

**ASTM E1680 & ASTM E 1646
TEST REPORT**

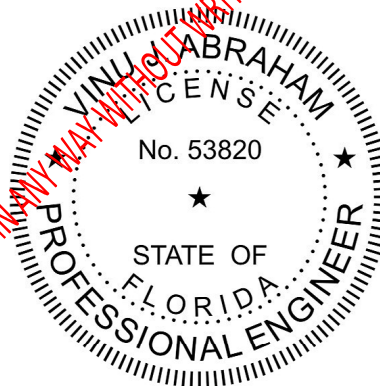
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SHEFFIELD METALS INTERNATIONAL

**MODEL DESIGNATION: SMI 2" Mechanical Seam over B-Deck w/ISO
PRODUCT TYPE: Standing Seam Roof System (24 Ga. Steel)**

This report contains in its entirety:

Cover Page: 1 page
Report Body: 6 pages



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Report No.: B5170.19-450-18
Test Dates: 2/3-6/12
Report Date: 3/2/12
Test Report Retention End Date: 3/2/16



Sheffield Metals International

SMI 2" Mechanical Seam over B-Deck w/ISO (ASTM E1680 & ASTM E 1646)

Test Report #: B5170.19-450-18

1.0 MANUFACTURER'S IDENTIFICATION

- 1.1 Name of Applicant: Sheffield Metals International
5467 Evergreen Parkway
Sheffield Village, OH 44054
Voice: 904.413.7425
- 1.2 Contact Person: Jim Mitchell

2.0 LABORATORY IDENTIFICATION

- 2.1 Test Notification #: N/A
- 2.2 Lab Certifications: Miami-Dade County (05-1014-03); Florida Building Code (TST1527); IAS (TL-244); AAMA; WDMA; Keystone Certifications; Texas Department of Insurance

3.0 SCOPE OF WORK

- 3.1 Introduction: Sheffield Metals International retained Architectural Testing, Inc. (ATI) to conduct air infiltration and water penetration testing on their SMI 2" Mechanical Seam over B-Deck w/ISO System per the requirements of ASTM.
- 3.2 Report Information: Table 1 provides the test dates for this specimen.

Table 1: Specimen Test Dates

Mock-Up	Specimen #	Test Dates
SMI 2" Mechanical Seam over B-Deck w/ISO	9A	2/3/2012 – 2/6/2012

4.0 PRODUCT IDENTIFICATION

- 4.1 Product Type: Standing Seam Roof System
- 4.2 Model Designation: SMI 2" Mechanical Seam over B-Deck w/ISO
- 4.3 Overall Size: 69" (wide) x 113" (long) – roof frame
- 4.4 General Description: This specimen consisted of a 69" x 113" roof frame sheathed with a single layer of 22 ga. B-deck installed into A36 steel. This was followed by a single layer each of insulation, felt paper and moisture/fire barrier. The roofing panels were fastened over the moisture/fire barrier.
- 4.5 Sample Source: Sheffield Metals provided the test specimen.

5.0 COMPONENT DESCRIPTION

5.1 B-Deck Details:

Table 2 provides the details of the B-Deck.

Table 2: B-Deck Details

Item	Description
22 ga. B-Deck	Each B-Deck panel was fabricated from 22 ga. (thickness = 0.030") ASTM A653 SS GRD33 steel and had a G60 galvanized coating applied to it. Each finished B-Deck panel was 36" (wide) x 120" (long) and featured 6 ribs that were each 3-1/2" (w) and 1 1/2" (h).

5.2 Accessories:

Table 3 provides a description of the accessories used in the test specimen.

Table 3: Accessories

Item	Description
Insulation	H-Shield 1" thick polyiso insulation NOTE: The insulation was obtained in 4' x 4' sheets and trimmed as necessary when assembling the test specimens.
Felt paper	30# Asphalt saturated organic paper (ASTM D226) meeting type II requirements
Moisture/fire barrier	VersaShield®

5.3 Metal Roof System:

Table 4 provides the metal roof system components used in the test specimen.

Table 4: Metal Roof System Components

Item	Overall Cross-Section	Material	Coil Width	Description
Mechanical Seam Panel	Please see part drawing labeled "SM 2" Mechanical Seam" for dimensions	24 ga. steel	24"	Each panel had an effective covering width of 18". Each finished roof panel was 111" (long) and featured two (2), 2" vertical legs (one w/return flap).
Clip Assembly (Butterfly Base 2" – Part # 1126600)	2.000" x 1.750" x 4.500" (long)	18 ga. G-90 galvanized steel	N/A	Each expansion-type butterfly panel clip consisted of a "base" and a "tab" that were each fabricated from two different thickness of steel. Each clip "base" had two holes capable of accommodating #12 pancake head screws.
Clip Assembly (Butterfly Tab 2" – Part # 1103097)	5.000" (long) x 0.900" (tall) with two return flaps that were 0.400" (wide)	22 ga. G-90 galvanized steel	N/A	



6.0 SPECIMEN CONSTRUCTION

6.1 Specimen Construction:

Table 5 provides the specimen construction.

Table 5: Specimen Construction

Location	Description
B-deck to roof frame	The B-deck panels were mechanically attached to the steel frame members using #12 x 1-1/4" self-drilling SMS spaced at 6" on center. The B-deck panels were not attached at the perimeter. Adjacent panels were mechanically attached to one another at the overlap locations using #12 x 1-1/4" self-drilling SMS spaced at 6" on center.
Insulation	A single layer of H-Shield 1" thick polyiso insulation was mechanically attached to the B-deck using #12 x 1-5/8" self-drilling PH Dekfast™ Fasteners through 2-7/8" x 2-7/8" insulation plates. There were five (5) fasteners used to secure each piece of insulation. These fasteners were located 8" from each corner and at the center. Additionally, the insulation was mechanically secured to the steel deck via the fasteners that attach the panel clips (described below).
Felt paper	A single layer of felt paper with 4" laps was tacked in place across the top of the B-deck and was secured when the metal roofing was installed.
Moisture/fire barrier	A single layer of VersaShield® with 4" laps was tacked in place across the top of the felt paper and was secured when the metal roofing was installed.
Roof panel	Each finished roof panel featured an inside leg and an outside leg. These legs were overlapped around a butterfly clip base/tab assembly. These clip assemblies were spaced 7" from each panel end and at 24" on center thereafter. Each clip was mechanically attached to the B-deck substrate using two (2), #12 x 1-5/8" self-drilling PH Dekfast™ Fasteners. The legs were then mechanically seamed 180 degrees.
Partial panel cut edges	The partial panel cut edges at the perimeter of the roof panel assembly were attached to the B-deck substrate using groups of two (2), #12 x 1-5/8" self-drilling PH Dekfast™ Fasteners spaced at 6" on center (two [2] fasteners in group were spaced 2" apart).
Panel ends	The panel ends at the perimeter of the roof panel assembly were attached to the B-deck substrate using a single row of #12 x 1-5/8" self-drilling PH Dekfast™ Fasteners spaced at 6" on center.

7.0 TEST RESULT SUMMARY

Table 6 provides a summary of the test results for all tests conducted per ASTM E 1680 and ASTM E 1646. The temperature during testing was 76°F.

Table 6: Summary of Test Results

Specimen #	Test Method	Test Conditions	Conclusion
9A	Air Leakage Test (ASTM E 1680)	+1.57/-1.57 psf	N/A
	Water Penetration Test (ASTM E 1646)	12.00 psf	PASS



8.0 TEST SEQUENCE

Table 7 provides the test sequence for the specimen.

Table 7: Test Sequence

Specimen # 9A	
1.	Air Leakage Test - Preloads
a.	Positive Preload
b.	Negative Preload
c.	Positive Preload
d.	Negative Preload
e.	Positive Preload
f.	Negative Preload
2.	Air Leakage Test - Air Infiltration
3.	Air Leakage Test - Air Exfiltration
4.	Water Penetration Test

9.0 TEST RESULTS

9.1 Air Leakage Test

9.1.1 Preload Pressures

Table 8 provides the pressure differences exerted across the test specimen during the preloads.

Table 8: Preload Pressures

	Test Pressure (psf)
Positive	45.88
Negative	45.88
Positive	45.88
Negative	45.88
Positive	45.88
Negative	45.88

9.1.2 Results

Table 9 provides the results for the air leakage test.

Table 9: Air Leakage Test Results

	Test Pressure (psf)	Measured (cfm/ft ²)
Air infiltration	+1.57	0.03
Air exfiltration	-1.57	0.02



9.2 Water Penetration Test

9.2.1 Results

Table 10 provides the results for the water penetration test.

Table 10: Water Penetration Test Results

Test Pressure (psf)	Spray Rate (gph/ft ²)	Test Duration (minutes)	Ponded Water Depth (in.)	Conclusion
12.00	5.0	15.00	0.75	Pass

9.2.2 Conclusion

ATI observed zero (0) water infiltration through the test specimen; as such, this test specimen satisfies the requirements of ASTM E 1646.

10.0 CERTIFICATION AND DISCLAIMER STATEMENT

All tests performed on this test specimen were conducted in accordance with the specifications of the applicable codes, standards and test methods listed below by ATI. ATI does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products tested at ATI. ATI is not owned, operated or controlled by any company manufacturing or distributing products it tests. This report is only intended for the use of the entity named in Section 1.0 of this report. Detailed assembly drawings showing panel/clip thicknesses, panel/clip profiles, accessories, fasteners and all other applicable layouts are on file and have been compared to the test specimen submitted. ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by ATI for the entire test record retention period.

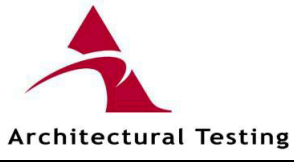
If test specimen contains glazing, no conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen can be made. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report may not be reproduced, except in full, without the written approval of ATI.

11.0 APPLICABLE CODES, STANDARDS, AND TEST METHODS

ASTM E 1680 – Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems
ASTM E 1646 – Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference

12.0 WITNESSES (ALL OR PARTIAL)

Vinny J. Abraham, P.E.	Vice President – Southeast Region	ATI
Jeff McGovern	Director – Regional Operations	ATI
Kristin Norville, E.I.	Operations Engineer	ATI
Veron Wickham	Technician	ATI
John Spallina	Technician	ATI



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ENGINEER OF RECORD

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Vinu J. Abraham, P.E.

3/2/2012

REPORT WRITER

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3/2/2012