



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

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P.O. Box 2400
Cookeville, Tennessee 38502-2400
Phone: 931-372-8871
Fax: 931-525-3896

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

	Test 1	Test 2	Test 3	Test 4	
Wt.	<u>107.20</u>	<u>106.40</u>	<u>109.80</u>	<u>110.70</u>	(grams)
Area	<u>0.018385</u>	<u>0.018385</u>	<u>0.018385</u>	<u>0.018385</u>	(m ²)
Depth	<u>228</u>	<u>234</u>	<u>231</u>	<u>234</u>	(mm)
	<u>230</u>	<u>236</u>	<u>238</u>	<u>236</u>	
	<u>226</u>	<u>227</u>	<u>240</u>	<u>236</u>	
	<u>224</u>	<u>223</u>	<u>233</u>	<u>238</u>	
Ave.	<u>227.00</u>	<u>230.00</u>	<u>235.50</u>	<u>236.00</u>	(mm)
Set. Den	<u>25.6865</u>	<u>25.1623</u>	<u>25.3599</u>	<u>25.5136</u>	(kg/m ³)
Set. Den	<u>1.603</u>	<u>1.571</u>	<u>1.583</u>	<u>1.593</u>	(lb/ft ³)

Settled Density 1.59 (lb/ft³)

Reviewed by: _____

Date: _____

Test results reported apply only to the specimen tested.



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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

Test Method: ASTM C 1485-00, "Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using an Electric Radiant Heat Energy Source."

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

Density (lb/ft ³)	Length of Burn (cm)	Critical Radiant Flux (W/cm ²)	Pass / Fail
<u>1.08</u>	<u>42.7</u>	<u>0.11</u>	<u>Fail</u>
<u>1.12</u>	<u>42.7</u>	<u>0.11</u>	<u>Fail</u>
<u>1.09</u>	<u>44.5</u>	<u>0.10</u>	<u>Fail</u>

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.



P.O. Box 2400
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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

Test Method: ASTM C 739-05, Section 10, "Specification for Cellulosic Fiber Loose-Fill Thermal Insulation" and ASTM E 970, "Test Method for Critical Radiant Flux of Exposed Attic Floor Using a Radiant Heat Energy Source".

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

Density (lb/ft ³)	Length of Burn (cm)	Critical Radiant Flux (W/cm ²)	Pass / Fail
<u>1.32</u>	<u>77.7</u>	<u>0.14</u>	<u>Pass</u>
<u>1.34</u>	<u>76.2</u>	<u>0.15</u>	<u>Pass</u>
<u>1.31</u>	<u>81.0</u>	<u>0.13</u>	<u>Pass</u>

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.



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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

Test Method: ASTM C 739-05, Section 14, "Specification for Cellulosic Fiber Loose-Fill Thermal Insulation."

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

Initial Weight (grams)	Final Weight (grams)	% loss	
<u>103.40</u>	<u>103.00</u>	<u>0.39</u>	<u>Pass</u>
<u>103.20</u>	<u>102.70</u>	<u>0.48</u>	<u>Pass</u>
<u>103.30</u>	<u>103.00</u>	<u>0.29</u>	<u>Pass</u>

Reviewed By: _____

Date: _____

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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

Test Method: ASTM C 739-03, Section 9, "Specification for Cellulosic Fiber Loose-Fill Thermal Insulation."

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

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

Reviewed By:

Date:

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



P.O. Box 2400
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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

Test Method: ASTM C 739-03, Section 12, "Specification for Cellulosic Fiber Loose-Fill Thermal Insulation."

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

Initial Weight (grams)	Final Weight (grams)	% Gain	Pass / Fail
<u>263.70</u>	<u>280.40</u>	<u>6.33</u>	<u>Pass</u>

Reviewed By: _____

Date: _____

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



P.O. Box 2400
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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

Test Method: ASTM C 518, "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus."

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:	<u>24 by 24</u>	inches x inches
Specimen thickness:	<u>4.000</u>	inches
Specimen density:	<u>1.59</u>	lb/ft ³
Cold plate temperature:	<u>52.56</u>	deg F
Hot plate temperature :	<u>97.56</u>	deg F
Average specimen temperature:	<u>75.06</u>	deg F
Apparent thermal conductivity:	<u>0.2759</u>	Btu.in/ft ² .hr.°F
Thermal resistivity (R-per-inch):	<u>3.625</u>	ft ² .hr.°F/Btu.in
Thermal resistance of specimen:	<u>14.5</u>	ft ² .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)? 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.



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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

Test Method: ASTM C 518, "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus."

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:	<u>24 by 24</u>	inches x inches
Specimen thickness:	<u>4.000</u>	inches
Specimen density:	<u>1.57</u>	lb/ft ³
Cold plate temperature:	<u>52.56</u>	deg F
Hot plate temperature :	<u>97.56</u>	deg F
Average specimen temperature:	<u>75.06</u>	deg F
Apparent thermal conductivity:	<u>0.2805</u>	Btu.in/ft ² .hr.°F
Thermal resistivity (R-per-inch):	<u>3.565</u>	ft ² .hr.°F/Btu.in
Thermal resistance of specimen:	<u>14.3</u>	ft ² .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.



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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

Test Method: ASTM C 518, "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus."

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:	<u>24 by 24</u>	inches x inches
Specimen thickness:	<u>4.000</u>	inches
Specimen density:	<u>1.54</u>	lb/ft ³
Cold plate temperature:	<u>52.56</u>	deg F
Hot plate temperature :	<u>97.56</u>	deg F
Average specimen temperature:	<u>75.06</u>	deg F
Apparent thermal conductivity:	<u>0.2811</u>	Btu.in/ft ² .hr.°F
Thermal resistivity (R-per-inch):	<u>3.558</u>	ft ² .hr.°F/Btu.in
Thermal resistance of specimen:	<u>14.2</u>	ft ² .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)? 49.8

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.



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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

Test Method: ASTM C 518, "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus."

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:	<u>24 by 24</u>	inches x inches
Specimen thickness:	<u>4.000</u>	inches
Specimen density:	<u>1.61</u>	lb/ft ³
Cold plate temperature:	<u>52.56</u>	deg F
Hot plate temperature :	<u>97.56</u>	deg F
Average specimen temperature:	<u>75.06</u>	deg F
Apparent thermal conductivity:	<u>0.2782</u>	Btu.in/ft ² .hr.°F
Thermal resistivity (R-per-inch):	<u>3.595</u>	ft ² .hr.°F/Btu.in
Thermal resistance of specimen:	<u>14.4</u>	ft ² .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)? 67.2

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.



P.O. Box 2400
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Phone: 931-372-8871
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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

Test Method: ASTM C 739-05, Section 13, "Specification for Cellulosic Fiber Loose-Fill Thermal Insulation."

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.



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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

Test Method: ASTM D778, "Test Methods for Hydrogen Ion Concentration (pH) of Paper Extracts (Hot-Extraction and Cold-Extraction Procedure)."

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

pH= 7.31

Reviewed By:

Date:

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.

<i>Aspergillus niger</i>	ATCC 9642
<i>Aspergillus flavus</i>	ATCC 9643
<i>Aspergillus versicolor</i>	ATCC 11730
<i>Penicillium funiculosum</i>	ATCC 11797
<i>Chaetomium globosum</i>	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.

Results	<u>Specimen</u>	<u>Fungal Growth Comparison and Comments</u>
	1	<u>Growth less than comparative material.</u>
	2	<u>Growth less than comparative material.</u>
	3	<u>Growth less than comparative material.</u>

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:

ASTM C 739, "Standard Specification for Cellulosic Loose-Fill Thermal Insulation", 2002 Annual Book of ASTM Standards, Vol. 04.06, pp. 362-372.

ASTM C 1149, "Standard Specification for Self-Supported Spray Applied Cellulosic Thermal Insulation", 2002 Annual Book of ASTM Standards, Vol. 04.06, pp. 630-637.

ASTM C 1338, "Standard test Method for Determining Fungi Resistance of Insulation Materials and Facings", 2002 Annual Book of ASTM Standards, Vol. 04.06, pp. 721-723.

ASTM C 1497, "Standard Specification for Cellulosic Fiber Stabilized Thermal Insulation", 2002 Annual Book of ASTM Standards, Vol. 04.06, pp. 849-852.

MIL-STD-810E, Method 508.4, "Fungus", 14 July 1989.



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
Ronald S. Graves
Vice President

October 8, 2003



P.O. Box 2400
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Phone: 931-372-8871
Fax: 931-525-3896

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

	Test 1	Test 2	Test 3	Test 4	
Wt.	<u>74.04</u>	<u>72.43</u>	<u>74.80</u>	<u>75.81</u>	(grams)
Area	<u>0.01548</u>	<u>0.01548</u>	<u>0.01548</u>	<u>0.01548</u>	(m ²)
Depth	<u>218</u>	<u>216</u>	<u>217</u>	<u>218</u>	(mm)
	<u>215</u>	<u>214</u>	<u>216</u>	<u>213</u>	
	<u>217</u>	<u>216</u>	<u>210</u>	<u>216</u>	
	<u>218</u>	<u>207</u>	<u>207</u>	<u>215</u>	
Ave.	<u>217.00</u>	<u>213.25</u>	<u>212.50</u>	<u>215.50</u>	(mm)
Set. Den	<u>22.0412</u>	<u>21.9411</u>	<u>22.7390</u>	<u>22.7252</u>	(kg/m ³)
Set. Den	<u>1.376</u>	<u>1.370</u>	<u>1.419</u>	<u>1.419</u>	(lb/ft ³)

Settled Density 1.40 (lb/ft³)

Ronald S. Swader

Reviewed By:

10-08-03
Date:

Test results reported apply only to the specimen tested.



P.O. Box 2400
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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

Density (lb/ft ³)	Length of Burn (cm)	Critical Radiant Flux (W/cm ²)	Pass / Fail
<u>1.40</u>	<u>74.9</u>	<u>0.14</u>	<u>Pass</u>
<u>1.41</u>	<u>74.0</u>	<u>0.14</u>	<u>Pass</u>
<u>1.40</u>	<u>73.8</u>	<u>0.14</u>	<u>Pass</u>

The average CRF is 0.14 W/cm²

The standard deviation is 0.00.

The coefficient of variation for repeatability is 0.0%.

Ronald S. Braden
Reviewed By:

10-08-03
Date:

Test results reported apply only to the specimen tested.



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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

Initial Weight (grams)	Final Weight (grams)	% loss	
<u>89.51</u>	<u>89.20</u>	<u>0.35</u>	<u>Pass</u>
<u>89.58</u>	<u>89.20</u>	<u>0.42</u>	<u>Pass</u>
<u>89.60</u>	<u>89.20</u>	<u>0.45</u>	<u>Pass</u>

Ronald S. Swen
Reviewed By:

10-08-03
Date:

Test results reported apply only to the specimen tested.



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Cookeville, Tennessee 38502-2400
Phone: 931-372-8871
Fax: 931-525-3896

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.

Initial Weight (grams)	Final Weight (grams)	% Gain	Pass / Fail
<u>248.70</u>	<u>253.70</u>	<u>2.01</u>	<u>Pass</u>

Ronald S. Seader
Reviewed By:

10-08-03
Date:

Test results reported apply only to the specimen tested.



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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	<u>Pass</u>	<u>No holes or perforations.</u>
Copper	<u>Pass</u>	<u>No holes or perforations.</u>
Steel	<u>Pass</u>	<u>No holes or perforations.</u>

Ronald S. Swain
Reviewed By:

10-08-03
Date:

Test results reported apply only to the specimen tested.



P.O. Box 2400
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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:	<u>24 by 24</u>	inches x inches
Specimen thickness:	<u>4.000</u>	inches
Specimen density:	<u>1.42</u>	lb/ft ³
Cold plate temperature:	<u>52.56</u>	deg F
Hot plate temperature :	<u>97.56</u>	deg F
Average specimen temperature:	<u>75.06</u>	deg F
Apparent thermal conductivity:	<u>0.2777</u>	Btu.in/ft ² .hr.°F
Thermal resistivity (R-per-inch):	<u>3.601</u>	ft ² .hr.°F/Btu.in
Thermal resistance of specimen:	<u>14.4</u>	ft ² .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)? 69.4

Ronald L. Swader
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.



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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 .

Heat flow meter:	<u>24 by 24</u>	inches x inches
Specimen thickness:	<u>3.999</u>	inches
Specimen density:	<u>1.42</u>	lb/ft ³
Cold plate temperature:	<u>52.54</u>	deg F
Hot plate temperature :	<u>97.56</u>	deg F
Average specimen temperature:	<u>75.05</u>	deg F
Apparent thermal conductivity:	<u>0.2767</u>	Btu.in/ft ² .hr.°F
Thermal resistivity (R-per-inch):	<u>3.614</u>	ft ² .hr.°F/Btu.in
Thermal resistance of specimen:	<u>14.4</u>	ft ² .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)? 69.3

Ronald S. Braden
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.



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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:	<u>24 by 24</u>	inches x inches
Specimen thickness:	<u>4.000</u>	inches
Specimen density:	<u>1.40</u>	lb/ft ³
Cold plate temperature:	<u>52.56</u>	deg F
Hot plate temperature :	<u>97.56</u>	deg F
Average specimen temperature:	<u>75.06</u>	deg F
Apparent thermal conductivity:	<u>0.2793</u>	Btu.in/ft ² .hr.°F
Thermal resistivity (R-per-inch):	<u>3.580</u>	ft ² .hr.°F/Btu.in
Thermal resistance of specimen:	<u>14.3</u>	ft ² .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)? 47.3

Ronald S. Swader

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.



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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

Ronald S. Seaver
Reviewed By:

10-08-03
Date:

Test results reported apply only to the specimen tested.



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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

Ronald S. Seaver
Reviewed By:

10-08-03
Date:

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.

<i>Aspergillus niger</i>	ATCC 9642
<i>Aspergillus flavus</i>	ATCC 9643
<i>Aspergillus versicolor</i>	ATCC 11730
<i>Penicillium funiculosum</i>	ATCC 11797
<i>Chaetomium globosum</i>	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.

Results	<u>Specimen</u>	<u>Fungal Growth Comparison</u>
	1	<u>Growth greater than comparative material.</u>
	2	<u>Growth not greater than comparative material.</u>
	3	<u>Growth not greater than comparative material.</u>

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.

Results	Specimen	<u>Fungal Growth Comparison</u>
	1	<u>N/A</u>
	2	<u></u>
	3	<u></u>

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.

<u>Grade</u>	<u>Amount of Growth</u>	<u>Description</u>
0	None	No fungal growth observed on test specimen.
1	Trace	Sparse or very restricted fungal growth and reproduction. Little or no physical or structural change of specimen detected.
2	Slight	Intermittent infestations or loosely spread fungal colonies on test specimen surface, moderate reproduction.
3	Moderate	Substantial fungal growth and reproduction. Test specimen exhibiting physical or structural change.
4	Severe	Massive fungal growth or reproduction. Test specimen decomposed or rapidly deteriorating.

Observations

	Day 7	Day 14	Day 21	Day 28
Specimen 1	<u>N/A</u>	_____	_____	_____
Specimen 2	_____	_____	_____	_____
Specimen 3	_____	_____	_____	_____

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.

Pita M Thompson
Evaluation

10-09-03
Date

Ronald S Swada
Review

10-09-03
Date

References:

ASTM C 739, "Standard Specification for Cellulosic Loose-Fill Thermal Insulation", 2002 Annual Book of ASTM Standards, Vol. 04.06, pp. 362-372.

ASTM C 1149, "Standard Specification for Self-Supported Spray Applied Cellulosic Thermal Insulation", 2002 Annual Book of ASTM Standards, Vol. 04.06, pp. 630-637.

ASTM C 1338, "Standard test Method for Determining Fungi Resistance of Insulation Materials and Facings", 2002 Annual Book of ASTM Standards, Vol. 04.06, pp. 721-723.

ASTM C 1497, "Standard Specification for Cellulosic Fiber Stabilized Thermal Insulation", 2002 Annual Book of ASTM Standards, Vol. 04.06, pp. 849-852.

MIL-STD-810E, Method 508.4, "Fungus", 14 July 1989.



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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

BONDED



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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.

Campioni :	risultato :	Commenti:
alluminio	positivo	nessun foro o perforazione
rame	positivo	nessun foro o perforazione
acciaio	positivo	nessun foro o perforazione

Controllato da :
Ronald S.Grawes
Vice Presidente

data 10.08.2003.



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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.

Test 1	test 2	test 3	test 4	
74.04	72.43	74.80	75.81	grammi
0.01548	0.01548	0.01548	0.01548	metriquadrati
218	216	217	218	mm
215	214	216	213	
217	216	210	216	
218	207	207	215	
22.04	21.94	22.73	22.72	kg/m3
1.376	1.370	1.419	1.419	lb/ft3

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

Controllato da :
Ronald S.Grawes
Vice Presidente

data 10.08.2003.

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

BONDED



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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.



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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.



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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

data 10.08.2003.

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

BONDED



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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.

Peso iniziale	peso finale	% perdita	esito
89.51 gr	89.20 gr	0.35	positivo
89.58 gr	89.20 gr	0.42	positivo
89.60 gr	89.20 gr	0.45	positivo

Controllato da :
Ronald S.Grawes
Vice Presidente

data 10.08.2003.



P.O. Box 2400
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Phone: 931-372-8871
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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.

Densità	lunghezza della bruciatura	flusso radiante (W/cm2)	esito
22.4 kg/m3	74.9 cm	0.14	positivo
22.5 kg/m3	74.0 cm	0.14	positivo
22.4 kg/m3	73.8 cm	0.14	positivo

Controllato da :
Ronald S.Grawes
Vice Presidente

data 10.08.2003.

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

BONDED