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CLARKDIETRICH BUILDING SYSTEMS, LLC

ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK
ASTM E90 AND ASTM E492 TESTING ON CERAMIC TILE OVER NOBLESEAL CIS

SPECIMEN TYPE
ClarkDietrich TradeReady® Steel Joist - 254 mm (10") - ClarkDietrich® Sound Clip - One-Layer USG SHEETROCK® Brand FIRECODE® C Core

REPORT NUMBER
J4775.06-113-11-R1

TEST DATE
03/20/19

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

RECORD RETENTION END
03/20/23

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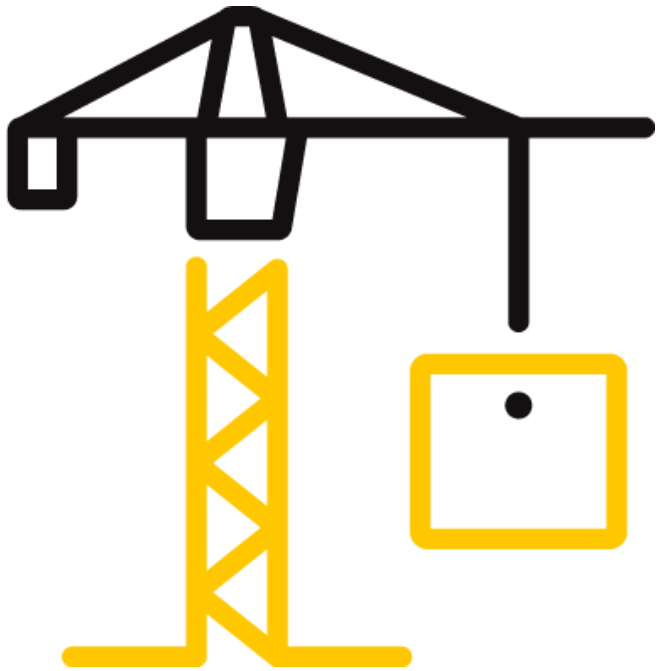

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York, PA 17406

Telephone: 717-764-7700
Facsimile: 717-764-4129
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TEST REPORT FOR CLARKDIETRICH BUILDING SYSTEMS, LLC

Report No.: J4775.06-113-11-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 Ceramic Tile over NobleSeal CIS. 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.	J4775.06
SERIES/MODEL:	Ceramic Tile over NobleSeal CIS
STC	56
IIC	50

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 E989-06 (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 (ClarkDietrich TradeReady® Steel Joist - 254 mm (10") - 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 1025.3 kg / 2259.6 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	34340	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	156.8 m^3 (5537.26 ft^3)
VT SOURCE ROOM VOLUME	190 m^3 (6709.79 ft^3)

SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Cody R. Snyder	Intertek B&C
Daniel B. Mohler	Intertek B&C

130 Derry Court
York, PA 17406

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Facsimile: 717-764-4129
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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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SECTION 9

TEST SPECIMEN DESCRIPTION

MATERIAL	Dimensions (mm/inch)	Thickness (mm/inch)	MANUFACTURER AND SERIES	QUANTITY	AVERAGE WEIGHT
Ceramic Tile	304.8 by 304.8 12 by 12	8 / 0.31	Daltile®	10.98 m² 118.19 ft²	15.87 kg/m² 3.25 lb/ft²
	Note: Laticrete Permacolor grout was placed into the 6.35 mm (0.25") joints between the ceramic tile and wiped clean. The ceramic tile was placed onto a bed of Laticrete Platinum 254 mortar. The mortar was set using a 6.35 mm by 6.35 mm (1/4" by 1/4") trowel. Both the grout and mortar were allowed to cure to manufacturer's specifications.				
Sound Reduction Membrane	3023 by 1219.2 119 by 48	0.8 / 0.03	NobleSeal® CIS	10.98 m² 118.19 ft²	0.9 kg/m² 0.18 lb/ft²
	Note: A sheet of 2 mil polyethylene plastic was adhered to the subfloor topping with 3M Super 77 spray adhesive. The underlayment was adhered to the sheeting with NobleBond 21 adhesive, which was spread using a 1.59 mm by 1.59 mm by 1.59 mm (1/16" by 1/16" by 1/16") trowel. Adhesive was allowed to cure per manufacturer's specifications.				
Floor Underlayment	3023 by 3632 119 by 143	25.4 / 1	USG Levelrock® Brand CSD® Early Exposure™	10.98 m² 118.19 ft²	45.89 kg/m² 9.4 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				
Steel Floor Deck	3023 by 914.4 119 by 36	14.6 / 0.57	22-Gauge Corrugated	10.98 m² 118.19 ft²	6.7 kg/m² 1.37 lb/ft²
	Note: Installed in a test frame flush to the source room. Flutes filled with FIRM-FILL® CSD. The depth of the deck flutes was 14.3 mm (9/16") and the measured thickness of the metal was 0.7 mm (0.03").				
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 joists, draped across furring/hat Channel.				
Steel Joist	3023 by 3632 119 by 143	254 / 10	ClarkDietrich TradeReady®	21.16 lin m 69.42 lin ft	4.78 kg/m 3.21 lb/ft
	Note: Installed on 610 mm (24") centers using Trade Ready® rim track.				
Resilient Sound Isolation Clip	76.2 by 36.5 3 by 1.4	31.8 / 1.25	ClarkDietrich® Sound Clip	24 clips 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 joists. 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

Report No.: J4775.06-113-11-R1
Date: 05/20/19

SECTION 10

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS

IAS ACCREDITED Testing Laboratory

TEST DATE	3/20/2019				
DATA FILE NO.	J4775.06				
CLIENT	ClarkDietrich Building Systems, LLC				
DESCRIPTION	8 mm (0.31") Daltile® Ceramic Tile, 0.8 mm (0.03") NobleSeal® CIS Sound Reduction Membrane, 25.4 mm (1") USG Levelrock® Brand CSD® Early Exposure™ Floor Underlayment, 6.4 mm (0.25") USG Levelrock® Brand SAM-N25™ Sound Attenuation Mat, 14.57 mm (0.57") 22-Gauge Corrugated Steel Floor Deck, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 254 mm (10") ClarkDietrich TradeReady® Steel Joist, 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.**	20.5°C (68.8°F)	**Source Temp.**	17.7°C (63.9°F)
TECHNICIAN	CRS	**Receive Humidity**	49%	**Source Humidity**	49%

FREQ (Hz)	**BACKGROUND SPL** (dB)	**ABSORPTION** m²	**SOURCE SPL** (dB)	**RECEIVE SPL** (dB)	**SPECIMEN TL** (dB)	**95% CONFIDENCE LIMIT**	**NUMBER OF DEFICIENCIES**
50	36.8	29.7	108	69	36	3.0	-
63	36.1	26.3	108	65	40	3.3	-
80	40.7	16.6	112	72	39	3.6	-
100	27.1	13.1	107	69	38	2.7	-
125	27.2	11.6	105	64	42	1.7	0
160	28.7	10.1	104	64	41	1.2	2
200	23.2	10.2	103	58	47	1.3	0
250	21.1	10.0	102	55	48	0.8	1
315	20.5	9.8	106	56	52	0.7	0
400	15.3	8.6	103	54	50	0.5	5
500	17.5	8.0	102	55	48	0.5	8
630	19.1	7.8	103	52	52	0.3	5
800	20.3	7.6	103	50	54	0.4	4
1000	19.7	7.6	103	48	57	0.6	2
1250	18.8	7.5	103	43	63	0.3	0
1600	14.3	7.7	101	39	65	0.2	0
2000	13.4	8.9	103	40	65	0.2	0
2500	13.1	9.8	101	36	67	0.4	0
3150	12.8	10.9	101	35	67	0.4	0
4000	12.0	12.5	100	35	65	0.6	0
5000	10.5	14.8	100	32	66	0.5	-
6300	11.4	18.7	99	29	67	0.5	-
8000	11.6	24.6	97	31	63	0.9	-
10000	10.2	24.6	98	30	64	1.2	-
STC Rating	**56**	*(Sound Transmission Class)*			**Sum of Deficiencies**		**27**

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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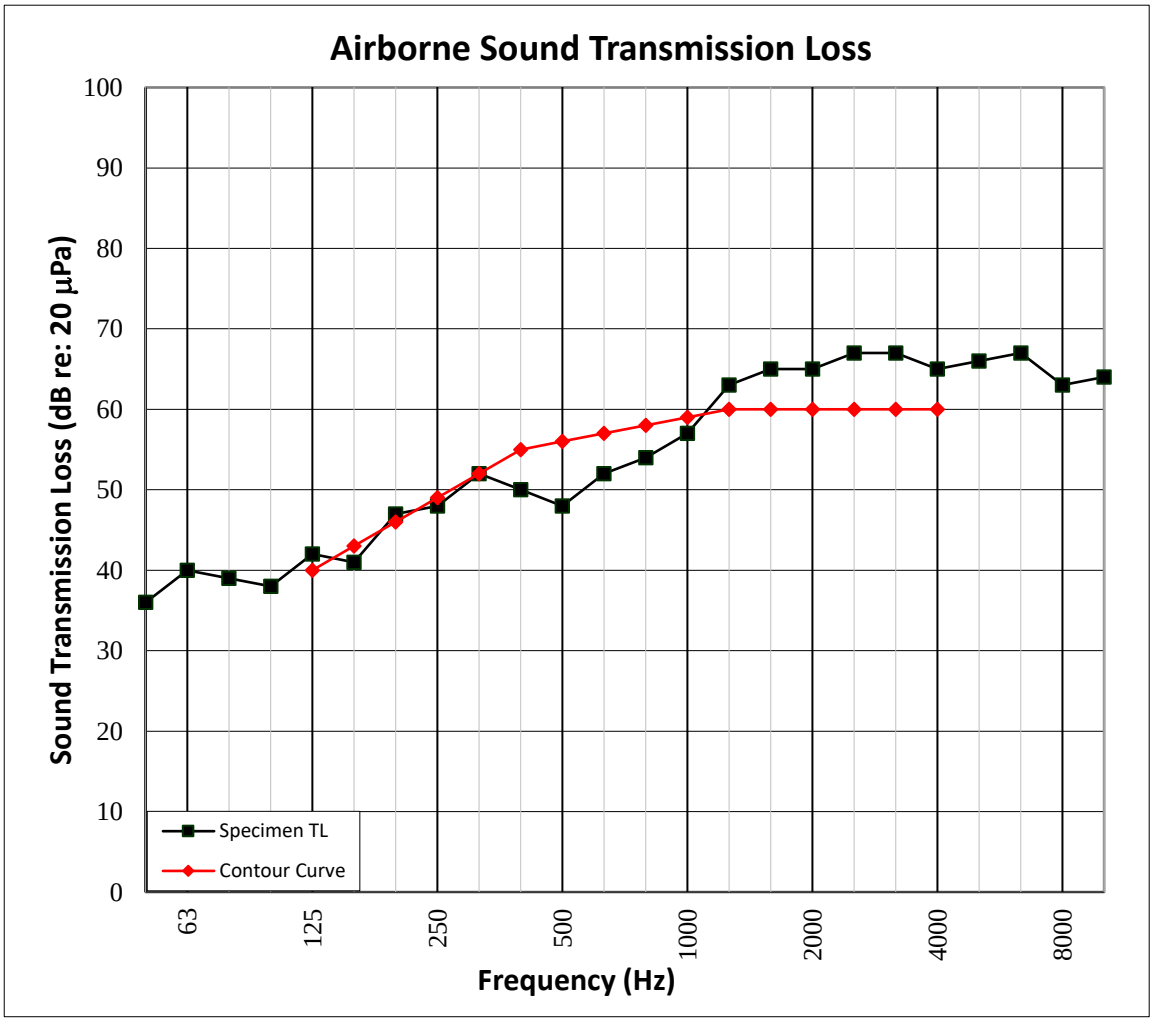
TEST REPORT FOR CLARKDIETRICH BUILDING SYSTEMS, LLC

Report No.: J4775.06-113-11-R1
Date: 05/20/19

SECTION 11

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS GRAPH

TEST DATE	3/20/2019				
DATA FILE NO.	J4775.06				
CLIENT	ClarkDietrich Building Systems, LLC				
DESCRIPTION	8 mm (0.31") Daltile® Ceramic Tile, 0.8 mm (0.03") NobleSeal® CIS Sound Reduction Membrane, 25.4 mm (1") USG Levelrock® Brand CSD® Early Exposure™ Floor Underlayment, 6.4 mm (0.25") USG Levelrock® Brand SAM-N25™ Sound Attenuation Mat, 14.57 mm (0.57") 22-Gauge Corrugated Steel Floor Deck, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 254 mm (10") ClarkDietrich TradeReady® Steel Joist, 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.**	20.5°C (68.8°F)	**Source Temp.**	17.7°C (63.9°F)
TECHNICIAN	CRS	**Receive Humidity**	49%	**Source Humidity**	49%



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Date: 05/20/19

SECTION 12

TEST RESULTS - IMPACT SOUND TRANSMISSION

IAS ACCREDITED Testing Laboratory

TEST DATE	3/20/2019				
DATA FILE NO.	J4775.06				
CLIENT	ClarkDietrich Building Systems, LLC				
DESCRIPTION	8 mm (0.31") Daltile® Ceramic Tile, 0.8 mm (0.03") NobleSeal® CIS Sound Reduction Membrane, 25.4 mm (1") USG Levelrock® Brand CSD® Early Exposure™ Floor Underlayment, 6.4 mm (0.25") USG Levelrock® Brand SAM-N25™ Sound Attenuation Mat, 14.57 mm (0.57") 22-Gauge Corrugated Steel Floor Deck, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 254 mm (10") ClarkDietrich TradeReady® Steel Joist, 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.**	20.6°C (69°F)	**Minimum Temp.**	20.3°C (68.6°F)
TECHNICIAN	CRS	**Max. Humidity**	50%	**Min. Humidity**	48%

FREQ (Hz)	**BACKGROUND SPL** (dB)	**ABSORPTION** m²	**NORMALIZED IMPACT SPL** (dB)	**95% CONFIDENCE LIMIT**	**NUMBER OF DEFICIENCIES**
50	38.0	30.7	67	1.8	-
63	35.4	22.1	61	2.7	-
80	35.0	16.8	65	1.3	-
100	31.3	13.0	65	1.4	3
125	28.6	11.2	65	1.5	3
160	36.8	10.2	65	0.8	3
200	31.3	10.4	64	0.4	2
250	26.9	10.1	65	0.8	3
315	26.0	9.9	64	0.3	2
400	21.2	8.8	66	0.3	5
500	22.0	8.1	65	0.4	5
630	23.6	7.8	62	0.2	3
800	23.6	7.4	61	0.2	3
1000	24.0	7.7	56	0.3	0
1250	22.4	7.6	48	0.2	0
1600	18.4	7.9	43	0.3	0
2000	16.3	8.8	41	0.3	0
2500	14.8	9.9	35	0.2	0
3150	16.2	10.9	29	0.3	0
4000	16.0	12.5	22	0.3	-
5000	15.8	14.7	15	0.2	-
6300	14.0	18.7	12	0.3	-
8000	14.4	24.6	11	0.2	-
10000	12.2	24.6	9	0.4	-
IIC Rating	**50**	*(Impact Insulation Class)*		**Sum of Deficiencies**	**32**

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

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TEST REPORT FOR CLARKDIETRICH BUILDING SYSTEMS, LLC

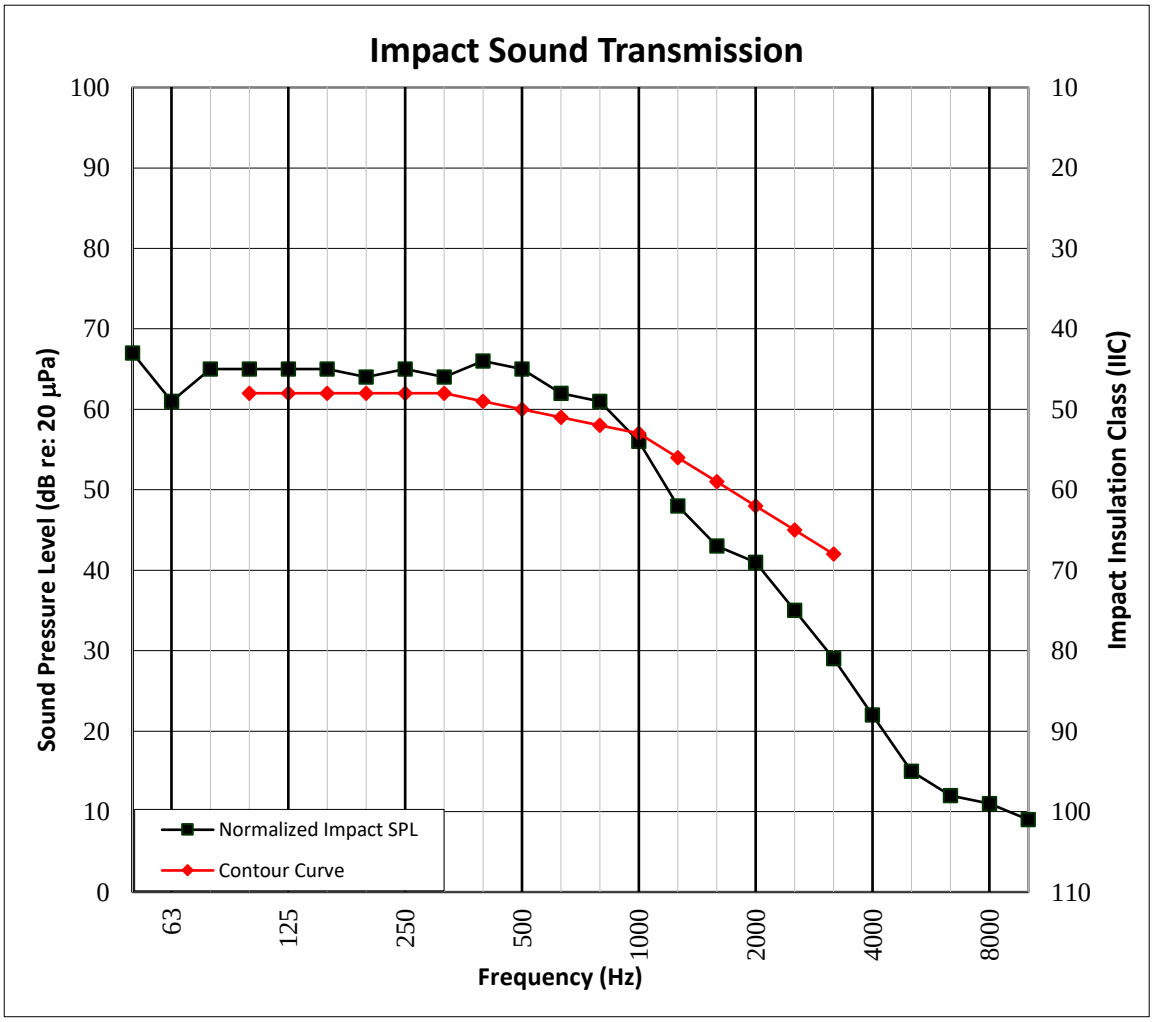
Report No.: J4775.06-113-11-R1
Date: 05/20/19

SECTION 13

TEST RESULTS - IMPACT SOUND TRANSMISSION GRAPH

IAS ACCREDITED Testing Laboratory

TEST DATE	3/20/2019				
DATA FILE NO.	J4775.06				
CLIENT	ClarkDietrich Building Systems, LLC				
DESCRIPTION	8 mm (0.31") Daltile® Ceramic Tile, 0.8 mm (0.03") NobleSeal® CIS Sound Reduction Membrane, 25.4 mm (1") USG Levelrock® Brand CSD® Early Exposure™ Floor Underlayment, 6.4 mm (0.25") USG Levelrock® Brand SAM-N25™ Sound Attenuation Mat, 14.57 mm (0.57") 22-Gauge Corrugated Steel Floor Deck, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 254 mm (10") ClarkDietrich TradeReady® Steel Joist, 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.**	20.6°C (69°F)	**Minimum Temp.**	20.3°C (68.6°F)
TECHNICIAN	CRS	**Max. Humidity**	50%	**Min. Humidity**	48%



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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