SPONSOR: **Overly Door Company**
Greensburg, PA

**Sound Transmission Loss**
**RAL™-TL21-241**

CONDUCTED: 2021-06-23



ON: Wood clad steel door assembly - Model STC5021241, operable

## TEST METHODOLOGY

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E90-09 (2016): "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements." The single number rating of the specimen was calculated according to ASTM E413-16: "Classification for Rating Sound Insulation." A description of the measurement procedure and room specifications is available upon request. The transmission loss values are for a single direction of measurement. The results presented in this report apply to the sample as received from the test sponsor.

## INFORMATION PROVIDED BY SPONSOR

The test specimen was designated by the sponsor as Wood clad steel door assembly - Model STC5021241, operable. The following nominal product information was provided by the sponsor prior to testing. The accuracy of such sponsor-provided information can affect the validity of the test results.

**Product Under Test**

| | |
|---|---|
| Components: | MCL500 hinges |
| | Schlage D110S cylindrical lockset |
| | Pemko S88D25 Siliconeseal Adhesive Gasketing |
| | H-Seal |
| Materials: | Wood clad steel door assembly |
| Manufacturer: | Overly Door Company |

## SPECIMEN MEASUREMENTS & TEST CONDITIONS

Through a full external visual inspection performed on the test specimen, Riverbank personnel verified the following specimen properties:

**Door Frame**

| | |
|---|---|
| Materials: | Metal door frame, concrete casting at perimeter |
| Dimensions: | Overall @ 1194 mm (47 in.) by 2413 mm (95 in.) |
| | Door frame @ 1016 mm (40 in.) by 2235 mm (88 in.) |
| Depth: | Overall @ 178 mm (7 in.) |
| | Door frame @ 165 mm (6.5 in.) |
| Overall Weight: | Frame and concrete @ 418.21 kg (922 lbs) |

## Door Stops

| | |
|---|---|
| Materials: | Formed metal rails with solid foam rubber gaskets/felt on one face |
| Dimensions: | Overall @ approximately 25.4 mm (1 in.) wide by 25.4 mm (1 in.) thick<br>2 @ 2127 mm (83.75 in.) long<br>1 @ 933 mm (36.75 in.) long<br>Foam gasket @ 16 mm (0.625 in.) wide by 3 mm (0.125 in.) thick<br>Felt @ 9.5 mm (0.375 in.) wide |
| Installation: | Fastened to interior faces of door frame, face with gaskets/felt oriented toward receive room, felt between gasket and frame<br>Exposed faces of gaskets recessed 48 mm (1.89 in.) from outer face of door frame |
| Overall Weight: | 2.72 kg (6 lbs) |

## Door Leaf

| | |
|---|---|
| Materials: | Wood exterior, with metal lockset and metal cam-lift hinges |
| Dimensions: | 908 mm (35.75 in.) by 2124 mm (83.625 in.) |
| Thickness: | 57 mm (2.25 in.) |
| Installation: | Suspended from jamb of door frame via three (3) hinges<br>Door opens into receive room |
| Overall Weight: | Door leaf @ 103.65 kg (228.5 lbs)<br>Hinges @ 2.72 kg (6 lbs) total<br>Lockset @ 2.04 kg (4.5 lbs) |

## Seals and Gaskets

### Bulb Gaskets

| | |
|---|---|
| Material: | Hollow rubber gasket, teardrop bulb profile |
| Dimensions: | 12.7 mm (0.5 in.) wide by 6.35 mm (0.25 in.) overall depth |
| Installation: | Head; adhered to corner of rabbet and stop, wide end facing stop<br>Hinge jamb; adhered to rabbet approximately 6.35 mm (0.25 in.) from receive side door frame face, narrow end facing stop<br>Strike jamb; adhered to rabbet approximately 6.35 mm (0.25 in.) from receive side door frame face, wide end facing stop |
| Overall Weight: | Approximately 0.06 kg (0.125 lbs) |

**Seals and Gaskets** (continued)

**Door Sweep**

| | |
|---|---|
| Materials: | Solid foam rubber, metal plate |
| Dimensions: | Steel @ 851 mm (33.5 in.) long by 79 mm (3.125 in.) wide |
| | Foam @ 914 mm (36 in.) long by 57 mm (2.25 in.) wide |
| Thickness: | Steel @ 3 mm (0.12 in.) |
| | Foam @ 24 mm (0.94 in.) |
| Installation: | Foam adhered to plate; plate fastened to bottom edge of door leaf |
| | Foam fits flush with source room face of door leaf via matching routed channel in door leaf |
| | Foam protrudes approximately 6.35 mm (0.25 in.) from bottom face of door leaf |
| | Thin layer of grease applied to foam |
| Overall Weight: | 1.59 kg (3.5 lbs) |

*Note: The specimen was fully opened and closed five (5) times immediately prior to testing in order to demonstrate operability. No further adjustments were made to the specimen.*

## Overall Specimen Measurements

| | |
|---|---|
| Dimensions: | 1.19 m (47 in.) wide by 2.41 m (95 in.) high |
| Thickness: | 0.18 m (7 in.) |
| Weight: | 530.99 kg (1170.62 lbs) |
| Overall Area: | 2.881 m² (31.01 ft²) |
| Mass per Unit Area: | 184.31 kg/m² (37.75 lbs/ft²) |

## Test Aperture

| | |
|---|---|
| Opening Size: | 1.22 m (4.0 ft.) by 2.44 m (8.0 ft.) |
| Filler Wall: | Yes |
| Aperture Size: | 1.02 m (40.0 in) wide by 2.24 m (88.0 in) high |
| Transmission Area: | 2.271 m² (24.44 ft²) |
| Sealed: | Entire periphery (both sides), including concrete, with dense mastic |

*Note: The dimensions used to determine the transmission area exclude those of the concrete-filled frame into which the door frame was cast. Given that the transmission loss performance of massive solid partitions is expected to be considerably greater than that of operable doors, the amount of flanking sound transmission through the mastic-covered concrete is assumed to be negligible. The specimen dimensions reflect this assumption.*

## Test Environment

Source Room

| | |
|---|---|
| Volume: | 131.48 m³ |
| Temperature: | 21.4 °C ± 0.6 °C |
| Relative Humidity: | 52.5 % ± 1.0 % |

Receive Room

| | |
|---|---|
| Volume: | 178.33 m³ |
| Temperature: | 21.9 °C ± 0.6 °C |
| Relative Humidity: | 50.0 % ± 0.0 % |

Requirements

| | |
|---|---|
| Temperature: | 22° C +/- 2° C, not more than 3° C change over all tests. |
| Relative Humidity: | ≥ 30%, not more than +/- 3% change over all tests. |

Figure 1 – Specimen mounted in test opening, as viewed from receive room (left) and source room (right)

Figure 2 – Operation of specimen, as viewed from receive room; extent of perimeter mastic seal

Figure 3 – Seals and gaskets at strike jamb

Figure 4 – Seals and gaskets at head and hinge jamb

Figure 5 – Detail of door sweep configuration

**Overly Door Company**
2021-06-23

**RAL™-TL21-241**


TEST RESULTS

Sound transmission loss values are tabulated at the eighteen standard frequency bands. A graphic presentation of the data and additional information appear on the following pages. The precision of the transmission loss test data is within the limits set by the ASTM Standard E90-09 (2016). See Appendix A for identification of corrections applied to the reported data.

| FREQ. | TL | ΔTL | DEF. | FREQ. | TL | ΔTL | DEF. |
|---|---|---|---|---|---|---|---|
| 100 | 28 | 0.68 | 0 | 800 | 50 | 0.10 | 2 |
| 125 | 36 | 0.53 | 0 | 1000 | 51 | 0.09 | 2 |
| 160 | 37 | 0.89 | 0 | 1250 | 50 | 0.13 | 4 |
| 200 | 37 | 0.31 | 3 | 1600 | 53 | 0.13 | 1 |
| 250 | 38 | 0.35 | 5 | 2000 | 53 | 0.14 | 1 |
| 315 | 45 | 0.31 | 1 | 2500 | 54 | 0.11 | 0 |
| 400 | 47 | 0.30 | 2 | 3150 | 54 | 0.14 | 0 |
| 500 | 48 | 0.21 | 2 | 4000 | 55 | 0.13 | 0 |
| 630 | 49 | 0.16 | 2 | 5000 | 56 | 0.14 | 0 |

STC=50

ABBREVIATION INDEX

FREQ. = 1/3 OCTAVE BAND CENTER FREQUENCY, Hz
TL = TRANSMISSION LOSS, dB
ΔTL = 95% CONFIDENCE INTERVAL FOR TL MEASUREMENTS, dB
DEF. = DEFICIENCIES, dB BELOW SHIFTED STC CONTOUR (SUM OF DEF = 25)
STC = SOUND TRANSMISSION CLASS

Tested by _____
Dean Victor
*Lead Experimentalist*

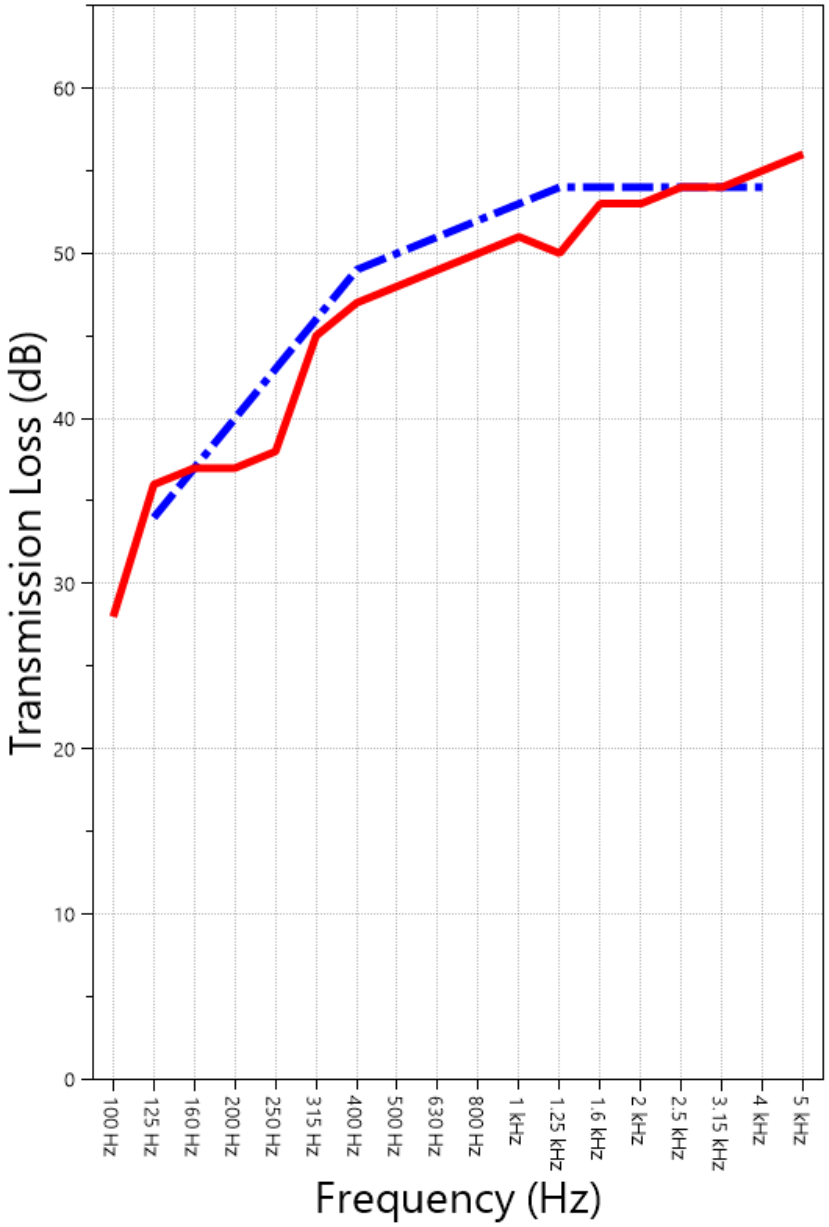
Report by _____
Malcolm Kelly
*Test Engineer, Acoustician*

Approved by _____
Eric P. Wolfram
*Laboratory Manager*

Digitally signed by Eric P Wolfram
Date: 2021.06.30 13:07:33 -05'00'

# SOUND TRANSMISSION REPORT

Wood clad steel door assembly - Model STC5021241, operable




**STC=50**
**OITC=40**

**TRANSMISSION LOSS**
**SOUND TRANSMISSION CLASS CONTOUR**

## APPENDIX A: Extended Frequency Range Data

Specimen: Wood clad steel door assembly - Model STC5021241, operable (See Full Report)

*The following non-accredited data were obtained in accordance with ASTM E90-09 (2016), but extend beyond the defined frequency range of 100Hz to 5,000Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes. Sampling precision observed during this procedure is reported below. Corrections are detailed in Appendix B.*

| 1/3 Octave Band Center Frequency (Hz) | **Sound Transmission Loss** (dB) | **Applicable Corrections** | **ΔTL (Eq. A2.5)** (dB) | **Repeatability** (dB) |
|---|---|---|---|---|
| 31.5 | 35 | *F* | 1.10 | 1.24 |
| 40 | 37 | *F* | 0.92 | 1.44 |
| 50 | 31 | *F* | 0.58 | 0.98 |
| 63 | 21 | | 0.66 | 2.33 |
| 80 | 26 | | 0.94 | 1.46 |
| 100 | 28 | | 0.68 | 0.77 |
| 125 | 36 | | 0.53 | 1.28 |
| 160 | 37 | | 0.89 | 1.18 |
| 200 | 37 | | 0.31 | 0.74 |
| 250 | 38 | | 0.35 | 0.53 |
| 315 | 45 | | 0.31 | 0.46 |
| 400 | 47 | | 0.30 | 0.41 |
| 500 | 48 | | 0.21 | 0.41 |
| 630 | 49 | | 0.16 | 0.32 |
| 800 | 50 | | 0.10 | 0.30 |
| 1000 | 51 | | 0.09 | 0.29 |
| 1250 | 50 | | 0.13 | 0.15 |
| 1600 | 53 | | 0.13 | 0.18 |
| 2000 | 53 | | 0.14 | 0.12 |
| 2500 | 54 | | 0.11 | 0.28 |
| 3150 | 54 | | 0.14 | 0.23 |
| 4000 | 55 | | 0.13 | 0.18 |
| 5000 | 56 | | 0.14 | 0.26 |
| 6300 | 56 | | 0.16 | 0.28 |
| 8000 | 56 | | 0.15 | 0.67 |
| 10000 | 54 | *F* | 0.20 | 0.93 |
| 12500 | 49 | *F* | 0.28 | 1.93 |

## APPENDIX B: Glossary of Standardized Corrections and Adjustments

Specimen: Wood clad steel door assembly - Model STC5021241, operable (See Full Report)

| Mark | Interpretation |
|---|---|
| *A* | Measured sound pressure levels in the receive room are within 10 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3. |
| *AA* | Measured sound pressure levels in the receive room are within 5 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.1. Transmission Loss values calculated from levels corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and a receive room with idealized ambient sound levels of (-∞) dB. |
| *F* | The reported Transmission Loss is within 10 dB of the laboratory flanking limit at the marked frequency band. The measured performance of the specimen may be limited by the performance of the laboratory building structure at this frequency band. |
| *Z* | The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.7 to account for possible sound transmission through the filler assembly. |
| *ZZ* | The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.8 to account for possible sound transmission through the filler assembly. Transmission Loss values corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and an idealized filler assembly with a Sound Transmission Class rating of (∞). |

## APPENDIX C: Glossary of Variability Metrics

Specimen: Wood clad steel door assembly - Model STC5021241, operable (See Full Report)

**ΔTL**, the 95% confidence interval for reported transmission loss values, is calculated from the standard deviation of the sets of measurements for source room sound pressure level, receive room sound pressure level, and receive room sound absorption. This metric is calculated in an effort to quantify the combined influences of room geometry, microphone positioning, and other varying environmental conditions on reported results.

**Repeatability**, expressed as a 95% confidence interval, is calculated from the standard deviation of transmission loss as obtained from a set of six (6) consecutive tests conducted according to this test method by RAL on 2020-02-24. The tests were performed on a specimen composed of welded aluminum tubing, using the same test opening as used in this report. This metric provides an estimate of the variation in results that might be observed if the test were repeated with no change to the installed specimen. Note that repeatability will vary with the construction type.

## APPENDIX D: Determination of Outdoor Indoor Transmission Class (OITC)

Specimen: Wood clad steel door assembly - Model STC5021241, operable (See Full Report)

The determination of the Outdoor Indoor Transmission Class (OITC) as reported below was made with explicit conformity to the procedures described in the ASTM E1332-16 test standard. Test Method ASTM E90-09 (2016) was used to obtain the sound transmission loss data. This rating is based on an average transportation noise source spectrum and an A-weighted sound level reduction, either of which may be inappropriate for some applications.

| One-third Octave Band Center Frequency, Hz | Reference Sound Spectrum, dB | Test Specimen Transmission Loss, dB |
|---|---|---|
| 80 | 103 | 26 |
| 100 | 102 | 28 |
| 125 | 101 | 36 |
| 160 | 98 | 37 |
| 200 | 97 | 37 |
| 250 | 95 | 38 |
| 315 | 94 | 45 |
| 400 | 93 | 47 |
| 500 | 93 | 48 |
| 630 | 91 | 49 |
| 800 | 90 | 50 |
| 1000 | 89 | 51 |
| 1250 | 89 | 50 |
| 1600 | 88 | 53 |
| 2000 | 88 | 53 |
| 2500 | 87 | 54 |
| 3150 | 85 | 54 |
| 4000 | 84 | 55 |

*OITC = 40*

## APPENDIX D: Instruments of Traceability

Specimen: Wood clad steel door assembly - Model STC5021241, operable (See Full Report)

| Description | Model | Serial Number | Date of Certification | Calibration Due |
|---|---|---|---|---|
| System 2 | Type 3160-A-042 | 3160-106974 | 2020-08-13 | 2021-08-13 |
| Bruel & Kjaer Mic And Preamp D | Type 4943-B-001 | 2311440 | 2020-09-30 | 2021-09-30 |
| Bruel & Kjaer Pistonphone | Type 4228 | 2781248 | 2020-08-12 | 2021-08-12 |
| EXTECH Hygro 662 | SD700 | A083662 | 2020-12-18 | 2021-12-18 |
| EXTECH Hygro 663 | SD700 | A083663 | 2020-12-18 | 2021-12-18 |

## APPENDIX E: Revisions to Original Test Report

Specimen: Wood clad steel door assembly - Model STC5021241, operable (See Full Report)

| Date | Revision |
|---|---|
| 2021-06-30 | Original report issued |

END