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REPORT OF TESTING

FLAME SPREAD CLASSIFICATION
SMOKE AND FUEL CONTRIBUTION

CUBICLE CURTAIN
COATED/BURN BARRIER™ FPR
FIRE RETARDANT

June 30, 1973

Test Engineer: James H. Heywood

Test Technician: K. Heywood

TEST REPORT NO. LA 62805

SIGNED FOR THE COMPANY

BY Bernd S. Givon
Professional Engineer

Laboratories in: New York • Chicago • Los Angeles • Houston • Tulsa • Memphis • Reading • Richland

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REFERENCE

Telecon and conference with Mr. Vernon D. Claiborne, President, and Client's letter of June 21, 1973.

REQUIREMENT

form standard fire-hazard classification test on Cubicle Curtain fabric sample supplied by the Client, and treated (by the Testing Co.) with Client's BURN BARRIER™ FPR fire retardant, utilizing the U.S. Testing Company's ASTM E84 flame spread tunnel facility.

SAMPLE IDENTIFICATION

fabric sample tested was submitted and identified by the Client as:

1. Cubicle Curtain Material - (Jean Cloth) 100% Cotton, standard as used in hospitals, nursing homes, etc. 96 threads/inch Warp direction. 64 threads/inch Filling direction. Sanforized, mercerized, vat dyed, light coral in color.
2. Curtain fabric treated by the Testing Co. with BURN BARRIER™ FPR fire retardant per printed label instructions: Fabric saturated, hand wrung, hang dried and reweighed.
3. Based upon weighings before and after treatment, approximately . oz./sq. yd. of "dry" retardant was added to the fabric.

INTRODUCTION

This report presents the test results per ASTM Designation E84-70 obtained 011 a treated Cubicle Curtain described under "Sample Identification". In addition to the foregoing description, the report includes the method of preparation, mounting and conditioning of the specimen.

The test was performed in conformance to the specifications set forth in ASTM Designation E84-70, "Standard Method of Test for Surface Burning Characteristics of Building Materials" both as to equipment and test procedure. The foregoing test procedure is identical in all respects to UL 723, ANSI No. 2.5, NFPA No. 255 and UBC No. 42-1.

Asbestos-cement board ("Flexboard" by Johns-Manville) and red oak flooring (No. 111 by Bradley) are used as comparative standards and their responses are assigned the values of 0 and 100, respectively, under similar fire exposure conditions. The test results cover three parameters: flamespread classification fuel contribution and smoke density during a 10-minute fire exposure period and are tabulated for ease of comparison.



PREPARATION AND CONDITIONING

The fabric sample was cut to a 24-inch width and 25 foot length to fit the tunnel's sample shelf. The sample was placed in the conditioning room (maintained at a dry-bulb temperature between 70° and 75°F and a relative humidity between 35 and 40 percent) and allowed to come to equilibrium.

TEST PROCEDURE

The tunnel was thoroughly preheated by burning natural gas. When the brick temperature, sensed by a floor thermocouple, had reached the prescribed $105^{\circ}\pm 5^{\circ}\text{F}$ level, the A/C board standards were run.

The fabric sample was tested following the foregoing calibration and preheating. For the test, the sample was placed on light-gauge, 2-inch mesh chicken wire supported at 2-foot intervals throughout the length on 1/4-inch iron bar stock. The top was covered with 1/4-inch A/C board. The tunnel roof was set in place and the evaluation was performed in conformance to the standard procedures specified.

TEST RESULTS

The test results, calculated in accordance with the prescribed methods of flame spread classification, furnace temperature effects of fuel contribution and smoke density are presented in Figures 3 and 4, pages 8 and 9.

The results and observations are tabulated on pages 5, 6 and 7. Because of the possible variations in reproducibility, the results have been adjusted to the nearest figure divisible by 5.



EQUIPMENT USED

1. ASTM Method E84 Standard Tunnel completely instrumented:
2. Leeds and Northrup Company, "Speedomax", Type G, 6-point Automatic Temperature Recorder. Range 0-2200°F. Six Chromel-Alumel shielded thermocouples installed in the tunnel.
3. Weston Microammeter, Model 741, FS = 500 P A linear scale, with matching Type RO Electric Eye for smoke detection. Leeds & Northrup Automatic strip chart run in parallel to record smoke-density.
4. American Meter Company Singer DTM-325 Gas Meter with Model 806 Resettable Indicator. Measures cubic feet of gas @ 1/2" differential, 10 psi W.P. to 10,000 cf total.
5. FP Rotameter calibrated for 14 SCFM = 100%, gas of 0.63 specific gravity when measured @ 7" W.C. and 70°F.
6. Crosby Reid Vapor Test Meter, 0-5 psi with 2/100 the divisions for gas line pressure.
7. Ellison Inclined Draft Gage for air flow, Petroleum Oil of 0.834 specific gravity, 0 - 0.5" range.
8. Ellison Inclined Draft Gage for gas flow, petroleum oil of 0.834 specific gravity, 0 - 4.0" range with calibrated orifice and conversion scale.
9. Weksler Psychrometer and mercury-in-glass dry and wet bulb thermometers.
10. Alnor Velometer (Pitot Probe) Series 6000P for airflow calibration, and measurement.

BUILDING CODES CITED

1. NFPA National Fire Codes, "Building Construction and Facilities Vol. 4. pp. 101-62 par. 6-2114, 1970-71.
2. UNIFORM BUILDING CODE, Part VIII, "Fire-Resistive Standard for Fire Protection" Chapt. 42 - Interior Wall & Ceiling Finish, Sections 4201-4203, pp. 490-1, 1970.



SAMPLE: CUBICLE CURTAIN, TREATED WITH BURN BARRIER™ FPR FIRE RETARDANT

FLAME PROPAGATION:-

Spotty Ignition: None Steady Ignition: None

After Flaming: None

Flame Spread (d) 0 (ft. max.); Burning Time (t) 10 Minutes

FLAMESPREAD:

- (1) (5.5) X (100)/t = (for t < 5.5 mm. & d = 19-1/2 ft.)
(2) 50 + 275/t = (for t > 5.5 & > 10 mm. & d = 19-1/2 ft.)
(3) 50 + 1.41d = (for d > 13.5 & < 19.5 ft. & t = 10 min.)
(4) 5.128d = 0 (for d < 3.5 ft. & t = 10 mm.)

NUMERICAL CLASSIFICATION

Table with 4 columns: Test Specimen Specimen, Flame Spread Number & Class, Fuel Contributed Factor, Smoke Density Factor. Rows include Asbestos-Cement Board, Red Oak Flooring, and Sample Tested.



FLAME SPREAD TUNNEL TEST-E84-70-DATA SHEET

Date of Test Run: 6-28-73

Material: Cubicle Curtain, Treated
with BURN BARRIER™ PFR

AIR MEASUREMENTS

Temperature (db) 71 °F; (wb) 56 °F; RH 37.9 %

Velocity (average from latest calibration) 240 fpm

Gauge (average for Test Run duration) 0.075 " water

GAS MEASUREMENTS

Total Gas Consumed 54.99 cf

Rate 5.50 cfm

Heat of Combustion 1049 Btu/cf

Heat Input 5770 Btu/min.

Gas Pressure @ Reducer (static) 0.32 psi

(kinetic) 0.24 psi

Rotameter NA

Gauge 1.00 water

API 1-1/2" Standard Line Pipe, I.D. Area 0.01411 ft²



SUMMARY OF TEST NOTATIONS

No ignition or propagation of flame occurred at any time during the test. The sample above the burners was seen to char and split, but did not ignite.

Smoke evolution maintained minimal levels throughout the test duration.

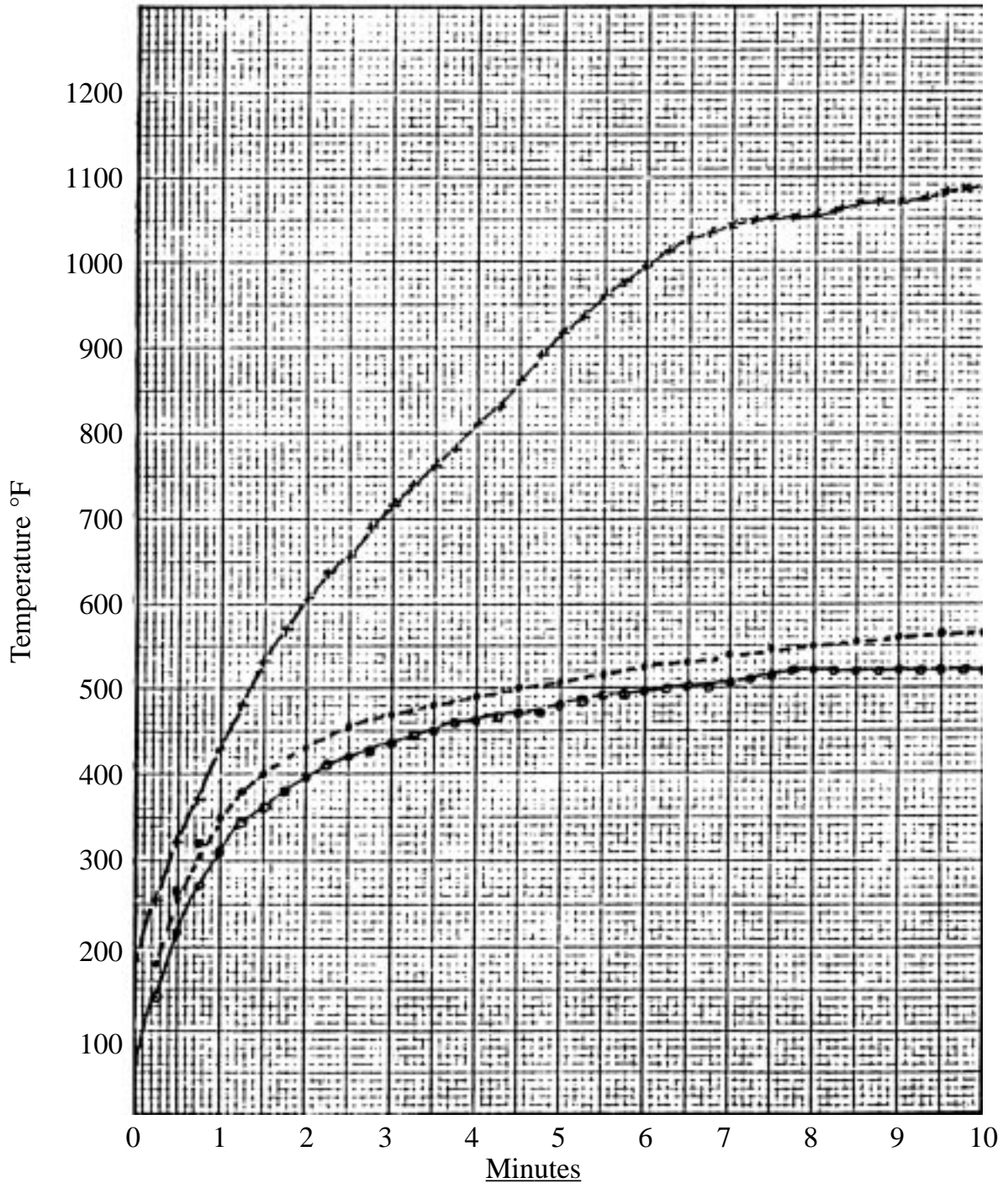
Post test examination revealed the sample had charred directly over the burners for a distance of 47 inches, with moderate to severe fabric deterioration and discoloration due to heat beyond this-point. The heat effects lessened with distance away from burners.



FUEL- CONTRIBUTED TEMPERATURE

Key:

Sample -○- -○- BURN BARRIER™ FPR
Red Oak -+ -+ -.-.-.-.- A/C Board



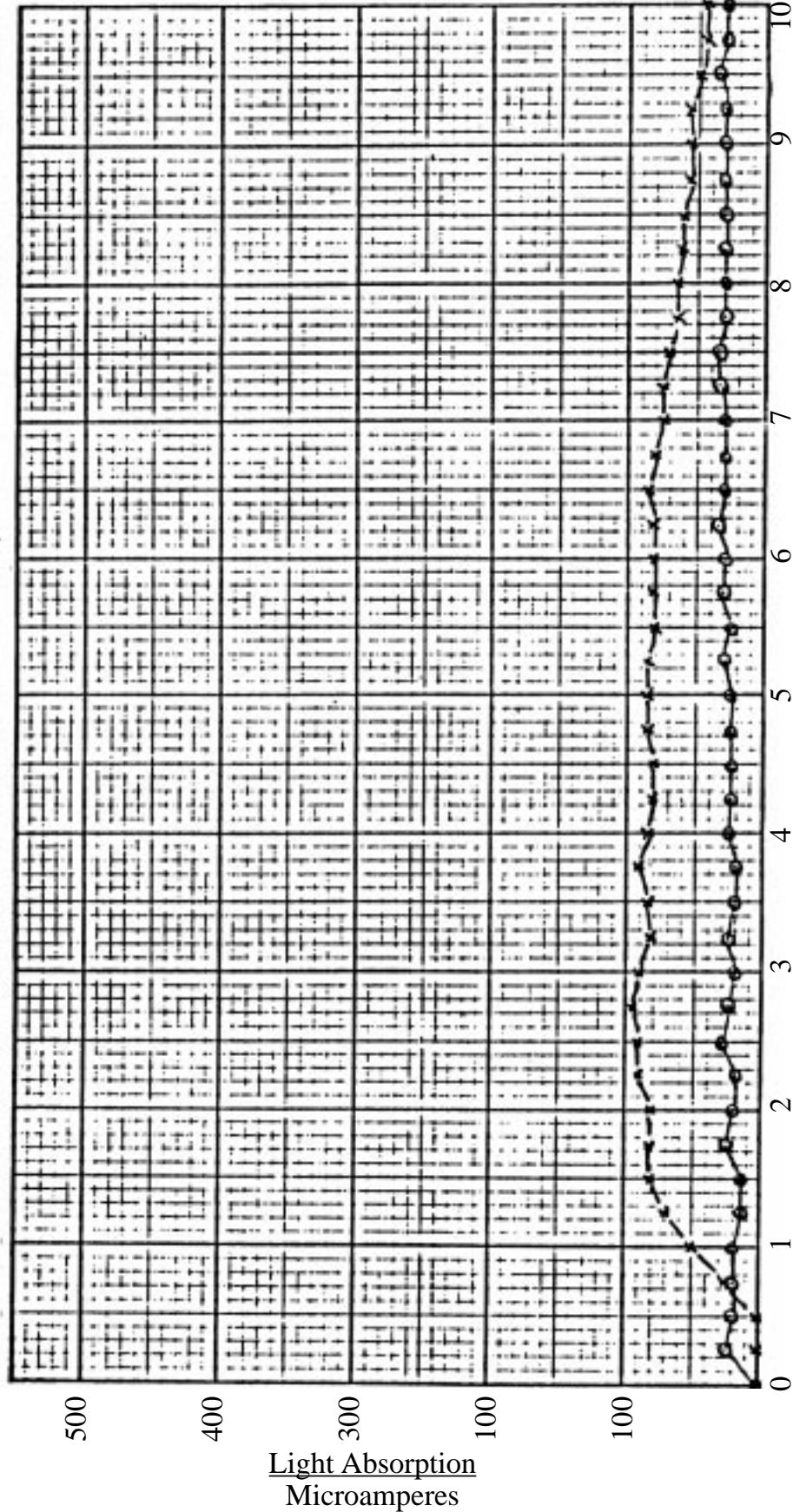
Minutes

Figure 3



SMOKE DENSITY

Key:
Sample ---○--- CUBICLE CURTAIN BURN BARRIER™ FPR
Red Oak ---+---



Minutes
Figure 4

CONCLUSIONS

1. For this sample the FSC is 0, the fuel contribution is 0, and the smoke density is 40.
2. The corresponding NFPA Interior Finish Materials Classification is Class A.

HAZARDS GROUPING (Interior Finish Materials)

NFPA CLASS	UBC CLASS	FLAME SPREAD
1. A	I	0 through 25
2. B	II	26 through 75
3a. C	---	76 through 200
3b. --	III	76 through 225
4. D	---	201 through 500
5. E	---	over 500