

MID AMERICA TESTING LABORATORY, INC.

10525 SIGNAL HILL DRIVE • CATAWISSA, MISSOURI 63015
(636) 257-4722 • FAX (636) 257-5425

DATE OF REPORT: March 24, 2006

LOCATION OF TESTING: Mid America Testing Laboratory, Inc.

DATES OF ERECTION: October 10 – 21, 2005

DATES OF TESING: November 8 – March 9, 2006

PRODUCT NAME: T14000 Inboard Series

JOB NUMBER: 05107L-Inboard-Th0

CLIENT: Tubelite

The following were present for all or portions of the specimen erection and testing:

Mr. Steve DeYoung	Tubelite
Mr. Les Olds	Tubelite
Mr. Eric Kraus	St. Charles Glass
Mr. Travis Swisshelm	Mid America Testing Laboratory
Ms. Cindy Barrow	Mid America Testing Laboratory
Mr. Rick Heitmann	Mid America Testing Laboratory

INTRODUCTION

As requested Mid America Testing Laboratory provided and structural chamber for purposes of weatherization, structural and thermal testing on the Tubelite inboard system. The test unit was erected on site by St. Charles Glass and Glazing under the direction of Tubelite.

UNIT DESCRIPTION

The test unit was identified as a Tubelite T14000 Inboard Series and measured a nominal 8' wide X 8' high. A total of four (4) lites of glass were incorporated into the test specimen with the overall depth of the thermally broken system measuring 4 ½" deep. The primary depth was created with the exterior extrusions.

FORMAL TESTING

All tests were performed utilizing the base guidelines provided by Tubelite incorporating the appropriate procedures outlined by AAMA and ASTM as referenced below:

1. **PRELOAD** +15.0 PSF static pressure (50% of the positive design load for ten (10) seconds).

ALLOWED: No failure of the system

RESULTS: No failure of the system

The above result constitutes an acceptable performance.

2. **STATIC AIR INFILTRATION** (ASTM E283) at 6.24 PSF (50 MPH wind and 1.2" H₂O).

ALLOWED: 3.8 CFM gross leakage or .06 CFM per square foot.

RESULTS: 3.0 CFM gross leakage or .047 CFM per square foot.

The above results constitute an acceptable performance.

3. **STATIC WATER INFILTRATION** (ASTM E331) at 10.0 PSF (63 MPH wind and 1.92" H₂O) with a water spray rate of five (5) gallons per hour per square foot minimum for fifteen (15) minutes.

ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water in filtration to the room side.

The above result constitutes an acceptable performance.

4. **STATIC WATER INFILTRATION** (ASTM E331) at 12.0 PSF (69 MPH wind and 2.3" H₂O) with a water spray rate of five (5) gallons per hour per square foot minimum for fifteen (15) minutes.

March 24, 2006
T14000-Inboard-THO

ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water in filtration to the room side.

The above result constitutes an acceptable performance.

5. **DYNAMIC WATER INFILTRATION** (AAMA 501.1) with a 100 MPH wind velocity at the prop creating a slip stream wind speed at the face of the wall of 69 MPH at the wall equivalent to 12.0 PSF. Water was applied at a rate of five (5) gallons per hour per square foot for fifteen (15) minutes.

ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water infiltration to the room side.

The above result constitutes an acceptable performance.

6. **STRUCTURAL DESIGN LOADING** (ASTM E330) with each load being held for a duration of ten (10) seconds.

+15.0 PSF (50% Positive Design Load)
+30.0 PSF (100% Positive Design Load)
-15.0 PSF (50% Negative Design Load)
-30.0 PSF (100% Negative Design Load)

ALLOWED: No member shall have deflection greater than L/175 of its span or .37" vertically a .25" horizontally.

RESULTS: No member exceeded the allowable deflection criteria with the maximum vertical deflection of .34" and maximum horizontal deflection of .21".

The above results constitute an acceptable performance.

7. **CONDENSATION RESISTANCE** (AAMA 1503.1) with the temperatures being held for a period of two (2) hours after stabilization. Eight (8) sets of reading were taken at fifteen (15) minute intervals with averages used to calculate the CRF value. The following were the base conditions:

Warm side ambient temperature:	70 degrees Fahrenheit
Cold side ambient temperature:	0 degrees Fahrenheit
Interior humidity:	15%
Exterior wind speed:	15 miles per hour

Calculated CRF Value: 57

8. **STATIC AIR INFILTRATION** (ASTM E283) at 6.24 PSF (50 MPH wind and 1.2" H₂O).

ALLOWED: 3.8 CFM gross leakage or .06 CFM per square foot.

RESULTS: There was no measurable change in the air infiltration as a result of the thermal testing.

The above results constitute an acceptable performance.

9. **STATIC WATER INFILTRATION** (ASTM E331) at 12.0 PSF (69 MPH wind and 2.3" H₂O) with a water spray rate of five (5) gallons per hour per square foot minimum for fifteen (15) minutes.

ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water in filtration to the room side.

The above result constitutes an acceptable performance.

10. **DYNAMIC WATER INFILTRATION** (AAMA 501.1) with a 100 MPH wind velocity at the prop creating a slip stream wind speed at the face of the wall of 69 MPH at the wall equivalent to 12.0 PSF. Water was applied at a rate of five (5) gallons per hour per square foot for fifteen (15) minutes.

March 24, 2006
T14000-Inboard-THO

ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water infiltration to the room side.

The above result constitutes an acceptable performance.

11. **STRUCTURAL PROOF LOADING** (ASTM E330) with each load being held for a duration of ten (10) seconds.

+22.5 PSF (75% Positive Design Load)
+45.0 PSF (150% Positive Design Load)
-22.5 PSF (75% Negative Design Load)
-45.0 PSF (150% Negative Design Load)

ALLOWED: No member shall have permanent set in excess of .2% of its span or shall there be any failure of the system.

RESULTS: No member exceeded the allowable permanent set or was there any failure of the system.

The above results constitute an acceptable performance.

SUMMARY

The Tubelite T14000 Inboard system has met the desired levels of performance as directed by client. The remedial action taken during the pretesting was done in steps to verify origin and cause of water. Sealing of metal joinery and improving compression eliminated any water infiltration.

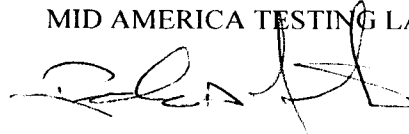
Should you have any questions regarding the information contained in this report please feel free to contact the laboratory.

March 24, 2006
T14000-Inboard-THO

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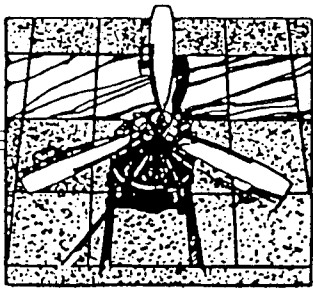
Respectfully Submitted,

MID AMERICA TESTING LABORATORY

A handwritten signature in black ink, appearing to read "Rick A. Heitmann", written over the company name.

Rick A. Heitmann
President

RAH:mm
05107L.TR-Inboard-Th0



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DATE OF REPORT: March 24, 2006

LOCATION OF TESTING: Mid America Testing Laboratory, Inc.

DATES OF ERECTION: October 10 – 21, 2005

DATES OF TESING: November 8 – March 7, 2006

PRODUCT NAME: T14000 Outboard Series

JOB NUMBER: 05107L-Outboard-Th0

CLIENT: Tubelite

The following were present for all or portions of the specimen erection and testing:

Mr. Steve DeYoung	Tubelite
Mr. Les Olds	Tubelite
Mr. Eric Kraus	St. Charles Glass
Mr. Travis Swisshelm	Mid America Testing Laboratory
Ms. Cindy Barrow	Mid America Testing Laboratory
Mr. Rick Heitmann	Mid America Testing Laboratory

INTRODUCTION

As requested Mid America Testing Laboratory provided a structural chamber for purposes of weatherization, structural and thermal testing on the Tubelite outboard system. The test unit was erected on site by St. Charles Glass and Glazing under the direction of Tubelite.

UNIT DESCRIPTION

The test unit was identified as a Tubelite T14000 Outboard Series and measured a nominal 8' wide X 8' high. A total of four (4) lites of glass were incorporated into the test specimen with the overall depth of the thermally broken system measuring 4 ½" deep. The primary depth was created with the interior extrusions.

FORMAL TESTING

All tests were performed utilizing the base guidelines provided by Tubelite incorporating the appropriate procedures outlined by AAMA and ASTM as referenced below:

1. **PRELOAD** +15.0 PSF static pressure (50% of the positive design load for ten (10) seconds).

ALLOWED: No failure of the system

RESULTS: No failure of the system

The above result constitutes an acceptable performance.

2. **STATIC AIR INFILTRATION** (ASTM E283) at 6.24 PSF (50 MPH wind and 1.2” H₂O).

ALLOWED: 3.8 CFM gross leakage or .06 CFM per square foot.

RESULTS: 2.9 CFM gross leakage or .045 CFM per square foot.

The above results constitute an acceptable performance.

3. **STATIC WATER INFILTRATION** (ASTM E331) at 10.0 PSF (63 MPH wind and 1 .92” H₂O) with a water spray rate of five (5) gallons per hour per square foot minimum for fifteen (15) minutes.

ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water infiltration to the room side.

The above result constitutes an acceptable performance.

March 24, 2006
T14000-Outboard-THO

4. **STATIC WATER INFILTRATION** (ASTM E331) at 12.0 PSF (69 MPH wind and 2.3" H₂O) with a water spray rate of five (5) gallons per hour per square foot minimum for fifteen (15) minutes.

ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water infiltration to the room side.

The above result constitutes an acceptable performance.

5. **DYNAMIC WATER INFILTRATION** (AAMA 501.1) with a 100 MPH wind velocity at the prop creating a slip stream wind speed at the face of the wall of 69 MPH at the wall equivalent to 12.0 PSF. Water was applied at a rate of five (5) gallons per hour per square foot for fifteen (15) minutes.

ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water infiltration to the room side.

The above result constitutes an acceptable performance.

6. **STRUCTURAL DESIGN LOADING** (ASTM E330) with each load being held for a duration of ten (10) seconds.

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+30.0 PSF (100% Positive Design Load)
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-30.0 PSF (100% Negative Design Load)

ALLOWED: No member shall have deflection greater than L/175 of its span or .37" vertically and .25" horizontally.

RESULTS:

No member exceeded the allowable deflection criteria with the maximum vertical deflection of .29" and maximum horizontal deflection of .15".

The above results constitute an acceptable performance.

7. **CONDENSATION RESISTANCE** (AAMA 1503.1) with the temperatures being held for a period of two (2) hours after stabilization. Eight (8) sets of reading were taken at fifteen (15) minute intervals with averages used to calculate the CRF value. The following were the base conditions:

Warm side ambient temperature:	70 degrees Fahrenheit
Cold side ambient temperature:	0 degrees Fahrenheit
Interior humidity:	15%
Exterior wind speed:	15 miles per hour

Calculated CRF Value:	62
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8. **STATIC AIR INFILTRATION** (ASTM E283) at 6.24 PSF (50 MPH wind and 1.2" H₂O).

ALLOWED: 3.8 CFM gross leakage or .06 CFM per square foot.

RESULTS: There was no measurable change in the air infiltration as a result of the thermal testing.

The above results constitute an acceptable performance.

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ALLOWED: No uncontrolled water infiltration to the room side.

March 24, 2006
T14000-Outboard-THO

RESULTS: No uncontrolled water infiltration to the room side.

The above result constitutes an acceptable performance.

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ALLOWED: No uncontrolled water infiltration to the room side.

RESULTS: No uncontrolled water infiltration to the room side.

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ALLOWED: No member shall have permanent set in excess of .2% of its span or shall there be any failure of the system.

RESULTS: No member exceeded the allowable permanent set or was there any failure of the system.

The above results constitute an acceptable performance.

SUMMARY

The Tubelite T14000 Outboard system has met the desired levels of performance as directed by the client.

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Respectfully Submitted,

MID AMERICA TESTING LABORATORY

A handwritten signature in black ink, appearing to read "Rick A. Heitmann", is written over the printed name of the laboratory.

Rick A. Heitmann
President

RAH:mm
05107LTR-Outboard-th0