

VULCRAFT/VERCO GROUP ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK

ASTM E90 AND ASTM E492 TESTING ON BARE CONCRETE FLOOR

SPECIMEN TYPE

Vulcraft 20 Gage Dove Tail 2.00 Steel Deck

REPORT NUMBER

H7786.01-113-11-R1

TEST DATE

02/10/18

ISSUE DATE

03/22/18

REVISED DATE

04/03/18

RECORD RETENTION END

02/10/22

PAGES

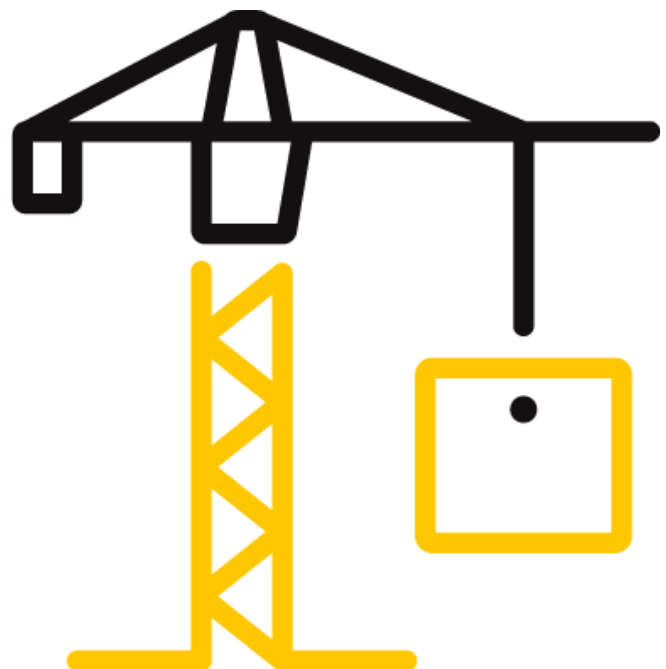
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DOCUMENT CONTROL

ATI 00629 (09/19/17)

RTTDS-R-AMER-Test-2844

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TEST REPORT FOR VULCRAFT/VERCO GROUP

Report No.: H7786.01-113-11-R1

Date: 04/03/18

REPORT ISSUED TO

VULCRAFT/VERCO GROUP

7205 Gault Avenue North
Fort Payne, Alabama 35967

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by to perform testing in accordance with ASTM E90 AND ASTM E492 on Bare Concrete Floor. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted in the VT 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.

SECTION 2

SUMMARY OF TEST RESULTS

| | |
|----------------------|---------------------|
| DATA FILE NO. | H7786.01 |
| SERIES/MODEL: | Bare Concrete Floor |
| STC | 52 |
| IIC | 23 |

COMPLETED BY: Daniel B. Mohler
Project Lead - Acoustical
TITLE: Testing
SIGNATURE:
DATE: 04/03/18

COMPLETED BY: Jordan Strybos
Project Manager - Acoustical
TITLE: Testing
SIGNATURE:
DATE: 04/03/18

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SECTION 3

TEST METHODS

The specimen was evaluated in accordance with the following:

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

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

ASTM E492-09(2016)e1, *Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine*

ASTM E989-06 (2012), *Classification for Determination of Impact Insulation Class (IIC)*

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

SECTION 4

MATERIAL SOURCE/INSTALLATION

The full test specimen was assembled on the day of testing by B&C. All materials provided by the client were installed on an existing B&C assembly (Vulcraft 20 Gage Dove Tail 2.00 Steel Deck) utilizing B&C-supplied materials. The assembly was installed in a steel test frame which was installed into the opening between the source and receive rooms in the test chamber. The test frame was isolated from the structure with dense neoprene gasket.

The total weight of the floor/ceiling assembly was 2856 kg. B&C will store samples of the test specimen for four years. Photographs of the test specimen are included in the attachments. A drawing of the test specimen is included in the attachments.

B&C will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by B&C for the entire test record retention period.

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SECTION 5 EQUIPMENT

| INSTRUMENT | MANUFACTURER | MODEL | DESCRIPTION | ASSET # | CAL DATE |
|--------------------------------------|----------------------|----------|--------------------------------------|----------|----------|
| Data Acquisition Unit | National Instruments | PXI-1033 | Data Acquisition Card | 63763-1 | 06/16 * |
| Data Acquisition Unit | National Instruments | PXI-4462 | Input Card | 63763-4 | 07/16 * |
| Data Acquisition Unit | National Instruments | PXI-4462 | Input Card | 63763-5 | 06/16 * |
| Microphone Calibrator | Norsonic | 1251 | Pistonphone calibrator | INT00127 | 03/17 |
| Receive Room Microphone | PCB Piezotronics | 378C20 | Microphone and Preamplifier | 65617 | 05/17 |
| Receive Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 63744 | 05/17 |
| Receive Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 63745 | 05/17 |
| Receive Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 63746 | 09/17 |
| Receive Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 63747 | 05/17 |
| Receive Room Environmental Indicator | Comet | T7510 | Temperature and Humidity Transmitter | 63810 | 10/17 |
| | | | | 63811 | 10/17 |
| Source Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 63738 | 04/17 |
| Source Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 63739 | 04/17 |
| Source Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 63740 | 04/17 |
| Source Room Microphone | PCB Piezotronics | 378B20 | Microphone and Preamplifier | 63742 | 04/17 |
| Source Room Microphone | PCB Electronics | 378B20 | Microphone and Preamplifier | 63741 | 04/17 |
| Source Room Environmental Indicator | Comet | T7510 | Temperature and Humidity Transmitter | INT00603 | 03/17 |
| Tapping Machine | Norsonic | Nor277 | Tapping Machine | INT00936 | 12/17 |

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

| | |
|-------------------------------|-----------------------|
| VT RECEIVE ROOM VOLUME | 158.99 m ³ |
| VT SOURCE ROOM VOLUME | 190 m ³ |

SECTION 6 LIST OF OFFICIAL OBSERVERS

| NAME | COMPANY |
|------------------|--------------|
| Daniel B. Mohler | Intertek B&C |
| Jordan Strybos | Intertek B&C |

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SECTION 7

TEST PROCEDURE

The microphones were calibrated before conducting the tests. The air temperature and relative humidity conditions were monitored and recorded during all measurements.

The airborne transmission loss test was conducted in accordance with the ASTM E90 test method using the single direction method. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions. Four sound pressure level measurements were made simultaneously in both rooms, at each of five microphone positions.

The impact sound transmission test was conducted in accordance with the ASTM E492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E492, and five sound absorption measurements were conducted at each of five microphone positions.

Detailed test procedures, data for flanking limit tests, repeatability measurements, and reference specimen tests are available upon request.

SECTION 8

TEST CALCULATIONS

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E413 and ASTM E989, respectively.

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SECTION 9

TEST SPECIMEN DESCRIPTION

| MATERIAL | DIMENSIONS (mm/inch) | THICKNESS (mm/inch) | MANUFACTURER AND SERIES | QUANTITY | AVERAGE WEIGHT |
|-------------------------------|---|------------------------|------------------------------------|----------------------|--------------------------|
| Standard 4000 PSI Concrete | 3023 by 3632 | 139.7 | N/A | 10.98 m ² | 248.08 kg/m ² |
| | Note: Poured directly on the floor deck and allowed to cure for a minimum of 28 days. | | | | |
| Steel Deck | 3023 by 609.6 | 139.7 | 20 Gage Vulcraft Dove Tail 2.00 | 10.98 m ² | 12.01 kg/m ² |
| | Note: Installed per manufacturer's specifications in a test frame with the top of the concrete flush with the source room. All seams and gaps underneath the deck were plugged with backer rod and sealed with Pecora AC-20 Acoustical Sealant. | | | | |

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SECTION 10
TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS


| | | | | | |
|----------------------|--|-------------------------|--------|------------------------|--------|
| TEST DATE | 2/10/2018 | | | | |
| DATA FILE NO. | H7786.01 | | | | |
| CLIENT | Vulcraft/Verco Group | | | | |
| DESCRIPTION | 139.7 mm Standard 4000 PSI Concrete, 139.7 mm 20 Gage Vulcraft Dove Tail 2.00 Steel Deck | | | | |
| SPECIMEN AREA | 10.98 m ² | Receive Temp. | 19.5°C | Source Temp. | 19.9°C |
| TECHNICIAN | #N/A | Receive Humidity | 41% | Source Humidity | 41% |

| FREQ (Hz) | BACKGROUND SPL (dB) | ABSORPTION m ² | SOURCE SPL (dB) | RECEIVE SPL (dB) | SPECIMEN TL (dB) | 95% CONFIDENCE LIMIT | NUMBER OF DEFICIENCIES |
|-------------------|---------------------------|-----------------------------------|-----------------------|------------------------|----------------------------|----------------------------|------------------------------|
| 80 | 29.7 | 17.0 | 110 | 68 | 40 | 3.8 | - |
| 100 | 27.5 | 15.0 | 106 | 67 | 38 | 1.8 | - |
| 125 | 30.2 | 10.2 | 105 | 65 | 40 | 1.6 | 0 |
| 160 | 25.6 | 10.7 | 106 | 67 | 39 | 1.5 | 0 |
| 200 | 21.5 | 10.5 | 104 | 66 | 38 | 1.4 | 4 |
| 250 | 33.7 | 11.3 | 104 | 64 | 40 | 0.7 | 5 |
| 315 | 20.5 | 9.8 | 105 | 63 | 43 | 1.0 | 5 |
| 400 | 20.6 | 8.5 | 104 | 58 | 48 | 0.7 | 3 |
| 500 | 20.7 | 8.4 | 103 | 56 | 48 | 0.5 | 4 |
| 630 | 20.2 | 7.8 | 104 | 59 | 47 | 0.5 | 6 |
| 800 | 19.6 | 7.4 | 104 | 53 | 53 | 0.5 | 1 |
| 1000 | 16.7 | 7.5 | 104 | 49 | 56 | 0.4 | 0 |
| 1250 | 13.3 | 7.8 | 104 | 47 | 58 | 0.4 | 0 |
| 1600 | 12.0 | 7.5 | 104 | 44 | 62 | 0.3 | 0 |
| 2000 | 8.5 | 8.3 | 103 | 42 | 63 | 0.3 | 0 |
| 2500 | 7.0 | 9.0 | 102 | 40 | 63 | 0.4 | 0 |
| 3150 | 5.9 | 10.1 | 103 | 37 | 66 | 0.4 | 0 |
| 4000 | 7.0 | 11.5 | 104 | 36 | 67 | 0.4 | 0 |
| 5000 | 7.4 | 13.4 | 103 | 34 | 68 | 0.4 | - |
| 6300 | 7.3 | 16.9 | 97 | 23 | 72 | 0.5 | - |
| 8000 | 7.2 | 22.3 | 97 | 19 | 74 | 0.5 | - |
| 10000 | 7.3 | 27.6 | 92 | 14 | 74 | 0.4 | - |
| STC Rating | 52 | <i>(Sound Transmission Class)</i> | | | Sum of Deficiencies | 28 | |

- Notes:**
- 1) Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.
 - 2) Specimen TL levels listed in **red** are potentially limited by the laboratory flanking limit.
 - 3) Specimen TL levels listed in **blue** indicate the lower limit of the transmission loss.
 - 4) Specimen TL levels listed in **green** indicate that there has been a filler wall correction applied

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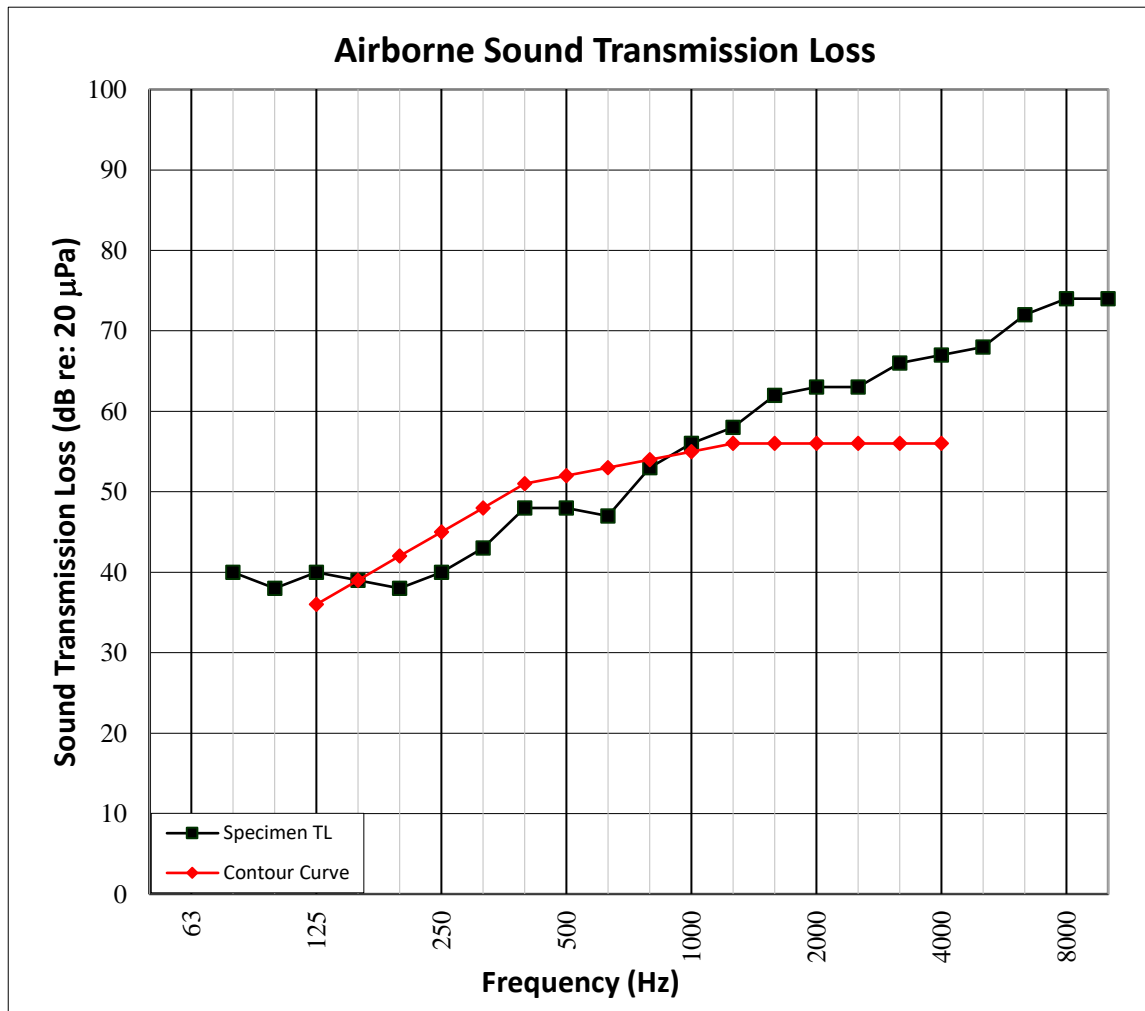
Date: 04/03/18

SECTION 11

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS GRAPH



| | | | | | |
|----------------------|--|-------------------------|--------|------------------------|--------|
| TEST DATE | 2/10/2018 | | | | |
| DATA FILE NO. | H7786.01 | | | | |
| CLIENT | Vulcraft/Verco Group | | | | |
| DESCRIPTION | 139.7 mm Standard 4000 PSI Concrete, 139.7 mm 20 Gage Vulcraft Dove Tail 2.00 Steel Deck | | | | |
| SPECIMEN AREA | 10.98 m ² | Receive Temp. | 19.5°C | Source Temp. | 19.9°C |
| TECHNICIAN | #N/A | Receive Humidity | 41% | Source Humidity | 41% |



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SECTION 12
TEST RESULTS - IMPACT SOUND TRANSMISSION


| | | | | | |
|----------------------|--|----------------------|--------|----------------------|--------|
| TEST DATE | 2/10/2018 | | | | |
| DATA FILE NO. | H7786.01 | | | | |
| CLIENT | Vulcraft/Verco Group | | | | |
| DESCRIPTION | 139.7 mm Standard 4000 PSI Concrete, 139.7 mm 20 Gage Vulcraft Dove Tail 2.00 Steel Deck | | | | |
| SPECIMEN AREA | 10.98 m ² | Maximum Temp. | 19.7°C | Minimum Temp. | 19.3°C |
| TECHNICIAN | #N/A | Max. Humidity | 42% | Min. Humidity | 40% |

| FREQ (Hz) | BACKGROUND SPL (dB) | ABSORPTION m ² | NORMALIZED IMPACT SPL (dB) | 95% CONFIDENCE LIMIT | NUMBER OF DEFICIENCIES |
|-------------------|---------------------------|----------------------------------|-------------------------------|----------------------------|------------------------------|
| 80 | 29.2 | 16.2 | 56 | 2.0 | - |
| 100 | 28.0 | 14.4 | 57 | 0.8 | 0 |
| 125 | 29.8 | 9.8 | 58 | 1.5 | 0 |
| 160 | 26.1 | 10.4 | 65 | 0.8 | 0 |
| 200 | 21.6 | 10.2 | 67 | 0.6 | 0 |
| 250 | 33.5 | 11.4 | 72 | 0.9 | 0 |
| 315 | 20.7 | 9.9 | 72 | 0.6 | 0 |
| 400 | 20.8 | 8.3 | 69 | 0.2 | 0 |
| 500 | 20.9 | 8.5 | 74 | 0.4 | 0 |
| 630 | 19.9 | 8.0 | 77 | 0.4 | 0 |
| 800 | 19.3 | 7.4 | 75 | 0.3 | 0 |
| 1000 | 17.3 | 7.5 | 74 | 0.3 | 0 |
| 1250 | 16.1 | 7.7 | 76 | 0.2 | 0 |
| 1600 | 19.6 | 7.5 | 74 | 0.2 | 0 |
| 2000 | 19.2 | 8.3 | 75 | 0.3 | 0 |
| 2500 | 15.7 | 9.2 | 76 | 0.2 | 4 |
| 3150 | 12.7 | 10.2 | 77 | 0.2 | 8 |
| 4000 | 9.7 | 11.4 | 75 | 0.3 | - |
| 5000 | 9.3 | 13.5 | 71 | 0.5 | - |
| 6300 | 8.9 | 17.0 | 63 | 0.7 | - |
| 8000 | 8.5 | 22.0 | 55 | 1.0 | - |
| 10000 | 8.0 | 28.0 | 50 | 0.8 | - |
| IIC Rating | 23 | <i>(Impact Insulation Class)</i> | | Sum of Deficiencies | 12 |

Notes: Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.

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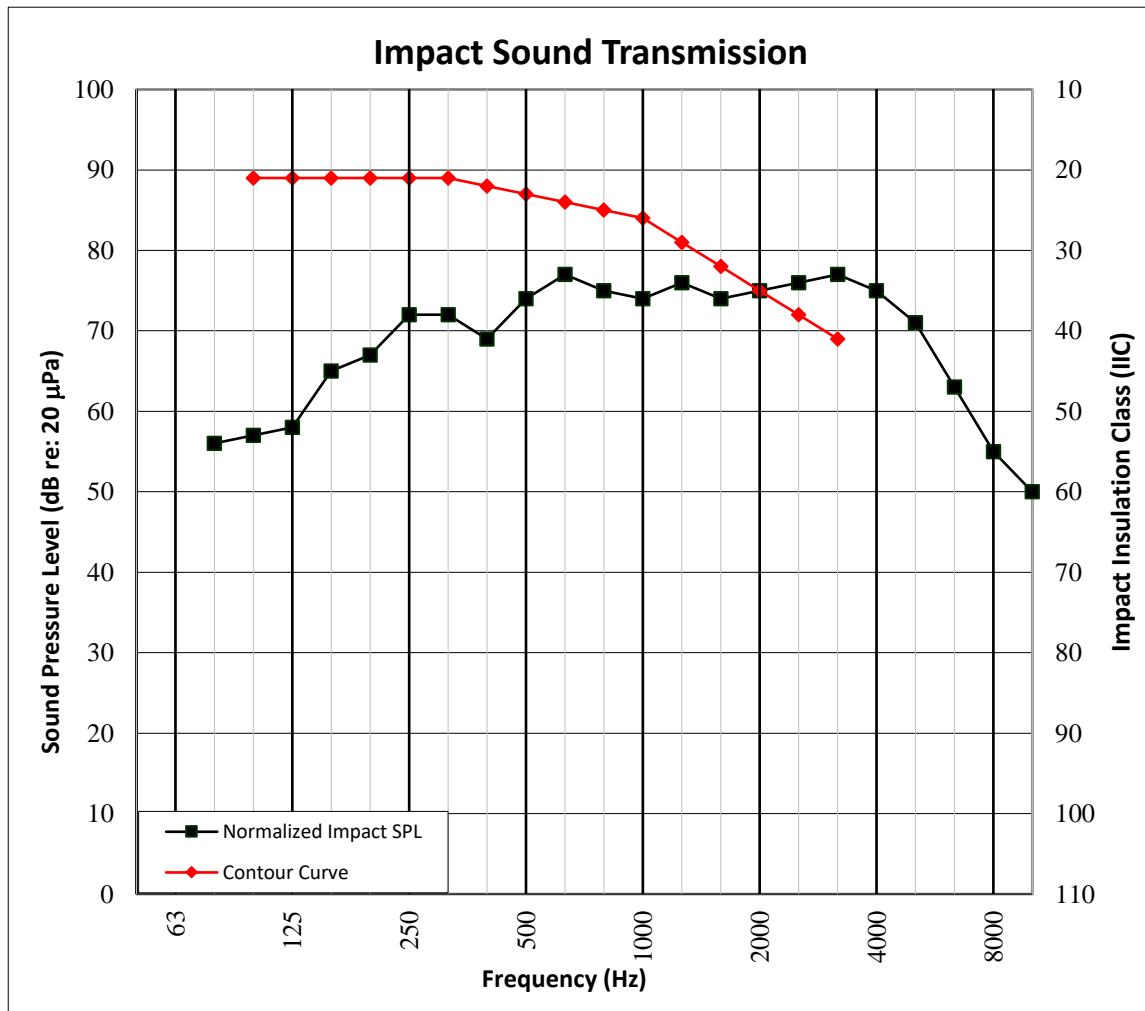
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SECTION 13

TEST RESULTS - IMPACT SOUND TRANSMISSION GRAPH



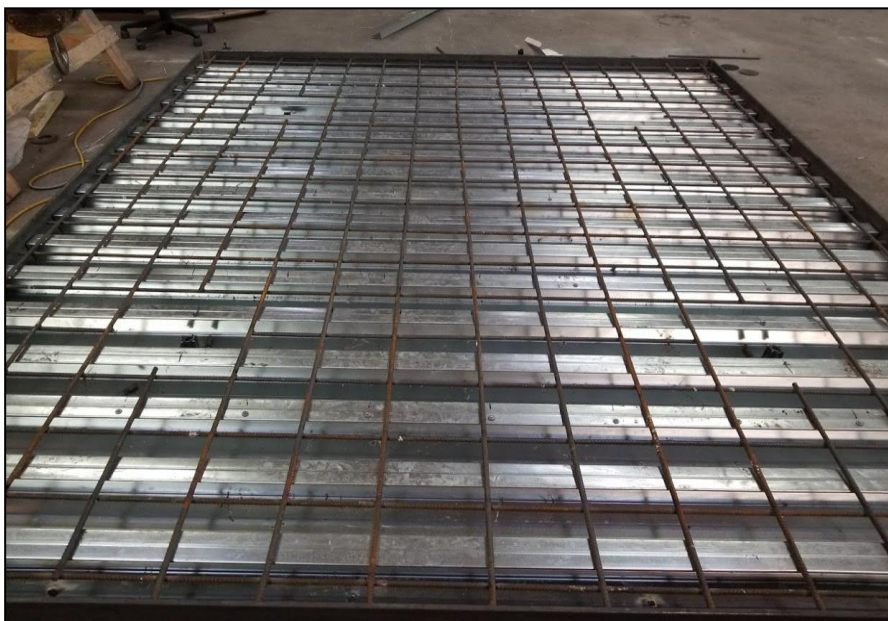
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|----------------------|--|----------------------|--------|----------------------|--------|
| TEST DATE | 2/10/2018 | | | | |
| DATA FILE NO. | H7786.01 | | | | |
| CLIENT | Vulcraft/Verco Group | | | | |
| DESCRIPTION | 139.7 mm Standard 4000 PSI Concrete, 139.7 mm 20 Gage Vulcraft Dove Tail 2.00 Steel Deck | | | | |
| SPECIMEN AREA | 10.98 m ² | Maximum Temp. | 19.7°C | Minimum Temp. | 19.3°C |
| TECHNICIAN | #N/A | Max. Humidity | 42% | Min. Humidity | 40% |



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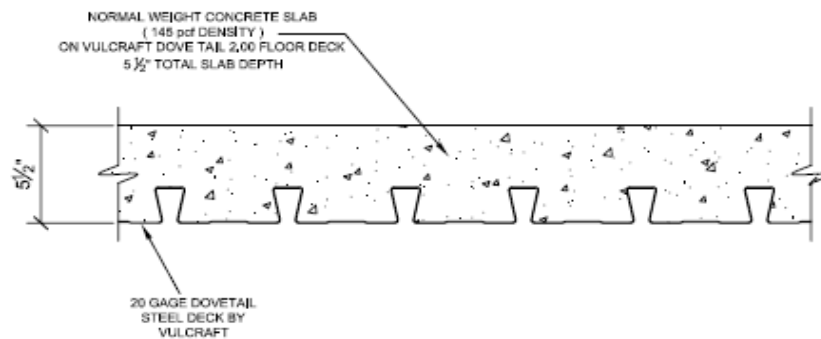
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SECTION 14**PHOTOGRAPHS****Photo No. 1****Source Room View of Test Specimen Installation****Photo No. 2****Construction of Test Specimen**

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SECTION 15**DRAWING****Drawing of Test Specimen (supplied by Client)**

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SECTION 16

REVISION LOG

| REVISION # | DATE | PAGES | DESCRIPTION |
|------------|----------|-------------|---|
| R0 | 03/22/18 | N/A | Original Report Issue |
| R1 | 04/03/18 | 1, 6-10, 12 | Steel deck name adjusted and drawing updated per client's request |