ASTM C1549 · ASTM C1371 · CRRC TEST RESULTS REPORT · R&D SERVICES, INC., COOKEVILLE, TN — ACCREDITED INDEPENDENT LABORATORY

ASTM testing at a CRRC-accredited U.S. lab: Super Therm® measures 0.83 solar reflectance, 0.90 emittance — emittance rising to 0.92 after three years outdoors

RD06248, 2 May 2006 — initial rating, six panels, two production batches, tested 26 Apr 2006 · RD09409, 27 Jul 2009 — three-year weathered, three climates · Reviewed by David W. Yarbrough, PhD, PE

Initial rating, averaged over six panels: solar reflectance **0.83** by ASTM C1549 and thermal emittance **0.90** by ASTM C1371. After three years on outdoor weathering farms in hot-humid, cold-temperate and hot-dry climates: reflectance **0.74 average, 0.78 hot-dry**; emittance **0.92**.

— CRRC-F-2 Test Results Report, Section C, laboratory RDS, report RD06248; aged values per RD09409. C1549 solar reflectance integrates the full solar spectrum, 300–2500 nm — the near-infrared is inside the number. CRRC licensed seller ID 0802, product "Super Therm," water-based white ceramic coating.

CRRC / ASTM
Accredited laboratory
Cookeville, TN
Initial + 3-yr aged

0.83
Solar reflectance, initial — C1549
Six panels, 0.832–0.835: a tight, repeatable surface

0.90 → 0.92
Thermal emittance — C1371
Initial → three-year aged: the exit door widens with age

104
Solar Reflectance Index, initial
Computed per ASTM E1980 from 0.83 / 0.90 (black = 0, white = 100)

INITIAL RATING — EVERY PANEL, BOTH BATCHES (RD06248)

BATCH · PANEL	SOLAR REFLECTANCE	THERMAL EMITTANCE
A (012306) · 2	0.834	0.91
A (012306) · 3	0.832	0.90
A (012306) · 4	0.833	0.90
B (21406) · 6	0.835	0.91
B (21406) · 7	0.834	0.90
B (21406) · 5	0.835	0.90
Average, all initial tests	**0.83**	**0.90**

Two manufacturing batches, 0.003 spread across six panels. Tests C1549 and C1371 dated 4/26/06; certified by David W. Yarbrough.

Reflectance — the locked front door. ASTM C1549 uses a solar reflectometer at air mass 1.5 to integrate the whole solar spectrum into one weighted figure. At 0.83, 83% of incoming solar energy — visible and near-infrared together — is turned away before it can become heat.

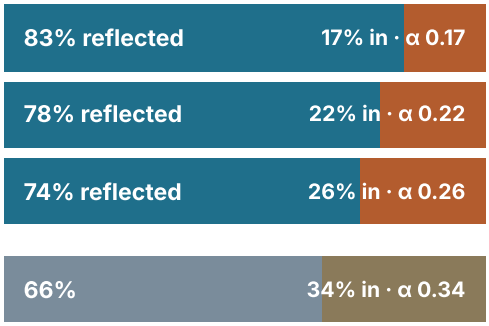
— RD06248, initial rating, standard panels, 2 May 2006.

THREE-YEAR WEATHERED REFLECTANCE BY CLIMATE — RD09409



Three-year average 0.74; emittance 0.92. Sun-aged outdoors, measured indoors by the same instrument.

WHAT THE SUN DELIVERS VS WHAT ENTERS — SOLAR-WEIGHTED, 300–2500 NM



Absorptance α = 1 − reflectance is the direct input to the API MPMS 19.4 loss equations. The industry table starts white paint at the same 0.17 and assumes 0.34 aged; after three years Super Therm sits where the table puts an average white, not an aged one.

Emittance — the exit. ASTM C1371 measures how readily the surface radiates the heat it does absorb. 0.90 initial, 0.92 after three years in the weather: the film sheds heat to the sky more effectively as it ages, not less.

— RD09409, three-year aged rating, CRRC weathering farms, 27 July 2009.

WHO AND HOW

Laboratory: R&D Services, Inc., Cookeville, Tennessee — CRRC accredited independent testing laboratory (lab ID RDS).
Methods: ASTM C1549 solar reflectance (reflectometer, air mass 1.5); ASTM C1371 thermal emittance (emissometer); SRI per ASTM E1980, medium wind.
Records: RD06248, 2 May 2006 (initial; prepared for Craig Smith, SPI, Shawnee KS); RD09409, 27 Jul 2009 (three-year aged, three climates).

Source: R&D Services, Inc. reports RD06248 (2006) and RD09409 (2009) on CRRC Test Results Report form F-2; figures as recorded. SRI computed per ASTM E1980. Reports are reproduced only in full; copies on request.

R&D Services

Test Report

CRRC - Initial Data for Super-Therm

Prepared For:

Mr. Craig Smith
Superior Products International II, Inc.
10835 W. 78th Street
Shawnee, KS 66214

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

Report: RD06248

Reviewed by: David W. Yarbrough
David W. Yarbrough, PhD, PE
President

May 2, 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.

Test Results Report

1738 Excelsior Avenue • Oakland, CA 94602 • Toll-free (866) 465-2523 • Fax (510) 482-4421 • www.coolroofs.org

TYPE OF TEST
(check only ONE; separate copy to be filled out for each type of test)

☒ Initial Rating Test (new product and reformulations)
☐ Aged Rating Test (CRRC Product ID # _____)

Section A; 1-10: Licensed Seller/Other Manufacturer and Product Information (this section to be filled out by licensee prior to sending to Laboratory)

1. **CRRC Licensed Seller/OM Company** Superior Products International II, Inc.	2. **Contact Name** Craig Smith
3. **Company Address** 10835 W. 78th St. Shawnee, KS 66214	4. **Contact Address** (if different from #3) same
5. **Email Address** Superthermhelp@aol.com	6. **Phone Voice** 913-962-4848
7. **CRRC License Seller/OM ID Number** 0802	8. **Phone Fax** 913-962-6767
9. **Product/Brand Name, Model Name/Number** Super Therm	10. **Brief Description (incl. color)** Water-based white latex ceramic coating

Section B; 11-16: Color Family Representative Element Information (This section is only for *establishing* a color family for factory-applied metal coatings or factory-coated metals – skip if not applicable. See *Procedure 3* for details)

11. **CRRC Color Family** (from Table 1 in CRRC Procedure #3)	
12. **CRRC Approved Color Family Color Properties Ranges and Default Radiative Properties** (from Table 1 in Procedure #3): L range____ - ____ a range____ - ____ b range____ - ____ Default TSR _____ Default TE _____	
13. **Formula Name/ Number**	14. **Resin or Material Type**
15. ***Measured* Color Properties** (see footnote[1] for equipment set-up): L range value_____ a range value_____ b range value_____	
16. **The undersigned certifies that, to the best of his/her knowledge, the measurements contained herein are true and accurate (color measuring party or applicant if same):** _____ _____ _____ Responsible Person's Printed Name Signature Date	

[1] Color Measurement Equipment Specification: 0°/45o Geometry with 10o observer, D65 light source and Hunter L,a,b color space

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Section C; 17-24: Accredited Independent Testing Laboratory Test Results and Signature (this section to be filled out by AITL only)

SUPERTHERM

17. **Laboratory ID** (Initial Ratings) RDS

18. **Laboratory ID** (Aged Ratings)

19. **Lab Report ID** (Initial Ratings) RD06248

20. **Lab report ID** (Aged Ratings)

21. **Tested Initial Radiative Properties: (Air mass of 1.5 used in reflectance measurements** ☐ (check for verification)

21a. *Group A*—MFR. Batch # 012306

Panel ID	Solar Reflectance	Thermal Emittance
1. 2	0.834	0.91
2. 3	0.832	0.90
3. 4	0.833	0.90
Batch Average	0.833	0.90

21b. *Group B*—MFR. Batch # 21406

Panel ID	Solar Reflectance	Thermal Emittance
1. 6	0.835	0.91
2. 7	0.834	0.90
3. 5	0.835	0.90
Batch Average	0.835	0.90

21c. **Results if preparing samples according to CRRC-1 Section 3.5 E (using CRRC-1 Method #1):**

Sample 1 (Batch A): 0.833 / 0.90 (SR / TE) Sample 2 (Batch B): 0.835 / 0.90 (SR / TE) Sample 3 (Batch A&B): ____ / ____ (SR / TE)

21d. **Average for all initial tests (2 decimal places):** Solar Reflectance (SR) 0.83 Thermal Emittance (TE) 0.90

21e. **Presumed Non-Variegated Particle or Gravel Coated Roofing Product 5-Point Reflectance Test Results:** (See CRRC-1 section 3.5.1 E for instructions) _____ _____ _____ _____ _____ **Average Reflectance** _____

21f. **Air mass of 1.5 used in reflectance measurements** ☐ **(check box to confirm)**

22. **Tested Aged Radiative Properties:**

22a. *Hot/Humid Climate Exposure* Panel ID	Solar Reflectance	Thermal Emittance
1.		
2.		
3.		

22b. *Cold/Temperate Exposure* Panel ID	Solar Reflectance	Thermal Emittance
1.		
2.		
3.		

22c. *Hot/Dry Climate Exposure* Panel ID	Solar Reflectance	Thermal Emittance
1.		
2.		
3.		

22d. **Results if preparing samples according to CRRC-1 Section 3.5 E (using CRRC-1 Method #1):**

Sample 1 (Batch A): ____ / ____ (SR / TE) Sample 2 (Batch B): ____ / ____ (SR / TE) Sample 3 (Batch A&B): ____ / ____ (SR / TE)

22e. **Average for all initial tests (2 decimal places):** Solar Reflectance (SR) _____ Thermal Emittance (TE) _____

22f. **Air mass of 1.5 used in reflectance measurements** ☐ **(check box to confirm)**

23. **Tests conducted:**

Type	Initial Test	Aged Test
☐ E903 Test	Date _____	Date _____
☐ E1918 Test	Date _____	Date _____
☑ C1549 Test	Date 4/21/06	Date _____
☑ C1371 Test	Date 4/21/06	Date _____
☐ CRRC-1 Method #1	Date _____	Date _____

24. **The undersigned certifies that, to the best of his/her knowledge, the measurements contained herein are true and accurate:**

DAVID W. YARBROUGH
Responsible Person's Printed Name

Daniel W. Yarbrough. 4/21/06
Responsible Person's Signature (Initial Tests) Date

_____ _____
Responsible Person's Signature (Aged Tests) Date

Test Report

Aged Values for Super Therm White Water-Based Latex Manufactured by Superior Products International II, Inc.

Prepared For:

Mr. Craig Smith
Superior Products International II, Inc.
10835 W. 78th Street
Shawnee, KS 66214

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

Report: RD09409

Reviewed by: David W. Yarbrough
David W. Yarbrough, PhD, PE
President

July 27, 2009

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.

AGED Test Results Report

Company Name _____

Product Brand Name and Model _____

1610 Harrison Street • Oakland, CA 94612 • Toll-free (866) 465-2523 • Fax (510) 482-4421 • www.coolroofs.org

INSTRUCTIONS: UPON RECEIVING NOTIFICATION OF COMPLETION OF THREE-YEAR WEATHERING FROM THE TEST FARM, LICENSEE SHALL COORDINATE WITH AN AITL TO CONDUCT THE AGED TESTING AND SHALL SUPPLY THE AITL WITH THIS AGED TEST RESULTS REPORT FORM WITH SECTION A COMPLETED. THE AITL SHALL CONDUCT THE TESTING, COMPLETE SECTION B AND RETURN THE COMPLETED FORM TO THE LICENSEE. THE LICENSEE SHALL SUBMIT THE COMPLETED FORM AND A COMPLETED AGED PRODUCT RATING APPLICATION (CRRC-F-12) TO THE CRRC. IT IS THE RESPONSIBILITY OF THE LICENSEE TO ENSURE THAT THE PRODUCT DESCRIPTION ON THE AGED TEST RESULTS REPORT MATCHES THE PRODUCT DESCRIPTION ON THE INITIAL TEST RESULTS REPORT FOR THE AITL AND CRRC'S IDENTIFICATION PURPOSES.

Section A; 1-8: Licensed Seller/Other Manufacturer and Product Information (this section to be filled out by licensee prior to sending to Laboratory)

1. **CRRC Licensed Seller/OM Company** Superior Products	2. **CRRC Product ID Number** Not shown
3. **Company Address** 10835 W. 78th St., Shawnee, KS 66214	4. **Contact Name** Craig Smith
5. **Email Address** ~~superthermhelp@aol.com~~ crsmith@spicoatings.com	
6. **Phone Voice and Fax** (913) 962-4848	Fax (913) 962-6767
7. **Product/Brand Name and Model Name/Number** Super Therm System	8. **Brief Description (incl. color)** Water-based Latex (white)

Section B; 9-13: Accredited Independent Testing Laboratory AGED Test Results and Signature (this section to be filled out by AITL only)

9. **Laboratory Name** RDS	10. **Lab report ID** (Aged Ratings) RD 09409

11. **Tested Aged Radiative Properties:**

11a. *Hot/Humid Climate Exposure*			11b. *Cold/Temperate Exposure*			11c. *Hot/Dry Climate Exposure*		
Panel ID	Solar Reflectance	Thermal Emittance	Panel ID	Solar Reflectance	Thermal Emittance	Panel ID	Solar Reflectance	Thermal Emittance
1. B1	0.722	0.932	1. B2	0.714	0.916	1. B4	0.783	0.920
2. A5	0.721	0.923	2. B3	0.716	0.921	2. A8	0.782	0.927
3. A6	0.722	0.935	3 A7	0.720	0.925	3. A9	0.782	0.919

11d. **Results if preparing samples according to CRRC-1 Section 2.2.4 C2 (using CRRC-1 Method #1):**

Sample 1 (Batch A&B): ____ / ____ Sample 2 (Batch A&B): ____ / ____ Sample 3 (Batch A&B): ____ / ____

SR TE SR TE SR TE

11e. **Average for all aged tests (2 decimal places):** Solar Reflectance (SR) 0.74 thermal Emittance (TE) 0.92

11f. **Air mass of 1.5 used in reflectance measurements** XX **(check box to confirm)**

AGED Test Results Report

Company Name _____

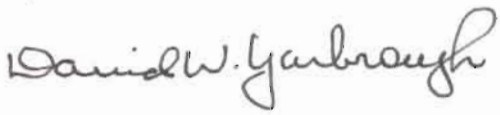
Product Brand Name and Model _____

12. **Tests conducted:**

Type	Aged Test Date
☐ E903 Test	Date _____
☐ E1918 Test	Date _____
x C1549 Test	Date 7-15-09
x C1371 Test	Date 7-22-09
☐ CRRC-1 Method #1	Date _____

13. **The undersigned certifies that, to the best of his/her knowledge, the measurements contained herein are true and accurate:**

David W. Yarbrough
Responsible Person's Printed Name



_____ 7-26-09
Responsible Person's Signature (Aged Tests) Date