

SOUTHWEST RESEARCH INSTITUTE®

6220 CULEBRA RD. 78238-5166 • P.O. DRAWER 28510 78228-0510 • SAN ANTONIO, TEXAS, USA • (210) 684-5111 • WWW.SWRI.ORG

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION
FIRE TECHNOLOGY DEPARTMENT
WWW.FIRE.SWRI.ORG
FAX (210) 522-3377



FIRE PERFORMANCE EVALUATION OF *DRAGONBOARD SHEATHING* TESTED IN ACCORDANCE WITH ASTM E 136, STANDARD TEST METHOD FOR BEHAVIOR OF MATERIALS IN A VERTICAL TUBE FURNACE AT 750 °C

FINAL REPORT
Consisting of 6 Pages

SwRI® Project No. 01.13544.01.313
Test Date(s): December 5 and 6, 2007
Report Date: January 3, 2008

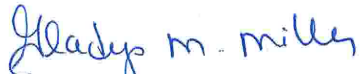
Prepared for:

DragonBoard
504 May Drive
Scranton, PA 18505

Prepared by:


Amber R. Faw
Research Scientist
Material Flammability Section

Approved by:


Gladys M. Miller, M.S., M.B.A.
Assistant Director
Fire Technology Department

This report is for the information of the client. It may be used in its entirety for the purpose of securing product acceptance from duly constituted approval authorities. This report shall not be reproduced except in full, without the written approval of SwRI. Neither this report nor the name of the Institute shall be used in publicity or advertising.



HOUSTON, TEXAS (713) 977-1377 • WASHINGTON, DC (301) 881-0226

1.0 INTRODUCTION

This report describes a small-scale fire test conducted in accordance with ASTM E 136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C* (1999), for DragonBoard, located in Scranton, Pennsylvania. Testing was conducted on December 5 and 6, 2007, at the Fire Technology Department of Southwest Research Institute (SwRI), located in San Antonio, Texas.

The test method described in ASTM E 136 is intended to measure and describe the properties of materials or products in response to heat and flame under controlled laboratory conditions. The results should not be used alone to describe or appraise the fire hazard or the fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a complete fire hazard for fire risk assessment, which takes into account all the factors that are pertinent to an assessment of the fire hazard or risk of a particular end-use.

The results presented in this report apply specifically to the specimens tested, in the manner tested, and not to the entire production of these or similar materials, nor to the performance when used in combination with other materials.

2.0 DESCRIPTION OF TEST APPARATUS AND PROCEDURE

The ASTM E 136 hot-air ignition furnace consists primarily of an electrical heating unit and specimen holder. The furnace tube is a vertical tube, with an inside diameter of 100 ± 5 mm and a length of 230 ± 20 mm, made of ceramic that will withstand at least 750 °C. The inner ceramic tube, with an inside diameter of 75 ± 5 mm, a length of 230 ± 20 mm, and a thickness of approximately 3 mm, is placed inside the furnace tube and positioned 20 ± 2 mm above the furnace floor on spacer blocks. The test apparatus is shown in Figure 1.

The air temperature inside the furnace is stabilized to 750 °C prior to testing. Sheathed thermocouples are used to measure the temperature of the furnace air (T_f), specimen surface (T_s), and specimen interior (T_c). The duration of flaming is recorded during the test, and specimen mass loss is determined based on weight measurements before and after testing. ASTM E 136 requires that a series of four tests be conducted for each sample.

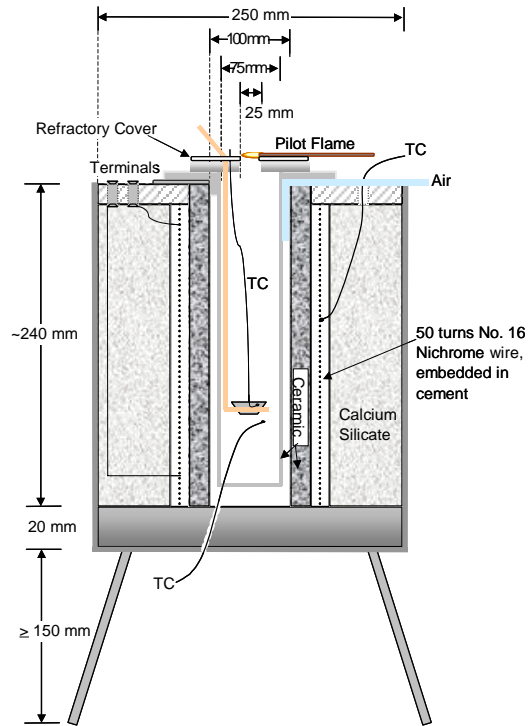


Figure 1. Schematic of SwRI's Hot-Air Furnace.

A material passes if at least three of the four specimens tested meet the following criteria:

1. When the weight loss is 50% or less:
 - a. The surface and interior thermocouples cannot have a temperature rise of more than 30 °C from the stabilized temperature measured by the interior thermocouple before testing.
 - b. No sustained flaming during the first 30 s of the test.
2. When the weight loss is 50% or more:
 - a. The surface and interior thermocouples cannot exhibit any temperature rise from the stabilized temperature measured by the interior thermocouple before testing.
 - b. No flaming at any time during the test.

The three specimens do not need to meet the same condition.

3.0 DESCRIPTION OF TEST SPECIMENS

DragonBoard provided four pieces of the material, identified as *DragonBoard Sheathing*. One sample measured 29 × 34 × 180 mm from which three samples 38 mm long were cut. Three additional pieces measuring 38 × 33 × 13mm were also received and layered together to form the fourth test sample. All sections were received by SwRI on December 4, 2007. A description of

the material provided by the client can be found in Table 1. The samples were placed in a controlled environment maintained at 23 °C ± 2 °C (73 °F ± 5 °F) and 50% ± 5% relative humidity from the time they were received until just prior to testing.

Table 1. Test Sample Description Provided by the Client.

Material ID	Description of Material	Nominal Thickness*	Nominal Density*	Color *
<i>DragonBoard Sheathing</i>	Proprietary Magnesium Oxide Based Sheathing	38 mm	935 kg/m ³	White

* Measured by SwRI personnel.

4.0 TEST RESULTS

Testing was conducted on December 5 and 6, 2007. During test runs 1, 2, and 4, no smoking, flames, or other signs of combustion were observed at anytime throughout the test. During test run 3 glowing ignition was visible beginning at 25 min 30 s and continued for the duration of that run. Tabular test data and graphs of the measured temperatures plotted with respect to time are presented in Appendix A.

5.0 CONCLUSIONS

The *DragonBoard Sheathing* tested meets the performance criteria presented in ASTM E 136.

APPENDIX A
TABULAR AND GRAPHICAL DATA
(Consisting of 1 Page)

SOUTHWEST RESEARCH INSTITUTE
ASTM E 136 TEST DATA SHEET

<p><i>Client:</i> DragonBoard <i>Operator:</i> C. Harper <i>Test Date(s):</i> December 5 and 6, 2007 <i>Material ID*:</i> DragonBoard Sheathing <i>Trade Name*:</i> None Provided <i>Description*:</i> Proprietary Magnesium Oxide Based Sheathing</p>	<p><i>Receipt Date:</i> December 4, 2007 <i>Date Prepared by SwRI:</i> December 4, 2007 <i>Color:</i> White <i>Original Thickness:</i> 29mm <i>Test Sample Thickness:</i> 29mm <i>Average Sample Mass:</i> 64.69 g</p>
---	---

* Information/instructions provided by the Client

RESULTS

Run	Initial Mass (g)	Final Mass (g)	Percent Mass Loss	Specimen Center			Criteria* ΔT < 30 °C	Specimen Surface			
				Stabilized (°C)	Maximum (°C)	Δ T (°C)		Stabilized (°C)	Maximum (°C)	Δ T (°C)	Criteria* ΔT < 30 °C
1	64.20	37.11	42%	750	742	-8	Pass	750	760	10	Pass
2	61.60	35.70	42%	750	738	-13	Pass	750	759	9	Pass
3 **	69.32	37.13	46%	751	958	208	Fail	751	768	17	Pass
4	63.63	36.82	42%	751	743	-7	Pass	751	758	8	Pass

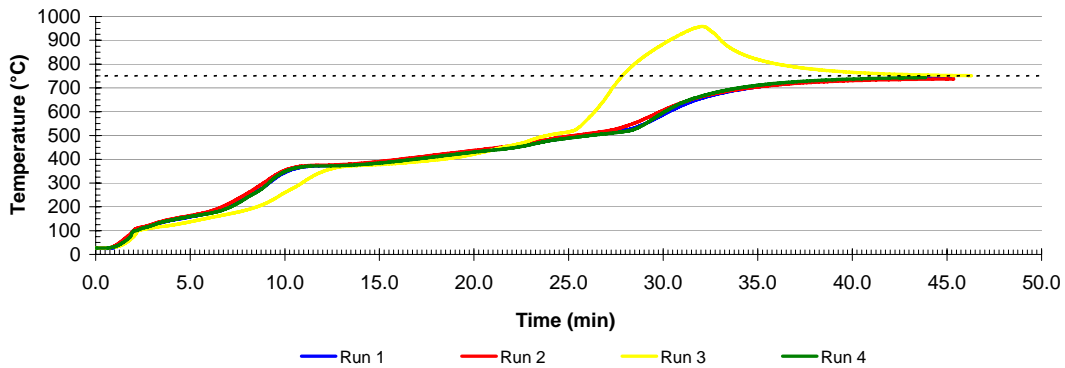
*Criteria for when percent mass loss < 50%

TEST OBSERVATIONS

	Insertion Time	Ignition Time	Flameout	Criteria	Observed Smoke	Observed Soot	Total Test Time
	(s)	(s)	(s)	< 30 s	(min:s)	(min:s)	(s)
1	32	No Ignition	N/A	Pass	None	None	2688
2	27	No Ignition	N/A	Pass	None	None	2695
3 **	30	1530	0:00	Fail	None	None	2748
4	27	No Ignition	N/A	Pass	None	None	2605

**The third run which failed was the sample that was pieced together and had a different appearance than the larger section.

Center Temperature Graph



Surface Temperature Graph

