COMMERCIAL TESTING COMPANY
1215 South Hamilton Street • Dalton, GA 30720
Telephone (706) 278–3935 • Facsimile (706) 278–3936

Standard Method of Test for
Surface Burning Characteristics of Building Materials

ASTM E 84–10

Daichi no Ibuki

Report Number 10–09116

Test Number 4166–0907
September 10, 2010

Tagawa Sangyo Co., Ltd.
Fukuoka, Japan

Commercial Testing Company

(Authorized Signature)

INTRODUCTION

This report is a presentation of results of a surface flammability test on a material submitted by Tagawa Sangyo Co., Ltd., Fukuoka, Japan.

The test was conducted in accordance with the ASTM International fire test response standard E 84–10, *Surface Burning Characteristics of Building Materials*, sometimes referred to as the Steiner tunnel test. This test is applicable to exposed surfaces such as walls and ceilings. The test is conducted with the specimen in the ceiling position with the surface to be evaluated exposed face down to the ignition source. The ASTM E 84 test method is the technical equivalent of NFPA No. 255 and UL No. 723.

This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire–hazard or fire–risk assessment of materials, products, or assemblies under actual fire conditions.

PURPOSE

The purpose of the test is to provide only the comparative measurements of surface flame spread and smoke development of materials with that of select grade red oak and fiber–reinforced cement board, Grade II, under specific fire exposure conditions. The test exposes a nominal 24-foot long by 20-inch wide test specimen to a controlled air flow and flaming fire adjusted to spread the flame along the entire length of a red oak specimen in 5.50 minutes. During the 10-minute test duration, flamespread over the specimen surface and density of the resulting smoke are measured and recorded. Test results are calculated relative to red oak, which has an arbitrary rating of 100, and fiber–reinforced cement board, Grade II, which has a rating of 0.

The test results are expressed as Flame Spread Index and Smoke Developed Index. The Flame Spread Index is defined in ASTM E 176 as "a number or classification indicating a comparative measure derived from observations made during the progress of the boundary of a zone of flame under defined test conditions." The Smoke Developed Index, a term specific to ASTM E 84, is defined as "a number or classification indicating a comparative measure derived from smoke obscuration data collected during the test for surface burning characteristics." There is not necessarily a relationship between the two measurements.

The method does not provide for measurement of heat transmission through the surface tested, the effect of aggravated flame spread behavior of an assembly resulting from the proximity of combustible walls and ceilings, or classifying a material as noncombustible solely by means of a Flame Spread Index.

The zero reference and other parameters critical to furnace operation are verified on the day of the test by conducting a 10–minute test using 1/4–inch fiber–reinforced cement board, Grade II. Periodic tests using NOFMA certified 23/32–inch select grade red oak flooring provide data for the 100 reference.

TEST SAMPLE

The test sample, selected by the client, was identified as **Daichi no Ibuki,** a lime plaster. Five test panels, each measuring two feet wide by five feet in length, were received from the client. The test panels, prepared by the client, consisted of the plaster applied to a 1/4–inch thick cement board substrate to an approximate thickness of 2mm. The panels were physically self-supporting and required no additional preparation. The prepared panels were transferred to storage racks and conditioned in an atmosphere with the temperature maintained at 71 ± 2°F and the relative humidity at 50 ± 5 percent. For testing, the panels were placed end–to–end on the ledges of the tunnel furnace and tested with no auxiliary support mechanism. This method of sample preparation is described in Appendix X1 of the E 84 standard, Guide to Mounting Methods, Section X1.5.1.

TEST RESULTS

The test results, calculated on the basis of observed flame propagation and the integrated area under the recorded smoke density curve, are presented below. The Flame Spread Index obtained in E 84 is rounded to the nearest number divisible by five. Smoke Developed Indices are rounded to the nearest number divisible by five unless the Index is greater than 200. In that case, the Smoke Developed Index

is rounded to the nearest 50 points. The flame spread and smoke development data are presented graphically at the end of this report.

Test Specimen	Flame Spread Index	Smoke Developed Index
Fiber–Reinforced Cement Board, Grade II	0	0
Red Oak Flooring	100	100
Daichi no Ibuki	**0**	**0**

OBSERVATIONS

The specimen did not ignite. Surface flame spread was observed to a maximum distance of 0.0 feet beyond the zero point at 0.00 minutes. The maximum temperature recorded during the test was 602°F.

CLASSIFICATION

The Flame Spread Index and Smoke Developed Index values obtained by ASTM E 84 tests are frequently used by code officials and regulatory agencies in the acceptance of interior finish materials for various applications. The most widely accepted classification system is described in the National Fire Protection Association publication NFPA 101 *Life Safety Code*, where:

Class A	0	– 25 Flame Spread Index	0 – 450 Smoke Developed Index
Class B	26	– 75 Flame Spread Index	0 – 450 Smoke Developed Index
Class C	76	– 200 Flame Spread Index	0 – 450 Smoke Developed Index

Class A, B, and C correspond to Type I, II, and III respectively in other codes. They do not preclude a material being otherwise classified by the authority of jurisdiction.

ASTM E 84 TEST DATA

Client: Tagawa Sangyo Co., Ltd.
Test Number: 4166-0907
Material Tested: Daichi no Ibuki
Date: September 10, 2010

Test Results:

Time to Ignition	=	0:00 minutes
Maximum Flamespread Distance	=	0 feet
Time to Maximum Spread	=	00:00 minutes
Flame Spread Index	=	0
Smoke Developed Index	=	0