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CLARKDIETRICH BUILDING SYSTEMS, LLC

ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK
ASTM E90 AND ASTM E492 TESTING ON EXPO LUXURY VINYL TILE

SPECIMEN TYPE
Open Web Truss - 406 mm (16") - Direct Layer USG SHEETROCK® Brand FIRECODE® C Core - ClarkDietrich® Sound Clip - One-Layer USG SHEETROCK® Brand FIRECODE® C

REPORT NUMBER
J4778.07-113-11-R1

TEST DATE
03/14/19

ISSUE DATE **REVISED DATE**
04/15/19 05/20/19

RECORD RETENTION END
03/14/23

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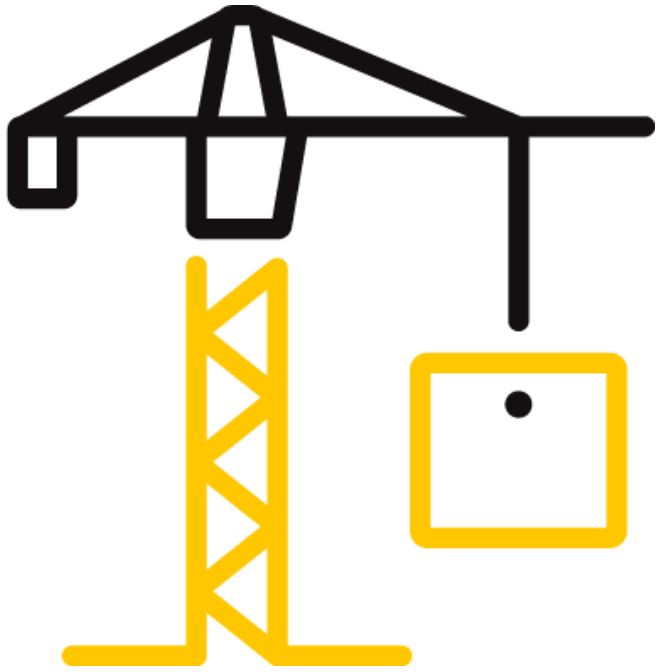

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York, PA 17406

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Facsimile: 717-764-4129
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TEST REPORT FOR CLARKDIETRICH BUILDING SYSTEMS, LLC

Report No.: J4778.07-113-11-R1
Date: 05/20/19

REPORT ISSUED TO

CLARKDIETRICH BUILDING SYSTEMS, LLC
9100 Centre Pointe Drive, Suite 210
West Chester, Ohio 45069

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by ClarkDietrich Building Systems, LLC to perform testing in accordance with ASTM E90 AND ASTM E492 on Expo Luxury Vinyl Tile. 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.	J4778.07
SERIES/MODEL:	Expo Luxury Vinyl Tile
STC	54
IIC	45

COMPLETED BY:	Cody R. Snyder	**COMPLETED BY:**	Daniel B. Mohler
TITLE:	Technician - Acoustical Testing	**TITLE:**	Project Lead - Acoustical Testing
SIGNATURE:	Digitally Signed by: Cody Snyder	**SIGNATURE:**	Digitally Signed by: Daniel Mohler
DATE:	05/20/19	**DATE:**	05/20/19

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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 E989-18, *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 (Open Web Truss - 406 mm (16") - Direct Layer USG SHEETROCK® Brand FIRECODE® C Core - ClarkDietrich® Sound Clip - One-Layer USG SHEETROCK® Brand FIRECODE® C Core) 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 1148.4 kg / 2532 lbs. B&C will store samples of the test specimen for four years. Photographs of the test specimen are included in the report. The client did not supply drawings of the test specimen.

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	INT00653	01/19	
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	156.28 m^3 (5519.06 ft^3)
VT SOURCE ROOM VOLUME	190 m^3 (6709.79 ft^3)

SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Morgan S. J. Kennedy	Intertek B&C
Daniel B. Mohler	Intertek B&C

130 Derry Court
York, PA 17406

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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 and 13.

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.

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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Date: 05/20/19

SECTION 9

TEST SPECIMEN DESCRIPTION

MATERIAL	Dimensions (mm/inch)	Thickness (mm/inch)	MANUFACTURER AND SERIES	QUANTITY	AVERAGE WEIGHT
Luxury Vinyl Tile	1219.2 by 152.4 48 by 6	2 / 0.08	Shaw Expo	10.98 m² 118.19 ft²	3.47 kg/m² 0.71 lb/ft²
	Note: A sheet of 2 mil polyethylene plastic was adhered to the subfloor topping with Sprayway Fast Tack 85 spray adhesive. The floor topping was adhered to the sheeting with a pressure sensitive adhesive, which was spread using a 0.79 mm by 1.59 mm by 0.79 mm (1/32" by 1/16" by 1/32") trowel. Adhesive was allowed to cure per manufacturer's specifications.				
Floor Underlayment	3022.6 by 3632.2 119 by 143	25.4 / 1	USG Levelrock® Brand 2500	10.98 m² 118.19 ft²	49.8 kg/m² 10.2 lb/ft²
	Note: Poured directly onto the subfloor underlayment, cured a minimum of 14 days. The gypsum panel had a closed cell foam perimeter isolation. No noticeable shrinkage or cracking was visible on the specimen.				
Sound Attenuation Mat	3023 by 1003.3 119 by 39.5	6.4 / 0.25	USG Levelrock® Brand SAM-N25™	10.98 m² 118.19 ft²	0.49 kg/m² 0.1 lb/ft²
	Note: Loose laid with seams overlapping and taped				
Oriented Strand Board Sheathing	1219 by 2438 48 by 96	18.8 / 0.74	N/A	10.98 m² 118.19 ft²	13.82 kg/m² 2.83 lb/ft²
	Note: Fastened to trusses with 76 mm (3") by 3 mm (0.12") framing nails on 203 mm (8") centers along perimeter and 305 mm (12") centers in the field.				
Fiberglass Insulation	520.7 by 3023 20.5 by 119	88.9 / 3.5	Johns Manville Unfaced R-13	10.98 m² 118.19 ft²	1.32 kg/m² 0.27 lb/ft²
	Note: Installed into the cavities between the trusses, stapled flush to the subfloor.				
Open Web Truss	88.9 by 2933.7 3.5 by 115.5	406.4 / 16	York PB Truss L/360	7 trusses	16.93 kg/truss 37.32 lb/truss
	Note: Installed on 610 mm (24") centers using JUS414 hanger brackets.				
Gypsum Panel	1219 by 3023 48 by 119	15.9 / 0.63	USG SHEETROCK® Brand FIRECODE® C Core	10.98 m² 118.19 ft²	11.9 kg/m² 2.44 lb/ft²
	Note: Fastened directly to the trusses on 203 mm (8") centers with 41.3 mm (1-5/8") Type S bugle head screws. The seams of the gypsum panels were sealed with Pecora AC-20 FTR caulk and covered with pressure sensitive tape.				
Resilient Sound Isolation Clip	76.2 by 36.5 3 by 1.4	31.8 / 1.25	ClarkDietrich® Sound Clip	24 clips	0.06 kg/clip 0.14 lb/clip
	Note: Installed in a 610 mm by 1219 mm (24" by 48") grid pattern.				
Furring/Hat Channel	3657.6 by 76.2 144 by 3	22.3 / 0.88	ClarkDietrich® 087F125-18	21.95 lin m 72 lin ft	0.48 kg/m 0.32 lb/ft
	Note: Installed on 610 mm (24") centers perpendicular to the trusses. The measured thickness of the metal was 0.7 mm (0.03").				
Gypsum Panel	1219 by 3023 48 by 119	15.9 / 0.63	USG SHEETROCK® Brand FIRECODE® C Core	10.98 m² 118.19 ft²	11.9 kg/m² 2.44 lb/ft²
	Note: Fastened to the channels on 203 mm (8") centers with 25.4 mm (1") Type S bugle head screws. The seams of the gypsum panels were sealed with Pecora AC-20 FTR caulk and covered with pressure sensitive tape.				

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TEST REPORT FOR CLARKDIETRICH BUILDING SYSTEMS, LLC

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Date: 05/20/19

SECTION 10

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS

IAS ACCREDITED Testing Laboratory

TEST DATE	3/14/2019				
DATA FILE NO.	J4778.07				
CLIENT	ClarkDietrich Building Systems, LLC				
DESCRIPTION	2 mm (0.08") Shaw Expo Luxury Vinyl Tile, 25.4 mm (1") USG Levelrock® Brand 2500 Floor Underlayment, 6.4 mm (0.25") USG Levelrock® Brand SAM-N25™ Sound Attenuation Mat, 18.8 mm (0.74") Oriented Strand Board Sheathing, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 406.4 mm (16") York PB Truss L/360 Open Web Truss, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel, 31.75 mm (1.25") ClarkDietrich® Sound Clip Resilient Sound Isolation Clip, 22.3 mm (0.88") ClarkDietrich® 087F125-18 Furring/Hat Channel, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel				
SPECIMEN AREA	10.98 m²	**Receive Temp.**	19.9°C (67.8°F)	**Source Temp.**	20.4°C (68.7°F)
TECHNICIAN	MSJK	**Receive Humidity**	63%	**Source Humidity**	63%

FREQ (Hz)	BACKGROUND SPL (dB)	ABSORPTION m²	SOURCE SPL (dB)	RECEIVE SPL (dB)	SPECIMEN TL (dB)	95% CONFIDENCE LIMIT	NUMBER OF DEFICIENCIES
50	37.1	27.6	99	69	26	3.6	-
63	35.4	27.3	98	60	36	3.9	-
80	37.5	17.3	107	73	32	3.1	-
100	32.0	12.7	105	70	35	2.3	-
125	28.3	12.6	102	70	32	1.9	6
160	28.4	10.7	105	69	37	0.8	4
200	23.9	11.5	101	62	39	1.6	5
250	21.5	11.0	99	60	40	1.0	7
315	22.7	9.8	102	57	46	0.9	4
400	18.4	8.8	101	54	49	0.6	4
500	18.1	7.6	102	50	53	0.6	1
630	21.8	7.6	103	46	59	0.5	0
800	20.8	7.4	102	44	61	0.3	0
1000	22.0	7.1	101	41	63	0.5	0
1250	20.1	7.5	102	38	67	0.6	0
1600	15.6	7.7	102	37	68	0.4	0
2000	15.0	8.9	102	36	68	0.5	0
2500	12.2	9.9	99	32	69	0.3	0
3150	8.8	10.9	101	29	74	0.4	0
4000	7.2	12.7	102	27	75	0.4	0
5000	5.8	15.1	101	24	77	0.5	-
6300	6.1	19.4	96	14	80	0.6	-
8000	6.5	25.7	95	11	82	1.1	-
10000	6.7	25.7	90	6	81	0.7	-
STC Rating	**54**	*(Sound Transmission Class)*			**Sum of Deficiencies**		**31**

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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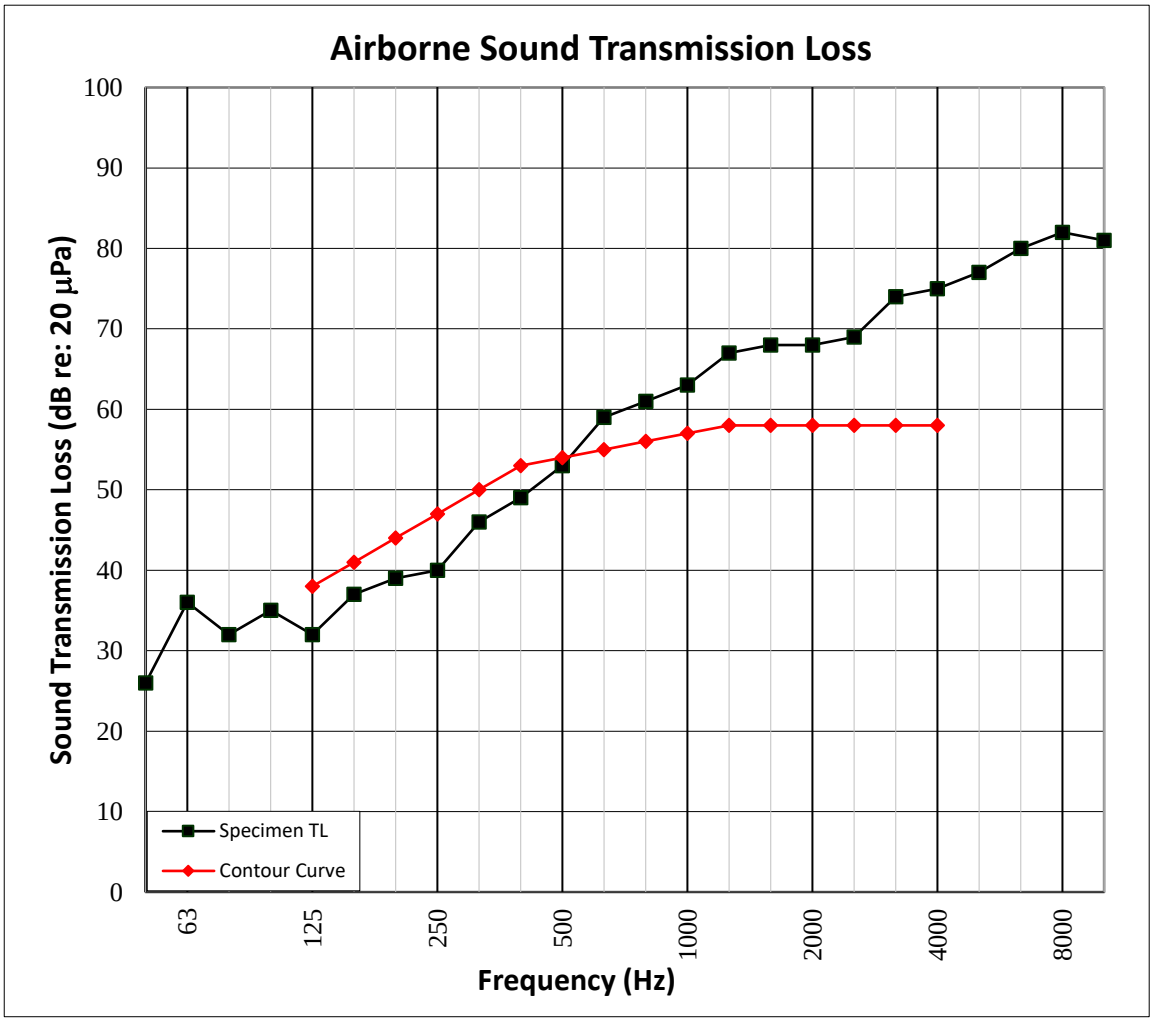
Report No.: J4778.07-113-11-R1
Date: 05/20/19

SECTION 11

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS GRAPH

TEST DATE	3/14/2019				
DATA FILE NO.	J4778.07				
CLIENT	ClarkDietrich Building Systems, LLC				
DESCRIPTION	2 mm (0.08") Shaw Expo Luxury Vinyl Tile, 25.4 mm (1") USG Levelrock® Brand 2500 Floor Underlayment, 6.4 mm (0.25") USG Levelrock® Brand SAM-N25™ Sound Attenuation Mat, 18.8 mm (0.74") Oriented Strand Board Sheathing, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 406.4 mm (16") York PB Truss L/360 Open Web Truss, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel, 31.75 mm (1.25") ClarkDietrich® Sound Clip Resilient Sound Isolation Clip, 22.3 mm (0.88") ClarkDietrich® 087F125-18 Furring/Hat Channel, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel				
SPECIMEN AREA	10.98 m²	**Receive Temp.**	19.9°C (67.8°F)	**Source Temp.**	20.4°C (68.7°F)
TECHNICIAN	MSJK	**Receive Humidity**	63%	**Source Humidity**	63%



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Date: 05/20/19

SECTION 12

TEST RESULTS - IMPACT SOUND TRANSMISSION

IAS ACCREDITED Testing Laboratory

TEST DATE	3/14/2019				
DATA FILE NO.	J4778.07				
CLIENT	ClarkDietrich Building Systems, LLC				
DESCRIPTION	2 mm (0.08") Shaw Expo Luxury Vinyl Tile, 25.4 mm (1") USG Levelrock® Brand 2500 Floor Underlayment, 6.4 mm (0.25") USG Levelrock® Brand SAM-N25™ Sound Attenuation Mat, 18.8 mm (0.74") Oriented Strand Board Sheathing, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 406.4 mm (16") York PB Truss L/360 Open Web Truss, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel, 31.75 mm (1.25") ClarkDietrich® Sound Clip Resilient Sound Isolation Clip, 22.3 mm (0.88") ClarkDietrich® 087F125-18 Furring/Hat Channel, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel				
SPECIMEN AREA	10.98 m²	**Maximum Temp.**	20.4°C (68.8°F)	**Minimum Temp.**	19.5°C (67.1°F)
TECHNICIAN	MSJK	**Max. Humidity**	64%	**Min. Humidity**	62%

FREQ (Hz)	**BACKGROUND SPL** (dB)	**ABSORPTION** m²	**NORMALIZED IMPACT SPL** (dB)	**95% CONFIDENCE LIMIT**	**NUMBER OF DEFICIENCIES**
50	38.8	29.5	68	1.3	-
63	34.8	30.2	64	2.2	-
80	37.7	18.7	72	3.1	-
100	30.7	12.5	71	1.5	4
125	27.8	13.1	74	1.8	7
160	27.8	11.1	72	0.6	5
200	24.0	11.1	74	0.7	7
250	21.5	10.7	74	0.9	7
315	22.0	9.9	66	0.4	0
400	16.4	8.5	64	0.5	0
500	17.0	7.8	63	0.4	0
630	20.7	7.6	61	0.3	0
800	20.6	7.5	58	0.2	0
1000	21.4	7.3	51	0.2	0
1250	19.4	7.5	46	0.2	0
1600	15.3	7.8	46	0.2	0
2000	15.4	9.0	46	0.3	0
2500	11.9	9.9	36	0.3	0
3150	8.5	10.9	27	0.6	0
4000	7.1	12.6	21	0.9	-
5000	6.0	15.1	16	1.1	-
6300	6.2	19.4	11	1.1	-
8000	6.7	25.9	12	1.0	-
10000	7.3	25.9	10	0.7	-
IIC Rating	**45**	*(Impact Insulation Class)*		**Sum of Deficiencies**	**30**

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

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York, PA 17406

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TEST REPORT FOR CLARKDIETRICH BUILDING SYSTEMS, LLC

Report No.: J4778.07-113-11-R1
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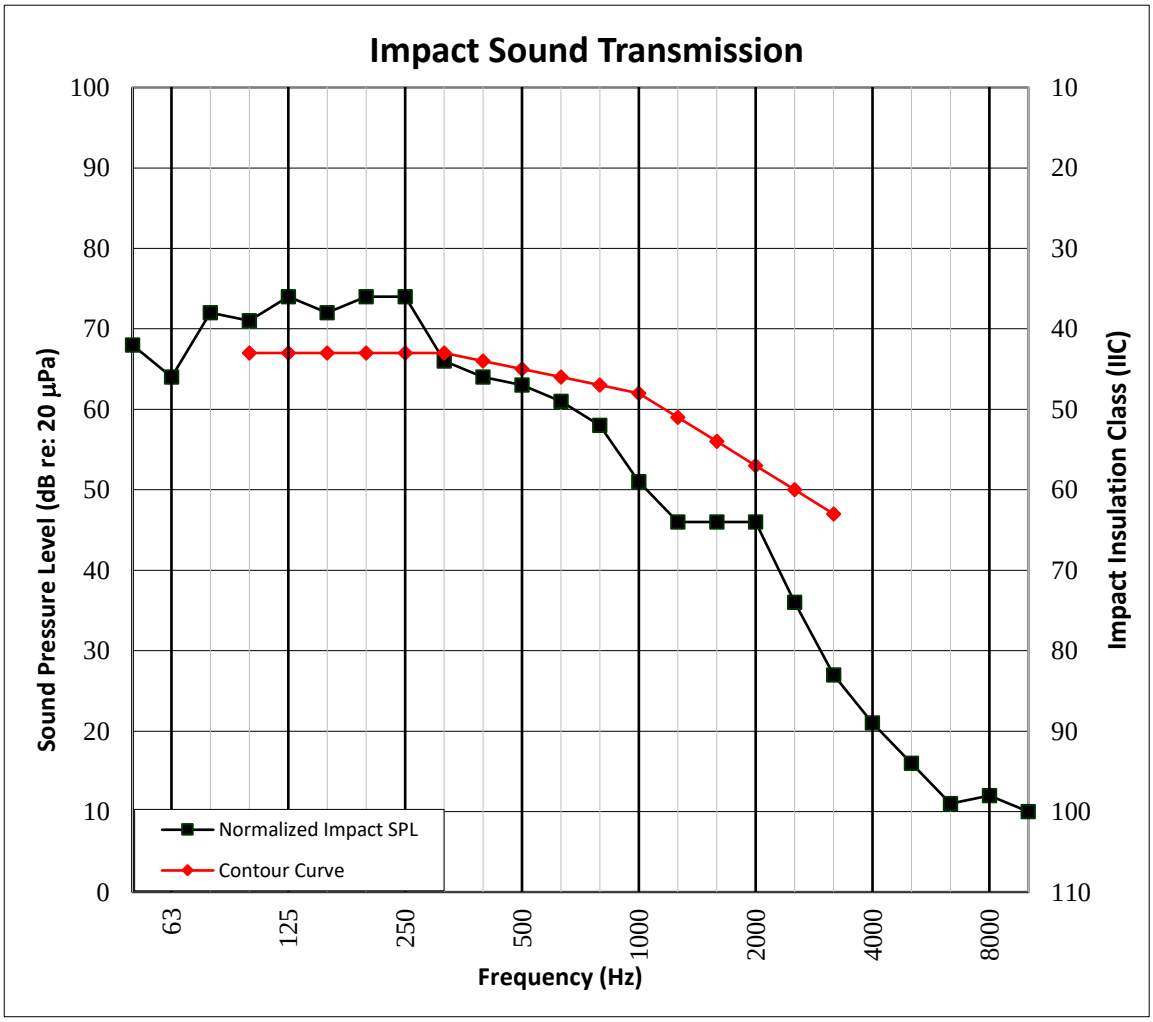
SECTION 13

TEST RESULTS - IMPACT SOUND TRANSMISSION GRAPH

TEST DATE	3/14/2019				
DATA FILE NO.	J4778.07				
CLIENT	ClarkDietrich Building Systems, LLC				
DESCRIPTION	2 mm (0.08") Shaw Expo Luxury Vinyl Tile, 25.4 mm (1") USG Levelrock® Brand 2500 Floor Underlayment, 6.4 mm (0.25") USG Levelrock® Brand SAM-N25™ Sound Attenuation Mat, 18.8 mm (0.74") Oriented Strand Board Sheathing, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 406.4 mm (16") York PB Truss L/360 Open Web Truss, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel, 31.75 mm (1.25") ClarkDietrich® Sound Clip Resilient Sound Isolation Clip, 22.3 mm (0.88") ClarkDietrich® 087F125-18 Furring/Hat Channel, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel				
SPECIMEN AREA	10.98 m²	**Maximum Temp.**	20.4°C (68.8°F)	**Minimum Temp.**	19.5°C (67.1°F)
TECHNICIAN	MSJK	**Max. Humidity**	64%	**Min. Humidity**	62%



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Telephone: 717-764-7700
Facsimile: 717-764-4129
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SECTION 14
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 15
REVISION LOG

REVISION #	DATE	PAGES	DESCRIPTION
R0	04/15/19	N/A	Original Report Issue
R1	05/20/19	All	Sound clip name corrected