



MIRO TESTINGS

Tests by SGS U.S. Testing Company Inc.

Testing	Standard	Result
Humidity Exposure	ASTM D2247-94, 670 hours maintained at 100° F 100% relative humidity	✓
Salt Spray	ASTM B117-94, 150 hours of salt solution (5% +/-1%) at 95° F	✓
QUV	ASTM G-53, 2500 hours with UVA 351 bulbs, 8 Hour cycles (4 h on, 4 h off)	✓
Flame Spread & Smoke Density	ASTM E84-97a, 10 minutes	✓

Tests by Lighting Sciences Inc.

Dirt Depreciation	48 h dust test	✓
CRI	bare lamp: 82.7	MIRO, specular quality : 82.1 = 99.3% MIRO, diffuse quality : 82.3 = 99.5% MIRO, semi quality : 82.2 = 99.4%

Summary of results

Testing	Result	
Dirt Depreciation	see comments; equal 3-5 years semi-clean office	48 h passed
Humidity Exposure	see comments; no changes	670 h passed
Salt Spray	see comments; slight changes	150 h passed
QUV	some salt residues, which could not be removed; no discolouration; no delamination; no degradation on total reflectance (Rho) by more than 3%	2500 h passed
Flame Spread & Smoke Density	see comments, no ignition	10 min passed

Testing was done on:
MIRO, specular quality
MIRO, diffuse quality
MIRO, semi quality

Sample code 2876
Sample code 3139
Sample code 3140



SGS U.S. Testing Company Inc.

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Tel: 213 838-1600
Fax: 213 722-8251

REPORT NUMBER: 105476-3
DATE: 06/02/98
PAGE 1 OF 2

CLIENT: ALANOD
Egerstrasse 12
D-58256 Ennepetal, Germany

SUBJECT: HUMIDITY EXPOSURE

REFERENCES: 1. Conferences and correspondence with Messrs. Andrew Sabel and Harold Kuster commencing October 13, 1998.
2. ASTM D2247-94, "Testing Water Resistance of Coatings in 100% Relative Humidity."

SAMPLE ID: The Client submitted and identified the following three types of aluminum panels:

- A. NR 2876; SF 21 W/PV3
- B. NR 3139; SF 11 RC
- C. NR 3140; SF 11 RC

The samples were submitted on February 20, 1998.

PROCEDURE: One, 6-inch by 6-inch specimen was prepared from each panel sample. The protective film was removed and the specimens were then placed in a chamber, maintained at 100°F, 100% relative humidity for a total of 670 hours.

TEST DATES: Between March 9 and April 6, 1998

SIGNED FOR THE COMPANY:

Larry Burmer
Senior Project Engineer

David Pereg
Manager, Engr. Dept.

Member of the SGS Group

ANALYTICAL SERVICES • PERFORMANCE TESTING • STANDARDS EVALUATION • CERTIFICATION SERVICES

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REPORT OF TEST

CLIENT: ALANOD

RESULTS: NR 2876; SF 21 W/PV3: The exposed specimen did not sustain any noticeable change in color or finish.

NR 3139; SF 11 RC: The exposed specimen did not sustain any noticeable change in color or finish.

NR 3140; SF 11 RC: The exposed specimen did not sustain any noticeable change in color or finish.

End of Report



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REPORT NUMBER: 105476-2
DATE: 06/02/98
PAGE 1 OF 2

CLIENT: ALANOD
Egerstrasse 12
D-58256 Ennepetal, Germany

SUBJECT: SALT SPRAY TESTING

REFERENCES: 1. Conferences and correspondence with Messrs. Andrew Sabel and Harold Kuster commencing October 13, 1997.
2. ASTM B117-94, "Standard Method of Salt Spray Testing."

SAMPLE ID: The Client submitted and identified the following three types of aluminum panels:
A. NR 2876; SF 21 W/PV3
B. NR 3139; SF 11 RC
C. NR 3140; SF 11 RC

The samples were submitted on February 20, 1998.

PROCEDURE: One, 6-inch by 6-inch specimen was prepared from each panel sample. The protective film was removed from the face to be tested and a 4-inch long scribe was scribed into the surface. The specimens were then placed in a salt spray (fog) environment, as specified in the referenced ASTM B117 Standard, for a total of 150 hours. The salt solution consisted of 5 ± 1 percent by weight of common salt dissolved in demineralized water. The chamber temperature was maintained at 95°F.

TEST DATES: Between March 10 and 16, 1998

SIGNED FOR THE COMPANY:

Larry Burmer
Senior Project Engineer

David Pereg
Manager, Engr. Dept.

Member of the SGS Group

CLIENT: ALANOD

RESULTS:

A. NR 2876; SF 21 W/PV3

Oxidation was present on the scribe and up to ¼-inch on either side of the scribe. The exposed surface sustained surface corrosion, which resulted in a slight loss of the mirror finish, when compared to an unexposed specimen.

B. NR 3139; SF 11 RC

No change was present at the scribe. The exposed surface sustained surface corrosion, which resulted in a slight loss of the mirror finish, when compared to an unexposed specimen.

C. NR 3140; SF 11 RC

No change was present at the scribe. The exposed surface sustained surface corrosion, which resulted in a slight loss of the mirror finish, when compared to an unexposed specimen.

End of Report



SGS U.S. Testing Company Inc.

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Fairfield, NJ 07004-3833
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Report Number: 105476-001
Date: 11/05/98
Page: 1 of 1

CLIENT: Alanod
Attn: Dr. Harold Kuester
Egerstrasse 12
D-58256 Ennepetal/Germany

SUBJECT: Three (3) samples received on 02/20/98 and identified by the client as:

3 Types of Aluminum Material:

- A) NR 2876; SF 21 W/PV3
- B) NR 3139; SF 11 RC
- C) NR 3140; SF 11 RC

AUTHORIZATION: RR 27451.

PURPOSE: To test the samples per client's request.

TEST DATES: Set up on 06/25/98 and out on 08/16/98. Sent the samples back to client; received (again) back on 09/14/98. Set up on 09/14/98 and out on 11/05/98.

PROCEDURE: The samples were exposed to UVA 351 bulbs, 4 hour cycles for 1,250 hours in accordance with ASTM G-53. The samples were returned to the client for interim gloss measurements. Later, the samples were exposed to UVA 351 bulbs with condensation 4 hours at 40°C and 4 hours at 60°C for another 1,250 hours in accordance with ASTM G-53.

RESULTS: Samples were returned to client for further evaluation.

SIGNED FOR THE COMPANY BY:

Lisa Van Savage
Laboratory Manager

/ls

Joseph Kwiatkowski, Director
Specialty & Applied Chemistry

Member of the SGS Group

REPORT OF TEST



SGS U.S. Testing Company Inc.

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REPORT NUMBER: 105476-1
DATE: 3/12/98
PAGE: 1 OF 3

CLIENT: ALANOD
Egerstrasse 12
D-58256 Ennepetal
Germany

SUBJECT: FLAME SPREAD CLASSIFICATION AND SMOKE DENSITY DEVELOPED

REFERENCES: 1. Our confirmation to the Client dated March 9, 1998.
2. Test sample received on February 20, 1998.
3. Testing conducted on March 11, 1998.
4. Testing authorized by Dr. Harold Kuester.

SAMPLE ID: The Client submitted and identified the sample material as:

NR 2876; SF 21 W/PV3, Aluminum Panels

TEST PROCEDURE: Perform standard flame spread and smoke density developed classification tests on the sample supplied by the Client in accordance with ASTM Designation E84-97a, "Standard Method of Test for Surface Burning Characteristics of Building Materials". The foregoing test procedure is comparable to UL 723, ANSI/NFPA No. 255, and UBC No. 8-1.

PREPARED BY:

Brian Ortega
Brian Ortega
Test Technician/gb

SIGNED FOR COMPANY BY:

Michael S. Elliott
Michael S. Elliott
Manager/Fire Tech. Dept.

Member of the SGS Group

CLIENT: ALANOD

**PREPARATION AND
 CONDITIONING:**

The sample material was submitted in twelve pieces, 24" wide by 24" long. The sample was supported during testing by ¼" round metal rods placed at two foot intervals across the width of the test chamber.

Prior to testing, the samples were placed in the conditioning room (maintained at 73.4 ± 5°F and a relative humidity of 50 ± 5%) and allowed to reach moisture equilibrium.

**SUMMARY OF
 ASTM E84 RESULTS:**

Because of the possible variations in reproducibility, the results are adjusted to the nearest figure divisible by 5.

<u>SAMPLE IDENTIFICATION</u>	<u>FLAME SPREAD</u>	<u>SMOKE DENSITY</u>
NR 2876; SF 21 W/PV3, Aluminum Panels	0	0

In order to obtain the Flame Spread Classification, the above results should be compared to the following table:

<u>NFPA CLASS</u>	<u>UBC CLASS</u>	<u>FLAME SPREAD</u>
A	I	0 through 25
B	II	26 through 75
C	III	76 through 200

BUILDING CODES CITED:

- National Fire Protection Association, ANSI/NFPA No. 101, "Life Safety Code", 1994 Edition
- Uniform Building Code, 1994 Edition, Chapter 8, Interior Finishes, Sections 801-807.

CLIENT: ALANOD

E 84 TEST DATA SHEET: CLIENT: Alanod DATE: 3/11/98
SAMPLE: NR 2876: SF 21 W/PV3. Aluminum Panels
OVERALL THICKNESS: 0.019" nominal

FLAME SPREAD: IGNITION: Did not ignite
FLAME FRONT: 0 feet maximum
TIME TO MAXIMUM SPREAD: N/A
TEST DURATION: 10 minutes
CALCULATION: N/A

SUMMARY: FLAME SPREAD: 0
SMOKE DENSITY: 0

OBSERVATIONS: *Sample surface ignition was not observed during the ten minute test period.*



SGS U.S. Testing Company Inc.

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REPORT NUMBER: 105476-2
DATE: 3/12/98
PAGE: 1 OF 3

REPORT OF TEST

CLIENT: ALANOD
Egerstrasse 12
D-58256 Ennepetal
Germany

SUBJECT: FLAME SPREAD CLASSIFICATION AND SMOKE DENSITY DEVELOPED

REFERENCES: 1. Our confirmation to the Client dated March 9, 1998.
2. Test sample received on February 20, 1998.
3. Testing conducted on March 11, 1998.
4. Testing authorized by Dr. Harold Kuester.

SAMPLE ID: The Client submitted and identified the sample material as:

NR 3139; SF 11 RC, Aluminum Panels

TEST PROCEDURE: Perform standard flame spread and smoke density developed classification tests on the sample supplied by the Client in accordance with ASTM Designation E84-97a, "Standard Method of Test for Surface Burning Characteristics of Building Materials". The foregoing test procedure is comparable to UL 723, ANSI/NFPA No. 255, and UBC No. 8-1.

PREPARED BY:


Brian Ortega

Test Technician/gb

SIGNED FOR COMPANY BY:


Michael S. Elliott

Manager/Fire Tech. Dept.

Member of the SGS Group

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CLIENT: ALANOD

**PREPARATION AND
CONDITIONING:**

The sample material was submitted in twelve pieces, 24" wide by 24" long. The sample was supported during testing by ¼" round metal rods placed at two foot intervals across the width of the test chamber.

Prior to testing, the samples were placed in the conditioning room (maintained at 73.4 ± 5°F and a relative humidity of 50 ± 5%) and allowed to reach moisture equilibrium.

**SUMMARY OF
ASTM E84 RESULTS:**

Because of the possible variations in reproducibility, the results are adjusted to the nearest figure divisible by 5.

<u>SAMPLE IDENTIFICATION</u>	<u>FLAME SPREAD</u>	<u>SMOKE DENSITY</u>
NR 3139; SF 11 RC Aluminum Panels	0	0

In order to obtain the Flame Spread Classification, the above results should be compared to the following table:

<u>NFPA CLASS</u>	<u>UBC CLASS</u>	<u>FLAME SPREAD</u>
A	I	0 through 25
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1. National Fire Protection Association, ANSI/NFPA No. 101, "Life Safety Code", 1994 Edition
2. Uniform Building Code, 1994 Edition, Chapter 8, Interior Finishes, Sections 801-807.

CLIENT: ALANOD

E 84 TEST DATA SHEET: CLIENT: Alanod DATE: 3/11/98
SAMPLE: NR 2876; SF 21 W/PV3. Aluminum Panels
OVERALL THICKNESS: 0.019" nominal

FLAME SPREAD: IGNITION: Did not ignite
FLAME FRONT: 0 feet maximum
TIME TO MAXIMUM SPREAD: N/A
TEST DURATION: 10 minutes
CALCULATION: N/A

SUMMARY: FLAME SPREAD: 0
SMOKE DENSITY: 0

OBSERVATIONS: Sample surface ignition was not observed during the ten minute test period.

REPORT OF TEST



SGS U.S. Testing Company Inc.

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REPORT NUMBER: 105476-2
DATE: 3/12/98
PAGE: 1 OF 3

REPORT OF TEST

CLIENT: ALANOD
Egerstrasse 12
D-58256 Ennepetal
Germany

SUBJECT: FLAME SPREAD CLASSIFICATION AND SMOKE DENSITY DEVELOPED

REFERENCES:

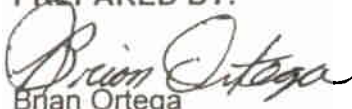
1. Our confirmation to the Client dated March 9, 1998.
2. Test sample received on February 20, 1998.
3. Testing conducted on March 11, 1998.
4. Testing authorized by Dr. Harold Kuester.

SAMPLE ID: The Client submitted and identified the sample material as:


NR 3139; SF 11 RC, Aluminum Panels

TEST PROCEDURE: Perform standard flame spread and smoke density developed classification tests on the sample supplied by the Client in accordance with ASTM Designation E84-97a, "Standard Method of Test for Surface Burning Characteristics of Building Materials". The foregoing test procedure is comparable to UL 723, ANSI/NFPA No. 255, and UBC No. 8-1.

PREPARED BY:


Brian Ortega
Test Technician/gb

SIGNED FOR COMPANY BY:


Michael S. Elliott
Manager/Fire Tech. Dept.

Member of the SGS Group

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REPORT NUMBER: 105476-1
 DATE: 3/12/98
 PAGE: 2 OF 3

CLIENT: ALANOD

**PREPARATION AND
 CONDITIONING:**

The sample material was submitted in twelve pieces, 24" wide by 24" long. The sample was supported during testing by 1/4" round metal rods placed at two foot intervals across the width of the test chamber.

Prior to testing, the samples were placed in the conditioning room (maintained at 73.4 ± 5°F and a relative humidity of 50 ± 5%) and allowed to reach moisture equilibrium.

**SUMMARY OF
 ASTM E84 RESULTS:**

Because of the possible variations in reproducibility, the results are adjusted to the nearest figure divisible by 5.

<u>SAMPLE IDENTIFICATION</u>	<u>FLAME SPREAD</u>	<u>SMOKE DENSITY</u>
NR 3139; SF 11 RC Aluminum Panels	0	0

In order to obtain the Flame Spread Classification, the above results should be compared to the following table:

<u>NFPA CLASS</u>	<u>UBC CLASS</u>	<u>FLAME SPREAD</u>
A	I	0 through 25
B	II	26 through 75
C	III	76 through 200

BUILDING CODES CITED:

1. National Fire Protection Association, ANSI/NFPA No. 101, "Life Safety Code", 1994 Edition
2. Uniform Building Code, 1994 Edition, Chapter 8, Interior Finishes, Sections 801-807.

CLIENT: ALANOD

E 84 TEST DATA SHEET: CLIENT: Alanod DATE: 3/11/98

SAMPLE: NR 3139; SF 11 RC, Aluminum Panels

OVERALL THICKNESS: 0.0175" nominal

FLAME SPREAD: IGNITION: Did not ignite

FLAME FRONT: 0 feet maximum

TIME TO MAXIMUM SPREAD: N/A

TEST DURATION: 10 minutes

CALCULATION: N/A

SUMMARY: FLAME SPREAD: 0

SMOKE DENSITY: 0

OBSERVATIONS: Sample surface ignition was not observed during the ten minute test period.

CLIENT: ALANOD

E 84 TEST DATA SHEET: CLIENT: Alanod DATE: 3/12/98

SAMPLE: NR 3140; SF 11 RC, Aluminum Panels

OVERALL THICKNESS: 0.019" nominal

FLAME SPREAD: IGNITION: Did not ignite

FLAME FRONT: 0 feet maximum

TIME TO MAXIMUM SPREAD: N/A

TEST DURATION: 10 minutes

CALCULATION: N/A

SUMMARY: FLAME SPREAD: 0

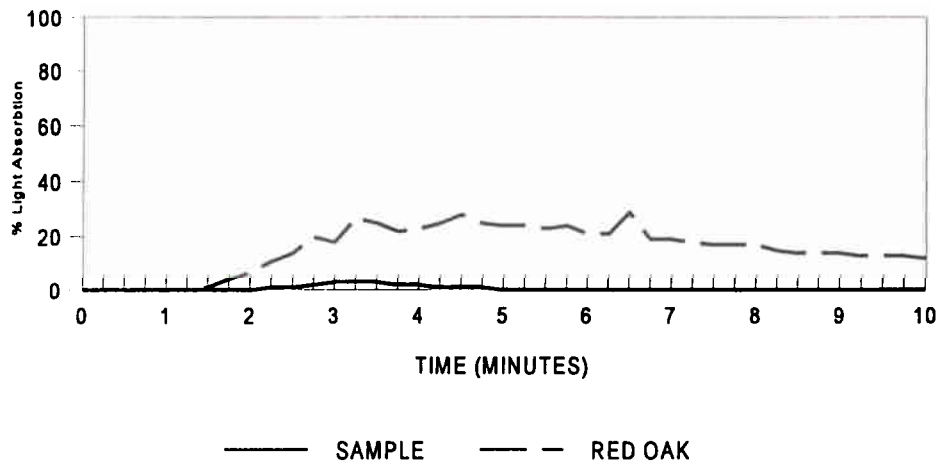
SMOKE DENSITY: 5

OBSERVATIONS: Sample surface ignition was not observed during the ten minute test period.

CLIENT: ALANOD

SMOKE DENSITY

NR 3140; SF 11 RC ALUMINUM PANELS



— SAMPLE - - RED OAK

End of Report

REPORT OF TEST



Lighting Sciences

An Advanced Lighting Technologies Joint Venture

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Tel: 602-991-9260 • Fax: 602-991-0375

CERTIFIED TEST REPORT 13472

48 HOUR DIRT DEPRECIATION TEST

Sample Name	Total Reflectivity	
	Before	After
Sample A: Nr. 2876 SF 21 W/PV3	93.14	83.83
Sample B: Nr. 3139 SF 11 RC	91.98	84.34
Sample C: Nr. 3140 SF 11 RC	91.90	87.00

REPORT PREPARED FOR:

ALANOD GmbH & CO.
Ennepetal, Germany

REPORT CERTIFIED BY:

James E. Walker III



Lighting Sciences

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CERTIFIED TEST REPORT 13471-A

Sample: Nr. 2876 SF 21 W/PV3

Filename: SF21WPV3

Title: COLOR RENDERING

Date: 7/13/1998

x chromaticity value = 0.3872
y chromaticity value = 0.3792
Color temperature = 3836.5 K

Color rendering index(CRI) = 82.1
Color rendering indices (Ri)
R1 = 94.1
R2 = 92.8
R3 = 59.4
R4 = 86.8
R5 = 85.0
R6 = 79.8
R7 = 88.2
R8 = 70.6
R9 = 7.4
R10 = 50.2
R11 = 70.0
R12 = 58.4
R13 = 96.5
R14 = 72.6

First peak = 227.219 mW/nm/m² at 612.25 nm
Bandwidth = 4.80 nm
Second peak = 169.303 mW/nm/m² at 545.76 nm

REPORT PREPARED FOR:

ALANOD GmbH & CO.
Ennepetal, Germany

REPORT CERTIFIED BY:

James E. Walker III



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CERTIFIED TEST REPORT 13471-B

Sample: Nr. 3139 SF 11 RC

Filename: SF11RC39
Title: COLOR RENDERING
Date: 7/13/1998

x chromaticity value = 0.3839
y chromaticity value = 0.3768
Color temperature = 3905.0 K

Color rendering index(CRI) = 82.3
Color rendering indices (Ri)
R1 = 94.7
R2 = 92.9
R3 = 59.0
R4 = 87.2
R5 = 85.1
R6 = 79.1
R7 = 88.3
R8 = 72.3
R9 = 10.3
R10 = 50.0
R11 = 70.5
R12 = 58.2
R13 = 96.9
R14 = 72.4

First peak = 199.961 mW/nm/m² at 612.22 nm
Bandwidth = 4.78 nm
Second peak = 149.923 mW/nm/m² at 545.74 nm

REPORT PREPARED FOR:

ALANOD GmbH & CO.
Ennepetal, Germany

REPORT CERTIFIED BY:

James E. Walker III



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CERTIFIED TEST REPORT NO. 13471-C

Sample: Nr. 3140 SF 11 RC

Filename: SF11RC40
Title: COLOR RENDERING
Date: 7/13/1998

x chromaticity value = 0.3866
y chromaticity value = 0.3786
Color temperature = 3846.6 K

Color rendering index(CRI) = 82.2
Color rendering indices (Ri)
R1 = 94.2
R2 = 92.9
R3 = 59.8
R4 = 86.8
R5 = 85.1
R6 = 80.1
R7 = 88.2
R8 = 70.8
R9 = 8.2
R10 = 50.7
R11 = 70.1
R12 = 59.0
R13 = 96.6
R14 = 72.8

First peak = 199.359 mW/nm/m² at 612.21 nm
Bandwidth = 4.78 nm
Second peak = 148.410 mW/nm/m² at 545.74 nm

REPORT PREPARED FOR:

ALANOD GmbH & CO.
Ennepetal, Germany

REPORT CERTIFIED BY:

James E. Walker III



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An Advanced Lighting Technologies Joint Venture

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CERTIFIED TEST REPORT 13471-D

Sample: Bare lamp:TL80 F32T8/TL841

Filename: BARETL80
Title: SPECTRUM
Date: 7/13/1998

x chromaticity value = 0.3910
y chromaticity value = 0.3805
Color temperature = 3750.6 K

Color rendering index(CRI) = 82.7
Color rendering indices (Ri)
R1 = 95.3
R2 = 92.8
R3 = 57.9
R4 = 88.4
R5 = 86.2
R6 = 79.6
R7 = 88.8
R8 = 72.9
R9 = 11.4
R10 = 49.8
R11 = 72.0
R12 = 57.8
R13 = 97.4
R14 = 71.6

First peak = 270.191 mW/nm/m² at 612.29 nm
Bandwidth = 4.89 nm
Second peak = 199.791 mW/nm/m² at 545.83 nm

REPORT PREPARED FOR:

ALANOD GmbH & CO.
Ennepetal, Germany

REPORT CERTIFIED BY:

James E. Walker III