

GAMCO CORPORATION ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK

ASTM E90 SOUND TRANSMISSION LOSS TESTING ON A FG451, STOREFRONT

REPORT NUMBER

K1721.02-113-11-R0

TEST DATE

09/12/19

ISSUE DATE

10/08/19

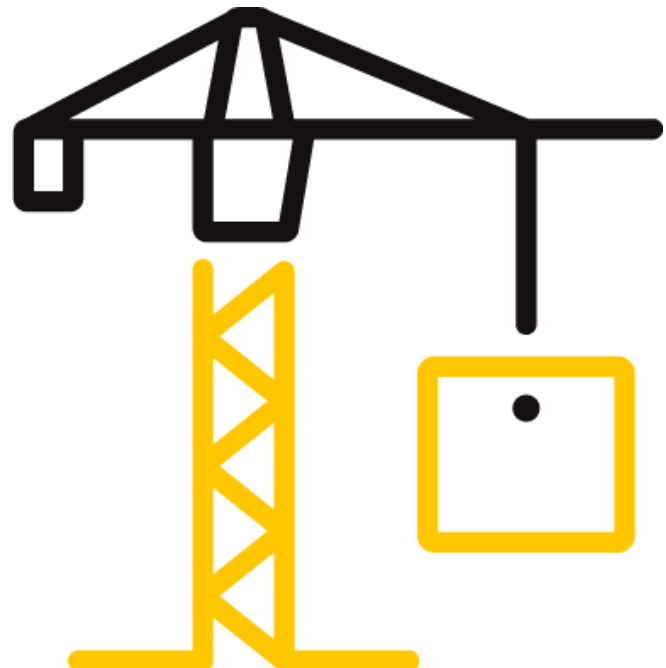
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11

DOCUMENT CONTROL NUMBER

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TEST REPORT FOR GAMCO CORPORATION

Report No.: K1721.02-113-11-R0

Date: 10/08/19

REPORT ISSUED TO

GAMCO CORPORATION

131-10 Maple Avenue
Flushing, New York 11355

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Gamco Corporation to conduct a sound transmission loss test. Results obtained are tested values and were secured by using the designated test methods. The complete test data is included herein. The client provided the test specimen. All measurements were conducted in the HT test chambers at Intertek B&C located in York, Pennsylvania.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends four years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.

For INTERTEK B&C:

| | | | |
|----------------------|--|---------------------|------------------------------------|
| COMPLETED BY: | Zachary P. Golden | REVIEWED BY: | Kurt A. Golden |
| TITLE: | Technician Team Leader Acoustical Testing | TITLE: | Project Lead Acoustical Testing |
| SIGNATURE: | | SIGNATURE: | |
| DATE: | 10/08/19 | DATE: | 10/08/19 |

ZPG:jmcs

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SECTION 2

SUMMARY OF TEST RESULTS

| | |
|-------------------------------------|---|
| SERIES/MODEL | FG451 |
| TYPE | Storefront |
| GLAZING (Nominal Dimensions) | 1" IG (1/4" tempered exterior, 1/2" air space, 1/4" laminated interior), Glass temperature 75°F |
| DATA FILE NO. | K1721.01B |
| STC | 35 |
| OITC | 28 |

SECTION 3

TEST METHODS

The specimens were evaluated in accordance with the following:

ASTM E90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

SECTION 4

SPECIMEN INSTALLATION

A sound transmission loss test was initially performed on a filler wall.

The specimen plug was removed from the filler wall assembly. The specimen was placed on an isolation pad in the test opening. Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing. Operable portions of the test specimen, if any, were cycled at least five times prior to testing.

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**SECTION 5
EQUIPMENT**

The equipment listed below meets the requirements of the test methods stated in Section 3 of this report.

| INSTRUMENT | MANUFACTURER | MODEL | DESCRIPTION | ASSET # | CAL DATE |
|--------------------------------------|----------------------|----------|-----------------------------|----------|----------|
| Data Acquisition Card | National Instruments | PXI-4462 | Data Acquisition Card | 65125* | 05/18 |
| Data Acquisition Card | National Instruments | PXI-4462 | Data Acquisition Card | 65126* | 05/18 |
| Data Acquisition Card | National Instruments | PXI-4462 | Data Acquisition Card | 63763-3* | 04/18 |
| Source Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 64902 | 12/18 |
| Source Room Microphone | PCB Piezotronics | 378C20 | Microphone and Preamplifier | 65969 | 04/19 |
| Source Room Microphone | PCB Piezotronics | 378C20 | Microphone and Preamplifier | 65103 | 03/19 |
| Source Room Microphone | PCB Piezotronics | 378C20 | Microphone and Preamplifier | 64905 | 03/19 |
| Source Room Microphone | PCB piezotronics | 378C20 | Microphone and Preamplifier | 64906 | 03/19 |
| Receive Room Microphone | PBC Piezotronics | 378B20 | Microphone and Preamplifier | 64907 | 12/18 |
| Receive Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 64908 | 12/18 |
| Receive Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 64909 | 12/18 |
| Receive Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 64910 | 12/18 |
| Receive Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 64911 | 01/19 |
| Receive Room Environmental Indicator | Comet | T7510 | Receive Room | 64915 | 01/19 |
| Source Room Environmental Indicator | Comet | T7510 | Source Room | 64914 | 03/19 |
| Microphone Calibrator | Norsonic | 1251 | Acoustical Calibrator | Y002919 | 04/19 |

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

TEST CHAMBER

| | VOLUME | DESCRIPTION |
|--------------|--------------------|---|
| RECEIVE ROOM | 234 m ³ | Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor |
| SOURCE ROOM | 207 m ³ | Stationary diffusers only Temperature and humidity controlled |

| | MAXIMUM SIZE | DESCRIPTION |
|-----------------|----------------------------|--|
| TL TEST OPENING | 4.27 m wide by 3.05 m high | Vibration break between source and receive rooms |

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SECTION 6

LIST OF OFFICIAL OBSERVERS

| NAME | COMPANY |
|-------------------|--------------|
| Zachary P. Golden | Intertek B&C |
| Brian D. Deickman | Intertek B&C |

SECTION 7

TEST PROCEDURE

The sensitivity of the microphones was checked before measurements were conducted.

The transmission loss values were obtained for a single direction of measurement.

Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure level measurements were made simultaneously in receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Data for flanking limit tests, repeatability measurements, and reference specimen tests are available upon request.

Intertek B&C will store the test specimens per the client's request.

SECTION 8

ACOUSTICAL TEST CALCULATIONS

Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus, 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating

To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating

The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

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SECTION 9

SPECIMEN DESCRIPTION

| FRAME | |
|----------------------------|--------------------|
| SIZE | 78-3/4" by 78-3/4" |
| THICKNESS | 4-1/2" |
| CORNERS | Butted |
| FASTENERS | Screws |
| SEAL METHOD | Sealant |
| MATERIAL | Aluminum |
| REINFORCEMENT | N/A |
| THERMAL BREAK MATERIAL | N/A |
| DAYLIGHT OPENING SIZE (X2) | 36" by 74-1/4" |

| | |
|--|----------|
| MEASURED OVERALL INSULATION GLASS UNIT THICKNESS | 0.924" |
| SPACER TYPE | Aluminum |

| | EXTERIOR SHEET | GAP | INTERIOR SHEET |
|--------------------|----------------|--------|----------------|
| MEASURED THICKNESS | 0.222" | 0.463" | 0.239" |
| MUNTIN PATTERN | N/A | N/A | N/A |
| MATERIAL | Tempered | Air* | Laminated |
| LAMINATE MATERIAL | N/A | N/A | PVB |

| | |
|-----------------------|----------|
| GLAZING METHOD | Pocket |
| GLAZING MATERIAL | EPDM |
| GLAZING BEAD MATERIAL | Aluminum |

| | TYPE | QUANTITY | LOCATION |
|--------------|-----------------|----------|----------|
| WEATHERSTRIP | No weatherstrip | | |
| HARDWARE | No hardware | | |
| DRAINAGE | No drainage | | |

| TOTAL WEIGHT (lbs) | AVERAGE WEIGHT (lbs/ft ²) |
|--------------------|---------------------------------------|
| 292 | 6.78 |

* - Stated per Client/Manufacturer, N/A-Not Applicable

Photographs are included in Section 11.

A drawing of the test specimen is included in Section 12.

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SECTION 10

TEST RESULTS

K1721.01B DATA

| | | | | | |
|----------------------|---------------------|-------------------------|---------|-----------------------|---------|
| SPECIMEN AREA | 4.00 m ² | RECEIVE TEMP. | 22.6 °C | SOURCE TEMP | 21.7 °C |
| TECHNICIAN | Zachary Gol | RECEIVE HUMIDITY | 50% | SOURCE HUMIDIT | 52% |

| FREQ (Hz) | BACKGROUND SPL (dB) | ABSORPTION (m ²) | SOURCE SPL (dB) | RECEIVE SPL (dB) | SPECIMEN TL (dB) | 95% CONFIDENCE LIMIT | NUMBER OF DEFICIENCIES |
|---------------------|--|---------------------------------|-----------------------|------------------------|------------------------|----------------------------|------------------------------|
| 80 | 42.6 | 6.2 | 99 | 75 | 23 | 2.07 | - |
| 100 | 36.0 | 5.4 | 100 | 69 | 31 | 1.73 | - |
| 125 | 39.5 | 6.1 | 100 | 74 | 25 | 1.40 | 0 |
| 160 | 40.6 | 5.5 | 102 | 76 | 25 | 0.95 | 0 |
| 200 | 39.5 | 5.4 | 102 | 81 | 19 | 0.62 | 6 |
| 250 | 34.0 | 5.6 | 98 | 76 | 21 | 0.78 | 7 |
| 315 | 27.5 | 6.0 | 98 | 71 | 25 | 0.48 | 6 |
| 400 | 23.3 | 6.2 | 97 | 65 | 30 | 0.47 | 4 |
| 500 | 18.8 | 6.5 | 97 | 63 | 32 | 0.29 | 3 |
| 630 | 21.1 | 6.1 | 97 | 60 | 35 | 0.25 | 1 |
| 800 | 16.8 | 6.2 | 95 | 55 | 38 | 0.38 | 0 |
| 1000 | 12.1 | 6.4 | 96 | 54 | 41 | 0.37 | 0 |
| 1250 | 10.0 | 7.0 | 95 | 50 | 43 | 0.27 | 0 |
| 1600 | 9.4 | 7.3 | 95 | 50 | 43 | 0.19 | 0 |
| 2000 | 8.4 | 7.7 | 95 | 54 | 39 | 0.26 | 0 |
| 2500 | 7.8 | 8.8 | 96 | 56 | 36 | 0.15 | 3 |
| 3150 | 8.4 | 10.3 | 95 | 51 | 40 | 0.25 | 0 |
| 4000 | 8.9 | 12.7 | 92 | 42 | 45 | 0.21 | 0 |
| 5000 | 9.7 | 16.1 | 93 | 37 | 49 | 0.26 | - |
| STC RATING | 35 (Sound Transmission Class) | | | | | | |
| DEFICIENCIES | 30 (Sum of Deficiencies) | | | | | | |
| OITC RATING | 28 (Outdoor-Indoor Transmission Class) | | | | | | |

Notes:

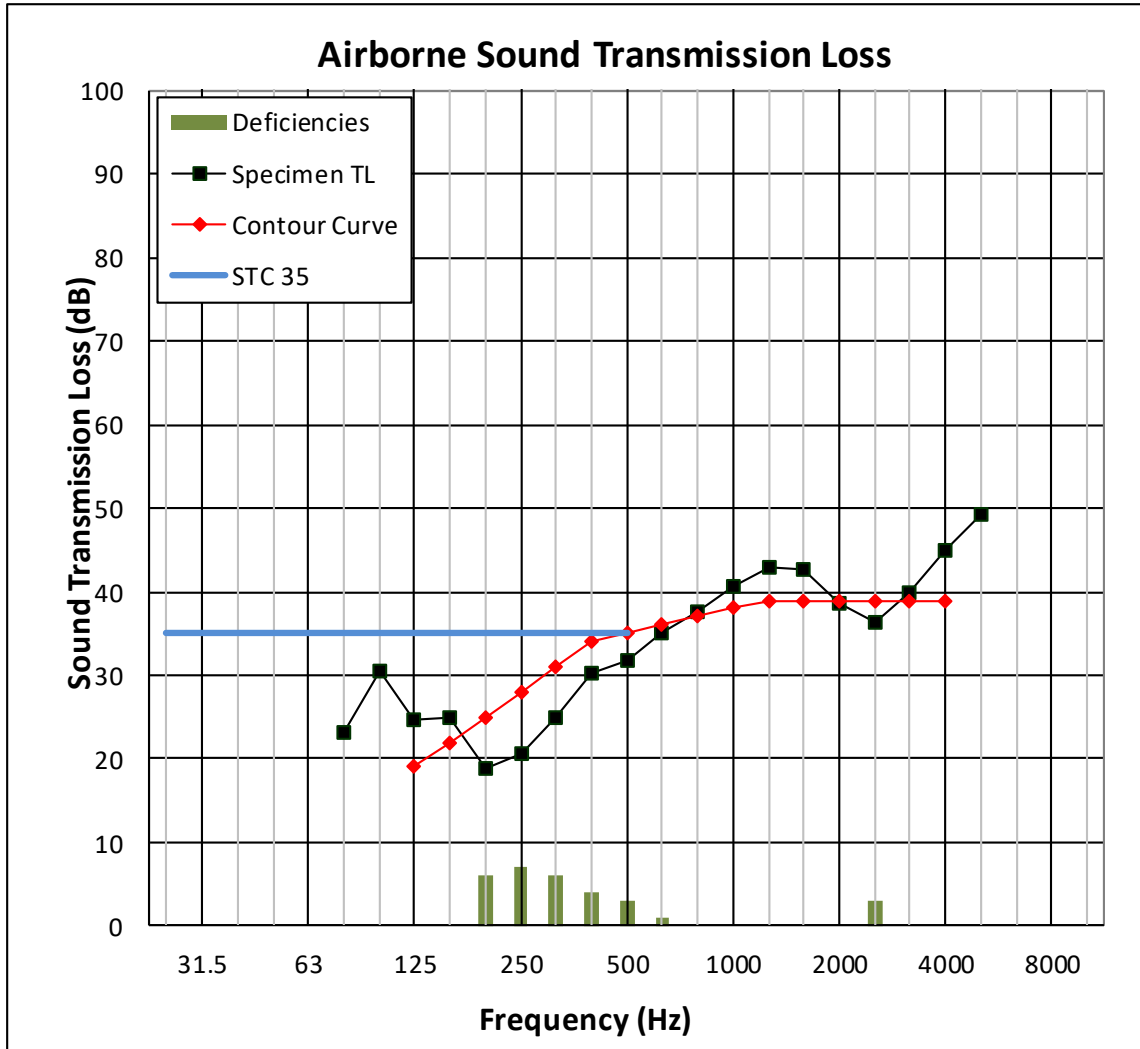
- 1) Receive Room levels less than 5 dB above the Background levels are red.
- 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
- 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

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K1721.01B GRAPH



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SECTION 11

PHOTOGRAPHS



Photo No. 1
Receive Room View of Installed Test Specimen



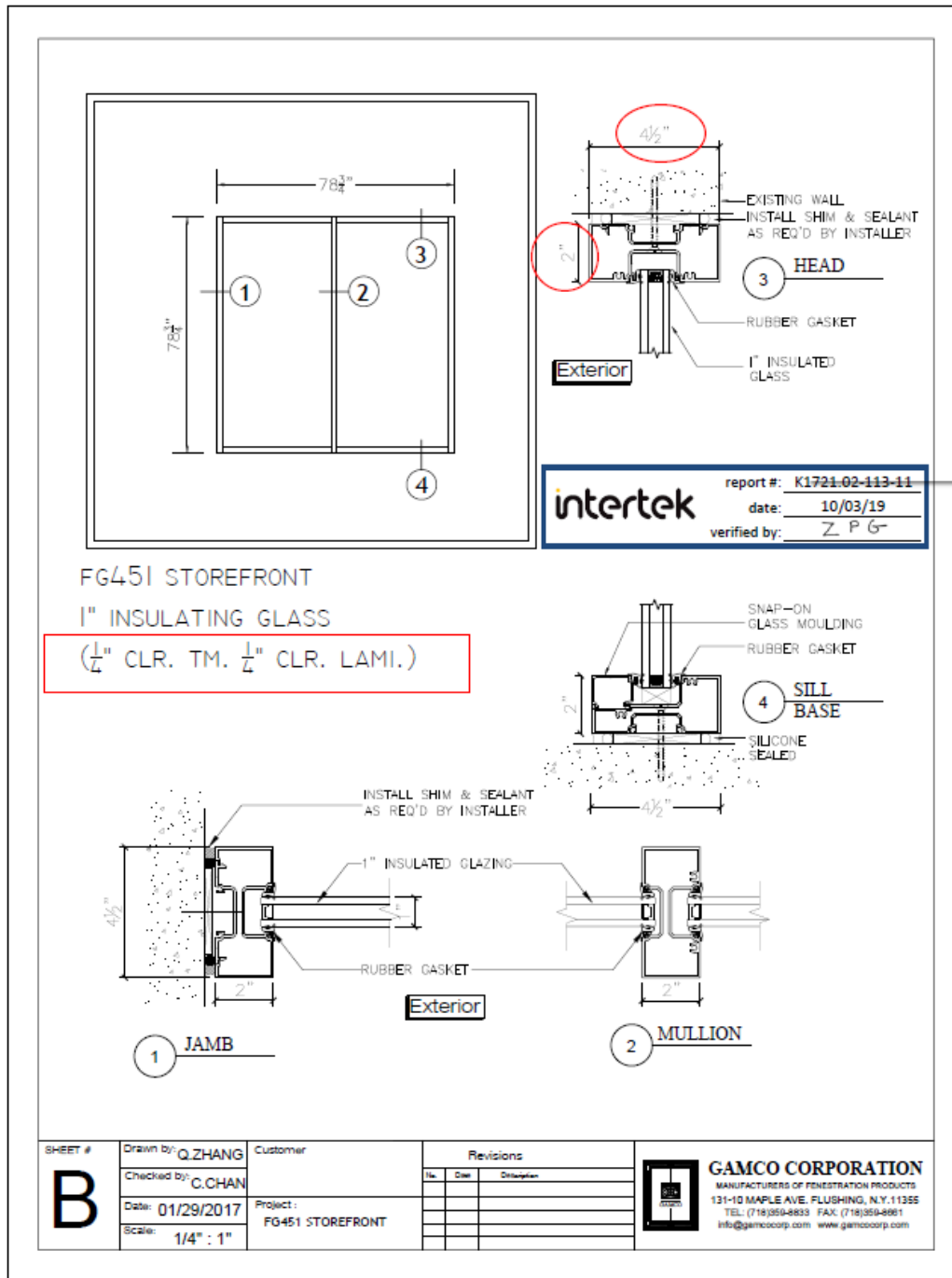
Photo No. 2
Source Room View of Installed Test Specimen


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SECTION 12 DRAWING



| | | | | | | |
|---|--------------------|------------------|-----------|------|--|-------------|
| B | Drawn by: Q.ZHANG | Customer: | Revisions | |  GAMCO CORPORATION MANUFACTURERS OF PENETRATION PRODUCTS 131-10 MAPLE AVE. FLUSHING, N.Y. 11355 TEL: (718)359-8833 FAX: (718)359-8861 info@gamcocorp.com www.gamcocorp.com | |
| | Checked by: C.CHAN | Project: | No. | Date | | Description |
| | Date: 01/29/2017 | FG451 STOREFRONT | | | | |
| | Scale: 1/4" : 1" | | | | | |



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SECTION 13

REVISION LOG

| REVISION # | DATE | PAGES | REVISION |
|------------|----------|-------|-----------------------|
| 0 | 10/08/19 | N/A | Original Report Issue |