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HALSTEAD NEW ENGLAND ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK
ASTM E90, ASTM E492, AND ASTM E2179 TESTING ON
LIFEPROOF - 8.0 mm (5.0 mm CORE + 1.5 mm LVT + 1.5 mm IXPE PAD)

SPECIMEN TYPE
Concrete Slab - 152 mm

REPORT NUMBER
J3954.01-113-11-R0

TEST DATE
02/16/19

ISSUE DATE
02/19/19

RECORD RETENTION END
02/16/23

PAGES
15

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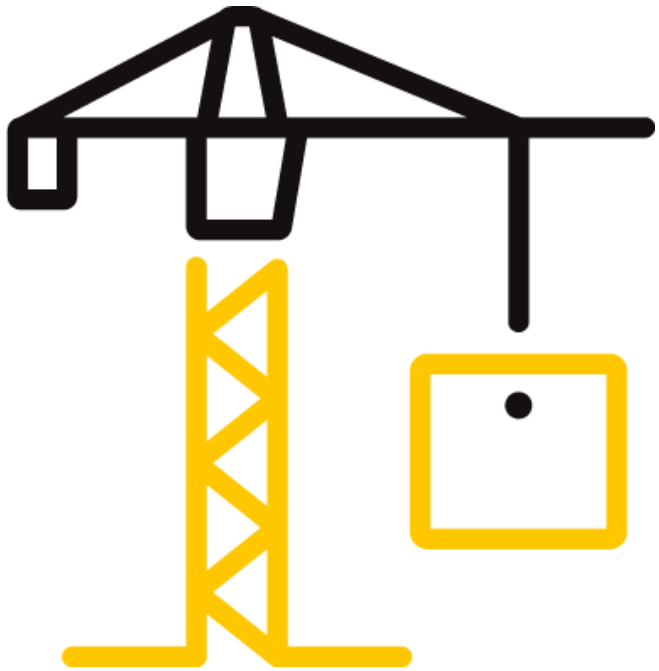

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TEST REPORT FOR HALSTEAD NEW ENGLAND

Report No.: J3954.01-113-11-R0
Date: 02/19/19

REPORT ISSUED TO

HALSTEAD NEW ENGLAND
119 Thomas Street
Calhoun, Georgia 30701

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Halstead New England to perform testing in accordance with ASTM E90, ASTM E492, AND ASTM E2179 on LifeProof - 8.0 mm (5.0 mm Core + 1.5 mm LVT + 1.5 mm IXPE Pad). 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.	J3954.01
SERIES/MODEL:	LifeProof - 8.0 mm (5.0 mm Core + 1.5 mm LVT + 1.5 mm IXPE Pad)
STC	52
IIC	52
ΔIIC	22

COMPLETED BY:	Seth J. Allen	**COMPLETED BY:**	Jordan Strybos
TITLE:	Technician II - Acoustical Testing	**TITLE:**	Engineer, Team Lead - Acoustical Testing
SIGNATURE:	Digitally Signed by: Seth Allen	**SIGNATURE:**	Digitally Signed by: Jordan Strybos
DATE:	02/19/19	**DATE:**	02/19/19

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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 E2179-03(2016), *Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors*

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 (Concrete Slab - 152 mm) 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 4108.4 kg. B&C will store samples of the test specimen for four years. Photographs of the test specimen are included in the report. A drawing of the test specimen is included in the report.

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-4462	Data Acquisition Card	INT00977	08/18	*
Data Acquisition Unit	National Instruments	PXI-4462	Data Acquisition Card	65124	05/18	*
Data Acquisition Unit	National Instruments	PXI-4462	Data Acquisition Card	63763-1	06/18	*
Microphone Calibrator	Norsonic	Nor1251	Acoustical Calibrator	65105	06/18	
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65617	06/18	
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64340	09/18	
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63745	06/18	
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63746	09/18	
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63747	07/18	
Receive Room Environmental Indicator	Comet	T7510	Temperature and Humidity Transmitter	63810	10/18	
				63811	10/18	
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63744	04/18	
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63739	04/18	
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63740	04/18	
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63742	03/18	
Source Room Microphone	PCB Electronics	378C20	Microphone and Preamplifier	63741	04/18	
Source Room Environmental Indicator	Comet	T7510	Temperature and Humidity Transmitter	63812	10/18	
Tapping Machine	Norsonic	Nor277	Tapping Machine	INT00936	12/18	

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

VT RECEIVE ROOM VOLUME	158.86 m^3
VT SOURCE ROOM VOLUME	190 m^3

SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Seth J. Allen	Intertek B&C
Michael K. Daniel	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 average temperature and humidity of both the source and received rooms are listed in Sections 10 and 11. The maximum and minimum temperatures and humidities of the receive room from the duration of the test are listed in Sections 12 through 15.

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. Two 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.

The delta impact insulation test was conducted in accordance with ASTM E2179 test method. In addition to the impact sound transmission test, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E492 with only the concrete slab installed 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), IIC (Impact Insulation Class), and ΔIIC (Delta Impact Insulation Class) ratings were calculated in accordance with ASTM E413, ASTM E989, and ASTM E2179, respectively.

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SECTION 9
TEST SPECIMEN DESCRIPTION

MATERIAL	DIMENSIONS (mm)	THICKNESS (mm)	MANUFACTURER AND SERIES	QUANTITY	AVERAGE WEIGHT
Waterproof Polymer Core (WPC) Flooring	708 by 302	8.0	LifeProof	10.98 m²	7.96 kg/m²
	Note: Loose laid. The flooring had an attached foam pad backing.				
Concrete Slab	3023 by 3632	152.4	5000 PSI	10.98 m²	366.18 kg/m²
	Note: Installed in a test frame flush to the source room. Mats of #5 reinforcing bars were placed 25.4 mm from both the top and bottom of the slab, with bars spaced on 305 mm centers in both directions. No noticeable shrinkage or cracking was visible on the specimen.				

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Date: 02/19/19

SECTION 10

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS

ACCREDITED Testing Laboratory

TEST DATE	2/16/2019				
DATA FILE NO.	J3954.01				
CLIENT	Halstead New England				
DESCRIPTION	8 mm LifeProof Waterproof Polymer Core (WPC) Flooring, 152.4 mm 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m²	**Receive Temp.**	18°C	**Source Temp.**	18.6°C
TECHNICIAN	MKD	**Receive Humidity**	54%	**Source Humidity**	54%

FREQ (Hz)	BACKGROUND SPL (dB)	ABSORPTION m²	SOURCE SPL (dB)	RECEIVE SPL (dB)	SPECIMEN TL (dB)	95% CONFIDENCE LIMIT	NUMBER OF DEFICIENCIES
80	28.3	15.6	109	69	39	2.8	-
100	26.4	13.2	105	67	38	2.1	-
125	30.5	9.9	105	67	38	1.9	0
160	26.8	10.5	106	69	37	1.4	2
200	20.7	10.9	103	66	37	1.6	5
250	18.4	11.4	102	58	44	0.8	1
315	21.7	10.4	105	57	48	0.9	0
400	14.8	8.6	103	56	48	0.5	3
500	15.1	8.0	103	55	49	0.6	3
630	19.8	7.6	104	59	46	0.6	7
800	20.6	7.6	103	55	49	0.6	5
1000	19.8	7.5	103	49	56	0.6	0
1250	15.2	7.7	104	44	61	0.4	0
1600	10.1	7.9	104	39	65	0.5	0
2000	9.5	8.7	103	38	67	0.5	0
2500	6.1	9.8	101	35	67	0.4	0
3150	4.7	10.8	103	32	71	0.7	0
4000	4.8	12.5	103	30	73	0.7	0
5000	5.3	14.5	103	27	75	0.6	-
6300	5.9	18.3	97	17	78	0.7	-
8000	6.5	24.2	96	13	80	1.0	-
10000	6.7	24.2	91	7	81	0.7	-
STC Rating	**52**	*(Sound Transmission Class)*			**Sum of Deficiencies**		**26**

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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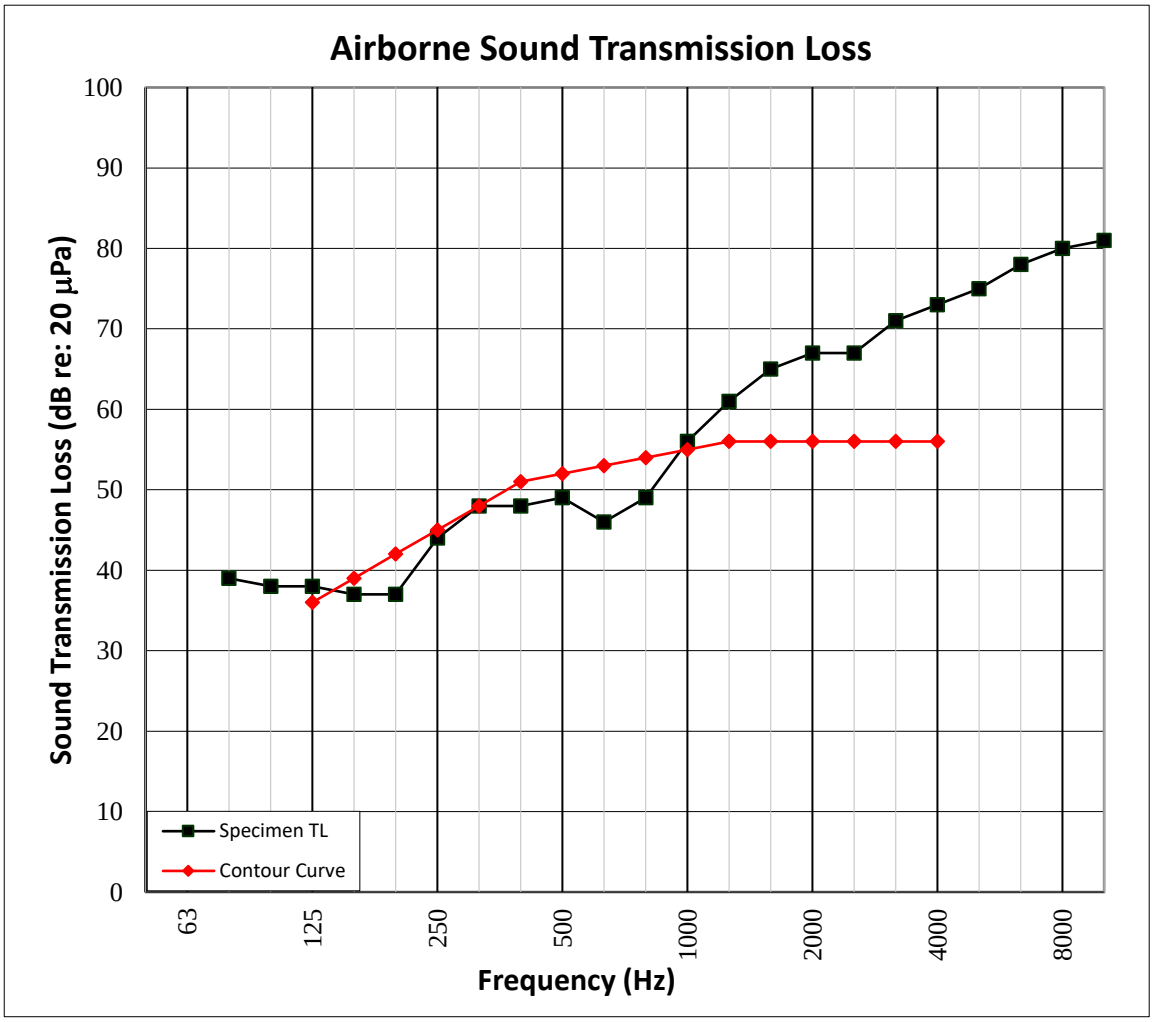
Date: 02/19/19

SECTION 11

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS GRAPH

ACCREDITED Testing Laboratory

TEST DATE	2/16/2019				
DATA FILE NO.	J3954.01				
CLIENT	Halstead New England				
DESCRIPTION	8 mm LifeProof Waterproof Polymer Core (WPC) Flooring, 152.4 mm 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m²	**Receive Temp.**	18°C	**Source Temp.**	18.6°C
TECHNICIAN	MKD	**Receive Humidity**	54%	**Source Humidity**	54%



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TEST REPORT FOR HALSTEAD NEW ENGLAND

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Date: 02/19/19

SECTION 12

TEST RESULTS - IMPACT SOUND TRANSMISSION

ACCREDITED Testing Laboratory

TEST DATE	2/16/2019				
DATA FILE NO.	J3954.01				
CLIENT	Halstead New England				
DESCRIPTION	8 mm LifeProof Waterproof Polymer Core (WPC) Flooring, 152.4 mm 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m²	**Maximum Temp.**	18.2°C	**Minimum Temp.**	17.9°C
TECHNICIAN	MKD	**Max. Humidity**	55%	**Min. Humidity**	54%

FREQ (Hz)	**BACKGROUND SPL** (dB)	**ABSORPTION** m²	**NORMALIZED IMPACT SPL** (dB)	**95% CONFIDENCE LIMIT**	**NUMBER OF DEFICIENCIES**
80	27.2	16.8	56	2.4	-
100	26.4	14.1	57	0.7	0
125	29.6	10.4	59	1.4	0
160	27.7	10.2	62	0.6	2
200	22.8	10.9	68	0.8	8
250	19.4	11.3	64	0.4	4
315	21.9	10.1	62	0.3	2
400	16.3	8.6	64	0.3	5
500	17.5	8.2	60	0.4	2
630	25.8	7.7	56	0.5	0
800	21.6	7.7	52	0.5	0
1000	21.5	7.6	48	0.4	0
1250	20.0	7.7	45	0.4	0
1600	10.3	7.8	41	0.4	0
2000	9.6	8.7	37	0.6	0
2500	6.2	9.8	30	0.6	0
3150	4.6	10.9	23	0.8	0
4000	4.8	12.6	17	0.9	-
5000	5.3	14.5	12	1.2	-
6300	6.0	18.3	9	0.3	-
8000	6.6	24.3	9	0.3	-
10000	6.8	24.3	9	0.5	-
IIC Rating	**52**	*(Impact Insulation Class)*		**Sum of Deficiencies**	**23**

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

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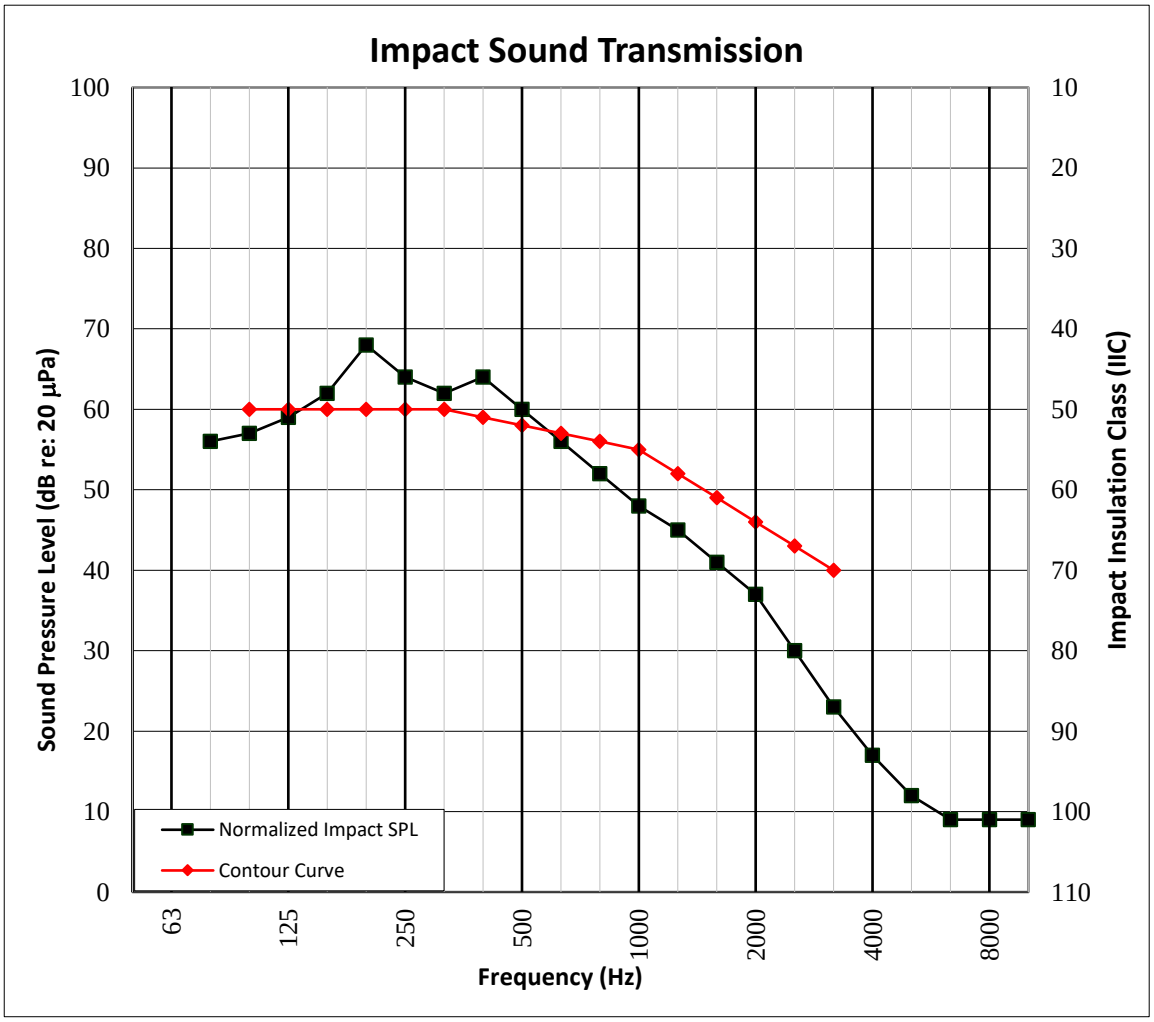
SECTION 13

TEST RESULTS - IMPACT SOUND TRANSMISSION GRAPH

ACCREDITED Testing Laboratory

TEST DATE	2/16/2019				
DATA FILE NO.	J3954.01				
CLIENT	Halstead New England				
DESCRIPTION	8 mm LifeProof Waterproof Polymer Core (WPC) Flooring, 152.4 mm 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m²	**Maximum Temp.**	18.2°C	**Minimum Temp.**	17.9°C
TECHNICIAN	MKD	**Max. Humidity**	55%	**Min. Humidity**	54%



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SECTION 14

TEST RESULTS - DELTA IMPACT INSULATION

ACCREDITED
Testing Laboratory

TEST DATE	2/16/2019				
DATA FILE NO.	J3954.01				
CLIENT	Halstead New England				
DESCRIPTION	8 mm LifeProof Waterproof Polymer Core (WPC) Flooring, 152.4 mm 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m²	**Maximum Temp.**	18.2°C	**Minimum Temp.**	17.9°C
TECHNICIAN	MKD	**Max. Humidity**	55%	**Min. Humidity**	54%

FREQ (Hz)	**BACKGROUND SPL** (dB)	**ABSORPTION** m²	**NORMALIZED IMPACT SPL** BARE (dB)	**95% CONF LIMIT**	**NORMALIZED IMPACT SPL** SPEC (dB)	**95% CONF LIMIT**	**RESULT ARRAY** $L_{ref,c}$	**NUMBER OF DEFI-CIENCIES**
100	26.4	14.1	58.7	0.8	56.8	0.8	65.0	3
125	29.6	10.4	60.3	1.7	58.7	1.7	66.0	4
160	27.7	10.2	64.2	0.8	62.1	0.8	66.0	4
200	22.8	10.9	70.2	1.1	67.8	1.0	66.0	4
250	19.4	11.3	67.1	0.5	63.9	0.6	66.0	4
315	21.9	10.1	66.1	0.3	62.0	0.3	65.0	3
400	16.3	8.6	69.9	0.5	64.0	0.4	64.0	3
500	17.5	8.2	68.2	0.5	59.6	0.5	62.0	2
630	25.8	7.7	69.9	0.5	56.4	0.6	57.0	0
800	21.6	7.7	71.2	0.7	52.2	0.6	53.0	0
1000	21.5	7.6	71.0	0.5	48.3	0.5	49.0	0
1250	20.0	7.7	71.9	0.5	44.7	0.5	45.0	0
1600	10.3	7.8	73.1	0.5	41.5	0.5	40.0	0
2000	9.6	8.7	73.3	0.5	36.6	0.7	35.0	0
2500	6.2	9.8	72.8	0.6	29.6	0.7	29.0	0
3150	4.6	10.9	72.1	0.7	23.3	1.0	23.0	0
ΔIIC Rating	**22**	*(Delta Impact Insulation Class)*			**Sum of Deficiencies**		**27**	

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

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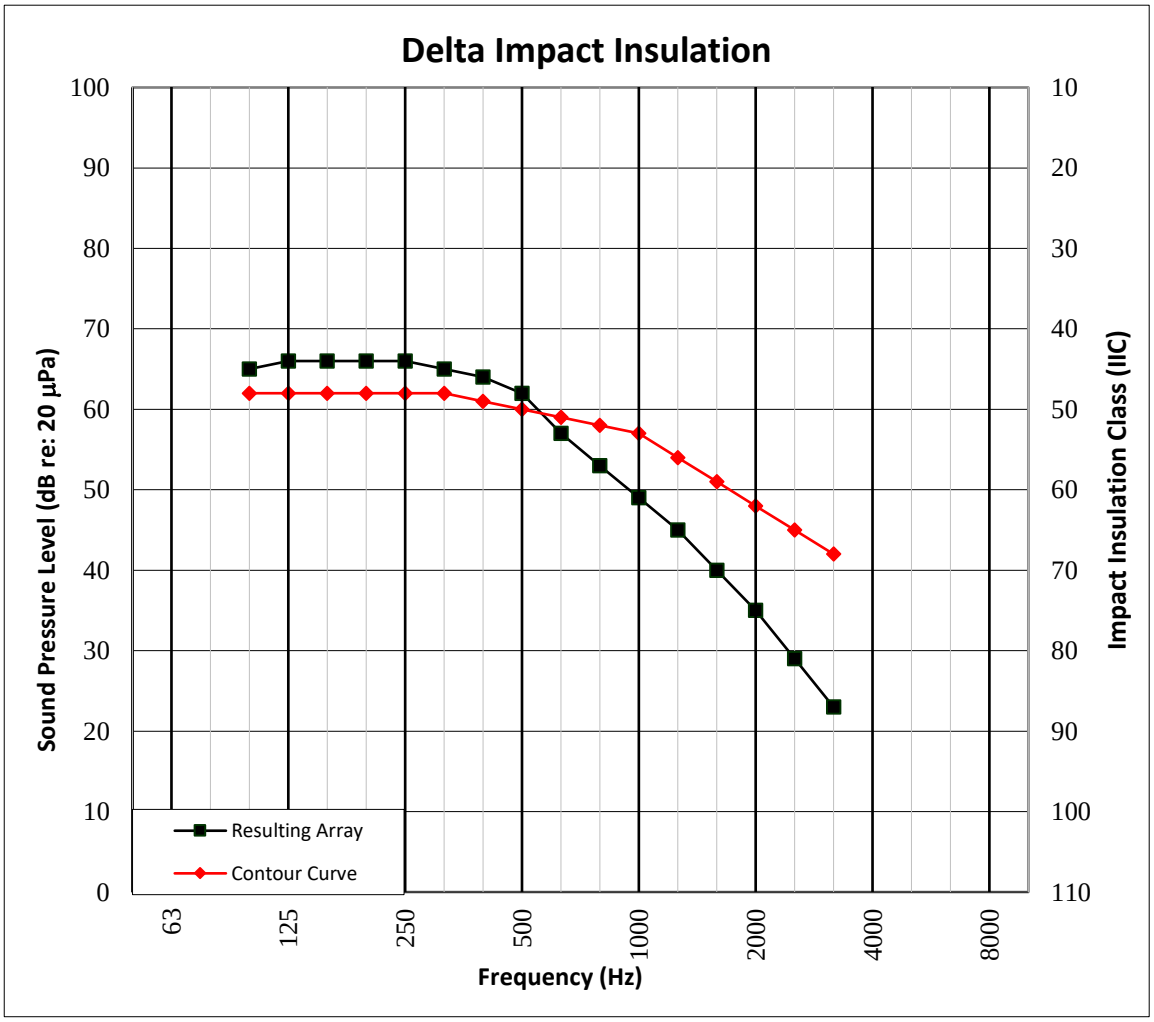
Date: 02/19/19

SECTION 15

TEST RESULTS - DELTA IMPACT INSULATION GRAPH

ACCREDITED Testing Laboratory

TEST DATE	2/16/2019				
DATA FILE NO.	J3954.01				
CLIENT	Halstead New England				
DESCRIPTION	8 mm LifeProof Waterproof Polymer Core (WPC) Flooring, 152.4 mm 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m²	**Maximum Temp.**	18.2°C	**Minimum Temp.**	17.9°C
TECHNICIAN	MKD	**Max. Humidity**	55%	**Min. Humidity**	54%



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SECTION 16
PHOTOGRAPHS

Photo No. 1
Source Room View of Test Specimen Installation

Photo No. 2
Receive Room View of Test Specimen Installation

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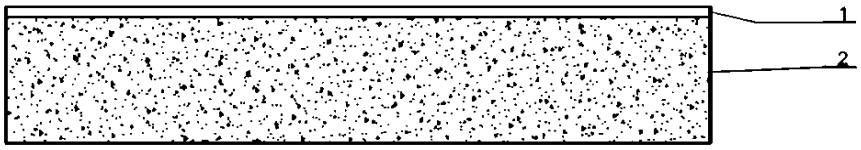
SECTION 17
DRAWING



1-Floor Topping
2-Concrete Slab

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SECTION 18
REVISION LOG

REVISION #	DATE	PAGES	DESCRIPTION
R0	02/19/19	N/A	Original Report Issue