



**HARDWOOD PLYWOOD & VENEER ASSOCIATION  
LABORATORY AND TESTING SERVICE**

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**Report On  
Surface Burning Characteristics  
Determined By  
ASTM E 84 Twenty-Five Foot  
Tunnel Furnace Test Method**

**PREPARED FOR:**

**Forbo Linoleum, Inc.  
Hazelton, Pennsylvania**

**TEST NUMBER T-11906**

**MATERIAL TESTED:**

**83316-A Bulletin Board  
Color 2203, 6.0mm**

**DATE OF ISSUE 02/23/2006**

**I. SCOPE**

This report contains the reference to the test method, purpose, test procedure, rounding procedures, preparation and conditioning of specimens, description of materials, test and post test observation data, and test results.

**II. TEST METHOD**

The test was conducted in accordance with ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials." The 25-foot tunnel method is also described by NFPA 255 and UL 723.

**III. PURPOSE**

The purpose of the test is to determine the relative performance of the test material under standardized fire exposure. Results are given for Flame Spread and Smoke Developed Index. The values obtained from burning the test material represent a comparison with that of 1/4" inorganic reinforced cement board expressed as zero and red oak flooring expressed as 100.

The flame spread results of 25-foot tunnel tests are frequently used by building code officials and regulatory agencies in the acceptance of interior finish material for various applications. The most widely accepted classification system is epitomized by the National Fire Protection Association Life Safety Code, NFPA 101:

Class A*	0 - 25	flame spread	0-450	smoke developed
Class B*	26 - 75	flame spread	0-450	smoke developed
Class C*	76 - 200	flame spread	0-450	smoke developed

\*Class A, B and C correspond to I, II and III, respectively, in other codes such as UBC and BOCA.

This flame spread classification system is based on the premise that the higher the flame spread numbers, the greater the fire spread potential. The actual relationship between the numbers developed under this test and life safety from fire has not been adequately established.

**IV. TEST PROCEDURE NOTES**

The furnace was preheated to a minimum of 150°F as measured by an 18 AWG thermocouple embedded in cement 1/8" below the floor surface of the chamber, 23-1/4" from the centerline of the ignition burners. The furnace was then cooled to 105°F (± 5°F) as measured by a thermocouple embedded 1/8" below the floor surface of the test chamber 13' from the fire end.

Prior 10-minute tests with 1/4" inorganic reinforced cement board provided the zero reference for flame spread. Periodic 10-minute tests with unfinished select grade red oak flooring provided for the 100 reference for flame spread and smoke developed as noted in Section III.

**A. Flame Spread**

The flame spread distance is observed and recorded at least every 15 seconds or every 2 feet of progression. The peak distance is noted at the time of occurrence. The flame spread distance is plotted over time. The total area under the flame spread distance-time curve is determined; flame front recessions are ignored. The flame spread is then calculated as a function of the area under the curve relative to the standard red oak curve area. The value for flame spread classification for the tested material may be compared with that of inorganic reinforced cement board and select grade red oak flooring.

**B. Smoke Developed**

The smoke developed during the test is determined by the reduction in output of a photoelectric cell. A light beam vertically orientated across the furnace outlet duct is attenuated by the smoke passing through the duct. The output of the photoelectric cell is related to the obscuration of the light source through the duct caused by the smoke. A curve is developed by plotting photoelectric cell output against time. The value of smoke developed is derived by calculating the net area under the curve for the test material and comparing this area with the net area under the curve for unfinished select grade 23/32" red oak flooring.

**V. FLAME SPREAD AND SMOKE DEVELOPED ROUNDING PROCEDURES**

Single test calculated flame spread and smoke developed values are rounded to the nearest multiple of 5 and reported as the Flame Spread or Smoke Developed Index. Actual test values are available on request.

For multiple tests, the individual calculated flame spread and smoke developed values are recorded, averaged, and the results rounded to the nearest multiple of 5. The averaged, rounded number is reported as the Flame Spread or Smoke Developed Index.

**VI. PREPARATION AND CONDITIONING OF TEST SAMPLES**

Three or four sections are generally used in the preparation of a complete test specimen which is 20-1/2" wide and 24' long. Materials 8' in length may be tested by using three sections 20-1/2" wide by 8' long for a total specimen length of 24'. A 14" length of uncoated 16 gauge steel sheet is used to make up the remainder of the test specimen; it is placed at the fire end of the test chamber. Prior to testing, three 8' long sections of 1/4" inorganic reinforced cement board are placed on the back side of the specimens to protect the furnace lid assembly. Test specimens are conditioned at a controlled temperature of 73.4°F ( $\pm 5^\circ\text{F}$ ) and a controlled relative humidity of 50  $\pm$  5 percent.

## VII. MATERIAL TESTED

- 1) Manufacturer: Forbo Linoleum, Inc.  
Hazelton, Pennsylvania
- 2) Burn Number 1
- 3) Average Thickness (in.) .875
- 4) Average Weight (lbs./sq.ft.) 3.667
- 5) Average Groove Depth (in.) N/A
- 6) Product Description: 83316-A Bulletin Board, Color 2206, 6.0mm  
The specimens were adhered to 5/8" Type X Gypsum Board by the manufacturer.
  
- 7) Color Green
- 8) Surface Face side exposed
- 9) Sample Selection Manufacturer
- 10) Date of Selection 02/2006
- 11) Material Description by Manufacturer
- 12) Method of Mounting: Self-supporting
  
- 13) Sample Conditioning (days) 8

## VIII. TEST CONDITIONS AND DATA

- 1) Specimen Preheat Time (min.) 2:00
- 2) Tunnel Brick Temp. (deg.F) 102
- 3) Ignation Time (seconds) 37
- 4) Time to End of Tunnel  
or Flamefront Distance 11.5'@10:00
- 5) Time-Distance Curve Area  
(min./ft.) 76.6
- 6) Fuel and Temperature
  - a) Fuel (cu.ft./min.) 4.895
  - b) Max. Vent End Temp. (deg.F) 625
  - c) Time to Max. Temp. (min.) 10:00
- 7) After Flaming Yes

## IX. TEST RESULTS

Test results calculated on the basis of the areas under the curves of flame spread distance and smoke developed versus time are provided in the table below for calibration materials and for:

83316-A Bulletin Board  
Color 2203, 6.0mm

Material Description	Flame Spread Index	Smoke Developed Index
High Density Inorganic Reinforced Cement Board	0	0
Red Oak Flooring	100	100
T-11906	40	450

OBSERVATIONS: Charring to 23 feet.

REMARKS: The sample consisted of 3 pieces 96 inches long laid end-to-end.

CONCLUSIONS: Based on one test, the Flame Spread Index, calculated according to ASTM E 84, meets Class B (Class II) - 75 or under flame spread.

REPORT PREPARED BY:

*Thomas A. Wilson*

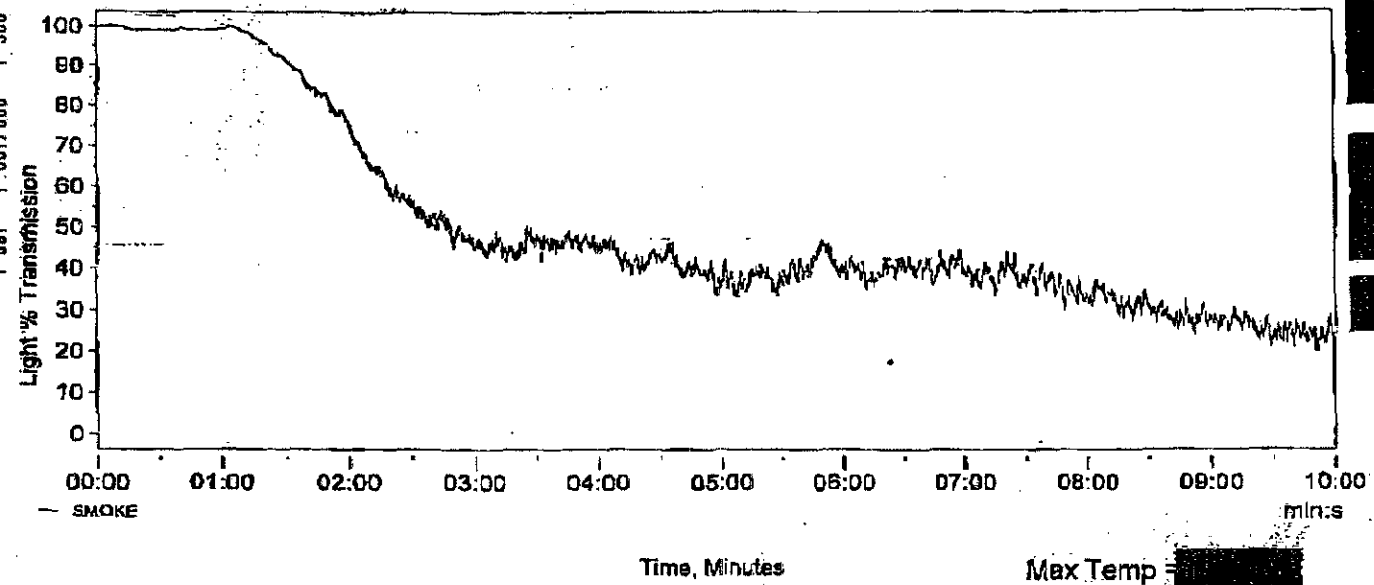
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REPORT REVIEWED BY:

*Russell L. Chapman*

RUSSELL L. CHAPMAN  
DIRECTOR, PRODUCT EVALUATION & STANDARDS

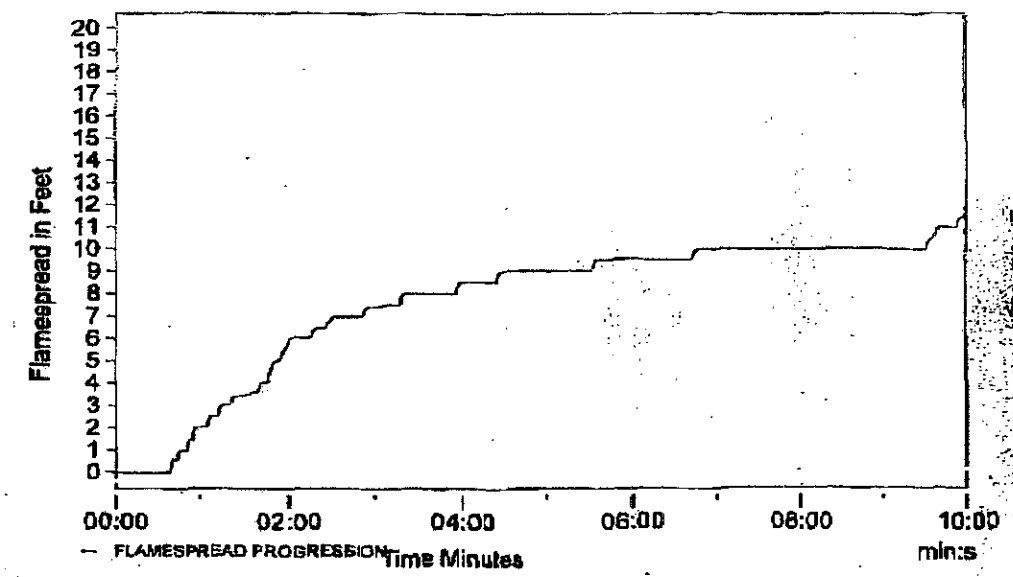
Conformance to the test standard is verified by a registered professional engineer. This is a factual report of the results obtained from laboratory tests of sample products. The results may be applied only to the products tested and should not be construed as applicable to other similar products of the manufacturer. The KPVX does not verify the description of materials and products when the description is provided by the client. The report is not a recommendation or a disapproval by the Hardwood Plywood & Veneer Association of the material or product tested. While this report may be used for obtaining product acceptance, it may not be used in advertising.



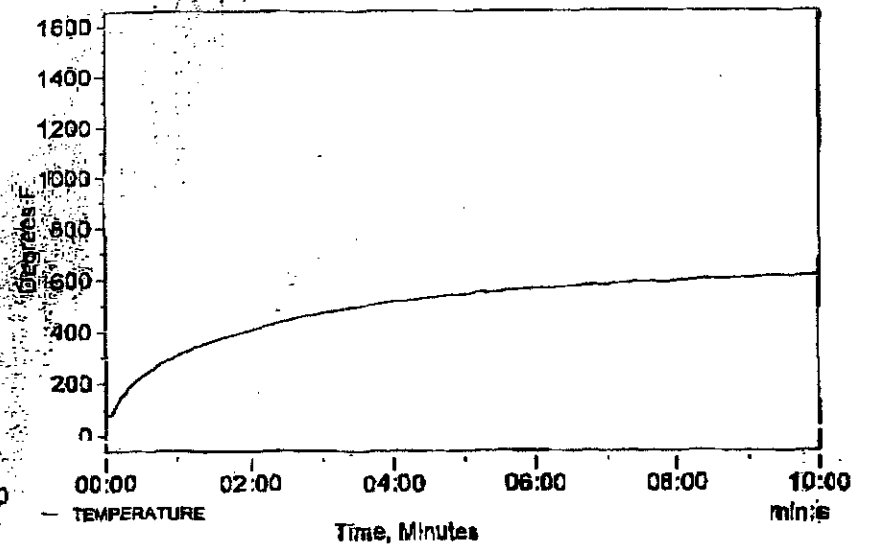
Flame Progression, Feet	59.41
Smoke MV	2.31
24 Ft. Temp, Deg. F	622
13 Ft. Temp, Deg. F	227
24 Foot Floor TC, Deg. F	145

Smoke Data

Max Temp @ Time



Flamespread Data



Fuel Data

**LABORATORY ACCREDITATION**

HPVA is a recognized ASTM E 84 testing laboratory by the following building code organizations under the Council of American Building Officials Report No. NER-TL329 and ICBO Evaluation Service Report No. TL 221.

International Conference of Building Officials  
 Building Officials and Code Administrators, International  
 Southern Building Code Congress International, Inc.


**HPVA FLAME SPREAD PROPERTY VERIFICATION PROGRAM**

The Hardwood Plywood & Veneer Association provides a product property verification program for flame spread properties. This program is based on the selection and testing of panels within a given marketing line on the basis of that combination of factors that theoretically should give the highest flame spread values. Such factors as panel thickness, specific gravity, color of stain, type of lamination, surface texture, and product mix are taken into consideration in the selection of flame spread samples.

While it is standard procedure to include smoke developed values in test reports, the HPVA label identifies only the flame spread class.

The HPVA label is evidence that the marketing line has been tested and inspected in accordance with the HPVA Flame Spread Inspection and Verification Program Procedures.

The HPVA label displayed below indicates conformance of the tested samples to the Type II glue bond requirements as set forth in ANSI/HPVA HP-1-2004 Standard For Hardwood And Decorative Plywood, and conformance to Flame Spread Class C (200 or less) as determined by the test procedures described in ASTM E 84. Depending on the type of product, the label may also include other information such as structural and formaldehyde emission ratings.

HARDWOOD PLYWOOD & VENEER ASSOCIATION		
BOND LINE TYPE II ANSI/HPVA HP-1-2004		FLAME SPREAD 200 OR LESS CLASS C ASTM E 84
	MILL 00 SPECIALTY GRADE	SIMULATED DECORATIVE FINISH ON PLYWOOD