Test Report

Classification Tests on GreenFiber-Lithia Springs
INS 735 Cellulose Product
Supplied by US GreenFiber

Prepared For:

Mr. Steve Martin
US GreenFiber, LLC
2285 Sweetwater Industrial Blvd.
Lithia Springs, GA 30122

R & D Services, Inc.
P.O. Box 2400
Cookeville, Tennessee 38502-2400

Report: RD06221

Reviewed by:

Ronald S. Graves
Vice President

April 18, 2006

The test results in this report apply only to the specimens tested. This report shall not be reproduced, except in full, without written approval of R & D Services, Inc. This report must not be used by the Client to claim product endorsement by R & D Services, Inc., NVLAP or any agency of the U.S. Government.
**Design Density Test Report**

R&D Test Number: RD061228DD Date of Test: February 20, 2006

Specimen Number: 1180060214-6.8 Date of Manufacture: February 10, 2006

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Blown Using a Krendl 500 Machine and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH

Test Method: ASTM C 739-05, Section 8 “Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.”

Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

<table>
<thead>
<tr>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.</td>
<td>107.20</td>
<td>106.40</td>
<td>109.80</td>
</tr>
<tr>
<td>Area</td>
<td>0.018385</td>
<td>0.018385</td>
<td>0.018385</td>
</tr>
<tr>
<td>Depth</td>
<td>228</td>
<td>234</td>
<td>231</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>236</td>
<td>238</td>
</tr>
<tr>
<td>Ave.</td>
<td>227.00</td>
<td>230.00</td>
<td>235.50</td>
</tr>
<tr>
<td>Set. Den</td>
<td>25.6865</td>
<td>25.1623</td>
<td>25.3599</td>
</tr>
<tr>
<td>Set. Den</td>
<td>1.603</td>
<td>1.571</td>
<td>1.583</td>
</tr>
<tr>
<td>Settled Density</td>
<td>1.59 (lb/ft³)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test results reported apply only to the specimen tested.
Critical Radiant Flux (Electric) Test Report

R&D Test Number: RD061250CR            Date of Test: February 24, 2006
Specimen Number: 1180060214-6,8            Date of Manufacture: February 10, 2006

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Blown Using a Krendl 500 Machine and Conditioned for >2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

Density (lb/ft³) | Length of Burn (cm) | Critical Radiant Flux (W/cm²) | Pass / Fail
--- | --- | --- | ---
1.08 | 42.7 | 0.11 | Fail
1.12 | 42.7 | 0.11 | Fail
1.09 | 44.5 | 0.10 | Fail

The average CRF is 0.11 W/cm²
The standard deviation is 0.01
The coefficient of variation for repeatability is 9.09%.

Reviewed By: Date:

The results in this report apply only to the specimen tested.
Critical Radiant Flux (Gas) Test Report

R&D Test Number: RD061229CR
Date of Test: February 20, 2006

Specimen Number: 1180060214-6.8
Date of Manufacture: February 10, 2006

Description of test specimen: GreenFiber-Lithia Springs; INS 735 Cellulose; Blown Using a Krendl 500 Machine and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH


Report prepared for: US GreenFiber, LLC. - Lithia Springs / Steve Martin

<table>
<thead>
<tr>
<th>Density (lb/ft³)</th>
<th>Length of Burn (cm)</th>
<th>Critical Radiant Flux (W/cm²)</th>
<th>Pass / Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.32</td>
<td>77.7</td>
<td>0.14</td>
<td>Pass</td>
</tr>
<tr>
<td>1.34</td>
<td>76.2</td>
<td>0.15</td>
<td>Pass</td>
</tr>
<tr>
<td>1.31</td>
<td>81.0</td>
<td>0.13</td>
<td>Pass</td>
</tr>
</tbody>
</table>

The average CRF is 0.14 W/cm²
The standard deviation is 0.01.
The coefficient of variation for repeatability is 7.14%.

Reviewed By: ___________________________ Date: ___________________________

Test results reported apply only to the specimen tested.
Smoldering Combustion Test Report

R&D Test Number: RD061251SC          Date of Test: February 21, 2006
Specimen Number: 1180060214-6.8      Date of Manufacture: February 10, 2006

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Blown Using a Krendl 500 Machine and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH; Tested at 1.59 PCF.


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

<table>
<thead>
<tr>
<th>Initial Weight (grams)</th>
<th>Final Weight (grams)</th>
<th>% loss</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>103.40</td>
<td>103.00</td>
<td>0.39</td>
<td>Pass</td>
</tr>
<tr>
<td>103.20</td>
<td>102.70</td>
<td>0.48</td>
<td>Pass</td>
</tr>
<tr>
<td>103.30</td>
<td>103.00</td>
<td>0.29</td>
<td>Pass</td>
</tr>
</tbody>
</table>

Reviewed By: __________________________ Date: __________________________

The results in this report apply only to the specimen tested.
Corrosiveness Test Report

R&D Test Number: RD061353CO Date of Test: February 21-March 07, 2006
Specimen Number: 1180060214-6,8 Date of Manufacture: February 10, 2006

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Blown Using a Krendl 500 Machine and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

Coupon: Pass / Fail Comments:

Aluminum Pass No holes or perforations.
Copper Pass No holes or perforations.
Steel Pass No holes or perforations.

Reviewed By: Date:

The results in this report apply only to the specimen tested.
Moisture Vapor Sorption Test Report

R&D Test Number: RD061354MS    Date of Test: March 03, 2006
Specimen Number: 1180060214-6,8    Date of Manufacture: February 10, 2006

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Blown Using a Krendl 500 Machine and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH; Tested 1.59 PCF


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

<table>
<thead>
<tr>
<th>Initial Weight (grams)</th>
<th>Final Weight (grams)</th>
<th>% Gain</th>
<th>Pass / Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>263.70</td>
<td>280.40</td>
<td>6.33</td>
<td>Pass</td>
</tr>
</tbody>
</table>

Reviewed By: ___________________________    Date: _______________________

The results in this report apply only to the specimen tested.
Thermal Resistance Test Report

Date of Test: February 24-27, 2006

Date of Manufacture: February 10, 2006

Fox Number: 5494

Specimen Number: 1180060214-6

R&D Test Number: RD061249TR

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Tested at 1.59 PCF


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

The results in this report were obtained with a heat-flow meter built and operated in accordance with ASTM C 518. The test results in a value for the apparent thermal conductivity of the test specimen, k, in units W/m.K. The thermal resistivity, R-value per inch, in U.S. customary units is the reciprocal of the product of 6.933 and k.

Heat flow meter: 24 by 24 inches x inches
Specimen thickness: 4.000 inches
Specimen density: 1.59 lb/ft³
Cold plate temperature: 52.56 deg F
Hot plate temperature: 97.56 deg F
Average specimen temperature: 75.06 deg F
Apparent thermal conductivity: 0.2759 Btu.in/ft².hr.ºF
Thermal resistivity (R-per-inch): 3.625 ft².hr.ºF/Btu.in
Thermal resistance of specimen: 14.5 ft².hr.ºF/Btu

Notes:
Calibration factor used for manual calculation? NA
EMF NA
Edge guards or cabinet temperature satisfactory? Yes
Excessive moisture on cold plate? No
Length of time for test (hours)? 69.9

The precision of this test is estimated to be 2.5% (Section 10.3, ASTM C 518)

Reviewed By: ___________________________ Date: ___________________________

The results in this report apply only to the specimen tested. This test conforms to ASTM Test Method C 518 except for the report requirements. The report includes summary data but a full complement of data is available upon request.
Thermal Resistance Test Report

Date of Test: March 07-09, 2006  Date of Manufacture: February 10, 2006

Fox Number: 5498  Specimen Number: 1180060214-7

R&D Test Number: RD061351TR

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Tested at 1.59 PCF


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

The results in this report were obtained with a heat-flow meter built and operated in accordance with ASTM C 518. The test results in a value for the apparent thermal conductivity of the test specimen, k, in units W/m.K. The thermal resistivity, R-value per inch, in U.S. customary units is the reciprocal of the product of 6.933 and k.

Heat flow meter: 24 by 24 inches x inches
Specimen thickness: 4.000 inches
Specimen density: 1.57 lb/ft³

Cold plate temperature: 52.56 deg F
Hot plate temperature: 97.56 deg F
Average specimen temperature: 75.06 deg F

Apparent thermal conductivity: 0.2805 Btu.in/ft².hr.°F
Thermal resistivity (R-per-inch): 3.565 ft².hr.°F/Btu.in
Thermal resistance of specimen: 14.3 ft².hr.°F/Btu

Notes: Calibration factor used for manual calculation? _NA_  EMF _NA_
Edge guards or cabinet temperature satisfactory? _Yes_
Excessive moisture on cold plate? _No_
Length of time for test (hours)? 49.0

The precision of this test is estimated to be 2.5% (Section 10.3, ASTM C 518)

Reviewed By: ___________________________  Date: ___________________________

The results in this report apply only to the specimen tested. This test conforms to ASTM Test Method C 518 except for the report requirements. The report includes summary data but a full complement of data is available upon request.
Thermal Resistance Test Report

Date of Test: March 07-09, 2006 Date of Manufacture: February 10, 2006

Fox Number: 2849 Specimen Number: 1180060214-7

R&D Test Number: RD061352TR

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Tested at 1.59 PCF


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

The results in this report were obtained with a heat-flow meter built and operated in accordance with ASTM C 518. The test results in a value for the apparent thermal conductivity of the test specimen, \( k \), in units W/m.K. The thermal resistivity, R-value per inch, in U.S. customary units is the reciprocal of the product of 6.933 and \( k \).

Heat flow meter: 24 by 24 inches x inches
Specimen thickness: 4.000 inches
Specimen density: 1.54 lb/ft\(^3\)

Cold plate temperature: 52.56 deg F
Hot plate temperature: 97.56 deg F
Average specimen temperature: 75.06 deg F

Apparent thermal conductivity: 0.2811 Btu.in/ft\(^2\).hr.ºF
Thermal resistivity (R-per-inch): 3.558 ft\(^2\).hr.ºF/Btu.in
Thermal resistance of specimen: 14.2 ft\(^2\).hr.ºF/Btu

Notes: Calibration factor used for manual calculation? __NA__ EMF __NA__
Edge guards or cabinet temperature satisfactory? __Yes__
Excessive moisture on cold plate? __No__
Length of time for test (hours)? 49.8

The precision of this test is estimated to be 2.5% (Section 10.3, ASTM C 518)

The results in this report apply only to the specimen tested. This test conforms to ASTM Test Method C 518 except for the report requirements. The report includes summary data but a full complement of data is available upon request.
Thermal Resistance Test Report

Date of Test: March 10-13, 2006          Date of Manufacture: February 10, 2006

Fox Number: 2851          Specimen Number: 1180060214-8

R&D Test Number: RD061350TR

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Tested at 1.59 PCF


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

The results in this report were obtained with a heat-flow meter built and operated in accordance with ASTM C 518. The test results in a value for the apparent thermal conductivity of the test specimen, k, in units W/m.K. The thermal resistivity, R-value per inch, in U.S. customary units is the reciprocal of the product of 6.933 and k.

Heat flow meter: 24 by 24 inches x inches
Specimen thickness: 4.000 inches
Specimen density: 1.61 lb/ft^3
Cold plate temperature: 52.56 deg F
Hot plate temperature: 97.56 deg F
Average specimen temperature: 75.06 deg F
Apparent thermal conductivity: 0.2782 Btu.in/ft^2.hr.ºF
Thermal resistivity (R-per-inch): 3.595 ft^2.hr.ºF/Btu.in
Thermal resistance of specimen: 14.4 ft^2.hr.ºF/Btu

Notes: Calibration factor used for manual calculation? NA       EMF NA
Edge guards or cabinet temperature satisfactory? Yes
Excessive moisture on cold plate? No
Length of time for test (hours) 67.2

The precision of this test is estimated to be 2.5% (Section 10.3, ASTM C 518)

 Reviewed By: ___________________________  Date: ___________________________
Odor Emission Test Report

R&D Test Number: RD061252OE      Date of Test: February 24, 2006

Specimen Number: 1180060214-6.8   Date of Manufacture: February 10, 2006

Description of test specimen: US GreenFiber-Lithia Springs; INS 735 Cellulose; Blown Using a Krendl 500 Machine and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH


Report prepared for: US GreenFiber, LLC - Lithia Springs / Steve Martin

1. Was a perceptible odor present? Yes / No     Yes

2. Odor was objectionable, pleasant, or neutral? Neutral

3. Was the odor weak or strong? Weak

Pass / Fail

Pass

Reviewed By: ___________________________    Date: ___________________________

The results in this report apply only to the specimen tested.
pH Test Report

R&D Test Number: RD061253PH          Date of Test: February 21, 2006
Specimen Number: 1180060214-6,8      Date of Manufacture: February 10, 2006

Description of test specimen: **US GreenFiber-Lithia Springs; INS 735 Cellulose; Blown Using a Krendl 500 Machine and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH**


Report prepared for: **US GreenFiber, LLC - Lithia Springs / Steve Martin**

pH = 7.31

The results in this report apply only to the specimen tested.
Test Report for Resistance to the Growth of Fungi

Report Summary

Manufacturer: US GreenFiber, LLC – Lithia Springs
Material Description: Cellulose INS 735 Product
ASTM Test Method: C 739, Section 11
Project Number: 1180
Specimen Number: 1180060214-6, 8
Report Number: RD061505FR
Date of Report: March 21, 2006
Period of Test: February 21, 2006 – March 21, 2006
Test Result: Pass
Number of Specimens Observed: 3
Comparative Material: Southern Yellow Pine
Fungi Checked for Viability: Yes
Regular or Extended Test: Regular

Background

The ASTM Standard Specification for many thermal insulations requires a test for the resistance of the insulation to the growth of fungi. Section 10 of C 1497, ASTM C 1338, Section 6.6 of ASTM C 1149, or Section 11 of ASTM C 739 are commonly used in the case of building materials. Evaluations for fungi growth are based on visual examinations at 40X magnification. The examinations at 40X magnification compare fungal growth on the material being evaluated with the fungal growth on an untreated comparative material that is exposed to the same environment as the test specimens. Both the material being tested and the comparative material are inoculated with a mixed spore suspension containing five specific fungal species to start the test. Since most fungi thrive in a relatively narrow range of temperature and humidity, inoculated specimens and comparative materials are maintained within temperature and relative
humidity ranges specified in the test method for the 28-day growth period. The purpose of the test is to provide an evaluation of the potential for fungal growth present in the insulation material relative to common types of wood used in building construction. The fungal species used in the tests for thermal insulation are listed below.

- *Aspergillus niger* ATCC 9642
- *Aspergillus flavus* ATCC 9643
- *Aspergillus versicolor* ATCC 11730
- *Penicillium funiculosum* ATCC 11797
- *Chaetomium globosum* ATCC 6205

A mixed spore suspension is produced from the above five species in accordance with the test method being followed. The viability of each of the five species is verified with each test as required by the test method being used. The ASTM test methods for resistance to fungal growth require a 40X visual comparison of test material and comparative materials 28 days after inoculation. The criteria for a pass/fail result at the end of the 28-day test period depends on the test method being followed.

**Test using ASTM C 739 or C 1149**

Each of the three test specimens shall be judged to have fungal growth that is less than, equal to, or greater than the comparative material. The insulation fails the test if two or more of the replicate test specimens have greater fungal growth than the comparative material.

<table>
<thead>
<tr>
<th>Results</th>
<th>Specimen</th>
<th>Fungal Growth Comparison and Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Growth less than comparative material.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Growth less than comparative material.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Growth less than comparative material.</td>
<td></td>
</tr>
</tbody>
</table>

The pass/fail result: **Pass**

Basis for the pass/fail result: **Three of three specimens passed**.
This R&D Services, Inc. test report and the evaluation contained in the report are limited to the material tested. The extent to which the material tested is representative of the product being manufactured is the sole responsibility of the manufacturer. The test results are not purported to predict the performance of the material in a building or installation.

_____________________________                      ________________
Evaluation                                             Date

_____________________________                      ________________
Review                                               Date

References:


Test Reports

Classification Tests on “All Borate” Cellulose Insulation
Supplied by Bonded Insulation Company on July 31, 2003

Prepared For:

Mr. Curt Chittenden
Bonded Insulation Company, Inc.
P.O. Box 337
Hagaman, NY 12086

R & D Services, Inc.
P.O. Box 2400
Cookeville, Tennessee 38502-2400

Report: RD03292

Reviewed by: Ronald S. Graves
Vice President

October 8, 2003

Test results reported apply only to the specimens tested. This report shall not be reproduced, except in full, without written approval of R & D Services, Inc. This report must not be used by the Client to claim product endorsement by R & D Services, Inc., NVLAP or any agency of the U.S. Government.
**Design Density Test Report**

R&D Test Number: **RD031996DD**  
Date of Test: **August 6, 2003**

Specimen Number: **1077030731-1**  
Date of Manufacture: **N/A**

Description of test specimen: Bonded “All Borate” Cellulose Product; Blown Through Big Blower and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH

Test Method: **ASTM C 739, Section 8**

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

<table>
<thead>
<tr>
<th></th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.</td>
<td>74.04</td>
<td>72.43</td>
<td>74.80</td>
<td>75.81</td>
</tr>
<tr>
<td>Area</td>
<td>0.01548</td>
<td>0.01548</td>
<td>0.01548</td>
<td>0.01548</td>
</tr>
<tr>
<td>Depth</td>
<td>218</td>
<td>216</td>
<td>217</td>
<td>218</td>
</tr>
<tr>
<td>Ave.</td>
<td>217.00</td>
<td>213.25</td>
<td>212.50</td>
<td>215.50</td>
</tr>
<tr>
<td>Set. Den</td>
<td>22.0412</td>
<td>21.9411</td>
<td>22.7390</td>
<td>22.7252</td>
</tr>
<tr>
<td>Set. Den</td>
<td>1.376</td>
<td>1.370</td>
<td>1.419</td>
<td>1.419</td>
</tr>
</tbody>
</table>

Settled Density **1.40** (lb/ft³)

Reviewed By:  
Date: **10-08-03**

Test results reported apply only to the specimen tested.
Critical Radiant Flux (Gas) Test Report

R&D Test Number: RD031997CR       Date of Test: August 7, 2003
Specimen Number: 1077030731-1       Date of Manufacture: N/A

Description of test specimen: Bonded “All Borate” Cellulose Product; Blown Through Big Blower and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH

Test Method: ASTM C 739, Section 10

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

<table>
<thead>
<tr>
<th>Density (lb/ft³)</th>
<th>Length of Burn (cm)</th>
<th>Critical Radiant Flux (W/cm²)</th>
<th>Pass / Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.40</td>
<td>74.9</td>
<td>0.14</td>
<td>Pass</td>
</tr>
<tr>
<td>1.41</td>
<td>74.0</td>
<td>0.14</td>
<td>Pass</td>
</tr>
<tr>
<td>1.40</td>
<td>73.8</td>
<td>0.14</td>
<td>Pass</td>
</tr>
</tbody>
</table>

The average CRF is 0.14 W/cm²
The standard deviation is 0.00.
The coefficient of variation for repeatability is 0.0%.

Reviewed By: ___________________________ Date: 10-08-03

Test results reported apply only to the specimen tested.
P.O. Box 2400
Cookeville, Tennessee 38502-2400
Phone: 931-372-8871
Fax: 931-525-3896

Smoldering Combustion Test Report

R&D Test Number: RD031999SC  Date of Test: August 12, 2003
Specimen Number: 1077030731-1  Date of Manufacture: N/A

Description of test specimen: Bonded “All Borate” Cellulose Product; Blown Through Big
Blower and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH; Tested at 1.39 PCF

Test Method: ASTM C 739, Section 14

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

<table>
<thead>
<tr>
<th>Initial Weight (grams)</th>
<th>Final Weight (grams)</th>
<th>% loss</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>89.51</td>
<td>89.20</td>
<td>0.35</td>
<td>Pass</td>
</tr>
<tr>
<td>89.58</td>
<td>89.20</td>
<td>0.42</td>
<td>Pass</td>
</tr>
<tr>
<td>89.60</td>
<td>89.20</td>
<td>0.45</td>
<td>Pass</td>
</tr>
</tbody>
</table>

Reviewed By:  

Date: 10-08-03

Test results reported apply only to the specimen tested.
Moisture Vapor Sorption Test Report

R&D Test Number: RD032000MS            Date of Test: September 16, 2003
Specimen Number: 1077030731-1          Date of Manufacture: N/A

Description of test specimen: Bonded "All Borate" Cellulose Product; Blown Through Big Blower and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH; Tested 1.39 PCF

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

Tested in accordance with ASTM C 739, Section 12.

<table>
<thead>
<tr>
<th>Initial Weight (grams)</th>
<th>Final Weight (grams)</th>
<th>% Gain</th>
<th>Pass / Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>248.70</td>
<td>253.70</td>
<td>2.01</td>
<td>Pass</td>
</tr>
</tbody>
</table>

Reviewed By:  

Date: 10-03-03

Test results reported apply only to the specimen tested.
Corrosiveness Test Report

R&D Test Number: RD032001CO  Date of Test: August 29, 2003
Specimen Number: 1077030731-1  Date of Manufacture: N/A

Description of test specimen: Bonded “All Borate” Cellulose Product; Blown Through Big Blower and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH

Test Method: ASTM C 739, Section 9.

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

Coupon: Pass / Fail  Comments:
Aluminum  Pass  No holes or perforations.
Copper  Pass  No holes or perforations.
Steel  Pass  No holes or perforations.

Reviewed By: Ronald S. Davis  10-08-03

Test results reported apply only to the specimen tested.
P.O. Box 2400
Cookeville, Tennessee 38502-2400
Phone 931-372-8871
Fax 931-525-3896

Thermal Resistance Test Report

Date of Test: September 12, 2003  Date of Manufacture: N/A
Fox Number: 2324  Specimen Number: 1077030731-1
R&D Test Number: RD032004TR

Description of test specimen: Bonded “All Borate” Cellulose Product; Tested at 1.39 PCF

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

The results in this report were obtained with a heat-flow meter built and operated in accordance with ASTM C 518. The test results in a value for the apparent thermal conductivity of the test specimen, k, in units W/m.K. The thermal resistivity, R-value per inch, in U.S. customary units is the reciprocal of the product of 6.933 and k.

Heat flow meter: 24 by 24 inches x inches
Specimen thickness: 4,000 inches
Specimen density: 1.42 lb/ft³

Cold plate temperature: 52.56 deg F
Hot plate temperature: 97.56 deg F
Average specimen temperature: 75.06 deg F

Apparent thermal conductivity: 0.2777 Btu.in/ft².hr.ºF
Thermal resistivity (R-per-inch): 3.601 ft².hr.ºF/Btu.in
Thermal resistance of specimen: 14.4 ft².hr.ºF/Btu

Notes: Calibration factor used for manual calculation? _NA_  EMF _NA_
Edge guards or cabinet temperature satisfactory? _Yes_
Excessive moisture on cold plate? _No_
Length of time for test (hours)? 69.4

Reviewed By:  10-08-03  Date:

Test results reported apply only to the specimen tested. This test conforms to ASTM Test Method C 518 except for the report requirements. The report includes summary data but a full complement of data is available upon request.
# Thermal Resistance Test Report

Date of Test: **September 12, 2003**  
Date of Manufacture: **N/A**

Fox Number: **5017**  
Specimen Number: **1077030731-1**

R&D Test Number: **RD032005TR**

Description of test specimen: **Bonded “All Borate” Cellulose Product: Tested at 1.39 PCF**

Report prepared for: **Bonded Insulation Company, Inc. / Curt Chittenden**

The results in this report were obtained with a heat-flow meter built and operated in accordance with ASTM C 518. The test results in a value for the apparent thermal conductivity of the test specimen, \(k\), in units W/m.K. The thermal resistivity, R-value per inch, in U.S. customary units is the reciprocal of the product of 6.933 and \(k\).

<table>
<thead>
<tr>
<th>Heat flow meter:</th>
<th>24 by 24</th>
<th>inches x inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen thickness:</td>
<td>3.999</td>
<td>inches</td>
</tr>
<tr>
<td>Specimen density:</td>
<td>1.42</td>
<td>lb/ft³</td>
</tr>
<tr>
<td>Cold plate temperature:</td>
<td>52.54</td>
<td>deg F</td>
</tr>
<tr>
<td>Hot plate temperature:</td>
<td>97.56</td>
<td>deg F</td>
</tr>
<tr>
<td>Average specimen temperature:</td>
<td>75.05</td>
<td>deg F</td>
</tr>
<tr>
<td>Apparent thermal conductivity:</td>
<td>0.2767</td>
<td>Btu.in/ft².hr.°F</td>
</tr>
<tr>
<td>Thermal resistivity ( R-per-inch):</td>
<td>3.614</td>
<td>ft².hr.°F/Btu.in</td>
</tr>
<tr>
<td>Thermal resistance of specimen:</td>
<td>14.4</td>
<td>ft².hr.°F/Btu</td>
</tr>
</tbody>
</table>

Notes: Calibration factor used for manual calculation? **NA**  
Edge guards or cabinet temperature satisfactory? **Yes**  
Excessive moisture on cold plate? **No**  
Length of time for test (hours)? **69.3**

Reviewed By:  
Date: **10-08-03**

Test results reported apply only to the specimen tested. This test conforms to ASTM Test Method C 518 except for the report requirements. The report includes summary data but a full complement of data is available upon request.
Thermal Resistance Test Report

Date of Test: September 16, 2003
Date of Manufacture: N/A

Fox Number: 2325
Specimen Number: 1077030731-1

R&D Test Number: RD032006TR

Description of test specimen: Bonded “All Borate” Cellulose Product; Tested at 1.39 PCF

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

The results in this report were obtained with a heat-flow meter built and operated in accordance with ASTM C 518. The test results in a value for the apparent thermal conductivity of the test specimen, \( k \), in units W/m.K. The thermal resistivity, R-value per inch, in U.S. customary units is the reciprocal of the product of 6.933 and \( k \).

| Heat flow meter: | 24 by 24 | inches x inches |
| Specimen thickness: | 4.000 | inches |
| Specimen density: | 1.40 | lb/ft\(^3\) |
| Cold plate temperature: | 52.56 | deg F |
| Hot plate temperature: | 97.56 | deg F |
| Average specimen temperature: | 75.06 | deg F |
| Apparent thermal conductivity: | 0.2793 | Btu.in/ft\(^2\).hr.\(^\circ\)F |
| Thermal resistivity (R-per-inch): | 3.580 | ft\(^2\).hr.\(^\circ\)F/Btu.in |
| Thermal resistance of specimen: | 14.3 | ft\(^2\).hr.\(^\circ\)F/Btu |

Notes:
- Calibration factor used for manual calculation? NA
- Edge guards or cabinet temperature satisfactory? Yes
- Excessive moisture on cold plate? No
- Length of time for test (hours)? 47.3

Reviewed By: [Signature]
Reviewed Date: 10-08-03

Test results reported apply only to the specimen tested. This test conforms to ASTM Test Method C 518 except for the report requirements. The report includes summary data but a full complement of data is available upon request.
pH Test Report

R&D Test Number: RD032003PH Date of Test: September 3, 2003

Specimen Number: 1077030731-1 Date of Manufacture: N/A

Description of test specimen: Bonded “All Borate” Cellulose Product; Blown Through Big Blower and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH

Test Method: ASTM D 778

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

pH= 6.64

Reviewed By: [Signature]
Date: 10-08-03

Test results reported apply only to the specimen tested.
Odor Emission Test Report

R&D Test Number: RD032002OE  Date of Test: October 6, 2003
Specimen Number: 1077030731-1  Date of Manufacture: N/A

Description of test specimen: Bonded “All Borate” Cellulose Product; Blown Through Big Blower and Conditioned for > 2 days at 69.8 +/- 3.6°F and 50 +/- 5% RH

Report prepared for: Bonded Insulation Company, Inc. / Curt Chittenden

Tested in accordance with ASTM C 739, Section 13.

1. Was a perceptible odor present? Yes / No  Yes
2. Odor was objectionable, pleasant, or neutral? Neutral
3. Was the odor weak or strong? Weak

Pass / Fail

Pass

Reviewed By: [Signature]

Date: [Signature]

Test results reported apply only to the specimen tested.
Test Report for Resistance to the Growth of Fungi

Report Summary

Manufacturer: Bonded Insulation Company, Inc.
Material Description: “All Borate” Cellulose Product
ASTM Test Method: C 739, Section 11
Project Number: 1077
Specimen Number: 1077030731-1
Report Number: RD032023FR
Date of Report: October 10, 2003
Period of Test: September 9, 2003 – October 9, 2003
Test Result: Pass
Number of Specimens Observed: 3
Comparative Material: Southern Yellow Pine
Fungi Checked for Viability: Yes
Regular or Extended Test: Regular

Background

The ASTM Standard Specification for many thermal insulations requires a test for the resistance of the insulation to the growth of fungi. Section 10 of C 1497, ASTM C 1338, Section 6.6 of ASTM C 1149, or Section 11 of ASTM C 739 are commonly used in the case of building materials. Evaluations for fungi growth are based on visual examinations at 40X magnification. The examinations at 40X magnification compare fungal growth on the material being evaluated with the fungal growth on an untreated comparative material that is exposed to the same environment as the test specimens. Both the material being tested and the comparative material are inoculated with a mixed spore suspension containing five specific fungal species to start the test. Since most fungi thrive in a relatively narrow range of temperature and humidity, inoculated specimens and comparative materials are maintained within temperature and relative
humidity ranges specified in the test method for the 28-day growth period. The purpose of the test is to provide an evaluation of the potential for fungal growth present in the insulation material relative to common types of wood used in building construction. The fungal species used in the tests for thermal insulation are listed below.

- Aspergillus niger ATCC 9642
- Aspergillus flavus ATCC 9643
- Aspergillus versicolor ATCC 11730
- Penicillium funiculosum ATCC 11797
- Chaetomium globosum ATCC 6205

A mixed spore suspension is produced from the above five species in accordance with the test method being followed. The viability of each of the five species is verified with each test as required by the test method being used. The ASTM test methods for resistance to fungal growth require a 40X visual comparison of test material and comparative materials 28 days after inoculation. The criteria for a pass/fail result at the end of the 28-day test period depends on the test method being followed.

**Test using ASTM C 739 or C 1149**

Each of the three test specimens shall be judged to have fungal growth that is less than, equal to, or greater than the comparative material. The insulation fails the test if two or more of the replicate test specimens have greater fungal growth than the comparative material.

<table>
<thead>
<tr>
<th>Results</th>
<th>Specimen</th>
<th>Fungal Growth Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Growth greater than comparative material.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Growth not greater than comparative material.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Growth not greater than comparative material.</td>
<td></td>
</tr>
</tbody>
</table>

The pass/fail result: Pass
Basis for the pass/fail result: Two of three specimens passed.
Test using ASTM C 1338

Each of the replicate test specimens shall be determined to have either no fungal growth, fungal growth not greater than the comparative material, or fungal growth greater than the comparative material.

<table>
<thead>
<tr>
<th>Results</th>
<th>Specimen</th>
<th>Fungal Growth Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The pass/fail result: __________
Basis for the pass/fail result: ____________________

**Extended Evaluation of Resistance to Fungal Growth**

An extended evaluation of fungal growth resistance is completed when requested. The extended evaluation grades the test specimens four times during the course of the 28-day long growth period in order to provide additional information to the manufacturer. The grading scheme has been adapted from MIL-STD-810E. Grading takes place 7, 14, 21, and 28 days after inoculation. The extended evaluation is not intended to replace the evaluation required by the particular standard being used.
<table>
<thead>
<tr>
<th>Grade</th>
<th>Amount of Growth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
<td>No fungal growth observed on test specimen.</td>
</tr>
<tr>
<td>1</td>
<td>Trace</td>
<td>Sparse or very restricted fungal growth and reproduction. Little or no physical or structural change of specimen detected.</td>
</tr>
<tr>
<td>2</td>
<td>Slight</td>
<td>Intermittent infestations or loosely spread fungal colonies on test specimen surface, moderate reproduction.</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td>Substantial fungal growth and reproduction. Test specimen exhibiting physical or structural change.</td>
</tr>
<tr>
<td>4</td>
<td>Severe</td>
<td>Massive fungal growth or reproduction. Test specimen decomposed or rapidly deteriorating.</td>
</tr>
</tbody>
</table>

Observations

<table>
<thead>
<tr>
<th></th>
<th>Day 7</th>
<th>Day 14</th>
<th>Day 21</th>
<th>Day 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen 1</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specimen 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specimen 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This R&D Services, Inc. test report and the evaluation contained in the report are limited to the material tested. The extent to which the material tested is representative of the product being manufactured is the sole responsibility of the manufacturer. The test results are not purported to predict the performance of the material in a building or installation.

Sita M. Thompson  
Evaluation  10-09-03  
Date

Ronald S. Bender  
Review  10-09-03  
Date

References:


PROVA DI ASSORBIMENTO DEL VAPORE

R&D Prova numero : RD032000MS  Data della prova : 16 Settembre 2003
Numero del campione :1077030731-1  Data di produzione : ---

Descrizione del test : Cellulosa isolante BONDED con formula ai borati , fatta passare attraverso il ventilatore e condizionata per 2 giorni a 21 gradi e 50 % di umidità testato con una densità di 22 kg/m3.

Rapporto di prova preparato per : BONDED INSULATION COMPANY Inc. Sig Curt Chittenden.

Provato secondo la normativa ASTM C 739 Sezione 12.

Peso iniziale del campione (grammi)  248,70
Peso finale del campione (grammi)   253,70
% di assorbimento                   2,01
Esito della prova :                  positivo

Controllato da :
Ronald S.Grawes
Vice Presidente
---------------------------------  data 10.08.2003.

I risultati della prova qui specificati si applicano solo al prodotto esaminato
PROVA DELLA CORROSIVITA’

R&D Prova numero : RD032001CO  Data della prova : 29 Agosto  2003
Numero del campione :1077030731-1  Data di produzione : ---

Descrizione del test : Cellulosa isolante BONDED con formula ai borati ,fatta passare attraverso il ventilatore e condizionata per 2 giorni a 21 gradi e 50 % di umidità testato con una densità di 22 kg/m3.

Provato secondo la normativa ASTM C 739 sezione 9.

Rapporto di prova preparato per : BONDED INSULATION COMPANY Inc. Sig Curt Chittenden.

<table>
<thead>
<tr>
<th>Campioni</th>
<th>risultato</th>
<th>Commenti:</th>
</tr>
</thead>
<tbody>
<tr>
<td>alluminio</td>
<td>positivo</td>
<td>nessun foro o perforazione</td>
</tr>
<tr>
<td>rame</td>
<td>positivo</td>
<td>nessun foro o perforazione</td>
</tr>
<tr>
<td>acciaio</td>
<td>positivo</td>
<td>nessun foro o perforazione</td>
</tr>
</tbody>
</table>

Controllato da :
Ronald S.Grawes
Vice Presidente
----------------------------------------
data 10.08.2003.

I risultati della prova qui specificati si applicano solo al prodotto esaminato
**PROVA DELLA DENSITA’**

R&D Prova numero : RD031996DD  
Data della prova : 6 Agosto 2003

Numero del campione: 1077030731-1  
Data di produzione : ---

Descrizione del test: Cellulosa isolante BONDED con formula ai borati, fatta passare attraverso il ventilatore e condizionata per 2 giorni a 21 gradi e 50 % di umidità.

Provato secondo la normativa ASTM C 739 sezione 8.

Rapporto di prova preparato per: BONDED INSULATION COMPANY Inc. Sig Curt Chittenden.

<table>
<thead>
<tr>
<th>Test 1</th>
<th>test 2</th>
<th>test 3</th>
<th>test 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>74.04</td>
<td>72.43</td>
<td>74.80</td>
<td>75.81</td>
</tr>
<tr>
<td>0.01548</td>
<td>0.01548</td>
<td>0.01548</td>
<td>0.01548</td>
</tr>
<tr>
<td>218</td>
<td>216</td>
<td>217</td>
<td>218</td>
</tr>
<tr>
<td>215</td>
<td>214</td>
<td>216</td>
<td>213</td>
</tr>
<tr>
<td>217</td>
<td>216</td>
<td>210</td>
<td>216</td>
</tr>
<tr>
<td>218</td>
<td>207</td>
<td>207</td>
<td>215</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>22.04</th>
<th>21.94</th>
<th>22.73</th>
<th>22.72</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.376</td>
<td>1.370</td>
<td>1.419</td>
<td>1.419</td>
</tr>
</tbody>
</table>

Densità stabilizzata : 1.40 (lb/ft³)   22 kg/m³

Controllato da:  
Ronald S.Grawes  
Vice Presidente

------------------------------------------

I risultati della prova qui specificati si applicano solo al prodotto esaminato.
PROVA DEL pH

R&D Prova numero : RD032003PH                             Data della prova : 3 settembre 2003
Numero del campione: 1077030731-1                          Data di produzione : ---

Descrizione del test : Cellulosa isolante BONDED con formula ai borati , fatta passare attraverso il ventilatore e condizionata per 2 giorni a 21 gradi e 50 % di umidità.

Provato secondo la normativa ASTM D 778

Rapporto di prova preparato per : BONDED INSULATION COMPANY Inc. Sig Curt Chittenden.

pH  = 6.64

Controllato da :
Ronald S.Grawes
Vice Presidente
----------------------------------
data 10.08.2003.

I risultati della prova qui specificati si applicano solo al prodotto esaminato
PROVA DELL’EMISSIONE DI ODORI

R&D Prova numero : RD032002OE  Data della prova : 6 ottobre  2003

Numero del campione: 1077030731-1  Data di produzione : ---

Descrizione del test : Cellulosa isolante BONDED con formula ai borati, fatta passare attraverso il ventilatore e condizionata per 2 giorni a 21 gradi e 50% di umidità.

Rapporto di prova preparato per : BONDED INSULATION COMPANY Inc. Sig Curt Chittenden.

Provato secondo la normativa ASTM C 739 sezione 13.

1. c’era un odore percettibile  si/no  si
2. l’odore era discutibile, piacevole, neutrale  neutrale
3. l’odore era debole o forte  debole

Esito positivo/negativo :

positivo

--------------------

Controllato da :
Ronald S. Grawes
Vice Presidente
--------------------  data 10.08.2003.

I risultati della prova qui specificati si applicano solo al prodotto esaminato.
PROVA DELLA RESISTENZA TERMICA

R&D Prova numero : RD032006TR         Data della prova : 16 SETTEMBRE  2003

Numero del campione: 1077030731-1              Data di produzione : ---

Descrizione del test : Cellulosa isolante BONDED con formula ai borati , fatta passare attraverso il ventilatore e condizionata per 2 giorni a 21 gradi e 50 % di umidità.

Rapporto di prova preparato per : BONDED INSULATION COMPANY Inc. Sig Curt Chittenden.
Provato secondo la normativa ASTM-C 518.

Tester del flusso di calore                  6090 X 6090 mm
Spessore del campione                        101 mm
Densità del campione                          22 kg/m3
Piastra fredda temperatura                   11.4 °C
Piastra calda temperatura                    36.4 °C
Temperatura media del campione               23.92 °C
Conducibilità termica apparente              0.040 W/mK

Fattori di conversione 1 Btu-in./hr.-sqft-°F = 0.1442 W/mK
1 pcf = 16.018 kg/m3
1 inch = 25.4 mm.

Controllato da :
Ronald S.Grawes
Vice Presidente
-----------------------------------------------

I risultati della prova qui specificati si applicano solo al prodotto esaminato
PROVA DELLA COMBUSTIONE

R&D Prova numero : RD031999SC  Data della prova : 12 Agosto  2003
Numero del campione: 1077030731-1  Data di produzione : ---

Descrizione del test : Cellulosa isolante BONDED con formula ai borati , fatta passare attraverso il ventilatore e condizionata per 2 giorni a 21 gradi e 50 % di umidità.

Rapporto di prova preparato per : BONDED INSULATION COMPANY Inc. Sig Curt Chittenden.

Provato secondo la normativa ASTM C 739 sezione 14.

<table>
<thead>
<tr>
<th>Peso iniziale</th>
<th>peso finale</th>
<th>% perdita</th>
<th>esito</th>
</tr>
</thead>
<tbody>
<tr>
<td>89.51 gr</td>
<td>89.20 gr</td>
<td>0.35</td>
<td>positivo</td>
</tr>
<tr>
<td>89.58 gr</td>
<td>89.20 gr</td>
<td>0.42</td>
<td>positivo</td>
</tr>
<tr>
<td>89.60 gr</td>
<td>89.20 gr</td>
<td>0.45</td>
<td>positivo</td>
</tr>
</tbody>
</table>

Controllato da :
Ronald S.Grawes
Vice Presidente
-------------------------------------------------------- data 10.08.2003.

I risultati della prova qui specificati si applicano solo al prodotto esaminato
PROVA DEL FLUSSO RADIANTE

R&D Prova numero : RD031997CR  Data della prova : 7 Agosto 2003
Numero del campione: 1077030731-1  Data di produzione : ---

Descrizione del test : Cellulosa isolante BONDED con formula ai borati , fatta passare attraverso il ventilatore e condizionata per 2 giorni a 21 gradi e 50 % di umidità.

Rapporto di prova preparato per : BONDED INSULATION COMPANY Inc. Sig Curt Chittenden.

Provato secondo la normativa ASTM C 739 sezione 10.

<table>
<thead>
<tr>
<th>Densità</th>
<th>lunghezza della bruciatura</th>
<th>flusso radiante ( W/cm²)</th>
<th>esito</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.4 kg/m³</td>
<td>74.9 cm</td>
<td>0.14</td>
<td>positivo</td>
</tr>
<tr>
<td>22.5 kg/m³</td>
<td>74.0 cm</td>
<td>0.14</td>
<td>positivo</td>
</tr>
<tr>
<td>22.4 kg/m³</td>
<td>73.8 cm</td>
<td>0.14</td>
<td>positivo</td>
</tr>
</tbody>
</table>

Controllato da :
Ronald S.Grawes
Vice Presidente
---------------------------
data 10.08.2003.

I risultati della prova qui specificati si applicano solo al prodotto esaminato