Architectural Testing

# ASTM E 90 SOUND TRANSMISSION LOSS TEST REPORT

**Rendered to:**

**TUBELITE, INC.**

**SERIES/MODEL: 300ES**

**TYPE: Two-Lite Curtain Wall System**

| Summary of Test Results | | | |
|---|---|---|---|
| **Data File No.** | **Glazing (Nominal Dimensions)** | **STC** | **OITC** |
| 87721.01 | 1" IG (1/4" tempered, 1/2" air space, 1/4" tempered) | 31 | 26 |

Reference should be made to Architectural Testing Report No. 87721.01-113-11 for complete test specimen description. The complete test results are listed in Appendix B.

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York, PA 17406-8405
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# ACOUSTICAL PERFORMANCE TEST REPORT

Rendered to:

TUBELITE, INC.
3056 Walker Ridge Drive NW Suite G
Walker, Michigan 49544

Report No: 87721.01-113-11
Test Date: 12/02/08
Report Date: 12/23/08
Expiration Date: 12/02/12

**Test Sample Identification**:

**Series/Model**: 300ES

**Type**: Two-Lite Curtain Wall System

**Overall Size**: 80-3/16" by 80"

**Glazing (Nominal Dimensions)**: 1" IG (1/4" Tempered, 1/2" Air Space, 1/4" Tempered)

**Project Scope**: Architectural Testing, Inc. was contracted by Tubelite, Inc. to conduct sound transmission loss tests on a Series/Model 300ES, two-lite curtain wall system. 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*.

**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.

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**Sample Installation**:

Sound transmission loss tests were initially performed on a filler wall that was designed to test 40" by 86" and 80" by 86" specimens. The filler wall achieved an STC rating of 69.

A filler wall reducing element was used to reduce the test opening size to 80-1/2" wide by 80-1/2" 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 curtain wall 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 curtain wall 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.

**Test Procedure**: 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**:

**Frame Construction**:

| | | **Frame** |
|---|---|---|
| **Size** | | 80-3/16" by 80" |
| **Thickness** | | 6" |
| **Corners** | | Butted |
| | Fasteners | Screws |
| | Seal Method | Sealant |
| **Material** | | Thermally broken aluminum |
| | Thermal Break Material | Insulbar |
| | Reinforcement | N/A |
| **Daylight Opening Size** | | 36-7/8" by 75-3/4" |

**Sample Descriptions**: (Continued)

**Glazing**:

| | |
|---|---|
| **Measured Overall Insulation Glass Unit Thickness** | 0.941" |
| **Spacer Type** | Aluminum |

| | **Exterior Sheet** | **Gap** | **Interior Sheet** |
|---|---|---|---|
| **Measured Thickness** | 0.223" | 0.495" | 0.223" |
| **Muntin Pattern** | N/A | N/A | N/A |
| **Material** | Tempered Low E | Air* | Tempered |
| **Laminate Material** | N/A | N/A | N/A |

| | |
|---|---|
| **Glazing Method** | Pocket glazed onto EPDM |
| **Glazing Material** | Flexible wedge gasket |
| **Glazing Bead Material** | N/A |

**Components**:

| | **TYPE** | **QUANTITY** | **LOCATION** |
|---|---|---|---|
| **Weatherstrip** | | | |
| | No weatherstrip | | |
| **Hardware** | | | |
| | No hardware | | |
| **Drainage** | | | |
| | No drainage | | |

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

**Comments**: The weight of the test sample was 218 lbs. The design drawing (included in Appendix C) supplied by the client, accurately describe the Series/Model 300ES, two-lite curtain wall system. The dimensions on the drawing that are circled and/or checked were verified against the test specimen. The curtain wall system was disassembled, and the components will be retained by Architectural Testing for four years. Photographs of the test specimen are included in Appendix D.

**Test Results**: The STC (Sound Transmission Class) 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 300ES, two-lite curtain wall system is listed below.

| Data File No. | Glazing (Nominal Dimensions) | STC | OITC |
|---|---|---|---|
| 87721.01 | 1" IG (1/4" annealed, 1/2" air space, 1/4" annealed) | 31 | 26 |

***Note**: Transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. On each data sheet listed in Appendix B, the cells are highlighted red for the transmission loss values limited in this way. Due to the calculations and sample size, transmission loss coefficient differences between 6 and 15 indicate there has been a filler wall correction applied. On each data sheet listed in Appendix B, cells highlighted in green indicate transmission loss values affected in this way.*

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 tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC:

Digitally Signed by: Daniel P. Platts

Daniel P. Platts
Technician - Acoustical Testing

Digitally Signed by: Todd D. Kister

Todd D. Kister
Laboratory Supervisor - Acoustical Testing

DPP:vlm

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

- Appendix-A: Equipment description (1)
- Appendix-B: Complete test results (2)
- Appendix-C: Drawing (1)
- Appendix-D: Photographs (1)

## Revision Log

| Rev. # | Date | Page(s) | Revision(s) |
|---|---|---|---|
| 0 | 12/23/08 | 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<br>Y001779 |
| Receive Room Loudspeakers | Renkus-Heinz | Trap Jr/9" | 2 - Loudspeakers | Y001784<br>Y001785 |
| Source Room Loudspeakers | Renkus-Heinz | Trap Jr/9" | 2 - Loudspeakers | Y002649<br>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

ASTM E90

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| | | | |
|---|---|---|---|
| **ATI No.** | 87721.01 | **Date** | 12/02/08 |
| **Client** | Tubelite, Inc. | | |
| **Specimen** | Series/Model: 300ES, two-lite curtain wall system with 1" IG (1/4" tempered exterior, 1/2" air space, 1/4" tempered interior) | | |
| **Specimen Area** | 44.54 Sq Ft | | |
| **Filler Area** | 95.46 Sq Ft | | |
| **Operator** | Daniel P Platts | | |

| | Bkgrd | Absorp | Source | Receive | Filler | Specimen |
|---|---|---|---|---|---|---|
| **Temp F** | 74.9 | 74.7 | 74.3 | 74.9 | 73.8 | 74.7 |
| **RH %** | 40.7 | 41.1 | 44.7 | 40.8 | 41.4 | 41.8 |

| 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 Defici-encies | Trans Coef Diff |
|---|---|---|---|---|---|---|---|---|---|
| 80 | 34.6 | 59.1 | 87.1 | 65.5 | 31.2 | 21 | 1.34 | 0 | 7.5 |
| 100 | 36.1 | 57.1 | 90.5 | 62.8 | 35.5 | 28 | 3.14 | 0 | 5.5 |
| 125 | 39.4 | 56.6 | 94.4 | 66.6 | 44.7 | 27 | 2.33 | 0 | 14.6 |
| 160 | 40.5 | 49.8 | 96.6 | 71.6 | 49.1 | 25 | 1.00 | 0 | 21.2 |
| 200 | 40.5 | 57.3 | 100.8 | 83.8 | 56.9 | 16 | 0.81 | 5 | 37.7 |
| 250 | 38.3 | 59.4 | 101.7 | 80.9 | 60.1 | 20 | 1.31 | 4 | 37.3 |
| 315 | 37.2 | 60.9 | 99.9 | 76.8 | 63.0 | 22 | 0.95 | 5 | 37.9 |
| 400 | 37.3 | 63.4 | 99.6 | 71.0 | 66.9 | 27 | 0.65 | 3 | 36.6 |
| 500 | 38.1 | 61.2 | 100.6 | 70.0 | 69.4 | 29 | 0.48 | 2 | 36.9 |
| 630 | 33.6 | 59.7 | 102.6 | 70.2 | 71.7 | 31 | 0.77 | 1 | 37.2 |
| 800 | 34.6 | 62.3 | 102.5 | 68.3 | 74.3 | 33 | 0.31 | 0 | 38.3 |
| 1000 | 32.8 | 66.3 | 102.2 | 66.6 | 76.9 | 34 | 0.48 | 0 | 39.8 |
| 1250 | 32.7 | 67.8 | 105.2 | 66.9 | 78.1 | 36 | 0.26 | 0 | 38.3 |
| 1600 | 30.0 | 71.9 | 111.0 | 72.5 | 77.7 | 36 | 0.33 | 0 | 38.0 |
| 2000 | 20.9 | 79.2 | 106.4 | 71.3 | 78.0 | 33 | 0.33 | 2 | 42.1 |
| 2500 | 10.5 | 89.9 | 105.0 | 69.2 | 78.6 | 33 | 0.24 | 2 | 42.7 |
| 3150 | 10.7 | 106.2 | 105.5 | 68.3 | 80.2 | 33 | 0.30 | 2 | 43.4 |
| 4000 | 8.8 | 129.1 | 104.0 | 63.4 | 80.8 | 36 | 0.19 | 0 | 41.5 |
| 5000 | 7.9 | 171.8 | 102.4 | 55.9 | 82.5 | 41 | 0.28 | 0 | 38.6 |

| | | |
|---|---|---|
| **STC Rating =** | **31** | *(Sound Transmission Class)* |
| **Deficiencies =** | **26** | *(Number of deficiencies versus contour curve)* |
| **OITC Rating =** | **26** | *(Outdoor/Indoor Transmission Class)* |

***Notes:***

*1) The acoustical chambers are qualified for measurements down to 80 hertz. Data reported below 80 hertz is for reference only.*

*2) Transmission loss coefficient differences less than 6 indicate the lower limit of the transmission loss for this specimen. These cells are highlighted red.*

*3) Transmission loss coefficient differences between 6 and 15 indicate there has been a filler wall correction applied. These cells are highlighted green.*

*4) Receive Room levels less than 5dB above the Background levels are highlighted in yellow.*

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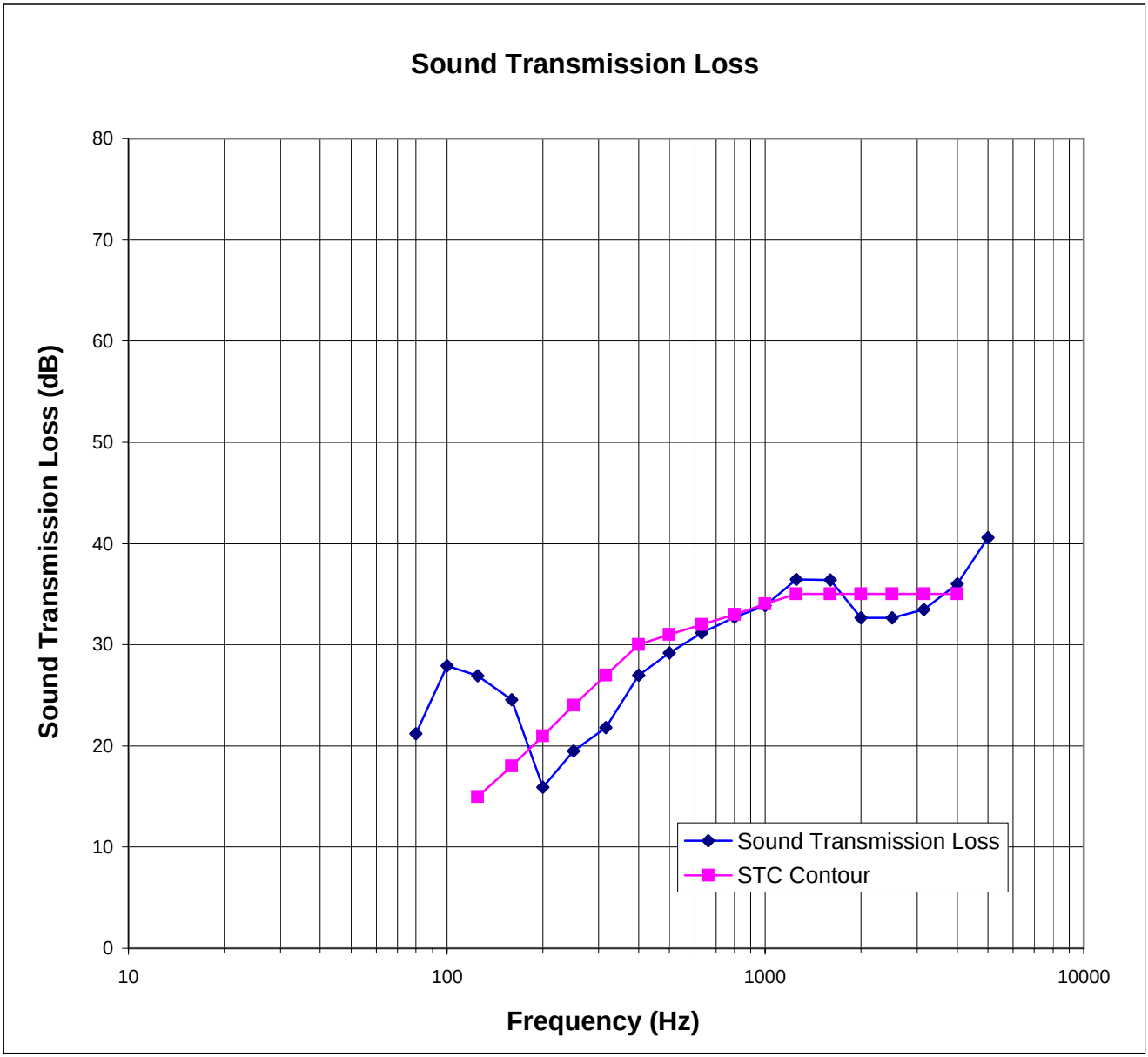
| | | | |
|---|---|---|---|
| **ATI No.** | 87721.01 | **Date** | 12/02/08 |
| **Client** | Tubelite, Inc. | | |
| **Specimen** | Series/Model: 300ES, two-lite curtain wall system with 1" IG (1/4" tempered exterior, 1/2" air space, 1/4" tempered interior) | | |
| **Specimen Area** | 44.54 Sq Ft | | |
| **Filler Area** | 95.46 Sq Ft | | |
| **Operator** | Daniel P Platts | | |




ACCREDITED

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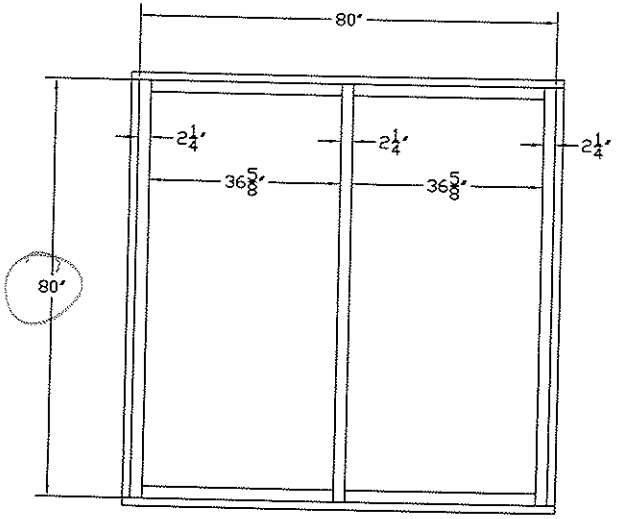
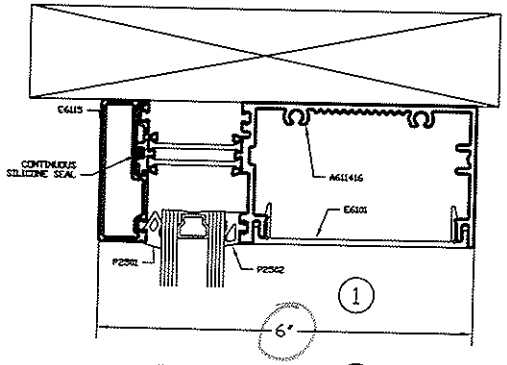
# Appendix C

## Design Drawing

T951-1




Conduct Sound Transmission Loss Testing in accordance with ASTM E 90.
Calculate Sound Transmission Class (STC) Rating in accordance with ASTM E413.
Calculate Outdoor-Indoor Transmission Class (OITC) Rating in accordance with ASTM E 1332.

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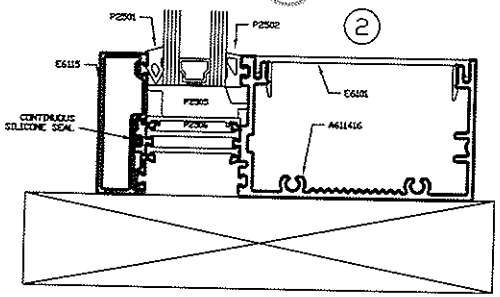
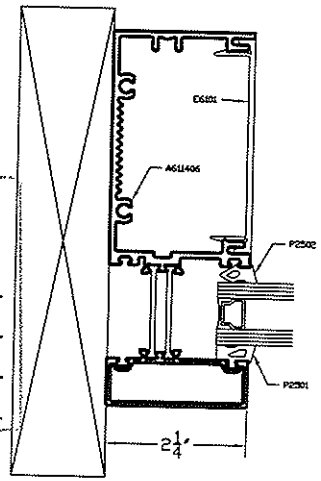



②

Architectural Testing
Client Tubelite
Report # 97721.01
Date 12/2/08
Tech D.P.P.

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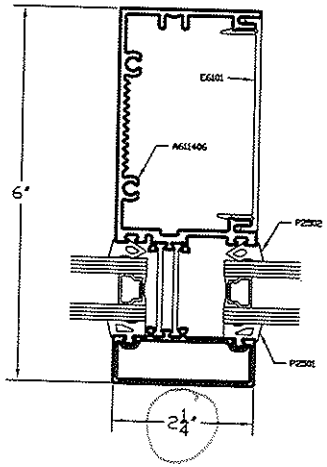


④

TUBELITE®
STOREFRONT, CURTAINWALL & ENTRANCES
DEPENDABLE

300ES CURTAINWALL SYSTEM
ACOUSTICAL TEST

| DRAWN BY | SRD | DRVG DATE | 8/15/08 | APPV'D BY | | DATE APPV'D | |
|---|---|---|---|---|---|---|---|
| DRVG SCALE | 1/2 | SIZE | PRODUCT CODE 440 | SHEET NO. | 1 OF 1 | | REV. |

# Appendix D

## Photographs


**Receive Room View of Installed Specimen**


**Source Room View of Installed Specimen**