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ASTM E 662 Rate of Smoke Generation of "OXIFREE TM198"

A Report To:	Oxifree Global LLC 22955 State Highway 249, Suite 6 Tomball, TX 77375 USA
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Attention:	Ed Hall
Submitted By:	Fire Testing
Report No.	12-002-080(A) 3 pages + appendix
Date:	February 16, 2012

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 your Purchase Order No. 0110250 dated February 12, 2012.

IDENTIFICATION

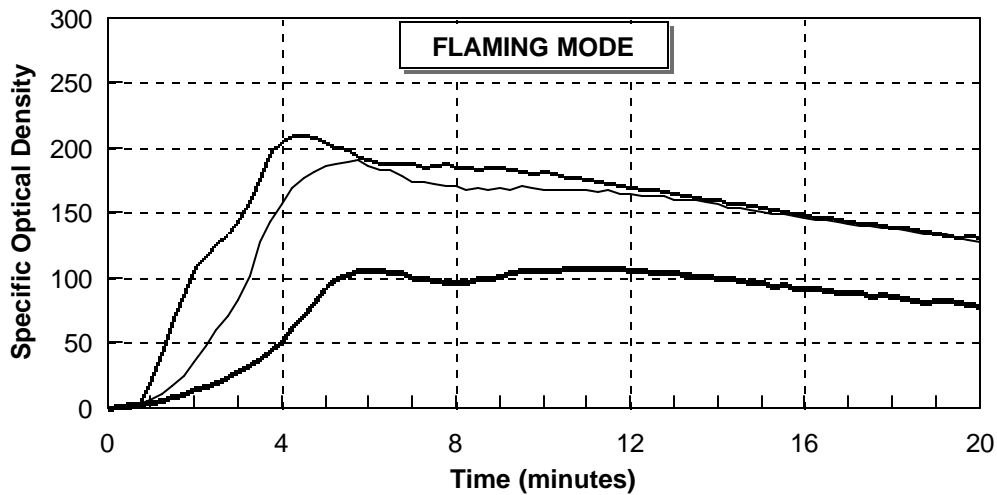
Protective organic coating material, approximately 12 mm in thickness and identified as "Oxifree TM198".

(Exova sample identification number 12-002-S0080)

TEST RESULTS

ASTM E 662-09

Specific Optical Density of Smoke Generated by Solid Materials

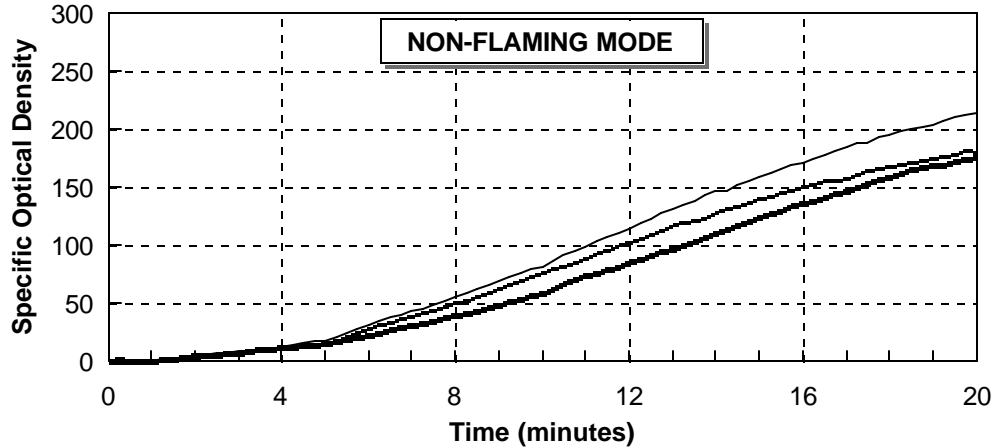


Relative Room Humidity: 23%		Test Duration: 20 min.			Chamber Wall Temp: 35°C		
Flaming Mode		Test	#1	#2	#3	Average	Specified Maxima
Specific Optical Density at 1.5 minutes			9	69	17	32	100
Specific Optical Density at 4.0 minutes			52	206	157	138	200
Maximum Specific Optical Density			107	210	190	169	-
Maximum Corrected Optical Density			107	191	179	159	-

TEST RESULTS (continued)

ASTM E 662-09

Specific Optical Density of Smoke Generated by Solid Materials



Relative Room Humidity: 23%	Test Duration: 20 min.			Chamber Wall Temp: 35°C		
Non-Flaming Mode	Test	#1	#2	#3	Average	Specified Maxima
Specific Optical Density at 1.5 minutes		2	3	2	2	100
Specific Optical Density at 4.0 minutes		12	13	13	13	200
Maximum Specific Optical Density		176	182	215	191	-
Maximum Corrected Optical Density		174	182	212	189	-

Observations

In the flaming mode, sample melts and ignition was observed at the point of flame increasing to full ignition within 30 seconds of the test. Flaming dripping of the molten material was observed with visible smoke production. In the non-flaming mode, melting of the material was observed followed by visible smoke production.

COMMENTS

There are no current, specific Federal Railroad Administration requirements cited for coating materials when tested for rate of smoke generation using the ASTM E 662 test procedure. Therefore, the criterion cited in this report are for general requirements and are listed for reference purposes only.

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

Mel Garces,
Fire Testing.

Ian Smith,
Fire Testing.

Note: This report and service are covered under Exova Canada Inc. Standard Terms and Conditions of Contract which may be found on the Exova website (www.exova.com), or by calling 1-866-263-9268.

APPENDIX

(1 Page)

Summaries of Test Procedures

ASTM E 662-09

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 662-09 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:

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

Where: Ds = Specific Optical Density

T = % Transmittance

V = Chamber Volume (18 ft³)

A = Exposed Area of the Sample (0.0456 ft²)

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

Transit authorities generally specify a maximum Ds 1.5 of 100 and a maximum Ds 4.0 of 200 in either flaming or non-flaming test mode.