1) reducing flame propagation, (2) reducing heat of combustion and (3) yielding a lower flamespread index (I_s). Also, the rapid and repetitive flashes of flame extending down some of the specimens were either completely eliminated or greatly reduced with the material coated with Fluorel. This coating when subjected to heat in the tests would blister and puff-up to a height of one inch or more, apparently from the entrapment of combustion gases from the substrate. The expanded flexible film upon continued heating would collapse and form a loose wrinkled and rigid char over the test material. The coating greatly inhibited surface flaming from progressing away from the acetylene pilot flame.

Much of the flaming occurred from the uncoated back side of the specimen rather than the coated side facing the radiant panel. Combustible gases arising in the airspace behind the specimen flamed upon reaching the pilot burner. For greater reproducibility of data a coarse wire screen was used in the tests to better secure the test specimen in its holder. Some tests were conducted for comparison without the screen and with a solid cement board backing of the specimens. The test data for materials No. 21 and 66 show better performance for the coated thermoplastics with the solid backing and a worse performance without the wire screen because of the sagging of the test sample. It should be noted that the worst of the test conditions most typical of an actual cabin fire would be that of unsupported materials. For this reason it may be desirable for thermoplastics to coat both sides of the material so as to also protect the back side. The fire damage sustained by test specimens of material No. 66 is shown in Figure 2. Complete destruction of the uncoated specimen at the right is revealed in the photographs compared to only partial destruction of the two coated specimens. Of the two coated specimens, the specimen provided with the wire screen support suffered less fire damage since it did not sag out of the holder and curl as did the unsupported specimen on the right.

Kerosene Torch Burn Test

The Fluorel coating burned off the surface of the asbestos fabric completely within 15 seconds over the entire area of flame impingement of the torch. Very little insulation to heat was provided by the asbestos curtain which registered a temperature of 1100°F in the back side within 15 seconds. No damage to the test specimen resulted after 15 minutes burner exposure other than tiny pinholes in the fabric. However, no flame penetration was visible from the rear of the test specimen. The use of the Fluorel in this instance was not to improve fire resistance but rather to improve the physical properties of the fabric with a non-flaming surface coating.

Smoke Tests

Tests were conducted on 0.020-inch-thick Fluorel coatings. The smoke indices obtained for the flaming condition were D_s= 3.1 (95% light transmission) after 2 minutes and D_m=42.7 (48% light transmission maximum) after 10 minutes. For the non-flaming test condition, the indices were D_s= 0.3 (99.5% light transmission) after 2 minutes and D_m=62.4 (62.4% light transmission maximum) after 10 minutes. Comparative data for typical aircraft materials and a description of the

test method are contained in Report NA 68-36. These data show that most of the common plastics such as ABS, vinyls and acrylics produce more smoke than Fluorel. A test was conducted to determine the effect on smoke emission of a material when coated with Fluorel. No significant reduction in smoke was found as with flammability between the uncoated and coated specimens of material No. 66. The smoke indices obtained were D_m= 197 (3.1% light transmission) for the uncoated specimen and D_m= 175 (4.8% light transmission) for the coated specimen.

Miscellaneous Tests

Tests were conducted to determine whether Fluorel could be made to burn with a flame. No flashpoint temperature was reached at an ambient air temperature of 1300°F in the Setchkin's Furnace test (ASTM Test Method D 1929). In these tests approximately 1/2 of the 5-gram Fluorel sample was consumed. The gas products of combustion were evidently highly halogenated since these repeatedly extinguished the pilot flame held in contact with the furnace's exhaust gases. The very strong extinguishing effect of the decomposition products of Fluorel were also evident in the Radiant Panel tests. In these tests the acetylene torch applied to the specimen was also frequently extinguished by the ascending gases up the specimen.

In separate furnace tests, no change in the appearance of the Fluorel was noted up to 600°F. At temperatures above 700°F the Fluorel coating darkened and at 1000°F the coating charred and blackened.

SUMMARY OF FLUOREL EVALUATION

1. The use of Fluorel as a coating is highly effective in arresting the spread of fire from an ignition source over the surface area of a combustible material.

2. The use of Fluorel as a coating over exterior surfaces such as cabin ceilings, wall and partitions would be severely limited because of poor abrasion and surface adhesion of the elastic film that is formed on the material to be protected.

3. The Fluorel coating appears to be sufficiently elastic to be used for the fire protection of materials such as foam padding which are flexed repeatedly in use.

4. The most promising as well as convenient application of Fluorel would appear to be as a sprayed coating on presently installed materials in aircraft which are too flammable to meet the more severe self-extinguishing requirements that have been lately proposed for certification.

5. The benefits of Fluorel coating to new materials capable of meeting the new requirements for a 6-inch burn length for a 60-second burner exposure would be relatively slight considering its disadvantages of added weight plus its poor esthetic and wearing surface.

6. Future needs for safer cabin interior materials with improved standards, including low smoke emission can better be met with continued development of high temperature plastics rather than a surface coating such as Fluorel.

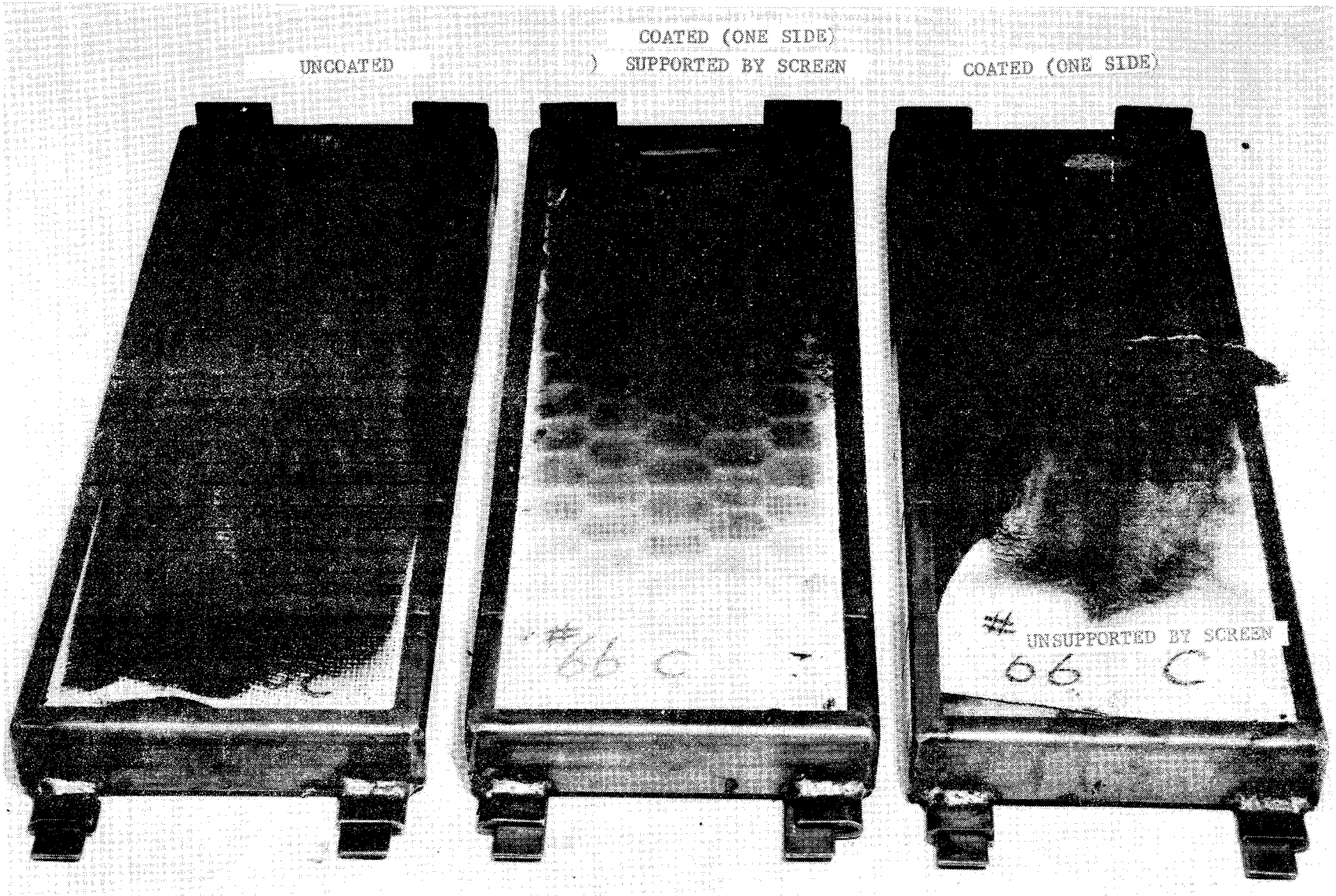

FIG. 2 FIRE DAMAGE TO FLUOREL COATED AND UNCOATED TEST SPECIMEN
(RADIANT PANEL TEST METHOD ASTM E-162)

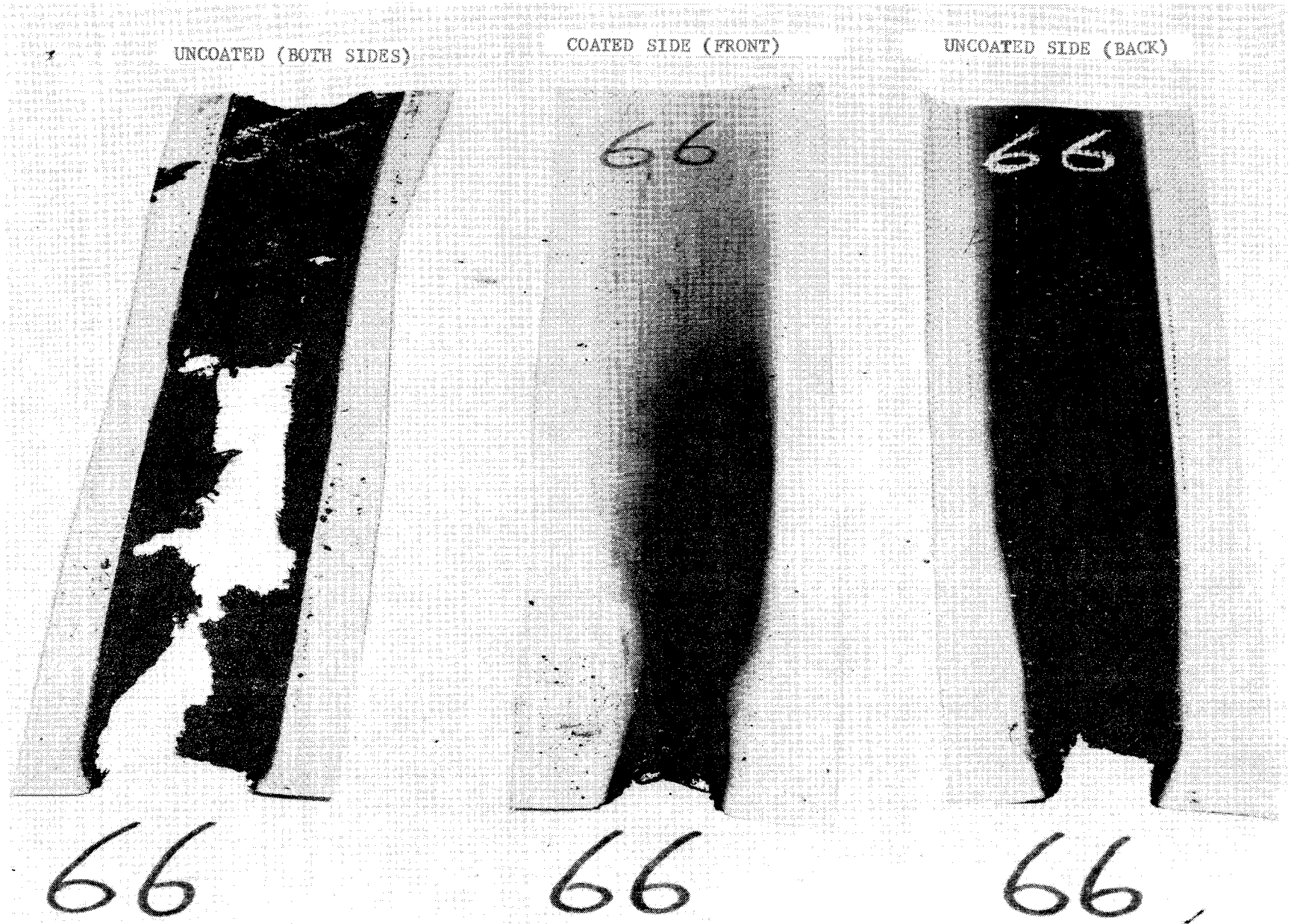

FIG. 1 FIRE DAMAGE TO FLUOREL COATED AND UNCOATED TEST SPECIMEN (VERTICAL TEST METHOD 5903)

TABLE I

MATERIALS DESCRIPTION

No.	Code	Thickness (in.)	Weight (oz/yd^2)	Color & Surface	Designation	Present or Intended Use	
21	L3	.044	79	Tan/Dull Brushed	Laminate	Panels	Face: Vinyl chloride/acrylate copolymer (80:20) on Back: Aluminum sheet
44	S1	.046	44	Tan Matte	Sheet	Seat Panels	PVA/ABS, china clay pigmented, possible PVC
57	F2	.006	6.1	Green Smooth	Fabric	Bulkhead Assembly, Lining	Plasticized PVC on glass fabric
66	S1	.032	25	Tan/Yellow Burlap	Sheet	Sidewall	Plasticized PVC
73	S3	.11	110	Gray Glossy	Sheet	Cockpit Liner	ABS/PVC
76	A	.350 – .365	76	White Smooth	Assembly (honeycomb)	Ceiling Panel	Face: Acrylic/Vinyl coating over plywood (paper) Core: Paper with Cresolformaldehyde resin adhesive
80	F2	.025	17	White Simulated Fabric	Fabric	Headliner	Plastic coated cotton
128B	S1	1.0	17	White Open Cell	Foam	Seat Padding	Polyether Urethane
141	S2	.031	28	Cream Semi-Clear Glossy	Sheet	Fabricated Parts	Polysulfone

Abbreviations:
F2 - Coated fabric
S1 - Flexible sheet
S2 - Semi-rigid sheet
S3 - Rigid sheet
L3 - Rigid laminate
A - Assembly
PVA - Polyvinyl acetate
PVC - Polyvinl chloride
ABS - Acrylonitrile/Butadiene/Styrene

TABLE II

EFFECT OF FLUOREL COATING ON BURNING OF TEST SPECIMENS
TEST DATA BY 1 1/2-INCH BUNSEN BURNER FLAME - VERTICAL TEST METHOD ON 5903

Material No.	Material Code	Ignition Time (min.)	Total Flaming Time (min.)	Flame-out Time (after burner removal) (min.)	Glow Time (min.)	Burn Length (in.)	Char Length (in.)	Max. Flame Height (in.)	Self Extinguishing	Remarks
21	L3	0.04	0.16	0.00	0.00	0.4	0.1	<1	Yes	Uncoated - 12 seconds ignition
21	L3	0.06	0.94	0.00	0.00	0.4	0.1	<1	Yes	Coated one side 5 mils - 60 secs ignition Blistered 1.2 in. coated side Trace smoke
44	S1	0.03	0.24	0.07	0.30	1.9	1.4	3	Yes	Uncoated - 12 secs ignition Heavy gray smoke
44	S1	0.03	0.92	-0.05 (1)	0.16	6.4	5.8	5	Yes	Uncoated - 60 secs ignition Heavy gray soot smoke
44	S1	0.04	1.26	0.30	0.00	3.5	3.5	4	Yes	Coated both sides 4½ mils - 60 secs ignition Coating bubbled from heat exposure Heavy gray smoke
57	F2	0.02	0.10	-0.88	0.00	4.0 F 1.0 B	0.5 F 0.5 B	4 F 1 B	Yes	Uncoated - 60 secs ignition Light white smoke
57	F2	0.02	0.26	-0.72	0.02	3.0 F 1.0 B	2.0 F 0.5 B	2 F 1 B	Yes	Coated one side 3 mils - 60 secs ignition Light white smoke
66	S1	0.02	1.60	1.42	0.00	X (2)	12	12+ (3)	No	Uncoated - 12 secs ignition Rapid burning Heavy gray very acrid smoke
66	S1	0.03	0.97	0.00	0.09	6.8	4.0	4	Yes	Coated both sides 4 mils each side - 60 secs ignition Heavy gray acrid smoke
66	S1	0.02	0.73	-0.25	0.09	5.5 F (4) 9.5 B (5)	3.0 F 6.8 B	5 F 10 B	Yes	Coated one side 2 ½ - 3 mils 60 secs ignition Heavy gray smoke
66	S1	0.02	0.71	-0.27	0.10	5.6 F 9.5 B	3.5 F 6.8 B	5 F 10 B	Yes	Coated one side 2½ - 3 mils 60 secs ignition Heavy gray smoke
66	S1	0.02	0.73	-0.25	0.03	5.0 F 9.5 B	2.7 F 7.0 B	3 F 10 B	Yes	Coated one side 5 mils -60 secs ignition Heavy gray smoke
66	S1	0.02	0.83	-0.15	0.06	5.0 F 9.7 B	3.5 F 7.0 B	3 F 10 B	Yes	Coated one side 5 mils -60 secs ignition

TABLE II (Continued)
EFFECT OF FLUOREL COATING ON BURNING OF TEST SPECIMENS
TEST DATA BY 1 1/2-INCH BUNSEN BURNER FLAME - VERTICAL TEST METHOD ON 5903

Material No.	Code	Ignition Time (min.)	Total Flaming Time (min.)	Flame-out Time (after burner removal) (min.)	Glow Time (min.)	Burn Length (in.)	Char Length (in.)	Max. Flame Height (in.)	Self Extinguishing	Remarks
66	S1	0.02	0.73	-0.25	0.05	4.5 F 8.5 B	3.0 F 6.0 B	3 F 10 B	Yes	Coated one side 5 mils -- 60 secs ignition Heavy gray smoke
66	S1	0.03	0.73	-0.24	0.09	8.0 F 11.5 B	5.8 F 8.5 B	5 F 10 B	Yes	Coated one side 1½ - 2 mils 60 secs ignition Heavy gray smoke
73	S3	0.03	0.17	0.00	0.00	1.8	0.6	2	Yes	Uncoated - 12 secs ignition Light white smoke
73	S3	0.03	2.10	1.13	0.18	3.5	2.7	3	Yes	Uncoated - 60 secs ignition Lingering flame during 2nd minute was about 1 inch high Moderate black smoke
73	S3	0.03	0.97	0.00	0.00	2.8	2.5	3	Yes	Coated both sides 4½ mils - 60 secs ignition Moderate black smoke. Coating bubbled
76	A	0.03	2.36	1.39	1.00	4.5 F 5.2 B	2.8 F 3.5 B	3	Yes	Uncoated - 60 secs ignition Burn and char lengths are for the surface. Moderate gray smoke
76	A	0.03	2.36	1.39	0.00	3.0 F 3.8 B	2.2 F 2.8 B	3	Yes	Coated both sides 5 mils - 60 secs ignition Moderate gray smoke Burn and char lengths are for surface.
80	F2	0.02	1.00	0.82	0.00	X	12	12+	No	Uncoated - 12 secs ignition Heavy black sooty smoke
80	F2	0.03	0.95	-0.02	0.12	4.0 F 2.0 F	2.8 F 1.2 B	5	Yes	Coated both sides 4½ mils - 60 secs ignition Moderate black sooty smoke
128 B	S1	0.01	0.60	0.41	0.00	X	12	12+	No	Uncoated - 5 secs ignition Flaming droplets burned on floor Moderate white smoke
128 B	S1	0.10	0.10	0.00	0.00	0.2	0.1	<1	Yes	Coated all sides 0.3 ozs wt - 5 secs ignition Trace smoke

TABLE II (Continued)
EFFECT OF FLUOREL COATING ON BURNING OF TEST SPECIMENS
TEST DATA BY 1 1/2-INCH BUNSEN BURNER FLAME - VERTICAL TEST METHOD ON 5903

Material No.	Code	Ignition Time (min.)	Total Flaming Time (min.)	Flame-out Time (after burner removal) (min.)	Glow Time (min.)	Burn Length (in.)	Char Length (in.)	Max. Flame Height (in.)	Self Extinguishing	Remarks
128 B	S1	---	0.80	0.00	0.00	2.0	1.5	<1	Yes	Coated all sides 0.3 oz - 60 secs ignition Heavy white smoke Coating created crust Sample hollow in area of burning Burn/Char lengths are on surface
141	S2	0.02	0.98	0.00	0.02	4.5	4.2	3	Yes	Uncoated - 60 secs ignition Gray smoke
141	S2	0.03	1.02	0.05	0.02	3.0 F 4.0 B	2.0 F 3.7 B	2 F 3 B	Yes	Coated one side 5 mils - 60 secs Light gray smoke

NOTES: (1) Negative (-) sign indicates flame-out time occurs before removal of Bunsen burner source.
(2) X - Burns completely.
(3) 12+ - Plus sign indicates that flame height reached ceiling top of cabinet.
(4) F - Facing of test specimen
(5) B - Backing of test specimen

TABLE III

EFFECT OF FLUOREL COATING ON BURNING OF TEST SPECIMENS
FLAMMABILITY DATA BY NBS RADIANT PANEL APPARATUS
FEDERAL STANDARD TEST METHOD 00136B (ASTM E-162)

Materials No.	Code	Ignition[1] Time (min.)	Total Flaming Time (min.)	Max. Flame Propagation (in.)	Glow Time (min.)	Total Burning Time (min.)	Char Length (in.)	Max. Temperature Rise (°C)	F_s	I_s[2]	Remarks
21	L3	0.12	2.03	11	0.0	8.0	17	25	9.4	34	Uncoated Acetylene pilot flame snuffed out twice.
21	L3	0.15	4.00	6	0.0	5.0	16	18	5.3	13	Coated 3 mils Coating bubbled at 0.4 min
21	L3	0.10	4.00	9	0.0	5.0	17	18	6.6	16	Coated 2 mils Coating bubbled Screen not used
44	S1	0.02	2.33	12	0.0	5.0	17	46	13.7	83	Uncoated Screen in use
44	S1	0.03	2.47	3	0.0	5.0	16	26	1.6	5	Coated 4 mils Screen in use
57	F2	0.02	0.43	6	0.0	1.5	1	2	24.8	7	Uncoated Flashes to 12 inches
57	F2	0.02	0.48	3	0.0	5.0	14	1	3.5	<1	Coated 2 1/2 mils Minor flashes to 5 inches Screen in use
57	F2	0.02	0.33	1	0.0	5.0	14	1	1.0	<1	Coated 5 mils Minor flashes to 6 inches Large bubble raised then slowly deflated Screen not in use
66	S1	0.03	1.97	9	0.0	5.0	17	67	8.4	74	Uncoated Flashed to 13 inches Screen in use Representative flashing up to 13 inches down specimen
66	S1	0.03	1.75	8	0.0	5.0	16	60	8.4	67	Coated 6 mils Short flashes 1/2 inch air space behind specimen Screen in use
66	S1	0.04	1.46	3	0.0	5.0	11	21	2.0	5	Coated 5 mils Screen in use Solid backing of specimen -- no air space No flashes

TABLE III (Continued)
EFFECT OF FLUOREL COATINGS ON BURNING OF TEST SPECIMENS
FLAMMABILITY DATA BY NBS RADIANT PANEL APPARATUS
FEDERAL STANDARD TEST METHOD 00136B (ASTM E-162)

Materials No.	Code	Ignition[1] Time (min.)	Total Flaming Time (min.)	Max. Flame Propagation (in.)	Glow Time (min.)	Total Burning Time (min.)	Char Length (in.)	Max. Temperature Rise (°C)	F_s	I_s[2]	Remarks
66	S1	0.04	---	15	0.0	3.0	15	---	--	--	Coated 5 mils Screen not in use Solid backing. Specimen sagged and coiled up exposing back side to fire
73	S3	0.02	4.90	9	0.0	5.0	14	45	4.4	26	Uncoated Screen in use
73	S3	0.02	0.48	2	0.0	5.0	14	44	1.0	6	Coated 5 mils Small flame appeared at 8 inch level and burned 30 - 40 seconds just prior to 5 minutes Screen in use
76	A	0.05	9.21	11	3.3	15.0	12	37	12.4	73	Uncoated Flashes Screen in use
76	A	0.03	4.97	11	0.0	5.0	17	31	7.0	29	Coated 10 mils Screen in use
80	F2	0.02	1.21	X[3]	0.0	1.23	17	75	40.6	402	Uncoated Flashes High flames Screen in use
80	F2	0.02	1.48	5	0.0	5.0	15	23	2.2	7	Coated 4 mils Screen in use
128 B	S1	0.02	0.25	X	0.0	0.27	17	92	118.5	1439	Uncoated Flaming droplets burned on floor Screen in use
128 B	S1	0.04	2.46	12	2.5	5.0	17	45	11.4	68	Coated 2 oz. one side After flame out, glow persisted. Entire specimen charred but did not melt

Notes: (1) For definition of headings see Report NA-68-30
(2) I_s - Flame Spread Index (Red Oak - 100, Asbestos Board - 0)
(3) X - Burns completely