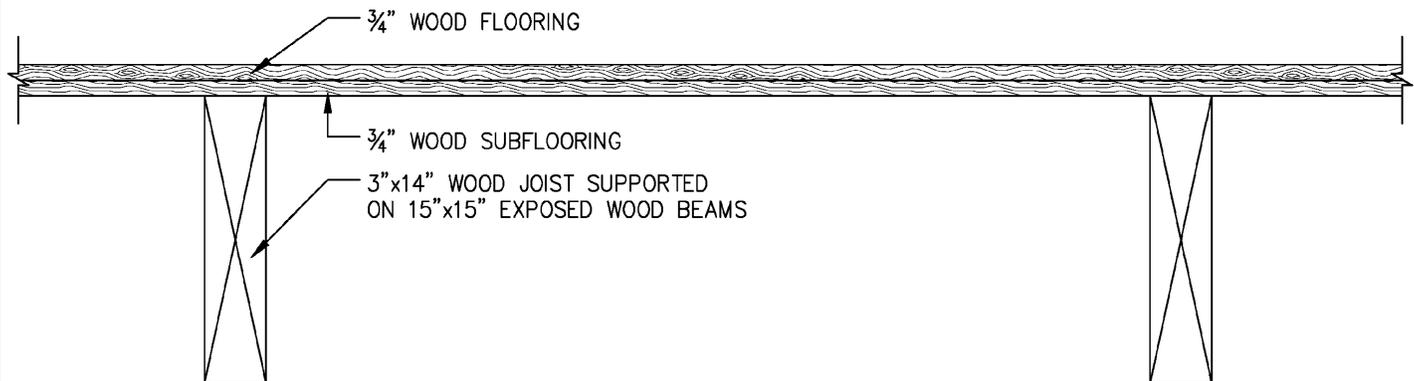


KINETICS NOISE CONTROL TEST REPORT #AT001099

- **KINETICS NOISE CONTROL PRODUCTS:**
 - NONE
- **ACOUSTICAL RATINGS:**
 - NIC 28
 - FIIC 22
- **TESTING AGENCY & REPORT NUMBER:**
 - METROPOLITAN ACOUSTICS
 - DATED: APRIL 29, 2013



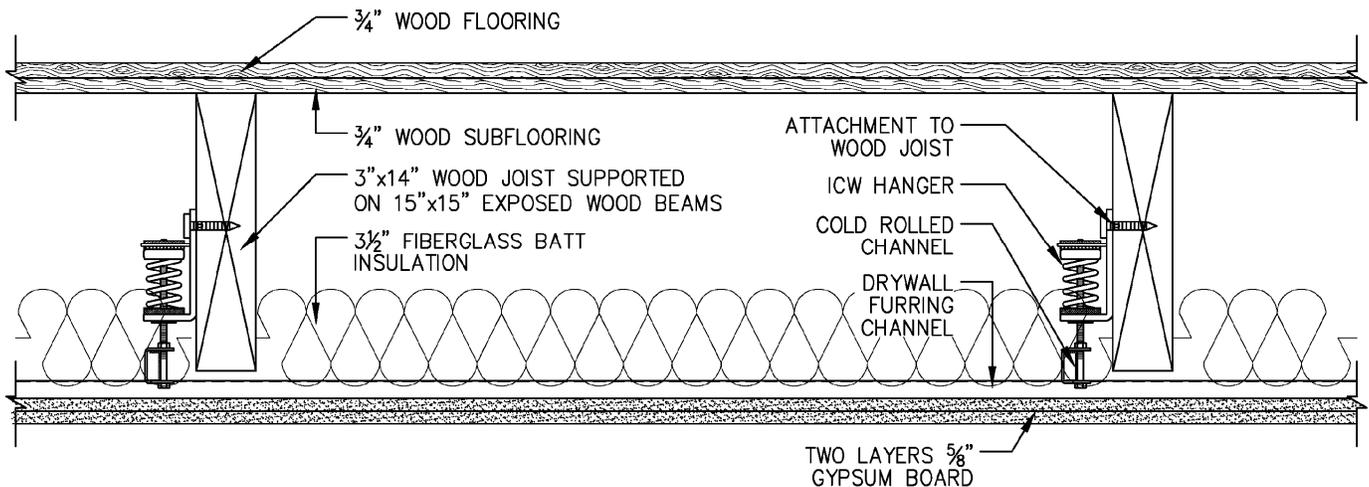
KINETICS DRAWING NUMBER: AT001099A



6300 IRELAN PLACE, DUBLIN OH
PHONE: 800.959.1229
FAX: 614.889.0540
WEB: WWW.KINETICSNOISE.COM
EMAIL: ARCHSALES@KINETISNOISE.COM

KINETICS NOISE CONTROL TEST REPORT #AT001099

- **KINETICS NOISE CONTROL PRODUCTS:**
 - ICW
- **ACOUSTICAL RATINGS:**
 - NIC 49
 - FIIC 51
- **TESTING AGENCY & REPORT NUMBER:**
 - METROPOLITAN ACOUSTICS
 - DATED: APRIL 29, 2013



KINETICS DRAWING NUMBER: AT001099B



6300 IRELAN PLACE, DUBLIN OH
PHONE: 800.959.1229
FAX: 614.889.0540
WEB: www.KINETICSNOISE.COM
EMAIL: ARCHSALES@KINETISNOISE.COM



April 29, 2013

Steve Manos
Kinetics Noise Control
6300 Irelan Place
Dublin, Ohio 43017

**Re: Kinetics Testing – 317 Mulberry St.
Acoustical Testing Report**

Dear Mr. Manos,

Metropolitan Acoustics has conducted acoustical testing at 317 Mulberry Street in Lancaster, PA. The intent of our two site visits, conducted on March 22nd and April 19th, 2013, was to perform airborne and impact sound transmission testing on one floor/ceiling assembly separating vertically stacked condominium units before and after the installation of a suspended gypsum wallboard (GWB) ceiling. The summary provided herein is based upon our test data and information extracted from architectural drawings provided by Stuart & Associates.

Performance Ratings of Interior Building Components

A comparison of the effectiveness of a partition in attenuating airborne and impact sound is typically presented in the form of Sound Transmission Class (STC) and Impact Insulation Class (IIC) ratings. The STC is a single-number rating of a wall or floor/ceiling assembly's effectiveness in isolating airborne sound. The IIC rating is limited to floor/ceiling assemblies and describes an assembly's effectiveness in isolating impact noises, such as those caused by foot traffic.

The Noise Isolation Class (NIC) is a single number rating derived from the measured values of noise reduction. The rating provides an evaluation of the sound isolation between two enclosed spaces that are acoustically connected by one or more paths. The STC and NIC ratings are similar. However, NIC is a field rating; STC is a laboratory rating and discounts field conditions like absorption in the receiving room and partition size. For all three ratings, STC, IIC, and NIC, increasing values correspond to increasing sound isolation.

Testing assemblies in accordance with ASTM E90 (*Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions*) and ASTM E492 (*Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine*) results in STC and IIC ratings, respectively. Ratings stated in terms of STC or IIC imply laboratory ratings. When the airborne and impact transmission loss of an assembly is measured in an actual installation, the ratings are presented as ASTC and FIIC, denoting "apparent" STC rating and "field" IIC rating. Field measurements result in NIC, ASTC, and FIIC ratings.

Acoustical performance ratings of wall and floor/ceiling assemblies are addressed in Section 1207 of the current International Building Code (IBC), "*Sound Transmission*". Minimum laboratory ratings of STC-50 and IIC-50 and field ratings of ASTC-45 and FIIC-45 are listed in the Code. The five point reduction accounts for a drop in performance due to field conditions. Because the field installation of a partition and the field test conditions are not as well controlled as in a laboratory, a properly constructed partition usually tests three to five points lower than its laboratory rating.

Survey Procedures and Observations

We measured the airborne and impact sound transmission through the floor/ceiling assembly before and after the installation of a suspended GWB ceiling using an Ivie Technologies IE-45 Real Time Analyzer, an amplified speaker and a Cesva MI005 tapping machine. The Ivie Real Time Analyzer, model IE-45, meets ANSI S1.4 criteria for a Type 2 sound level meter. The tested

floor/ceiling assembly is between the Second Floor Unit A and Third Floor Unit A on the west half of the building.

ASTC/NIC Testing

The airborne sound transmission through the floor/ceiling assembly was tested between the Second Floor Unit A and Third Floor Unit A, with the Second Floor space as the source room and the Third Floor space as the receiving room.

Random broadband noise was generated in the source room using an amplified speaker and a pink noise generator. The test noise was measured in the source room in each 1/3 octave band between 125 and 4,000 Hz generally following ASTM E336 (*Standard Test Method for Measurement of Airborne Sound Insulation in Buildings*) using the Ivie Real Time Analyzer. Similarly, the test noise was measured in the receiving room. The difference between the source and receiver room levels in each 1/3 octave band is the Noise Reduction (NR).

From the NR's in each band, the NIC rating is determined following ASTM E413 (*Classification for Rating Sound Insulation*). ASTC ratings are determined from the transmission loss (TL) values of the partition. These TLs are calculated by applying adjustments to the NR in each 1/3 octave band. The adjustments consider the test partition area and the receiver room absorption. The receiving room absorption is calculated using the receiver room volume and the measured reverberation time. Background sound levels are measured in the receiving rooms to discount any external noise that may have influenced the readings.

Ideally, to properly follow ASTM guidelines for ASTC testing, the test rooms should be empty and acoustically hard. The test assemblies should not be offset between rooms and should have minimum dimensions of 7.5-ft x 9-ft with a minimum area of 60-ft². The test rooms should have a minimum and maximum volume of 1,400-ft³ and 5,297-ft³, respectively. The room volume requirements exist as a guideline so that the lowest frequencies of interest are diffuse in the room and so that the room effect, or attenuation due to room volume and absorption, is minimized. The tested room volumes were 16,087-ft³ and 13,716-ft³ in the "Before" and "After" conditions, respectively. Because the volumes of the test spaces exceed the guidelines in the ASTM standard, the proper metric to report is the NIC rating. The ASTC rating of the floor/ceiling assembly can be measured after the interior partitions are installed in two stacked units. Since only the 2nd Floor spaces were finished in this building, our airborne sound transmission measurements resulted in NIC ratings. Each space was unfurnished during the test, and the source and receiver rooms are not offset.

FIIC Testing

The FIIC of the floor/ceiling assembly was tested between the same spaces; however, the source and receiver rooms were reversed.

The procedure for performing FIIC testing is standardized in ASTM E1007 (*Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission through Floor-Ceiling Assemblies and Associated Support Structures*). As an impact source, we utilized a Cesva model MI005 Tapping Machine. The machine's construction conforms to the specifications in ISO 140/IV-1978(E). Sound pressure levels and reverberation time in the receiver room were measured utilizing the same equipment as for the NIC testing.

The tapping machine has five steel hammers, each with a weight of approximately 1.1 pounds, equally spaced in a line with about 15.7-in. between the two end hammers. The machine delivers 10 impacts per second at equal intervals. The spectrum of the noise in the receiving room can be influenced by the location of the tapping machine on the floor-ceiling assembly. For our testing purposes, and in accordance with ASTM E1007, the tapping machine was located at four different positions in the source room (refer to Figure 1). The locations and orientation of the joists were estimated in the field.

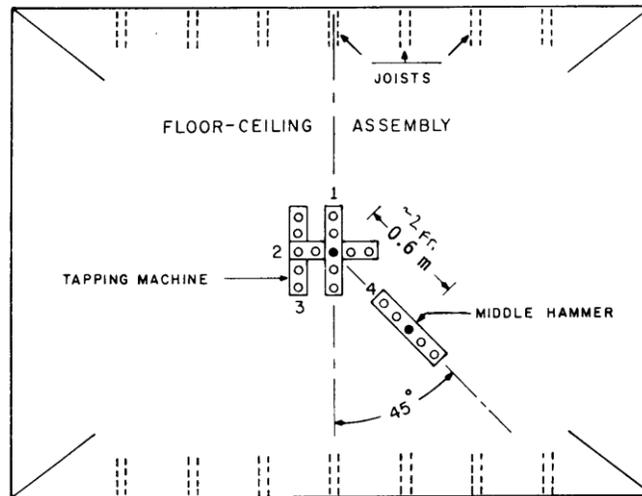


Figure 1. Tapping machine positions

During tapping machine operation, the resulting sound pressure level was measured in the receiving room for each position in 1/3 octave bands from 100 to 3150 Hz, and the four measurements were averaged. The normalized impact sound pressure level was calculated considering the adjustments for each room's absorption based on our reverberation time measurements. The resulting FIIC rating for each assembly was then established in accordance with ASTM E989 (*Standard Classification for Determination of Impact Insulation Class*).

Ideally, to properly follow ASTM guidelines for FIIC testing, the rooms should not be offset. In addition, the receiving room should have a volume of at least 2,100-ft³. Since each Unit A has an approximate volume of 13,716 ft³ and 16,256 ft³ with and without the GWB ceiling, respectively, the volume requirements were met in each space. Each space was unfurnished during the testing, and the source and receiver rooms are not offset.

Based on the architectural drawings and correspondence with Stuart & Associates, the floor/ceiling assembly consists of the following components:

The "Before" condition without a GWB ceiling:

- 3/4" wood flooring
- 3/4" wood subflooring
- 3"x14" wood joists supported on 15"x15" wood beams and columns with saddles

The "After" condition with a GWB ceiling:

- 3/4" wood flooring
- 3/4" wood subflooring
- 3"x14" wood joists supported on 15"x15" wood beams and columns with saddles
- Kinetics ICW hanger
- Cold rolled channel
- GWB furring channel
- 3.5" Fiberglass batt insulation
- Two layers of 5/8" GWB

The following observations were made during the site visit on 3/22/2013:

- The 2nd Floor and 3rd Floor Unit A spaces had full-height demising walls between the unit and the public corridor. No interior walls were framed or constructed.
- Doors and door frames were not installed at the time the testing was performed. During the testing, the entry doorways to the units were closed using a layer of 5/8" GWB.
- The gaps between the floor and perimeter walls were covered with 2x4 wood blocking and sealed with caulk. Gaps between the floor and penetrating structural columns and miscellaneous holes in the floor were covered with 2x4 wood blocking.

- No untreated holes or penetrations between the 2nd and 3rd Floor Unit A spaces were observed.

Photos of the construction in the "Before" condition are presented in Figure 2.



Figure 2. 2nd Floor ceiling (a and b) and 3rd Floor floor constructions (c and d) in the "Before" Condition.

The following observations were made during the site visit on 4/19/2013:

- The 2nd Floor and 3rd Floor Unit A spaces had full-height demising walls between the unit and the public corridor. Interior walls in the 2nd Floor Unit A space were framed; however, no GWB was installed.
- The isolated GWB ceiling was installed throughout the 2nd Floor Unit A space. The ceiling penetrations for lights and hangers did not appear to be in contact with the GWB, and the gaps around the penetrating items were sealed with caulk.
- Doors and door frames were not installed at the time the testing was performed. During the testing, the entry doorways to the units were closed using a layer of 5/8" GWB.
- The gaps between the floor and perimeter walls were covered with 2x4 wood blocking and sealed with caulk. Gaps between the floor and penetrating structural columns and miscellaneous holes in the floor were covered with 2x4 wood blocking.
- No untreated holes or penetrations between the 2nd and 3rd Floor Unit A spaces were observed.

Photos of the construction in the "After" condition are presented in Figure 3.



Figure 3. 2nd Floor ceiling (a and b) and 3rd Floor floor constructions (c and d) in the "After" Condition.

Survey Results

The table below indicates the measured ratings of each assembly.

| Table 1: Floor/Ceiling Assembly Measured Ratings Before and After the Installation of an Isolated GWB Ceiling 317 Mulberry Street, Lancaster, PA | | |
|---|---------------|-------------|
| Condition | Airborne Test | Impact Test |
| Before – without isolated GWB ceiling | NIC-28 | FIIC-22 |
| After – with isolated GWB ceiling | NIC-49 | FIIC-51 |
| Change | 21 points | 29 points |

As the table indicates, the FIIC rating of the floor/ceiling assembly in the "After" condition meet IBC requirements. The noise reduction data and NIC curves for the floor/ceiling assembly are shown in attached Figures 4 and 6. The normalized impact sound pressure level and FIIC curves for the floor/ceiling assembly are shown in attached Figures 5 and 7.

Steve Manos
April 29, 2013
Page 6 of 6

This concludes the summary of our acoustical testing at 317 Mulberry Street in Lancaster, PA. Please feel free to contact us if you have any questions regarding this report.

Best regards,
METROPOLITAN ACOUSTICS, LLC

A handwritten signature in black ink, appearing to read "Seth M. Harrison". The signature is fluid and cursive, with the first name "Seth" being more prominent.

Seth M. Harrison, PE
Senior Consultant
MA Project #13027

Attachments:

- Figure 4. NIC Graph in the "Before" Condition
- Figure 5. FIIC Graph in the "Before" Condition
- Figure 6. NIC Graph in the "After" Condition
- Figure 7. FIIC Graph in the "After" Condition

317 Mulberry Street

Noise Reduction and Noise Isolation Class As Tested 03/22/2013 Existing Conditions West Units 2nd Floor to 3rd Floor NIC-28

1. The maximum deviation of the NR curve below the NIC contour and any single frequency shall not exceed 8 dB.
2. The sum of the deviations below the NIC contour at all 16 frequencies of the NR curve shall not exceed 32 dB.
3. NIC rating is NR at 500 Hz for the final position of contour.

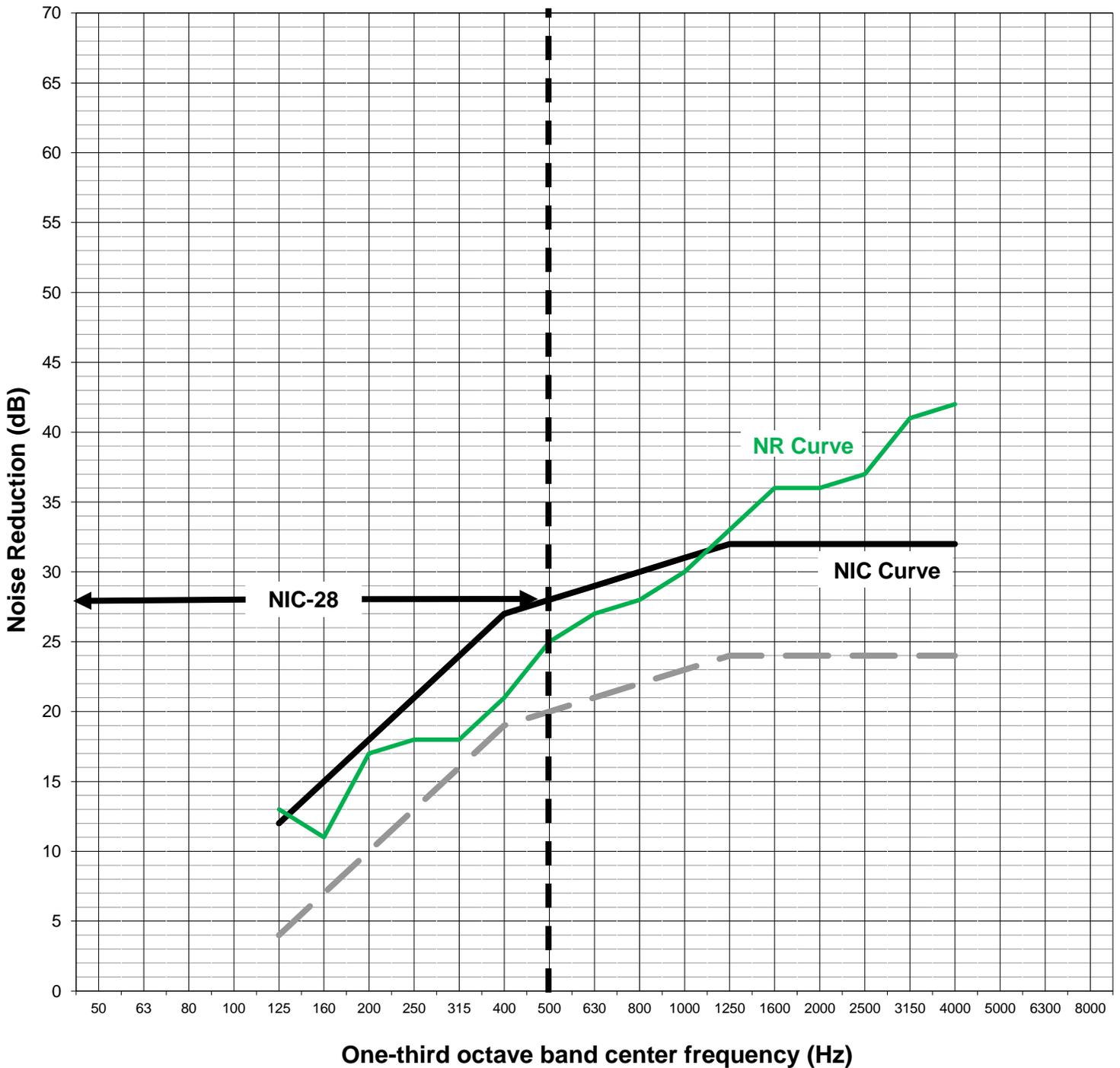


Figure 4

317 Mulberry Street

Field Impact Insulation Class (FIIC) Rating

As Tested 03/22/2013 Existing Conditions

West Units 3rd Floor to 2nd Floor FIIC-22

1. The maximum deviation of the ISPL curve above the FIIC contour and any single frequency shall not exceed 8 dB.
2. The sum of the deviations above the FIIC contour at all 16 frequencies of the test curve shall not exceed 32 dB.
3. FIIC rating is at 500 Hz for the final position of contour.

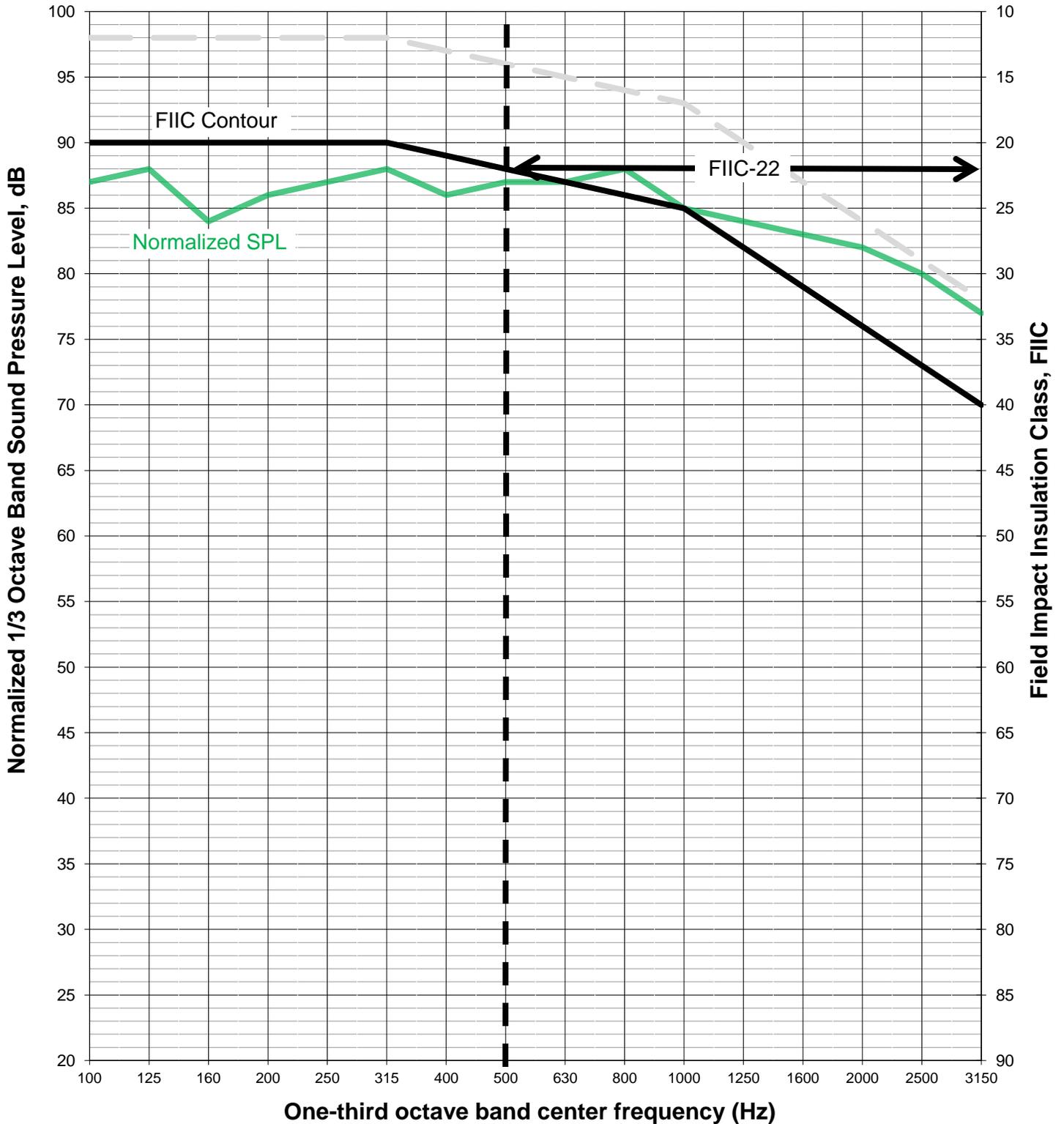


Figure 5

317 Mulberry Street

Noise Reduction and Noise Isolation Class

As Tested 04/19/2013 with Isolated GWB Ceiling

West Units 2nd Floor to 3rd Floor NIC-49

1. The maximum deviation of the NR curve below the NIC contour and any single frequency shall not exceed 8 dB.
2. The sum of the deviations below the NIC contour at all 16 frequencies of the NR curve shall not exceed 32 dB.
3. NIC rating is NR at 500 Hz for the final position of contour.

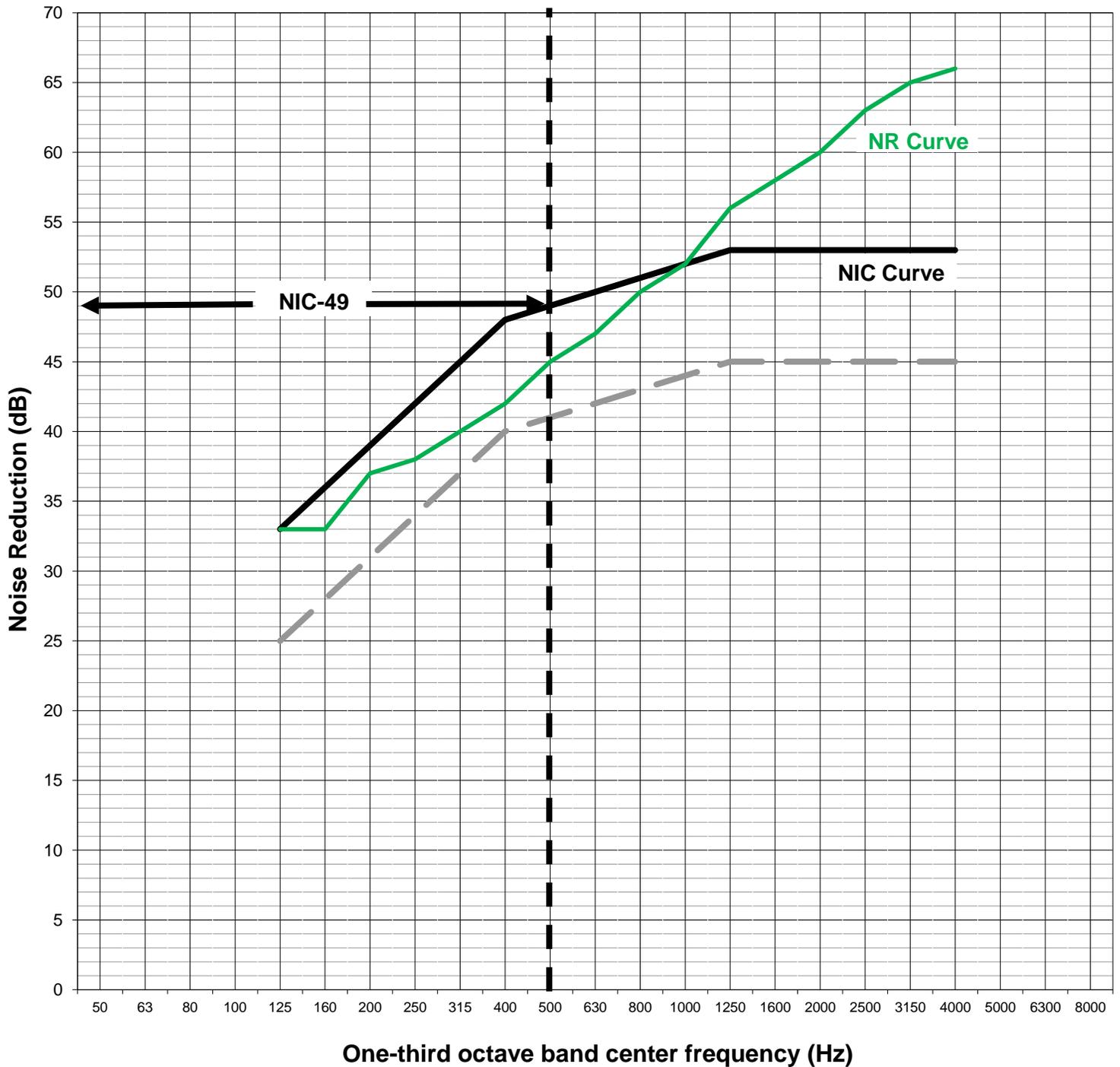


Figure 6

317 Mulberry Street

Field Impact Insulation Class (FIIC) Rating

As Tested 04/19/2013 with Isolated GWB Ceiling

West Units 3rd Floor to 2nd Floor FIIC-51

1. The maximum deviation of the ISPL curve above the FIIC contour and any single frequency shall not exceed 8 dB.
2. The sum of the deviations above the FIIC contour at all 16 frequencies of the test curve shall not exceed 32 dB.
3. FIIC rating is at 500 Hz for the final position of contour.

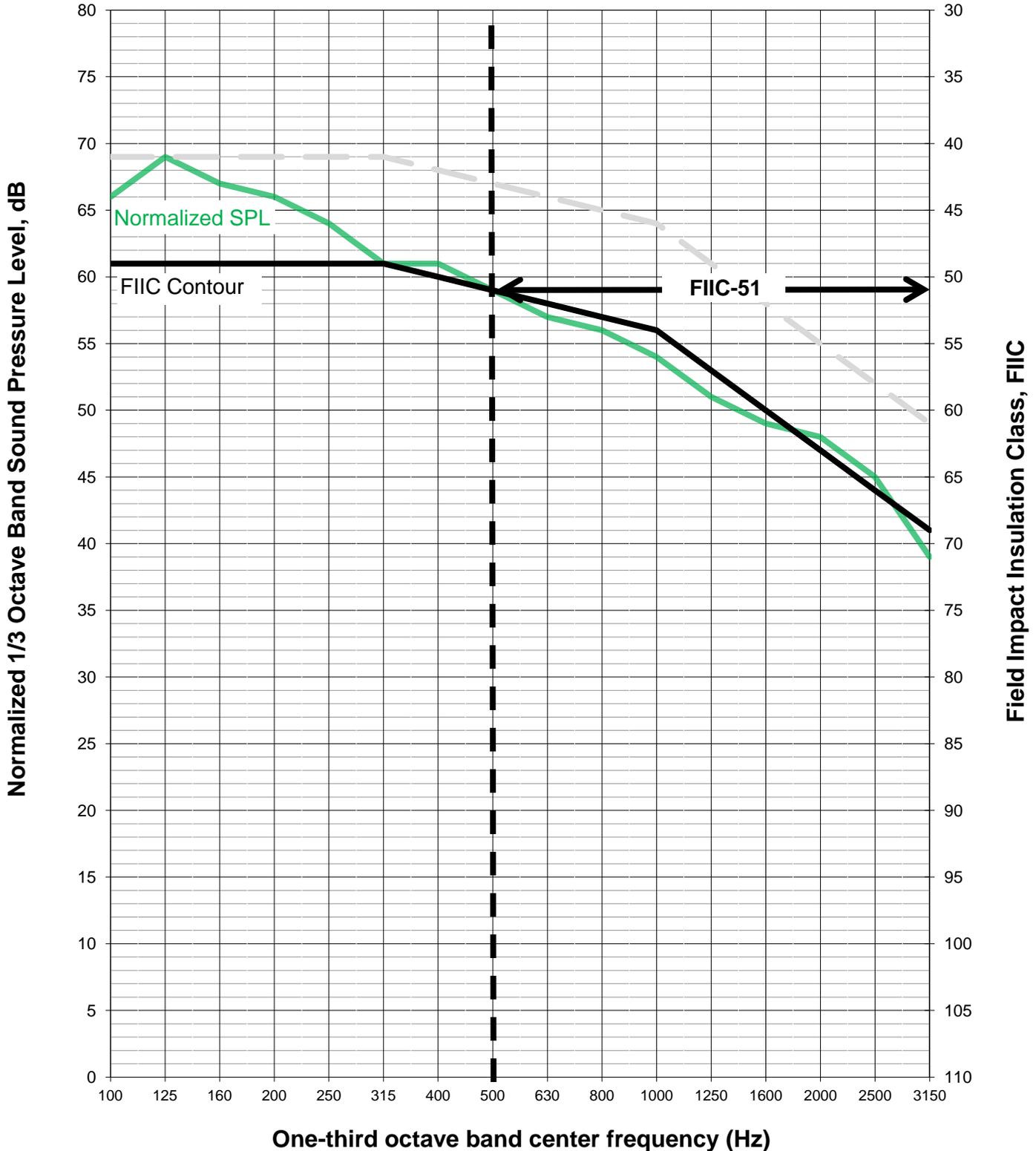


Figure 7