

File R25940
Project 08CA28788

March 17, 2009

REPORT

On

DISTRIBUTION DEVICES, AIR

Under The

CLASSIFICATION PROGRAM

Durkeesox (Shanghai) Air Dispersion System Ltd
Wuhan Huibei 430074 China

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DESCRIPTION

PRODUCT COVERED:

The product covered by this Report is an air distribution device identified as "NanoSox."

The object of this project was to investigate the product for Classification under category AJIJ, Air Distribution Devices and for compliance to ICC Evaluation Service, Inc. Acceptance Criteria for Fabric Air Dispersion Systems, AC167 and UL Subject 2518, Outline for Air Dispersion System Materials.

USE:

The product is intended for use in building ventilation systems as permitted by authorities having jurisdiction.

TEST RECORD NO. 1

GENERAL:

Test results relate only to the items tested.

Samples of the "NanoSox" fabric air distribution device were submitted by the manufacturer for examination and test.

At the request of the submitter, the "NanoSox" fabric air distribution device was evaluated for Classification under category AJIJ, Air Distribution Devices. The product was also investigated for compliance to ICC Evaluation Service, Inc. Acceptance Criteria for Fabric Air Dispersion Systems, AC167 and UL Subject 2518, Outline for Air Dispersion System Materials.

The following tests were conducted in accordance with the Tenth Edition of UL 181, Factory Made Air Ducts and Air Connectors.

Test	Paragraph / Clause
Surface Burning Characteristics	UL 181, Par. 7.1 through 7.7
Mold Growth and Humidity	UL 181, Par. 13.1 through 13.4
Erosion	UL 181, Par. 18.1 through 18.3
Pressure	UL 181, Par. 19.1 through 19.5
Low Temperature	UL 181, Par. 14.1 through 14.3
High Temperature	UL 181, Par. 14.1 through 14.3

EXAMINATION OF MATERIALS

The samples used in this investigation were produced under the observation of a representative of Underwriters Laboratories Inc., in a ready-to-use form. The composition of the material is of a proprietary nature. Data on the composition is on file at the Laboratories for use in the Follow-Up Service Program.

Various physical and chemical tests were conducted on the components and finished products. The results developed from these tests were employed in establishing specifications for use in the factory Follow-Up Service Program.

SURFACE BURNING CHARACTERISTICS:

SAMPLES

The samples consisted of the NanoSox fabric air distribution device. A longitudinal seam was sewn through the center of the samples, and a zipper was sewn into the samples. The test sample was placed into the test apparatus so that the zipper was approximately 4 ft. from the burner.

Each test sample consisted of a length 24 ft long by 24 in. wide of the finished product.

Each test sample was supported by 2 in. hexagonal poultry netting supported by 1/4 in. diameter steel rods spaced 2 ft apart.

For each test a piece of 1 ft long by 22 in. wide by 1/16 in. thick uncoated steel plate was placed at the fire end of the tunnel furnace "upstream" from the gas burners to complete the 25 ft chamber length.

The test samples were allowed to condition at a temperature of $73 \pm 4^\circ\text{F}$ and a relative humidity of 50 ± 5 percent prior to testing.

METHOD

The test was conducted in accordance with Standard ANSI/UL 723, Tenth Edition; dated September 10, 2008, "Test for Surface Burning Characteristics of Building Materials," (ASTM E84-08).

RESULTS

Data on flame spread and smoke developed appears in the following tabulations. Graphs of flame spread versus time and smoke developed versus time are also provided as part of the Test Record.

Flame Spread Index

The maximum distance the flame spreads along the length of the sample from the end of the igniting flame is determined by observation.

The Flame Spread Index (FSI) of the material is determined by rounding the Calculated Flame Spread (CFS) as described in UL 723. The CFS is derived by calculating the area under the flame spread distance (ft) versus time (min) curve, ignoring any flame front recession, and using one of the calculation methods as described below.

1. If the total area (A_T) is less than or equal to 97.5 min-ft, the CFS shall be 0.515 times the total area ($\text{FSI} = 0.515 A_T$).

2. If the total area (A_T) is greater than 97.5 min-ft, the CFS is to be 4900 divided by 195 minus the total area ($\text{FSI} = 4900 / (195 - A_T)$).

Table 1: Flame Spread Summary

	Sample Description	Maximum Flame Spread (ft)	Time of Maximum Flame Spread (min:s)	Calculated Flame Spread (CFS)
1	NanoSox	0.0	n/a	0.0
2	NanoSox	0.0	n/a	0.0

Flame Spread Index	0.0
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Smoke Developed Index

The smoke Developed Index is determined by rounding the Calculated Smoke Developed (CSD) as described in UL 723. The CSD is determined by the output of a photoelectric circuit operating across the furnace flue pipe. A curve is developed by plotting values of light absorption (decrease in cell output) against time. The CSD is derived by expressing the net area under the curve for this material as a percentage of the net area under the curve for untreated red oak.

The CSD is expressed as:

$$CSD = (A_M / A_{ro}) \times 100$$

Where:

CSD = Calculated Smoke Developed

A_M = The area under the curve for the test material

A_{ro} = The area under the curve for untreated red oak

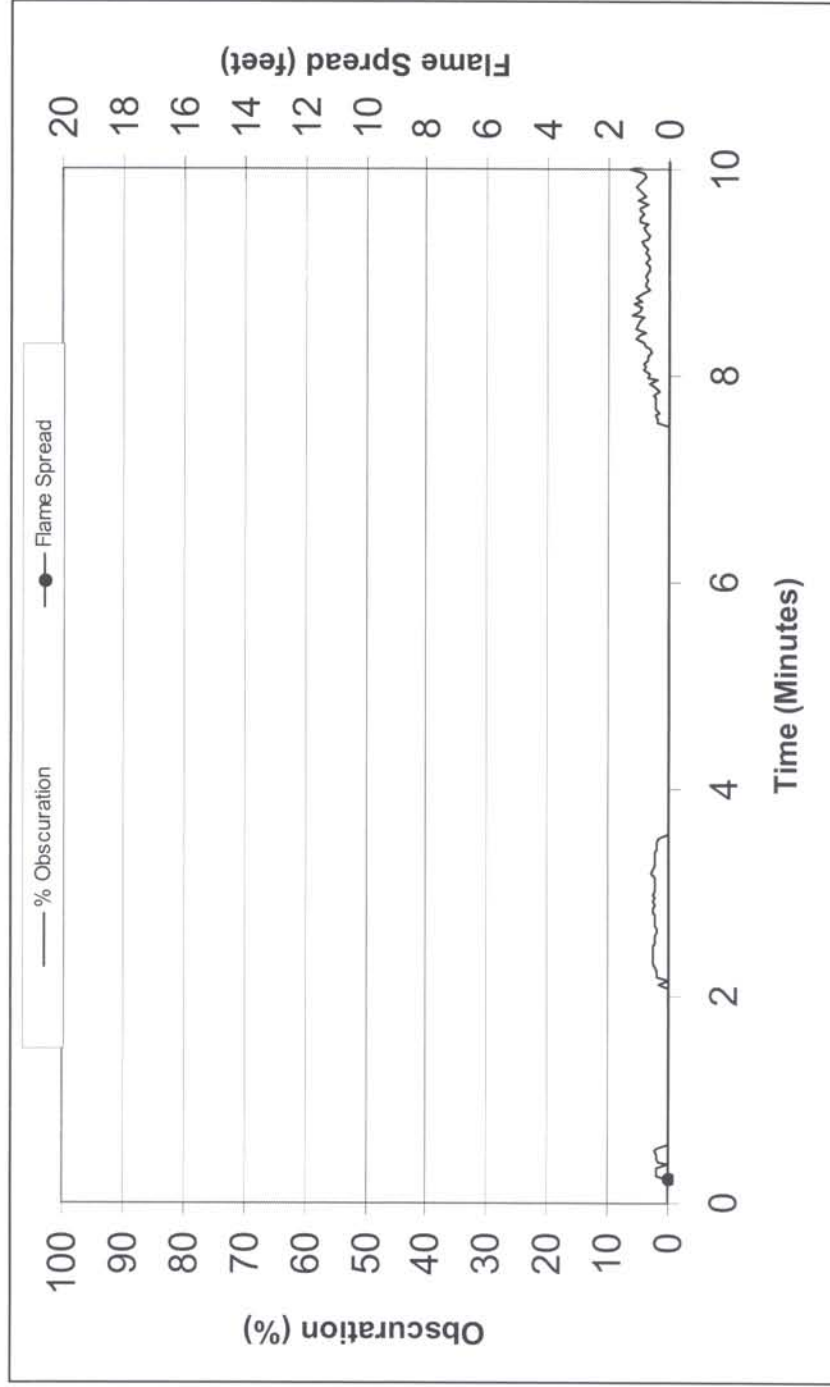
Table 2: Smoke Developed Summary

	Sample Description	CSD Calculated Smoke Developed
1	NanoSox	15.8
2	NanoSox	26.9

Smoke Developed Index	20
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Flame Spread / Smoke Results

Durkeesox
NanoSox fabric duct sample

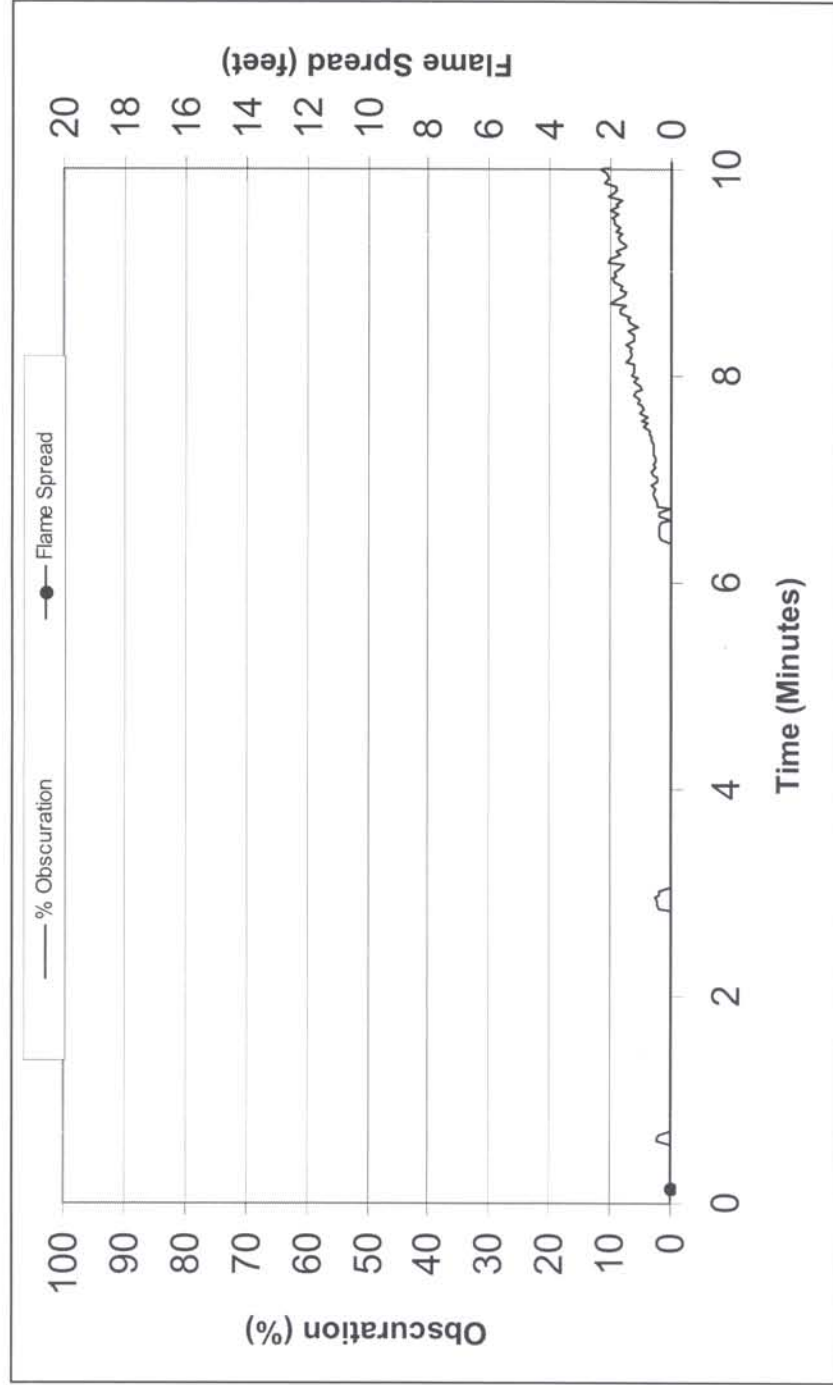


Test Num.: 1
R25940 / 08CA28788
01050906

Flame Spread Index: 0
Smoke Developed Index: 15
Max. Flame Spread (ft.): 0.0

Flame Spread / Smoke Results

Durkeesox
NanoSox fabric duct sample



Test Num.: 2
R25940 / 08CA28788
01050908

Flame Spread Index: 0
Smoke Developed Index: 25
Max. Flame Spread (ft.): 0.0

TEMPERATURE TEST:

The test was conducted in accordance with Section 14.2 of the Standard and is summarized below. The test was also conducted in accordance with Section 14.3 of the Standard, with the exception that the temperature was 129.4°C (265°F) both for the interior and exterior.

METHOD

Representative samples of the fabric were placed in a closed vessel with the atmosphere saturated with water vapor at room temperature for 48 hours. The samples were then placed in a refrigerated compartment for 24 hours at 17.8°C (0°F).

Two samples were also exposed to 265°F. The conditions of the test were maintained for 60 days.

RESULTS

Following the exposures, there was no indication of deterioration of the wall structure.

EROSION TEST:

The test was conducted in accordance with Sections 18.1 through 18.3 of the Standard and is summarized below.

METHOD

A representative sample of the fabric air distribution device was installed with a 90-degree bend and subjected to a velocity of 2-1/2 times the maximum rated velocity of 1,575 ft per minute for one hour. A collecting screen was then placed one foot from the outlet, and the test was conducted for 4 one hour increments.

RESULTS

There was no evidence of erosion. The sample showed no signs of cracking, flaking, peeling, or delamination. The particle count decreased or remained the same with each subsequent one hour time increment.

PRESSURE TEST:

The test was conducted in accordance with Sections 19.1 through 19.5 of the Standard and is summarized below.

METHOD

Two representative samples were selected in a 12 in. diameter, measuring 8 ft long for this test. A rubber bladder was inserted inside the sample. Each end of the sample was sealed airtight and attached to a stationary fixture. A pressure tap consisting of tubing was sealed into one end of the test sample and connected to a water manometer. The manufacturer's rated positive pressure of 3.0 in. W.C. was gradually attained and held for one minute. Then the positive pressure was increased to 2-1/2 times the manufacturer's rated pressure and held for one (1) hour.

RESULTS

The sampled did maintain the designated test pressure of 7.5 in. W.C. without rupture, evidence of breaks, rips, tears, or other openings greater than 1/8 inch. The samples were suitable for future use.

MOLD GROWTH AND HUMIDITY TEST:

Tests were conducted in accordance with Sections 13.1 through 13.4 of the Standard and are summarized below.

METHOD

Representative samples of the fabric were inoculated with Mold Mycelia and spores from Chaetomium Globosum on all surfaces. The samples were placed in a closed vessel in which an atmosphere saturated with water vapor was maintained at room temperature and under dark conditions. The samples were to remain in this atmosphere until the extent of growth had been demonstrated or until the mold and spores had disintegrated, but not less than 60 days.

RESULTS

At the end of the 60-day test period, there was no visible growth of mold beyond the inoculated areas. Structural materials did not become deformed or show delamination.

TEST RECORD SUMMARY 1:

The results of this investigation, including construction review and testing, indicate that the product evaluated complies with the applicable requirements in the standard noted below and, therefore, such product is judged eligible to bear UL's Classification Mark as described in the Guide for the category AJIJ. Any information and documentation provided to you involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

Standard	Title	Edition or Publication Date	Latest Revision Date
ICC Evaluation Service, Inc. AC167	Acceptance Criteria for Fabric Air Dispersion Systems	1st	July 1, 2004

Test Record No. 1 By:

Reviewed By:

Kim Lamke
Associate Project EngineerJames Hatcher
Staff Engineer

Any information and documentation provided to you involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

CONCLUSION

The following conclusions represent the judgment of Underwriters Laboratories Inc. based upon the results of the examination and tests presented in this Report.

NFPA 90A, "Installation of Air Conditioning and Ventilation Systems" requires air outlets to be constructed of noncombustible material or material that has Flame Spread and Smoke Developed ratings less than or equal to 25 and 50, respectively.

The product covered by this Report is judged to be eligible for Classification and Follow-Up Service. The manufacturer is authorized to use the UL Classification Marking as shown below on such products, which comply with the Follow-Up Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the UL Classification Marking are considered as Classified by Underwriters Laboratories Inc.

CLASSIFICATION MARKING:



AIR DISTRIBUTION DEVICE
IN ACCORDANCE WITH FLAMMABILITY REQUIREMENTS
OF NFPA 90A
Control No.

The Classification Mark for products investigated to ICC Evaluation Service AC167 and UL Subject 2518 may also include the statement "ALSO CLASSIFIED IN ACCORDANCE WITH ICC EVALUATION SERVICE AC167 AND UL SUBJECT 2518."

Test Record By:

Kim Lamke
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