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ASTM E 662 Rate of Smoke Generation of "Moniflex as manufactured by Isoflex AB"

A Report To:	**Isoflex AB** Soldatvägen 1 783 50 Gustafs Sweden
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Submitted By:	Exova Warringtonfire North America
Report No.	16-002-411(B) 3 pages + appendix
Date:	July 28, 2016

ACCREDITATION To ISO/IEC 17025 for a defined Scope of Testing by the International Accreditation Service

SPECIFICATIONS OF ORDER

Determine rate of smoke generation according to ASTM E 662, as per Exova GmbH reference Order No. E04316000341 dated July 12, 2016.

IDENTIFICATION

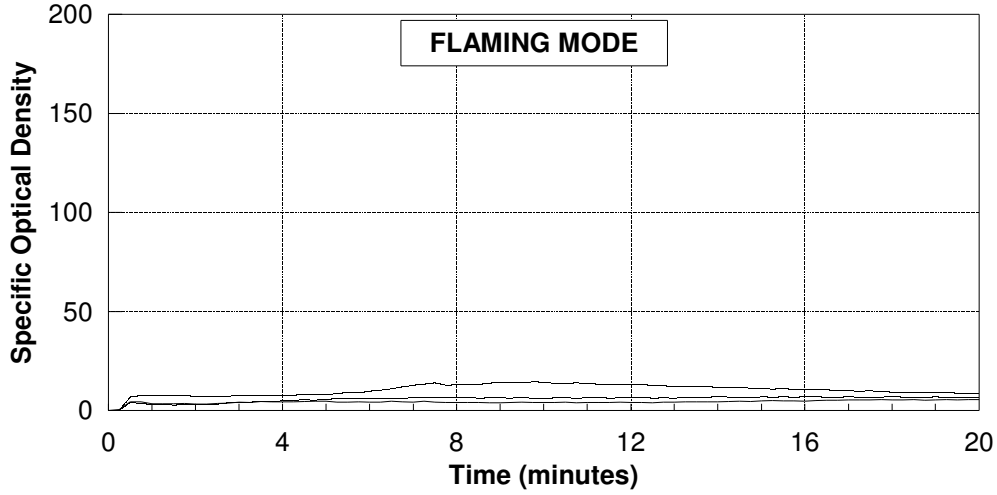
Cellulose based insulation material, identified as "Moniflex as manufactured by Isoflex AB".

(Exova sample identification number 16-002-S0411)

TEST RESULTS

ASTM E 662-15a

Specific Optical Density of Smoke Generated by Solid Materials

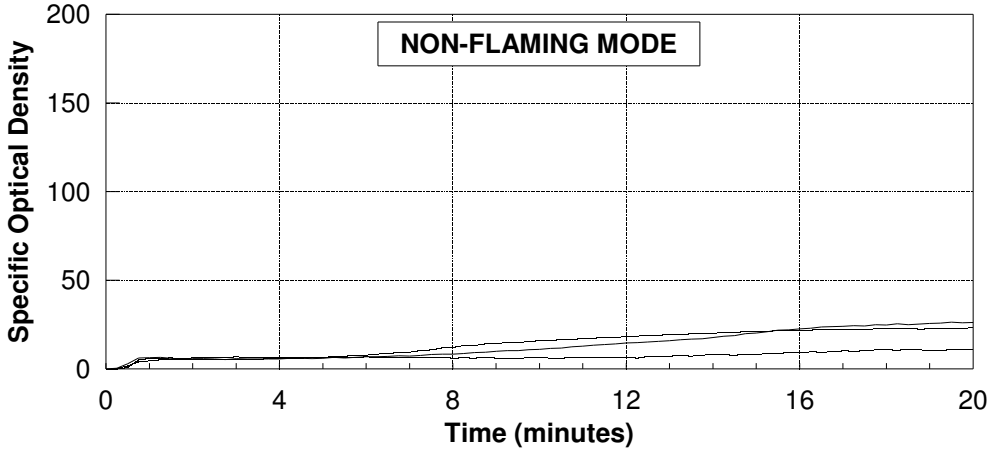


Relative Room Humidity: 53%	Test Duration: 20 min.			Chamber Wall Temp: 35°C		
Flaming Mode	Test	#1	#2	#3	Average	NFPA 130 Specified Maxima
Specific Optical Density at 1.5 minutes		8	4	4	5	-
Specific Optical Density at 4.0 minutes		8	5	4	6	100
Maximum Specific Optical Density		15	7	6	9	-
Maximum Corrected Optical Density		13	6	5	8	-

TEST RESULTS (continued)

ASTM E 662-15a

Specific Optical Density of Smoke Generated by Solid Materials



Relative Room Humidity: 53%	Test Duration: 20 min.			Chamber Wall Temp: 35°C		
Non-Flaming Mode	Test	#1	#2	#3	Average	NFPA 130 Specified Maxima
Specific Optical Density at 1.5 minutes		6	5	7	6	-
Specific Optical Density at 4.0 minutes		7	6	7	6	100
Maximum Specific Optical Density		11	23	26	20	-
Maximum Corrected Optical Density		11	20	25	19	-

Observations

In the flaming mode, sample melts with the ignition of the melt material observed at approximately 120 seconds into the test. Visible smoke production was also observed. In the non-flaming, melting of the material was observed followed by visible smoke.

CONCLUSIONS

The cellulose based insulation material identified in this report, meets NFPA 130 (2014 Edition) requirements as they pertain to rate of smoke generation (ASTM E 662).

Note: This is an electronic copy of the report. Signatures are on file with the original report.

Mel Garces,
Senior Technologist.

Ian Smith,
Technical Manager.

APPENDIX

(1 Page)

Summaries of Test Procedures

ASTM E 662-15a

Specific Optical Density of Smoke Generated by Solid Materials

This method of test covers a procedure for measuring the smoke generated by solid materials and assemblies in thickness up to and including 1 inch (25.4 mm). Measurement is made of the attenuation of a light beam by smoke (suspended solid or liquid particles) accumulating within a closed chamber due to nonflaming pyrolytic decomposition and flaming combustion. Results are expressed in terms of specific optical density (Ds), which is derived from a geometrical factor and the measured optical density (absorbance).

As specified, the test samples are pre-dried for 24 hours at 60°C. Section 9.1 of ASTM E 662-15a states to then condition the specimens to "equilibrium (constant weight)" but does not specify a definition or procedure with respect to establishing the "constant weight". Therefore, prior to testing, the specimens are then conditioned for a minimum period of 24 hours at 50 ± 5% relative humidity and 23 ± 3°C.

Three specimens, 3" square, are exposed to each mode of combustion. Prior to test initiation, the chamber wall temperature is established in the range of 33 to 37° C. The % light transmittance during the course of the combustion is recorded. These data are used to express the quantity of smoke in the form of Specific Optical Density based on the following formula, which assumes the applicability of Bouguer's law:

$$Ds = (V/AL)\cdot\log(100/T) = G\cdot\log(100/T) = 132\cdot\log(100/T)$$

Where: Ds = Specific Optical Density
T = % Transmittance
V = Chamber Volume (18 ft^3)
A = Exposed Area of the Sample (0.0456 ft^2)
L = Length of Light Path in Chamber (3.0 ft)
G = Geometric Factor

Among the parameters normally reported are:

Ds 1.5	- specific optical density after 1.5 minutes
Ds 4.0	- specific optical density after 4.0 minutes
Dm	- maximum specific optical density at any time during the 20 minute test
Dm (corr)	- Dm corrected for incidental deposits on the optical surfaces

For thermal and acoustical insulation, NFPA 130 (2014 Edition) specifies a maximum average Ds 4.0 of 100 in either flaming or non-flaming test mode.