

**ASTM E 90 SOUND TRANSMISSION LOSS
TEST REPORT**

Rendered to:

THERMA-TRU DOORS

SERIES/MODEL: Classic-Craft, Fiber Classic, and Smooth Star

TYPE: 3/8 Impact Rated Full Lite Side Hinged Door

| Summary of Test Results | | | | |
|--------------------------------|--|------------|-------------|-------------|
| ATI Data File No. | Leaf Description | STC | OITC | EWNR |
| 74384.01A* | Fiberglass skins and expanded foam core with 1" IG (3/8" laminated exterior, 1/2" air space, 1/8" tempered interior) glass temperature 73°F, inoperable test | 30 | 28 | 33 |
| 74384.01B | Fiberglass skins and expanded foam core with 1" IG (3/8" laminated exterior, 1/2" air space, 1/8" tempered interior) glass temperature 73°F, operable test | 28 | 26 | 31 |

* - *This test was not performed in accordance with ASTM E90 because the door system was not operable. The door leaf was sealed on both sides with duct tape.*

Reference should be made to ATI Report No. 74384.01-113-11 for complete test specimen description. The complete test results are listed in Appendix B.

ACOUSTICAL PERFORMANCE TEST REPORT

Rendered to:

THERMA-TRU DOORS
118 Industrial Drive
Edgerton, Ohio 73517

Report No: 74384.01-113-11
Test Date: 10/10/07
Report Date: 11/30/07
Expiration Date: 10/10/11

Test Sample Identification:

Series/Model: Classic-Craft, Fiber Classic, and Smooth Star

Type: 3/8 Impact Rated Full Lite Side Hinged Door

Overall Size: 37-7/8" by 98"

Leaf Size: 36" by 95-1/4"

Leaf Description: Fiberglass Skins and Expanded foam Core

Leaf Glazing: 1" IG (3/8" Laminated Exterior, 1/2" Air Space, 1/8" Tempered Interior)

Project Scope: Architectural Testing, Inc. was contracted by Therma-Tru Doors to conduct sound transmission loss tests on a Series/Model Classic-Craft, Fiber Classic, and Smooth Star, 3/8 impact rated full lite side hinged door. A summary of the results is listed in the Test Results section and the complete test data is included as Appendix B of this report. The sample was provided by the client.

Test Methods: The acoustical tests were conducted in accordance with the following:

ASTM E 90-04, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions*.*

ASTM E 413-04, *Classification for Rating Sound Insulation*.

ASTM E 1332-90 (Re-approved 2003), *Standard Classification for Determination of Outdoor-Indoor Transmission Class*.

ASTM E 2235-04, *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*.

* - For test number 74384.01A, the following deviation from the standard was performed: The door was testing in a sealed condition and was not operable during the test. The door leaf was sealed on both sides with duct tape.

Test Equipment: The equipment used to conduct these tests meets the requirements of ASTM E 90. The microphones were calibrated before conducting sound transmission loss tests. The test equipment and test chamber descriptions are listed in Appendix A.

Sample Installation:

Sound transmission loss tests were initially performed on a filler wall that was designed to test 96" by 99" specimens. The filler wall achieved an STC rating of 69.

A filler wall reducing element was used to reduce the test opening size to 38-1/2" wide by 98-1/2" high. The reducing element consisted of a double 2x4 wood stud wall construction with three layers of 5/8" drywall on both sides. The stud cavities in the wall were insulated with two layers of R-13 fiberglass insulation. The door system was placed on a foam isolation pad in the new test opening. Duct seal was used to seal the perimeter of the test specimen to the test opening on both sides. The interior side of the door frame, when installed, was approximately 1/4" from being flush with the receiving room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing. For the operable test the door panel was opened and closed at least five times prior to testing.

Test Procedure: The door was closed and latched for this test. The sound transmission loss test consisted of the following measurements: One background noise sound pressure level and five sound absorption measurements were conducted at each of the five microphone positions. Two sound pressure level measurements were made simultaneously in both rooms, at each of the five microphone positions. The air temperature and relative humidity conditions were monitored and recorded during the background, absorption, source, and receive room measurements.

Sample Descriptions:

Door Construction:

| | Main Frame | Leaf |
|------------------------------|-------------------|--------------------|
| Size | 37-7/8" by 98" | 36" by 95-1/4" |
| Thickness | 4-1/2" | 1-3/4" |
| Corners | Coped | Butted |
| Fasteners | Screws | Glue |
| Seal Method | Sealant | None |
| Material | Wood | See below |
| Reinforcement | N/A | N/A |
| Thermal Break Material | N/A | N/A |
| Daylight Opening Size | N/A | 20-7/8" by 78-1/8" |

Leaf Materials:

| Layers (outside to inside) | Layer Description (material and thickness) |
|---------------------------------------|---|
| 1 | 0.085" Fiberglass skin |
| 2 | 1.559" Expanded foam |
| 3 | 0.085" Fiberglass skin |

Comments: The lock stile was constructed from 3-5/8" by 1-1/2" plywood. The hinge stile was constructed from 7/8" by 1/2" wood. The top rail contained a composite member measuring 1" by 1-1/2". The bottom rail contained a composite member measuring 7/8" by 1-1/2". The door knob and deadbolt holes were reinforced by the lock stile. The hinge stile and lock stile was capped with 5/16" by 1-5/16" wood.

Sample Descriptions: (Continued)

Glazing:

| | |
|---|--------------------------|
| Measured Overall Insulation Glass Unit Thickness | 1.016" |
| Spacer Type | Aluminum butyl composite |

| | Exterior Sheet | Gap | Interior Sheet |
|---------------------------|------------------------|------------|-----------------------|
| Measured Thickness | 0.123", 0.090", 0.155" | 0.525" | 0.123" |
| Muntin Pattern | N/A | N/A | N/A |
| Material | Laminated | Air* | Tempered |
| Laminate Material | PVB | N/A | N/A |

| | |
|------------------------------|--------------------------|
| Glazing Method | Exterior pressure glazed |
| Glazing Material | Cellular glazing tape |
| Glazing Bead Material | Aluminum |

Components:

| | TYPE | QUANTITY | LOCATION |
|---------------------|---|-----------------|------------------------|
| Weatherstrip | | | |
| | Foam filled leaf gasket | 1 Row | Head and jambs |
| | Triple leaf flexible door sweep with 1/2" bulb gasket | 1 | Leaf bottom rail |
| Hardware | | | |
| | Full mortise butt hinge | 4 | Hinge jamb/hinge stile |
| | Dead bolt assembly | 1 | Lock stile |
| | Adjustable threshold | 1 | Sill |
| | Door knob | 1 | Lock stile |
| | Strike plate | 2 | Lock jamb |
| Drainage | | | |
| | Sloped sill | N/A | N/A |

* - Stated per Client/Manufacturer, N/A-Non Applicable

Comments: The weight of the door leaf was 122 lbs. The client did not supply drawings on the Series/Model Classic-Craft, Fiber Classic, and Smooth Star, 3/8 impact rated full lite side hinged door. The door was disassembled, and the components will be retained by ATI for four years. Photographs of the test specimen are included in Appendix C.

Test Results: The STC (Sound Transmission Class) and EWNR (Exterior Wall Noise Reduction) rating was calculated in accordance with ASTM E 413. The OITC (Outdoor-Indoor Transmission Class) was calculated in accordance with ASTM E 1332. A summary of the sound transmission loss test results on the Series/Model Classic-Craft, Fiber Classic, and Smooth Star, 3/8 impact rated full lite side hinged door is listed below.

| Summary of Test Results | | | | |
|-------------------------|--|-----|------|------|
| ATI Data File No. | Leaf Description | STC | OITC | EWNR |
| 74384.01A* | Fiberglass skins and expanded foam core with 1" IG (3/8" laminated exterior, 1/2" air space, 1/8" tempered interior) glass temperature 73°F, inoperable test | 30 | 28 | 33 |
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* - This test was not performed in accordance with ASTM E90 because the door system was not operable. The door leaf was sealed on both sides with duct tape.

The complete test results are listed in Appendix B. Flanking limit tests and reference specimen tests are available upon request.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire. Results obtained are tested values and were secured by using the designated test methods. 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(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC:

Brandon C. Ward
Technician - Acoustical Testing

Todd D. Kister
Laboratory Supervisor - Acoustical Testing

BCW:crc

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix-A: Equipment description (1)
- Appendix-B: Complete test results (3)
- Appendix-C: Photographs (1)

| | |
|---|--|
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|---|--|

Revision Log

| <u>Rev. #</u> | <u>Date</u> | <u>Page(s)</u> | <u>Revision(s)</u> |
|---------------|-------------|----------------|-----------------------|
| 0 | 11/30/07 | N/A | Original Report Issue |

Appendix A

Instrumentation:

| Instrument | Manufacturer | Model | Description | ATI Number |
|---------------------------|----------------------|------------|---|--------------------|
| Analyzer | Agilent Technologies | 35670A | Dynamic signal analyzer | Y002929 |
| Receive Room Microphone | G.R.A.S. | 40AR | 1/2", pressure type, condenser microphone | Y003246 |
| Source Room Microphone | G.R.A.S. | 40AR | 1/2", pressure type, condenser microphone | Y003245 |
| Receive Room Preamp | G.R.A.S. | 26AK | 1/2" preamplifier | Y003249 |
| Source Room Preamp | G.R.A.S. | 26AK | 1/2" preamplifier | Y003248 |
| Microphone Calibrator | Bruel & Kjaer | 4228 | Pistonphone calibrator | Y002816 |
| Noise Source | Delta Electronics | SNG-1 | Two, non-coherelated "Pink" noise signals | Y002181 |
| Equalizer | Rane | RPE228 | Programmable EQ | Y002180 |
| Power Amplifiers | Renkus-Heinz | P2000 | 2 - Amplifiers | Y002179 Y001779 |
| Receive Room Loudspeakers | Renkus-Heinz | Trap Jr/9" | 2 - Loudspeakers | Y001784 Y001785 |
| Source Room Loudspeakers | Renkus-Heinz | Trap Jr/9" | 2 - Loudspeakers | Y002649 Y002650 |

Test Chamber:

| | Volume | Description |
|----------------|--|--|
| Receiving Room | 8291.3 ft ³ (234 m ³) | Rotating vane and stationary diffusers. Temperature and humidity controlled. Isolation pads under the floor. |
| Source Room | 7296.3 ft ³ (206.6 m ³) | Stationary diffusers only. Temperature and humidity controlled. |

| | Maximum Size | Description |
|-----------------|--------------------------|---|
| TL Test Opening | 14 ft wide by 10 ft high | Vibration break between source and receive rooms. |

Appendix B
Complete Test Results



SOUND TRANSMISSION LOSS and EXTERIOR WALL NOISE REDUCTION

ASTM E90

Architectural Testing

| | | | |
|----------------------|--|-------------|----------|
| ATI No. | 74384.01A | Date | 10/10/07 |
| Client | Therma-Tru Doors | | |
| Specimen | Classic-Craft, Fiber-Classic and Smooth-Star, side hinged door with full light, impact glazing with 1" IG (3/8" laminated exterior, 1/2" air space, 1/8" tempered interior) glass temperature 73F, inoperable test | | |
| Specimen Area | 23.81 Sq Ft | | |
| Filler Area | 116.19 Sq Ft | | |
| Operator | Brandon C. Ward | | |

| | Bkgrd | Absorp | Source | Receive | Filler | Specimen |
|--------|-------|--------|--------|---------|--------|----------|
| Temp F | 74.8 | 75.8 | 73.3 | 74.8 | 74.9 | 74.7 |
| RH % | 44.3 | 42.7 | 42.9 | 44.1 | 59.1 | 43.5 |

| Freq (Hz) | Bkgrd SPL (dB) | Absorp (Sabines /Sq Ft) | Source SPL (dB) | Receive SPL (dB) | Filler TL (dB) | Specimen TL (dB) | 95% Conf Limit | No. of Deficiencies | Trans Coef Diff |
|-----------|----------------|-------------------------|-----------------|------------------|----------------|------------------|----------------|---------------------|-----------------|
| 80 | 45.4 | 49.6 | 87.7 | 66.1 | 39.0 | 19 | 1.94 | 0 | 13.7 |
| 100 | 39.6 | 51.9 | 89.2 | 65.4 | 42.8 | 20 | 3.51 | 0 | 15.5 |
| 125 | 40.3 | 46.7 | 94.8 | 64.8 | 53.4 | 27 | 3.19 | 0 | 19.4 |
| 160 | 43.3 | 51.7 | 95.9 | 69.8 | 52.7 | 23 | 1.52 | 0 | 23.2 |
| 200 | 43.4 | 51.5 | 101.0 | 73.0 | 54.2 | 25 | 0.88 | 0 | 22.7 |
| 250 | 39.4 | 58.3 | 101.2 | 72.4 | 55.9 | 25 | 0.85 | 0 | 24.0 |
| 315 | 37.6 | 58.6 | 99.9 | 68.1 | 57.3 | 28 | 1.14 | 0 | 22.5 |
| 400 | 35.7 | 58.9 | 99.2 | 66.8 | 63.3 | 29 | 0.82 | 0 | 27.9 |
| 500 | 32.7 | 62.4 | 101.3 | 67.2 | 66.3 | 30 | 0.71 | 0 | 29.6 |
| 630 | 28.4 | 60.5 | 104.2 | 68.9 | 69.0 | 31 | 0.29 | 0 | 30.8 |
| 800 | 27.2 | 61.9 | 103.5 | 67.7 | 72.9 | 32 | 0.46 | 0 | 34.3 |
| 1000 | 26.0 | 64.2 | 102.9 | 66.1 | 76.7 | 32 | 0.37 | 1 | 37.4 |
| 1250 | 25.8 | 70.1 | 106.3 | 74.5 | 78.4 | 27 | 0.26 | 7 | 44.4 |
| 1600 | 21.4 | 72.3 | 112.4 | 81.6 | 77.2 | 26 | 0.20 | 8 | 44.4 |
| 2000 | 15.0 | 79.0 | 108.2 | 75.6 | 75.7 | 27 | 0.28 | 7 | 41.3 |
| 2500 | 8.3 | 89.7 | 106.9 | 65.6 | 77.7 | 36 | 0.17 | 0 | 35.4 |
| 3150 | 8.0 | 106.1 | 107.7 | 58.6 | 87.1 | 43 | 0.34 | 0 | 37.7 |
| 4000 | 7.0 | 129.3 | 106.1 | 57.4 | 90.7 | 41 | 0.32 | 0 | 42.5 |
| 5000 | 7.3 | 170.7 | 104.5 | 51.8 | 90.8 | 44 | 0.15 | 0 | 39.8 |

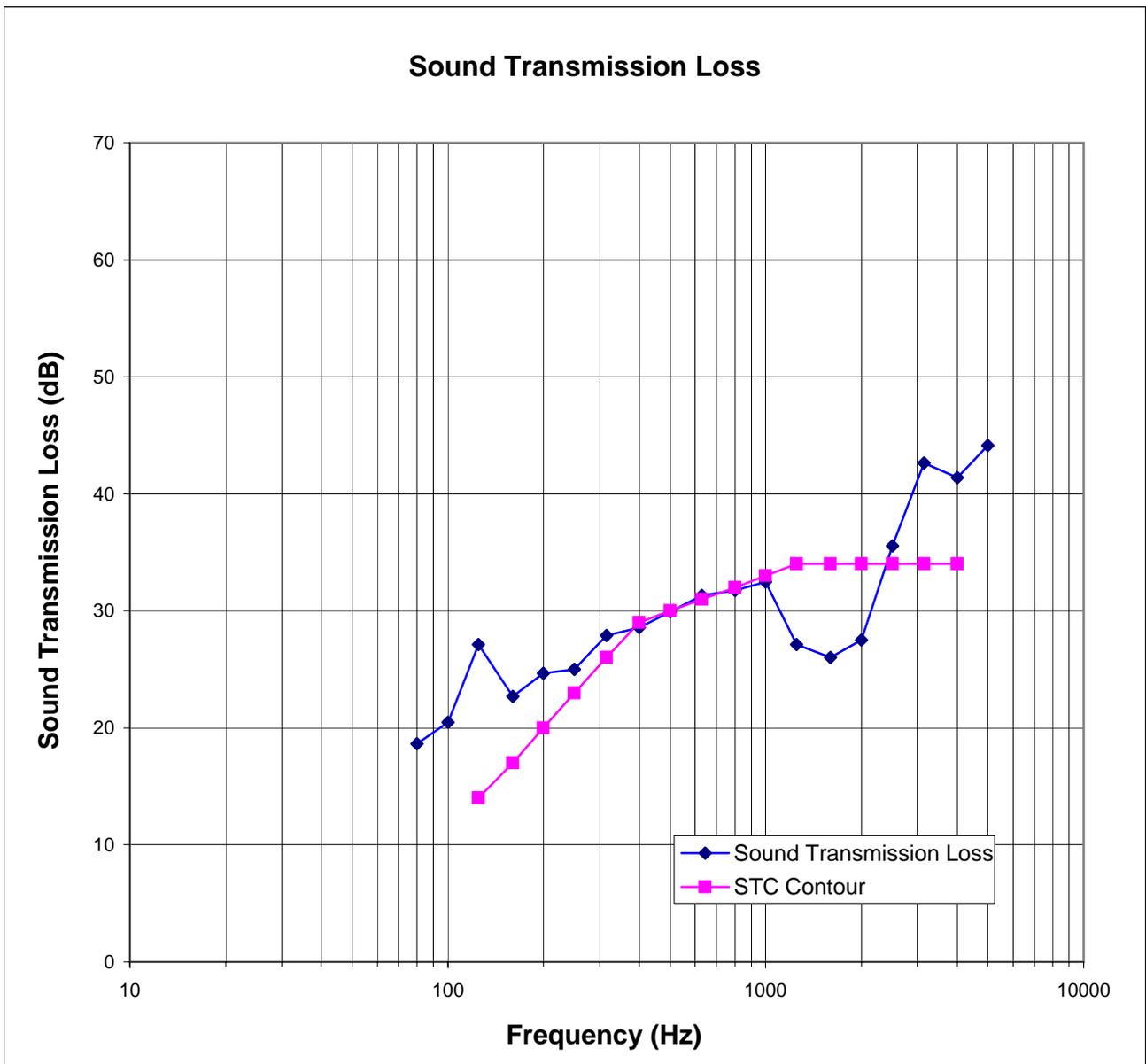
| | | |
|-----------------------|-----------|--|
| STC Rating = | 30 | <i>(Sound Transmission Class)</i> |
| Deficiencies = | 23 | <i>(Number of deficiencies versus contour curve)</i> |
| OITC Rating = | 28 | <i>(Outdoor/Indoor Transmission Class)</i> |
| EWNR Rating= | 33 | <i>(Exterior Wall Noise Reduction)</i> |

Note: The acoustical chambers are qualified for measurements down to 80 hertz.
Data reported below 80 hertz is for reference only.



Architectural Testing

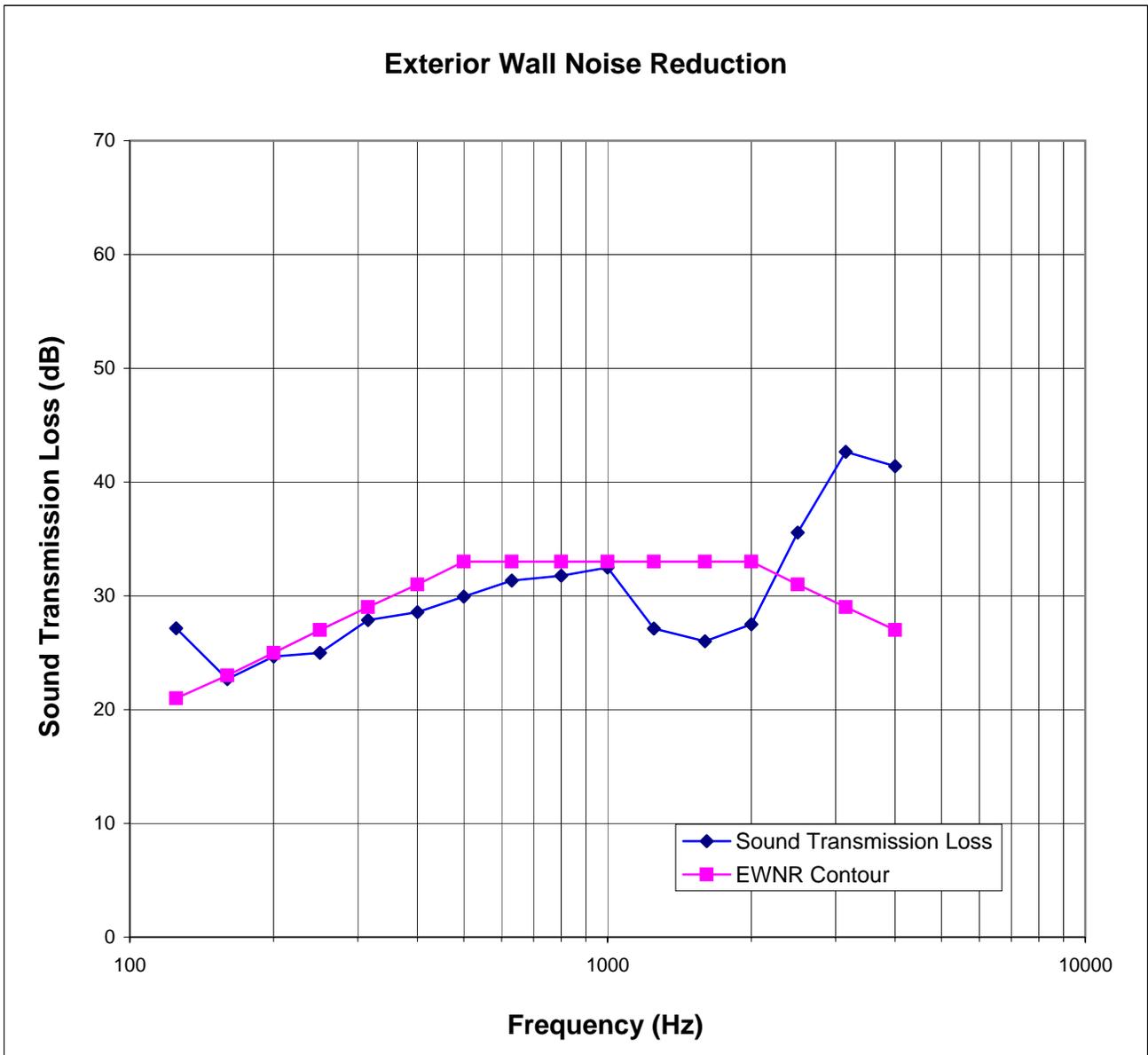
ATI No. 74384.01A **Date** 10/10/07
Client Therma-Tru Doors
Specimen Classic-Craft, Fiber-Classic and Smooth-Star, side hinged door with full light, impact glazing with 1" IG (3/8" laminated exterior, 1/2" air space, 1/8" tempered interior) glass temperature 73F, inoperable test
Specimen Area 23.81 Sq Ft
Filler Area 116.19 Sq Ft
Operator Brandon C. Ward





Architectural Testing

ATI No. 74384.01A Date 10/10/07
Client Therma-Tru Doors
Specimen Classic-Craft, Fiber-Classic and Smooth-Star, side hinged door with full light, impact glazing with 1" IG (3/8" laminated exterior, 1/2" air space, 1/8" tempered interior) glass temperature 73F, inoperable test
Specimen Area 23.81 Sq Ft
Filler Area 116.19 Sq Ft
Operator Brandon C. Ward





SOUND TRANSMISSION LOSS and EXTERIOR WALL NOISE REDUCTION

ASTM E90

Architectural Testing

| | | | |
|----------------------|--|-------------|----------|
| ATI No. | 74384.01B | Date | 10/10/07 |
| Client | Therma-Tru Doors | | |
| Specimen | Classic-Craft, Fiber-Classic and Smooth-Star, side hinged door with full light, impact glazing with 1" IG (3/8" laminated exterior, 1/2" air space, 1/8" tempered interior) glass temperature 73F, operable test | | |
| Specimen Area | 23.81 Sq Ft | | |
| Filler Area | 116.19 Sq Ft | | |
| Operator | Brandon C. Ward | | |

| | Bkgrd | Absorp | Source | Receive | Filler | Specimen |
|--------|-------|--------|--------|---------|--------|----------|
| Temp F | 76.2 | 76.8 | 76.5 | 76.2 | 74.9 | 76.4 |
| RH % | 40.1 | 39.8 | 38.4 | 40.1 | 59.1 | 39.6 |

| Freq (Hz) | Bkgrd SPL (dB) | Absorp (Sabines /Sq Ft) | Source SPL (dB) | Receive SPL (dB) | Filler TL (dB) | Specimen TL (dB) | 95% Conf Limit | No. of Deficiencies | Trans Coef Diff |
|-----------|----------------|-------------------------|-----------------|------------------|----------------|------------------|----------------|---------------------|-----------------|
| 80 | 43.2 | 52.0 | 87.1 | 65.4 | 39.0 | 19 | 3.18 | 0 | 13.8 |
| 100 | 41.0 | 55.3 | 89.0 | 65.8 | 42.8 | 20 | 3.11 | 0 | 16.4 |
| 125 | 40.6 | 54.0 | 94.8 | 66.0 | 53.4 | 25 | 3.42 | 0 | 21.3 |
| 160 | 43.3 | 55.0 | 95.7 | 70.1 | 52.7 | 22 | 1.60 | 0 | 23.9 |
| 200 | 45.0 | 52.9 | 100.7 | 73.8 | 54.2 | 23 | 0.85 | 0 | 23.8 |
| 250 | 41.8 | 56.1 | 101.2 | 73.5 | 55.9 | 24 | 0.82 | 0 | 25.0 |
| 315 | 38.8 | 59.1 | 99.8 | 69.0 | 57.3 | 27 | 1.15 | 0 | 23.5 |
| 400 | 36.3 | 62.9 | 99.3 | 68.1 | 63.3 | 27 | 0.70 | 0 | 29.5 |
| 500 | 32.2 | 60.6 | 101.1 | 68.7 | 66.3 | 28 | 0.71 | 0 | 31.1 |
| 630 | 28.0 | 59.8 | 103.9 | 71.1 | 69.0 | 29 | 0.35 | 0 | 33.2 |
| 800 | 26.5 | 63.1 | 103.5 | 71.7 | 72.9 | 28 | 0.53 | 2 | 38.4 |
| 1000 | 25.7 | 67.4 | 102.9 | 70.9 | 76.7 | 28 | 0.34 | 3 | 42.3 |
| 1250 | 25.3 | 71.8 | 106.2 | 75.8 | 78.4 | 26 | 0.35 | 6 | 45.9 |
| 1600 | 21.0 | 74.2 | 112.4 | 82.4 | 77.2 | 25 | 0.17 | 7 | 45.4 |
| 2000 | 15.7 | 82.0 | 108.2 | 76.5 | 75.7 | 26 | 0.28 | 6 | 42.5 |
| 2500 | 11.3 | 90.2 | 106.8 | 69.0 | 77.7 | 32 | 0.27 | 0 | 38.9 |
| 3150 | 9.3 | 107.8 | 107.6 | 65.8 | 87.1 | 35 | 0.28 | 0 | 45.0 |
| 4000 | 8.1 | 130.2 | 106.0 | 64.3 | 90.7 | 34 | 0.33 | 0 | 49.4 |
| 5000 | 8.0 | 174.4 | 104.4 | 61.4 | 90.8 | 34 | 0.29 | 0 | 49.6 |

STC Rating = 28 *(Sound Transmission Class)*
Deficiencies = 24 *(Number of deficiencies versus contour curve)*
OITC Rating = 26 *(Outdoor/Indoor Transmission Class)*
EWNR Rating = 31 *(Exterior Wall Noise Reduction)*

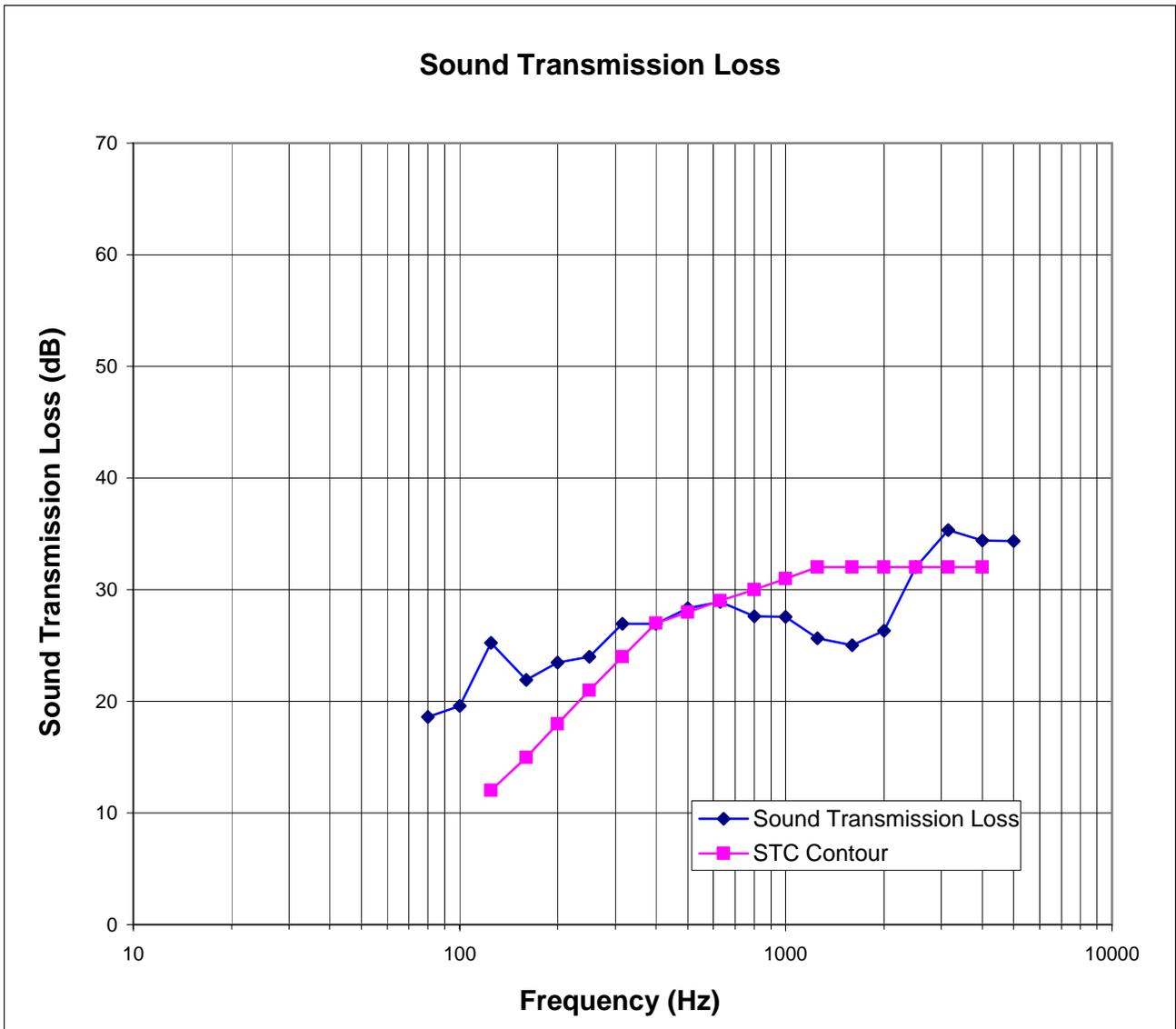
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Data reported below 80 hertz is for reference only.

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Architectural Testing

ATI No. 74384.01B Date 10/10/07
Client Therma-Tru Doors
Specimen Classic-Craft, Fiber-Classic and Smooth-Star, side hinged door with full light, impact glazing with 1" IG (3/8" laminated exterior, 1/2" air space, 1/8" tempered interior) glass temperature 73F, operable test
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Filler Area 116.19 Sq Ft
Operator Brandon C. Ward

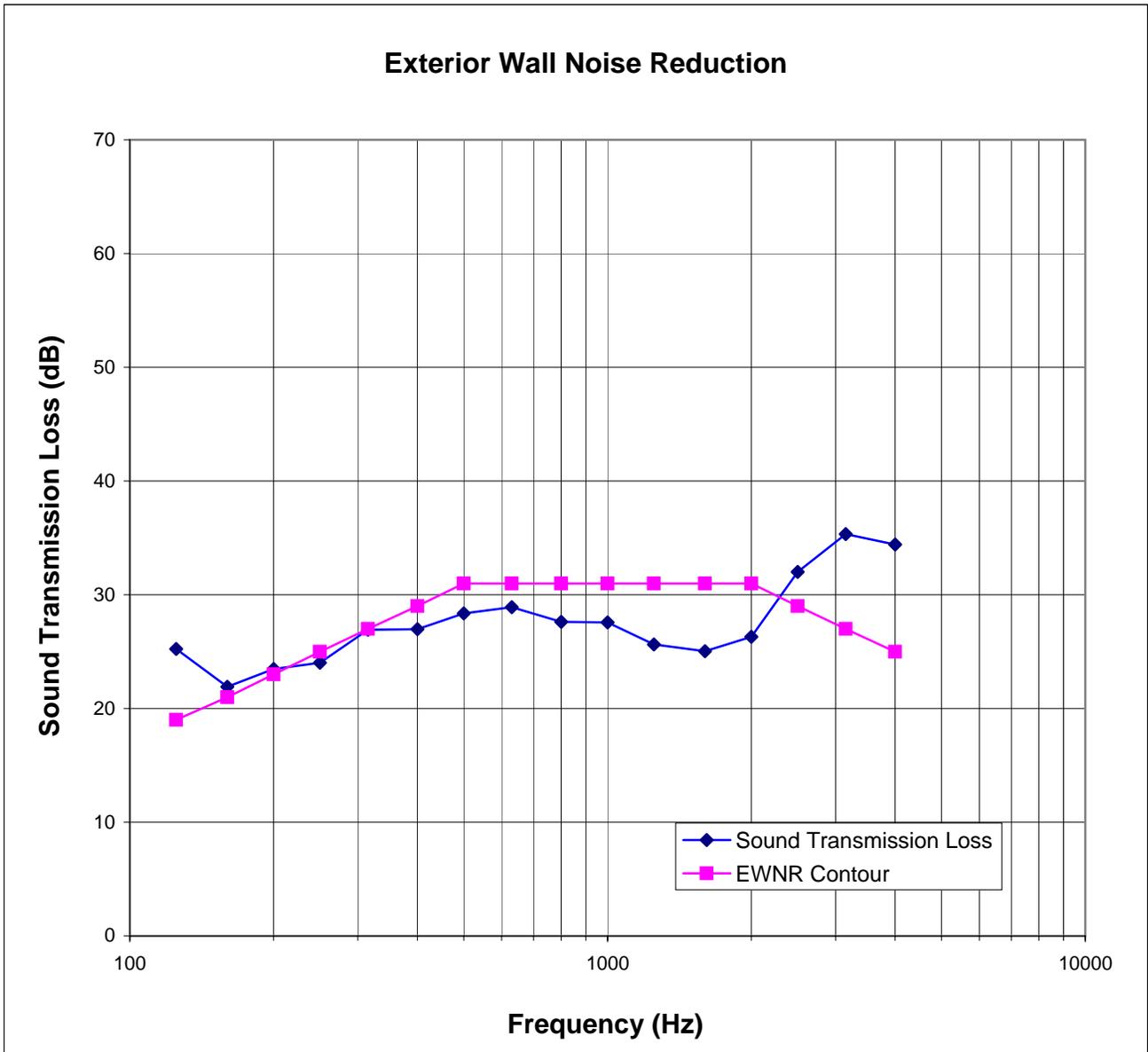


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Appendix C

Photographs



Leaf Cross Section at Lock Stile



Sample Installed in Test Chamber