

# Framework

an urban + rural ecology

## DELIVERABLE 19

### 19 - Acoustic Testing and Wood Supply

June 15, 2017

#### Report 19 Deliverables:

- A. Shop Drawings and Details for Tests
- B. Sound and Impact Test Results Summary
- C. Test 1: Sound and Impact Transmission Test - CLT
- D. Test 2: Sound and Impact Transmission Test - Concrete Topping
- E. Test 3a: Sound and Impact Transmission Test - Marmoleum
- F. Test 3b: Sound and Impact Transmission Test - Marmoleum
- G. Test 4: Sound and Impact Transmission Test - Carpet
- H. Test 5a: Sound and Impact Transmission Test - Luxury Vinyl Plank
- I. Test 5b: Sound and Impact Transmission Test - Luxury Vinyl Plank
- J. Test 6: Sound and Impact Transmission Test - Mechanical Roof

Produced by: ARUP, StructureCraft, InterTek

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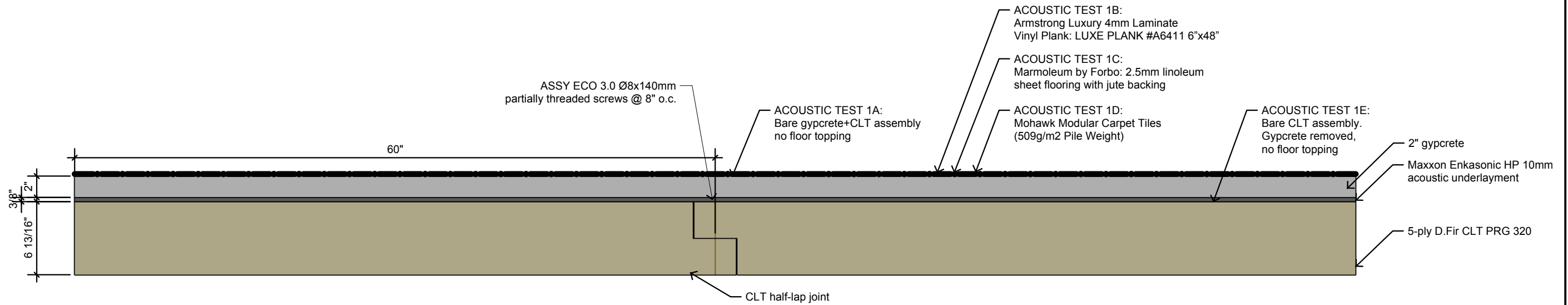
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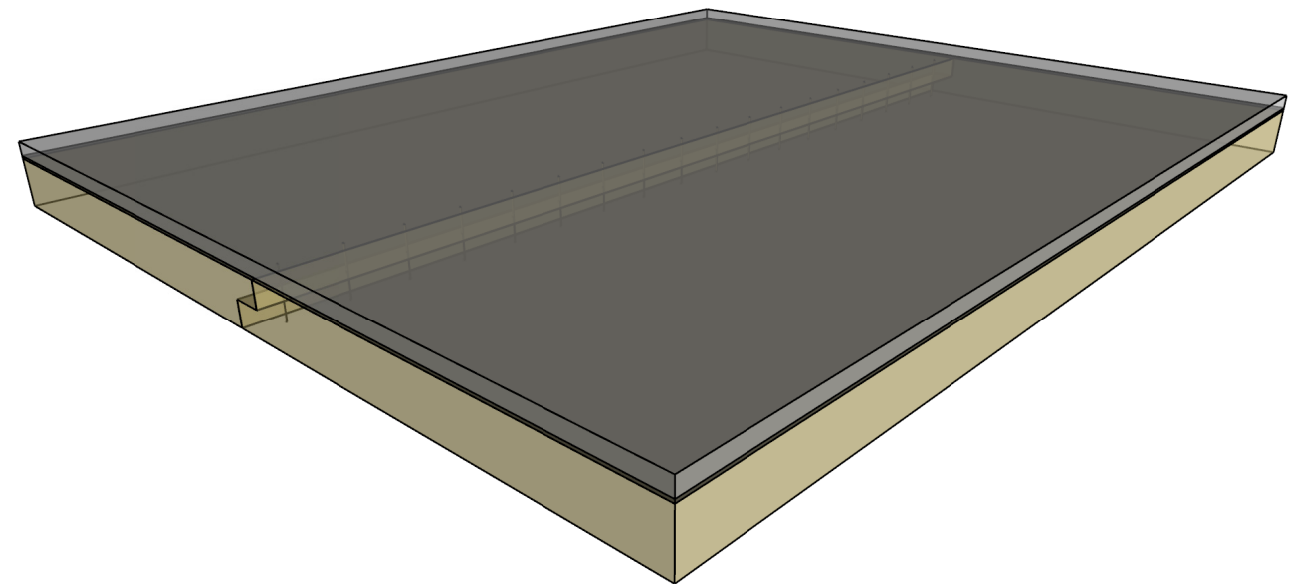
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**REPORT DELIVERABLE 19-A:**  
**Shop Drawings and Details for Tests**





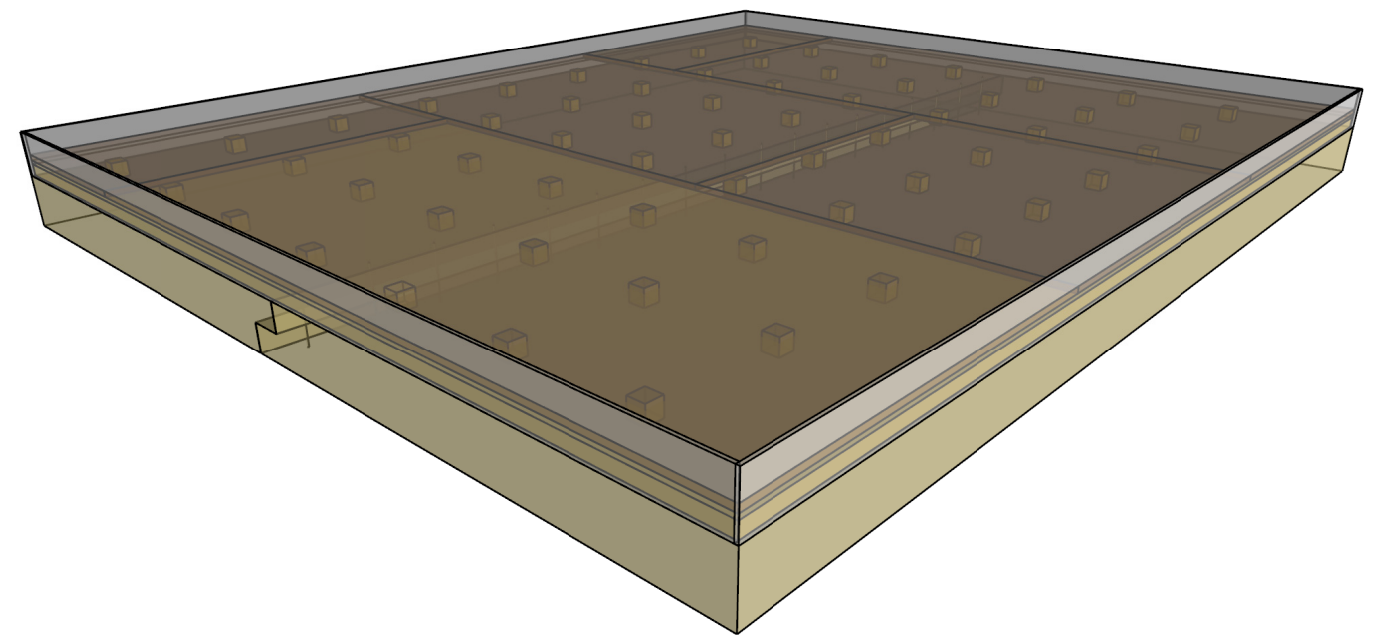
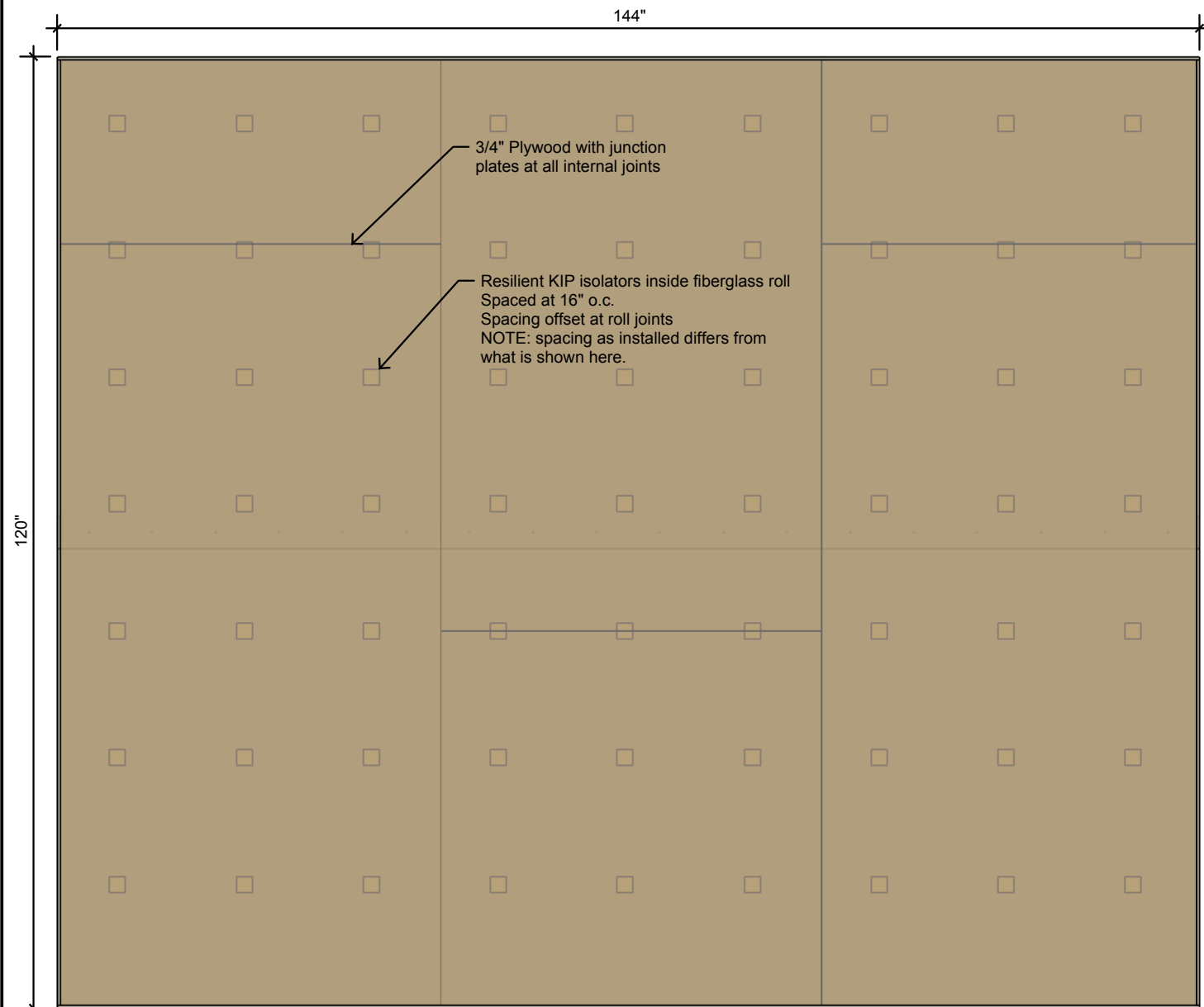
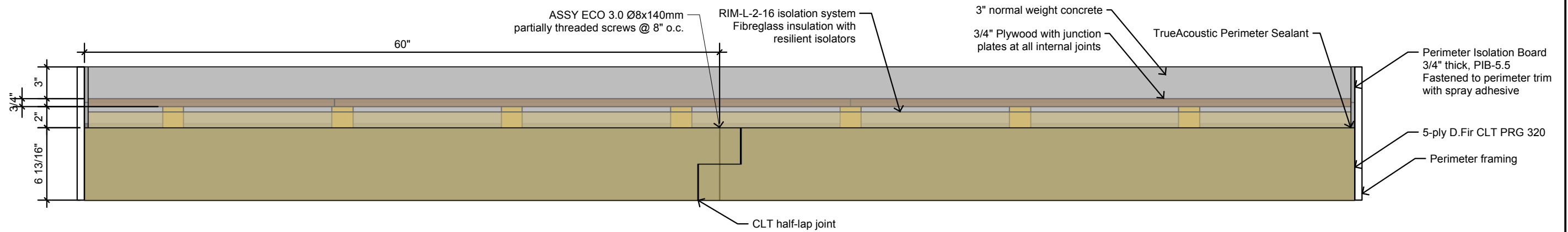
**PLAN VIEW**



**SIDE VIEW**

All dimensions are in millimeters unless noted otherwise.	
NOTES: Unless noted otherwise, welds shall be 1/4" fillet welds.	
DESIGN REF:	
DRAWING REF:	
DRAWN: LE	DATE: 2016-05-27
CHECKED:	DATE:



0		2016-10-28		IFC	
Rev. No.		Date (Y-M-D)		Description	
		StructureCraft			
8279 River Way Delta, BC Canada V4G 1G9		T 604.940.8889 F 604.940.8857			
Copyright reserved. This drawing and design is, and at all times remains, the exclusive property of StructureCraft and cannot be used or reproduced without their written consent.					
S283 Framework				Mark No. TST-A1	
ACOUSTIC TEST 1A Floor Buildups				Revision: 	
CLIENT: Walsh Construction		ARCHITECT: LEVER Architecture			



**SIDE VIEW**

**PLAN VIEW**

All dimensions are in millimeters unless noted otherwise.	
NOTES: Unless noted otherwise, welds shall be 1/4" fillet welds.	
DESIGN REF:	
DRAWING REF:	
DRAWN: LE	DATE: 2016-05-27
CHECKED:	DATE:

0	2016-10-28	IFC		
Rev. No.	Date (Y-M-D)	Description		
		StructureCraft		
8279 River Way Delta, BC Canada V4G 1G9		T 604.940.8889 F 604.940.8857		
Copyright reserved. This drawing and design is, and at all times remains, the exclusive property of StructureCraft and cannot be used or reproduced without their written consent.				
S283 Framework			Mark No. TST-A2	
ACOUSTIC TEST 1B Roof Buildup			Revision: 	
CLIENT: Walsh Construction		ARCHITECT: LEVER Architecture		

**REPORT DELIVERABLE 19-B:**  
**Sound and Impact Test Results Summary**

Sound and Impact Transmission Test Results (50 needed)					
TEST	DESCRIPTION	DETAILS	SOUND (STC)	IMPACT (IIC)	REPORT
1	- CLT	175mm 5-ply CLT panel	Did not pass. (41)*	Did not pass. (27)*	06
2	- Concrete Topping	2" Maxxon Gypsum with Mat on CLT	<b>Passed.</b> (52)*	Did not pass. (38)*	01
3a	- Marmoleum	2" Maxxon Gypsum with Mat topped with Forbo Sheet Vinyl	<b>Passed.</b> (51)	Did not pass. (48)	02
3b	- Marmoleum	2" Maxxon Gypsum with Mat topped with Forbo Sheet Vinyl on Armstrong QuietComfort Underlayment	<b>Passed.</b> (51)	<b>Passed.</b> (53)	07
4	- Carpet	2" Maxxon Gypsum with Mat topped with Mohawk Carpet	<b>Passed.</b> (50)	<b>Passed.</b> (66)	03
5a	- Luxury Vinyl Plank	2" Maxxon Gypsum with Mat topped with Armstrong 4mm LVT	<b>Passed.</b> (52)	Did not pass. (44)	04
5b	- Luxury Vinyl Plank	2" Maxxon Gypsum with Mat topped NC LVT I-Set on Armstrong QuietComfort Underlayment	<b>Passed.</b> (52)	<b>Passed.</b> (51)	08
6	- Mechanical Roof	3" concrete with Kinetics RIM roll-out isolation mat on CLT	(58)**	(55)**	05

\* Note: This condition will not be present in the building.

\*\* Note: The mechanical roof partition is between a mechanical space and a dwelling unit, it is not subject to the IBC requirements. In order to inform the sound isolation requirements of the mechanical roof, Arup utilized noise data for the specified mechanical equipment and determined the necessary acoustic transmission loss required to meet the background noise criteria for the apartment as specified in the Arup SD report (dated 2015-12-02). Because mechanical equipment is generally considerably noisier than household activity, a STC target above the IBC standard was necessary. The target criteria for the mechanical roof slab, per Arup's TN10, was STC 62. Due to a construction error, the assembly as tested was not equivalent to the assembly as designed and the acoustic isolation of the mechanical roof was compromised. We expect that the assembly as designed will perform better than the tested assembly, but cannot specifically determine its performance without re-testing a properly constructed assembly.

**REPORT DELIVERABLE 19-C:**  
**Test 1: Sound and Impact Transmission Test - CLT**





**G2463.06-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**THE FRAMEWORK PROJECT, LLC**

**Series/Model: CLT5 Panel DF PRG 320 Cross Laminated Timber**

**Specimen Type: Cross Laminated Timber - 175 mm**

**Overall Size: 3023 mm by 3632 mm**

<b>STC</b>	<b>41</b>
<b>IIC</b>	<b>27</b>

**Test Specimen Identification:**

Floor Slab: 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber

Reference should be made to Intertek-ATI Report G2463.06-113-11 for complete test specimen description. This page alone is not a complete report.



## Acoustical Performance Test Report

THE FRAMEWORK PROJECT, LLC  
116 NW 17th Avenue  
Portland, Oregon 97209

**Report** G2463.06-113-11  
**Test Date** 11/02/16  
**Report Date** 11/29/16

### Project Scope

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The full test specimen was assembled on the day of testing by Intertek-ATI. All materials provided by the client were installed on an existing Intertek-ATI assembly (Cross Laminated Timber - 175 mm) utilizing Intertek-ATI-supplied

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09(2016)e1, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the VT test chambers at Intertek-ATI located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 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.

**Test Procedure (Continued)**

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

**Test Conditions**

Source Room		Receive Room	
Average Temperature	20.9°C	Average Temperature	20.2°C
Average Relative Humidity	70%	Average Relative Humidity	49%

**Test Calculations**

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

**Test Specimen Materials and Installation Details**

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Cross Laminated Timber	3023 by 3632	175.0	CLT5 Panel DF PRG 320	10.98 m <sup>2</sup>	113.19 kg/m <sup>2</sup>
	<i>Note: Two equal size pieces fastened together as per attached drawing. Installed in a test frame flush to the source room.</i>				

**Comments**

The total weight of the floor/ceiling assembly was 1242.8 kg. Intertek-ATI will store samples of the test specimen for four years. A photograph of the test specimen is included in the attachments. A drawing of the test specimen is included in the attachments.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

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FOR INTERTEK-ATI:

  
Digitally Signed by: Daniel Mohler

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Daniel B. Mohler  
Project Lead - Acoustical Testing

  
Digitally Signed by: Jordan Strybos

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Jordan Strybos  
Project Manager - Acoustical Testing

Attachments (7 pages): This report is complete only when all attachments listed are included.

- Instrumentation (1)
- Airborne Sound Transmission Loss Data (2)
- Impact Sound Transmission Data (2)
- Photographs (1)
- Drawings (1)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*



### Revision Log

<b><u>Revision</u></b>	<b><u>Date</u></b>	<b><u>Page(s)</u></b>	<b><u>Description</u></b>
R0	11/29/16	N/A	Original Report Issue

## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	65124	06/16 *
Microphone Calibrator	Norsonic	1251	INT00127	01/16
Receive Room Microphone	PCB Piezotronics	378B20	63748	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63744	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63745	06/16
Receive Room Microphone	PCB Piezotronics	378C20	65617	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63747	06/16
Receive Room Environmental Indicator	Comet	T7510	63810	10/16
			63811	10/16
Source Room Microphone	PCB Piezotronics	378B20	63738	05/16
Source Room Microphone	PCB Piezotronics	378B20	63739	05/16
Source Room Microphone	PCB Piezotronics	378B20	63740	05/16
Source Room Microphone	PCB Piezotronics	378B20	63742	05/16
Source Room Microphone	Scantek	378B20	63741	05/16
Source Room Environmental Indicator	Comet	T7510	63812	11/15
Tapping Machine	Look Line s.r.l.	EM50 (TM50)	65351	02/16

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

### Test Chambers

VT Receive Room Volume	158.6 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>

# AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/02/16
Data File No.	G2463.06
Client	The Framework Project, LLC
Description	175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

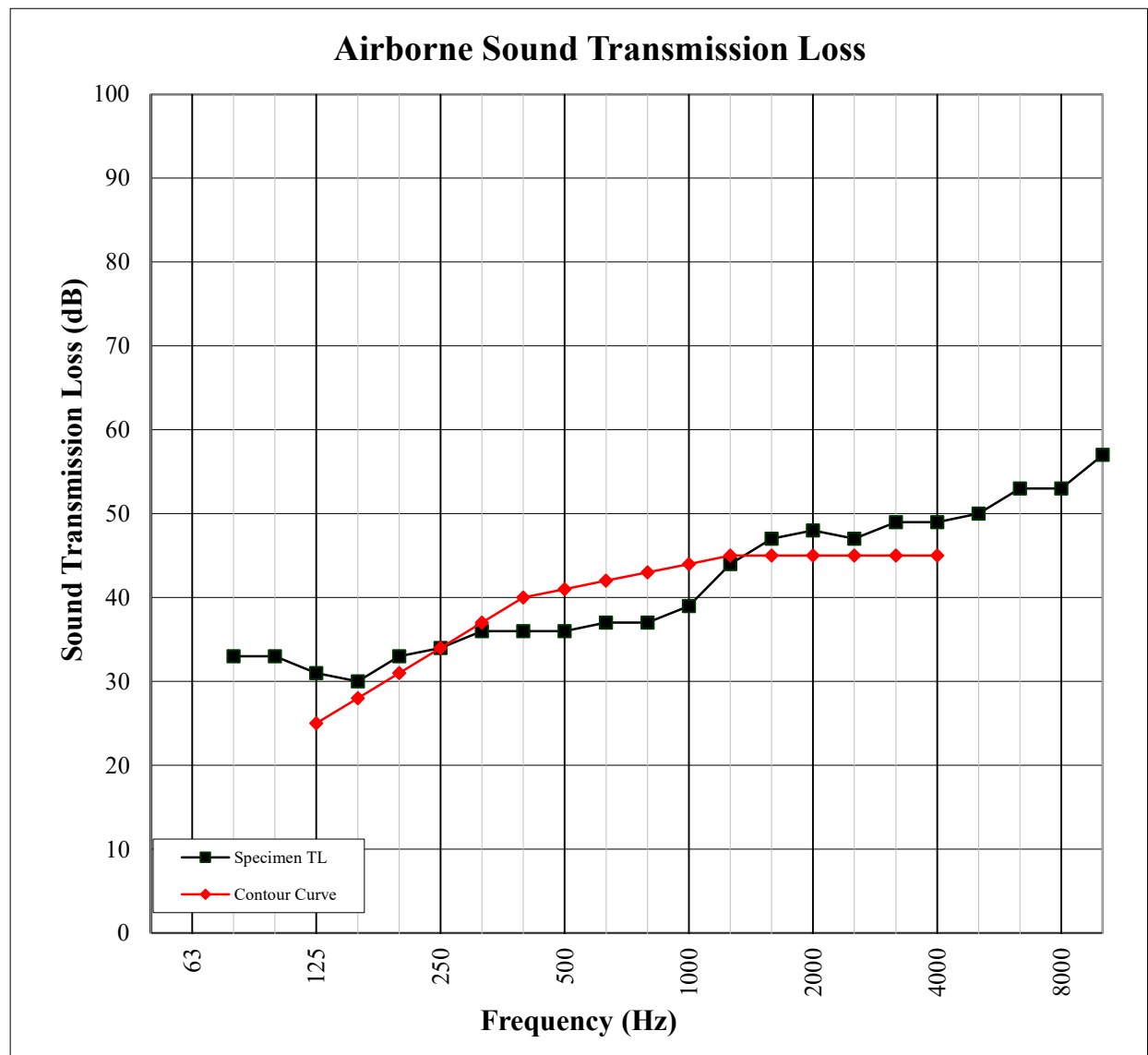
Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	41.3	17.6	118	83	33	2.50	-
100	29.7	13.3	108	75	33	2.00	-
125	32.7	11.2	103	72	31	2.30	0
160	28.2	10.6	104	74	30	1.60	0
200	25.7	10.5	103	71	33	1.60	0
250	27.3	10.7	102	68	34	0.90	0
315	23.7	9.8	105	69	36	0.60	1
400	22.2	8.4	102	68	36	0.60	4
500	24.7	7.9	102	67	36	0.50	5
630	21.4	7.6	102	66	37	0.60	5
800	21.8	7.7	102	67	37	0.90	6
1000	17.0	7.9	102	64	39	0.40	5
1250	14.3	7.8	100	58	44	0.60	1
1600	11.8	7.5	100	55	47	0.40	0
2000	7.6	8.4	100	53	48	0.40	0
2500	5.5	9.3	96	50	47	0.40	0
3150	4.8	10.0	98	50	49	0.50	0
4000	5.2	11.3	98	49	49	0.50	0
5000	5.8	12.8	96	45	50	0.60	-
6300	6.2	15.9	93	39	53	0.80	-
8000	6.5	20.7	94	38	53	0.90	-
10000	6.8	25.1	92	32	57	1.10	-

STC Rating      **41**      *(Sound Transmission Class)*  
Deficiencies      27      *(Sum of Deficiencies)*

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

# **AIRBORNE SOUND TRANSMISSION LOSS** ASTM E 90

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.06
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler







G2463.06-113-11-R0



# IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/02/16
Data File No.	G2463.06
Client	The Framework Project, LLC
Description	175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Normalized Impact SPL (dB)	95% Confidence Limit	Number of Deficiencies
80	42.3	16.0	67	3.9	-
100	29.0	14.3	68	2.9	0
125	31.4	11.1	71	2.6	0
160	28.9	10.3	74	1.9	0
200	23.9	11.0	75	0.6	0
250	27.2	10.9	78	0.8	0
315	23.3	9.7	81	0.5	0
400	21.3	8.5	82	0.7	0
500	24.5	7.8	84	0.8	1
630	22.0	7.7	84	0.1	2
800	22.2	7.8	87	0.1	6
1000	18.0	7.9	86	0.5	6
1250	15.0	7.7	83	0.5	6
1600	13.1	7.5	80	0.4	6
2000	8.7	8.4	76	0.4	5
2500	5.5	9.3	68	0.4	0
3150	4.8	10.0	61	0.7	0
4000	5.2	11.3	59	1.3	-
5000	5.7	12.8	56	1.3	-
6300	6.1	15.8	51	1.8	-
8000	6.5	20.6	47	1.9	-
10000	6.8	25.0	44	2.7	-

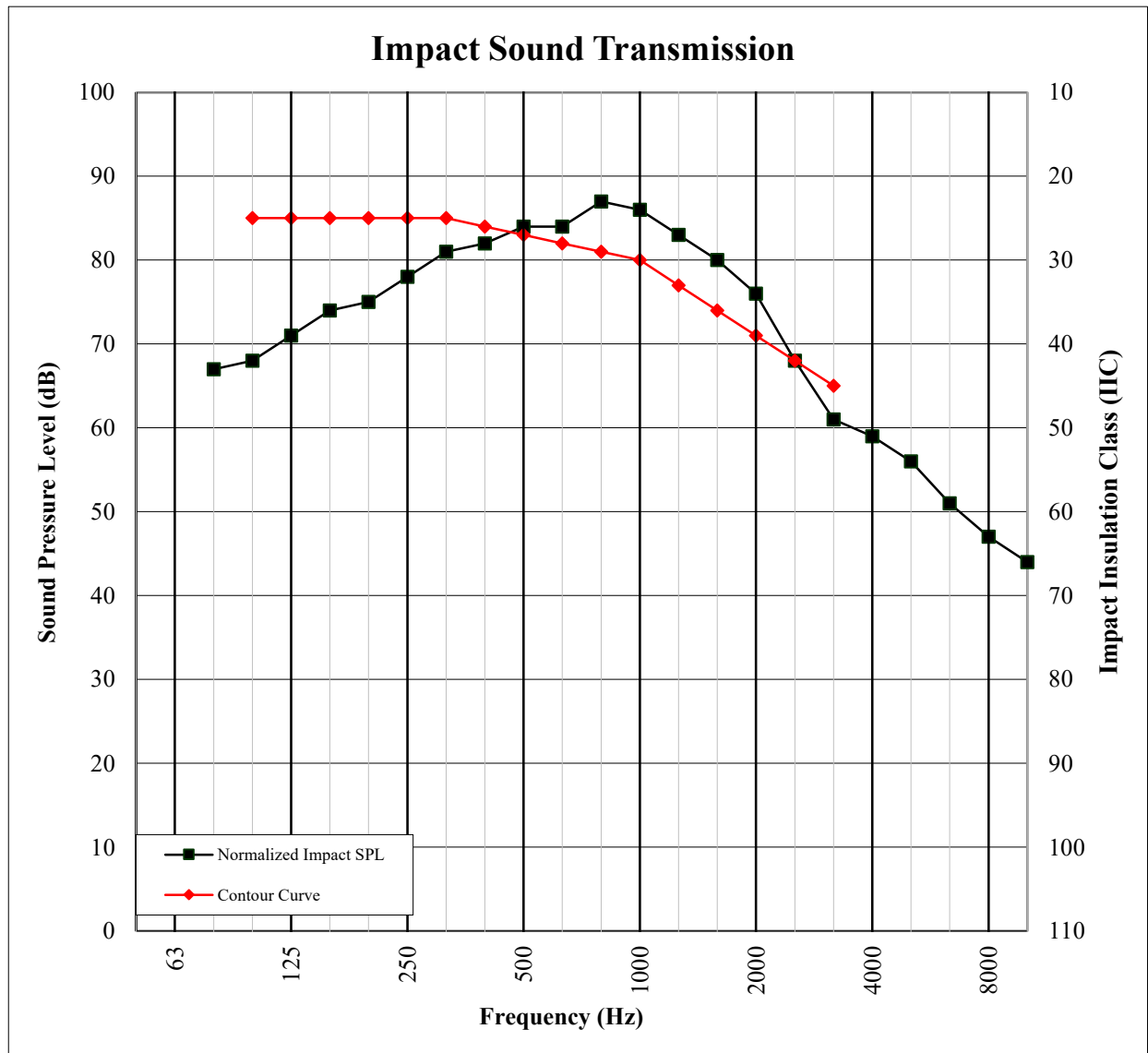
**IIC Rating**      **27**      *(Impact Insulation Class)*  
**Deficiencies**      **32**      *(Sum of Deficiencies)*

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

## IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/02/16
Data File No.	G2463.06
Client	The Framework Project, LLC
Description	175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

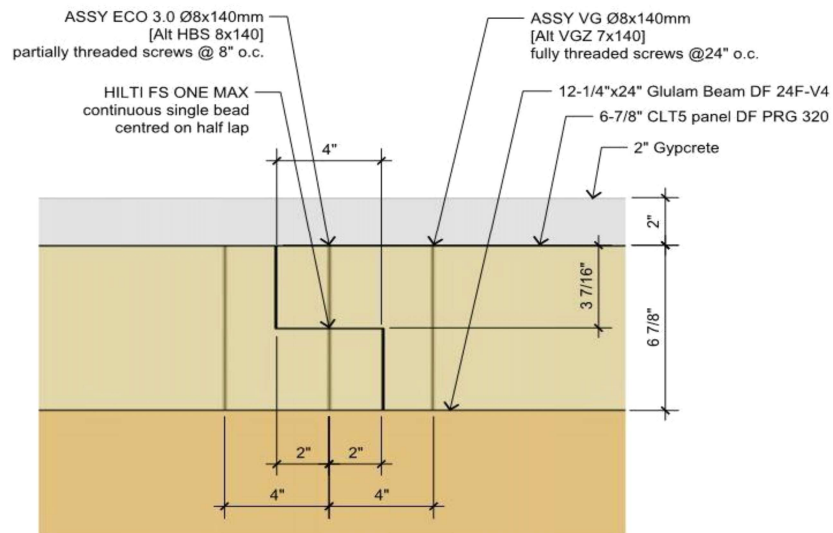


**Photograph**



**Construction of Test Specimen**

**Drawing**



**B: HALF LAP**

**CLT Half Lap Fastening Detail**

REPORT DELIVERABLE 19-D:  
Test 2: Sound and Impact Transmission Test -  
Concrete Topping



**G2463.01-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**THE FRAMEWORK PROJECT, LLC**

**Series/Model: Maxxon Corporation Gyp-Crete® Gypsum Concrete over Maxxon Corporation Maxxon Corporation Enkasonic HP Sound Control Mat**

**Specimen Type: Cross Laminated Timber - 175 mm**

**Overall Size: 3023 mm by 3632 mm**

<b>STC</b>	<b>52</b>
<b>IIC</b>	<b>38</b>

**Test Specimen Identification:**

Subfloor Topping: 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete

Subfloor Underlayment: 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat

Floor Slab: 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber

Reference should be made to Intertek-ATI Report G2463.01-113-11 for complete test specimen description. This page alone is not a complete report.



## Acoustical Performance Test Report

THE FRAMEWORK PROJECT, LLC  
116 NW 17th Avenue  
Portland, Oregon 97209

**Report** G2463.01-113-11  
**Test Date** 11/02/16  
**Report Date** 12/01/16

### Project Scope

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The full test specimen was assembled on the day of testing by Intertek-ATI. All materials provided by the client were installed on an existing Intertek-ATI assembly (Cross Laminated Timber - 175 mm) utilizing Intertek-ATI-supplied

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09(2016)e1, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the VT test chambers at Intertek-ATI located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 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.

### Test Procedure (Continued)

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

### Test Conditions

Source Room		Receive Room	
Average Temperature	19.8°C	Average Temperature	20.2°C
Average Relative Humidity	50%	Average Relative Humidity	49%

### Test Calculations

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

### Test Specimen Materials and Installation Details

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Gypsum Concrete	3023 by 3632	50.8	Maxxon Corporation Gyp-Crete®	10.98 m <sup>2</sup>	94.42 kg/m <sup>2</sup>
	<i>Note: Poured directly on top of the sound control mat, cured a minimum of 14 days.</i>				
Sound Control Mat	3023 by 3632	11.0	Maxxon Corporation Enkasonic HP	10.98 m <sup>2</sup>	0.88 kg/m <sup>2</sup>
	<i>Note: Loose laid with seams taped and perimeter isolated with foam</i>				
Cross Laminated Timber	3023 by 3632	175.0	CLT5 Panel DF PRG 320	10.98 m <sup>2</sup>	113.19 kg/m <sup>2</sup>
	<i>Note: Two equal size pieces fastened together as per attached drawing. Installed in a test frame flush to the source room.</i>				



## Comments

The total weight of the floor/ceiling assembly was 2289.2 kg. Intertek-ATI will store samples of the test specimen for four years. A photograph of the test specimen is included in the attachments. A drawing of the test specimen is included in the attachments.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

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FOR INTERTEK-ATI:

  
Digitally Signed by: Daniel Mohler

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Daniel B. Mohler  
Project Lead - Acoustical Testing

  
Digitally Signed by: Jordan Strybos

---

Jordan Strybos  
Project Manager - Acoustical Testing

Attachments (7 pages): This report is complete only when all attachments listed are included.

- Instrumentation (1)
- Airborne Sound Transmission Loss Data (2)
- Impact Sound Transmission Data (2)
- Photographs (1)
- Drawings (1)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*



### Revision Log

<u>Revision</u>	<u>Date</u>	<u>Page(s)</u>	<u>Description</u>
R0	12/01/16	N/A	Original Report Issue

## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	65124	06/16 *
Microphone Calibrator	Norsonic	1251	INT00127	01/16
Receive Room Microphone	PCB Piezotronics	378B20	63748	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63744	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63745	06/16
Receive Room Microphone	PCB Piezotronics	378C20	65617	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63747	06/16
Receive Room Environmental Indicator	Comet	T7510	63810	10/16
			63811	10/16
Source Room Microphone	PCB Piezotronics	378B20	63738	05/16
Source Room Microphone	PCB Piezotronics	378B20	63739	05/16
Source Room Microphone	PCB Piezotronics	378B20	63740	05/16
Source Room Microphone	PCB Piezotronics	378B20	63742	05/16
Source Room Microphone	Scantek	378B20	63741	05/16
Source Room Environmental Indicator	Comet	T7510	63812	11/15
Tapping Machine	Look Line s.r.l.	EM50 (TM50)	65351	02/16

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

### Test Chambers

VT Receive Room Volume	158.22 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>



G2463.01-113-11-R0



# AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/02/16
Data File No.	G2463.01
Client	The Framework Project, LLC
Description	50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

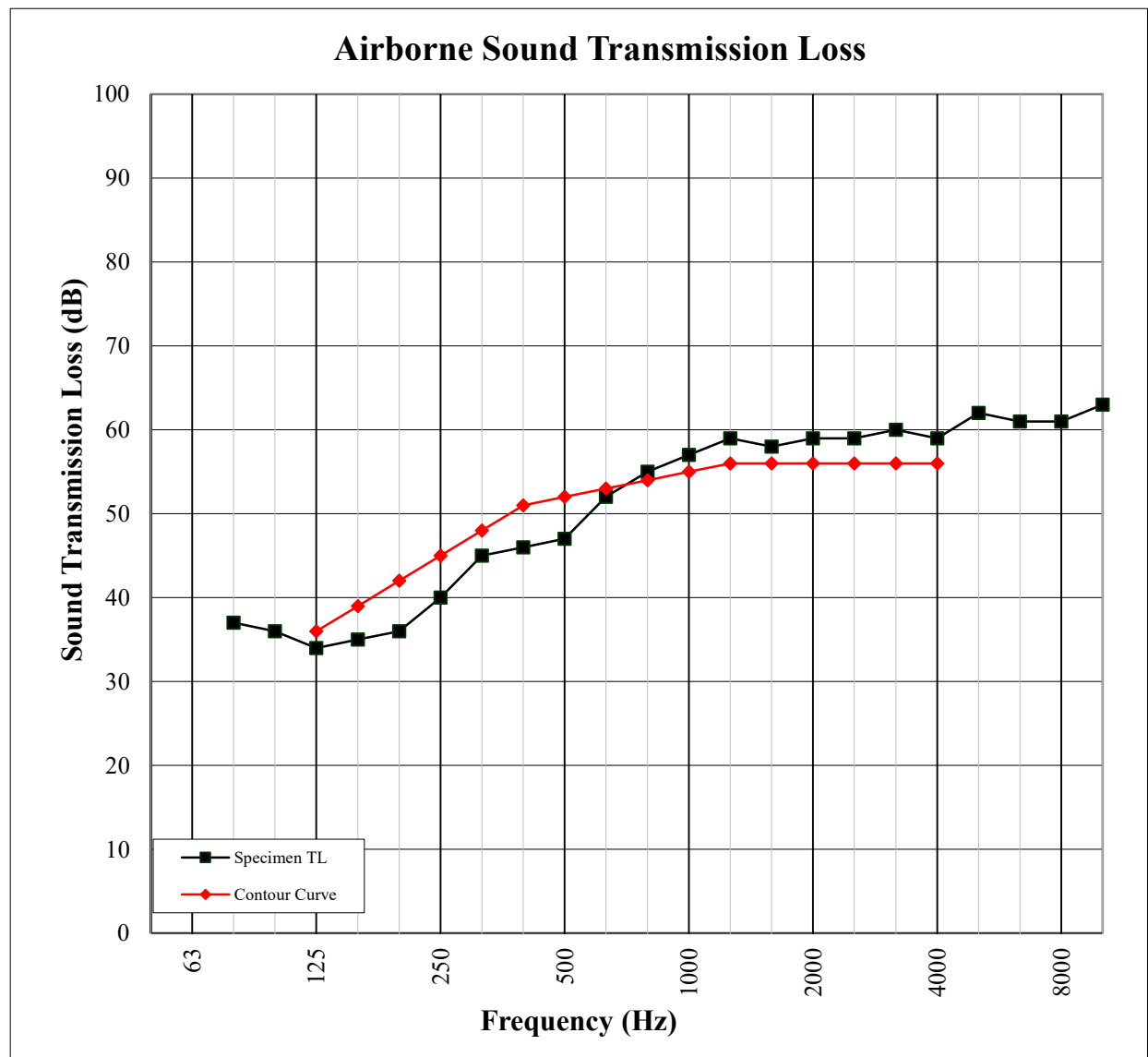
Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	40.6	17.6	118	80	37	3.80	-
100	34.6	12.0	108	72	36	1.80	-
125	33.6	10.3	103	71	34	2.10	2
160	28.0	9.9	105	70	35	1.10	4
200	23.5	11.0	104	68	36	1.90	6
250	25.0	10.3	102	62	40	1.20	5
315	22.8	10.3	105	61	45	0.70	3
400	19.5	8.4	103	58	46	0.50	5
500	25.1	7.5	102	56	47	0.50	5
630	22.2	7.6	102	52	52	0.40	1
800	22.3	7.7	102	50	55	0.60	0
1000	19.5	7.7	102	46	57	0.30	0
1250	17.4	7.6	100	43	59	0.60	0
1600	14.2	7.8	101	45	58	0.40	0
2000	9.3	8.6	100	43	59	0.40	0
2500	6.9	9.7	96	39	59	0.60	0
3150	5.8	10.5	98	38	60	0.70	0
4000	5.7	12.3	98	39	59	0.60	0
5000	6.2	14.6	96	33	62	0.60	-
6300	6.6	17.8	93	30	61	0.70	-
8000	7.0	23.7	93	30	61	1.10	-
10000	7.3	29.7	91	26	63	1.40	-

**STC Rating**      **52**      *(Sound Transmission Class)*  
**Deficiencies**      **31**      *(Sum of Deficiencies)*

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

# **AIRBORNE SOUND TRANSMISSION LOSS** ASTM E 90

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.01
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler





G2463.01-113-11-R0



# IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/02/16
Data File No.	G2463.01
Client	The Framework Project, LLC
Description	50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Normalized Impact SPL (dB)	95% Confidence Limit	Number of Deficiencies
80	40.9	17.2	59	3.8	-
100	34.9	12.5	64	2.2	0
125	36.5	10.1	70	2.2	0
160	33.7	10.3	71	2.0	0
200	29.2	10.7	73	2.0	0
250	27.9	10.3	71	1.9	0
315	25.8	10.3	71	1.3	0
400	22.6	8.2	70	0.9	0
500	25.8	7.8	69	0.5	0
630	24.3	7.5	69	0.3	0
800	24.4	7.7	69	0.5	0
1000	20.2	7.7	67	0.3	0
1250	19.7	7.6	66	0.4	0
1600	16.7	7.9	65	0.3	2
2000	11.1	8.7	63	0.5	3
2500	7.7	9.7	63	0.4	6
3150	7.7	10.5	62	0.4	8
4000	8.0	12.2	58	0.8	-
5000	7.3	14.3	55	0.5	-
6300	7.7	18.1	47	0.8	-
8000	8.3	23.6	37	1.1	-
10000	7.9	29.6	25	1.1	-

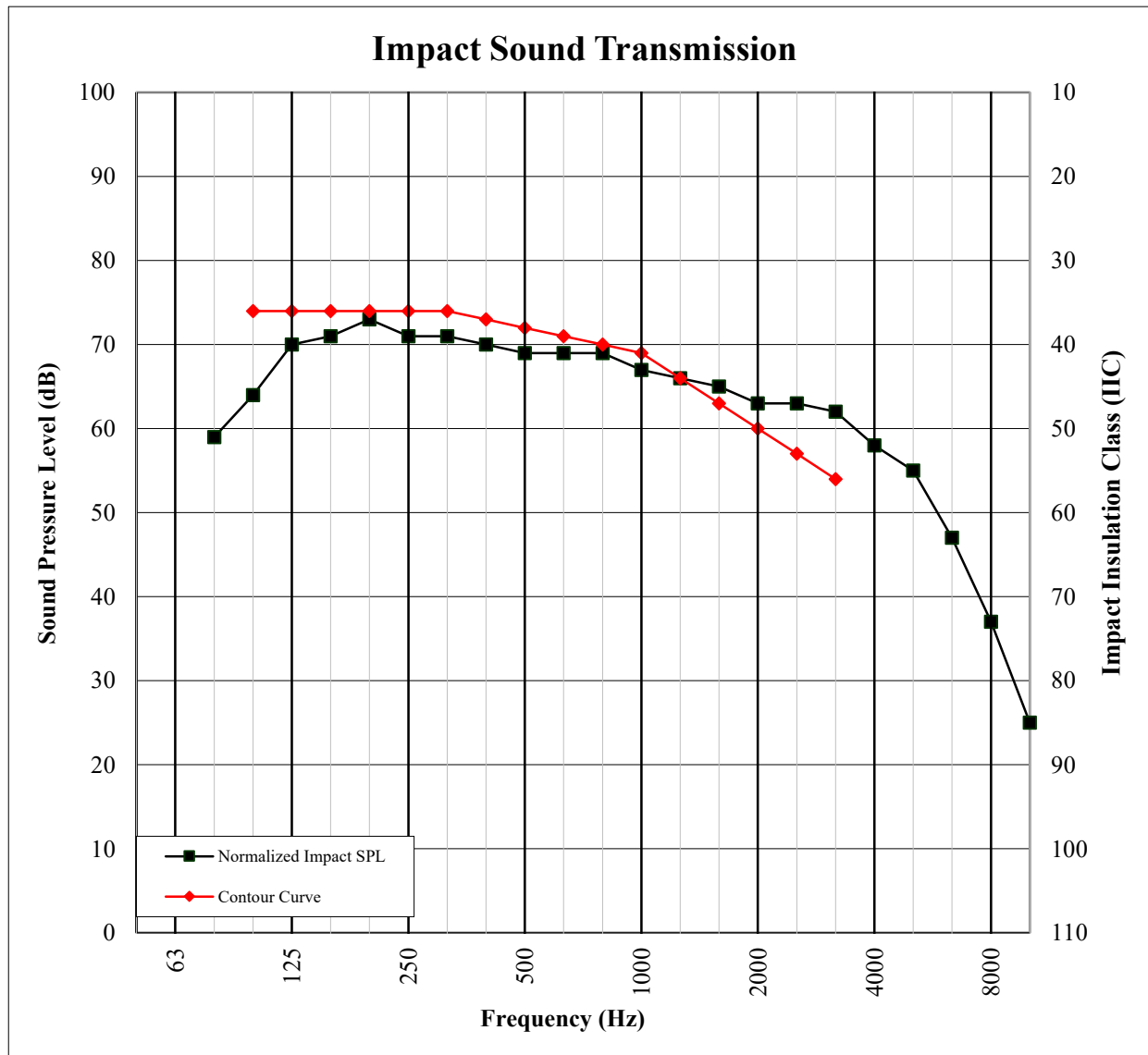
**IIC Rating**      **38**      *(Impact Insulation Class)*  
**Deficiencies**      **19**      *(Sum of Deficiencies)*

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

## IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/02/16
Data File No.	G2463.01
Client	The Framework Project, LLC
Description	50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler



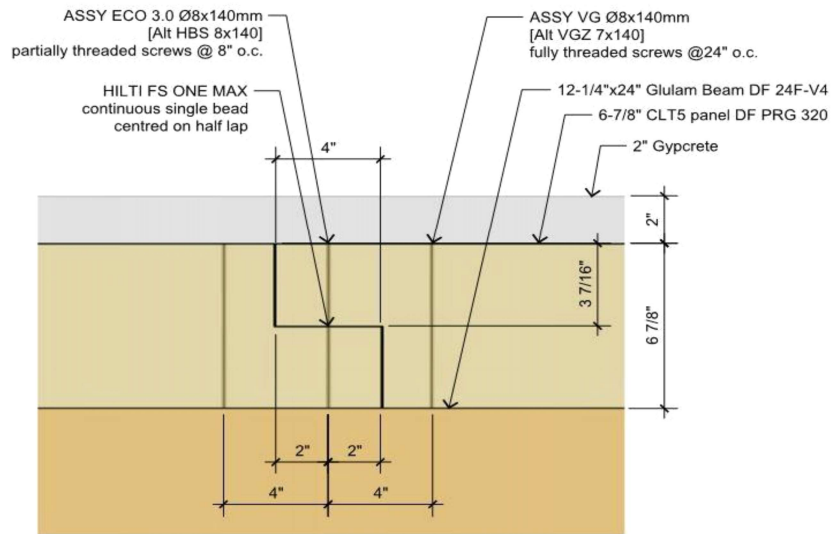
**Photograph**



**Cross Section View of Test Specimen**



**Drawing**



**B: HALF LAP**

**CLT Half Lap Fastening Detail**

REPORT DELIVERABLE 19-E:  
Test 3a: Sound and Impact Transmission Test -  
Marmoleum



**G2463.02-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**THE FRAMEWORK PROJECT, LLC**

**Series/Model: Maxxon Corporation Gyp-Crete® Gypsum Concrete over Maxxon Corporation Enkasonic HP Sound Control Mat - Forbo Marmoleum Decibel**

**Specimen Type: Cross Laminated Timber - 175 mm**

**Overall Size: 3023 mm by 3632 mm**

<b>STC</b>	<b>51</b>
<b>IIC</b>	<b>48</b>

**Test Specimen Identification:**

Floor Topping: 3.5 mm Forbo Marmoleum Decibel Sheet Vinyl

Subfloor Topping: 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete

Subfloor Underlayment: 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat

Floor Slab: 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber

Reference should be made to Intertek-ATI Report G2463.02-113-11 for complete test specimen description. This page alone is not a complete report.



## Acoustical Performance Test Report

THE FRAMEWORK PROJECT, LLC  
116 NW 17th Avenue  
Portland, Oregon 97209

**Report** G2463.02-113-11  
**Test Date** 11/02/16  
**Report Date** 12/01/16

### Project Scope

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The full test specimen was assembled on the day of testing by Intertek-ATI. All materials provided by the client were installed on an existing Intertek-ATI assembly (Cross Laminated Timber - 175 mm) utilizing Intertek-ATI-supplied

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09(2016)e1, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the VT test chambers at Intertek-ATI located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 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.

### Test Procedure (Continued)

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

### Test Conditions

Source Room		Receive Room	
Average Temperature	19.7°C	Average Temperature	20.2°C
Average Relative Humidity	49%	Average Relative Humidity	49%

### Test Calculations

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

### Test Specimen Materials and Installation Details

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Sheet Vinyl	3023 by 3632	3.5	Forbo Marmoleum Decibel	10.98 m <sup>2</sup>	3.03 kg/m <sup>2</sup>
	<i>Note: Installed per manufacturer's specifications</i>				
Gypsum Concrete	3023 by 3632	50.8	Maxxon Corporation Gyp-Crete®	10.98 m <sup>2</sup>	94.42 kg/m <sup>2</sup>
	<i>Note: Poured directly on top of the sound control mat, cured a minimum of 14 days.</i>				
Sound Control Mat	3023 by 3632	11.0	Maxxon Corporation Enkasonic HP	10.98 m <sup>2</sup>	0.88 kg/m <sup>2</sup>
	<i>Note: Loose laid with seams taped and perimeter isolated with foam</i>				
Cross Laminated Timber	3023 by 3632	175.0	CLT5 Panel DF PRG 320	10.98 m <sup>2</sup>	113.19 kg/m <sup>2</sup>
	<i>Note: Two equal size pieces fastened together as per attached drawing. Installed in a test frame flush to the source room.</i>				

### Comments

The total weight of the floor/ceiling assembly was 2322.5 kg. Intertek-ATI will store samples of the test specimen for four years. A photograph of the test specimen is included in the attachments. A drawing of the test specimen is included in the attachments.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

**This report may not be reproduced, except in full, without the written approval of Intertek-ATI.**

FOR INTERTEK-ATI:

  
Digitally Signed by: Daniel Mohler

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Daniel B. Mohler  
Project Lead - Acoustical Testing

  
Digitally Signed by: Jordan Strybos

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Jordan Strybos  
Project Manager - Acoustical Testing

Attachments (7 pages): This report is complete only when all attachments listed are included.

- Instrumentation (1)
- Airborne Sound Transmission Loss Data (2)
- Impact Sound Transmission Data (2)
- Photographs (1)
- Drawings (1)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*



### Revision Log

<b><u>Revision</u></b>	<b><u>Date</u></b>	<b><u>Page(s)</u></b>	<b><u>Description</u></b>
R0	12/01/16	N/A	Original Report Issue

## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	65124	06/16 *
Microphone Calibrator	Norsonic	1251	INT00127	01/16
Receive Room Microphone	PCB Piezotronics	378B20	63748	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63744	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63745	06/16
Receive Room Microphone	PCB Piezotronics	378C20	65617	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63747	06/16
Receive Room Environmental Indicator	Comet	T7510	63810	10/16
			63811	10/16
Source Room Microphone	PCB Piezotronics	378B20	63738	05/16
Source Room Microphone	PCB Piezotronics	378B20	63739	05/16
Source Room Microphone	PCB Piezotronics	378B20	63740	05/16
Source Room Microphone	PCB Piezotronics	378B20	63742	05/16
Source Room Microphone	Scantek	378B20	63741	05/16
Source Room Environmental Indicator	Comet	T7510	63812	11/15
Tapping Machine	Look Line s.r.l.	EM50 (TM50)	65351	02/16

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

### Test Chambers

VT Receive Room Volume	158.22 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>



# AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/02/16
Data File No.	G2463.02
Client	The Framework Project, LLC
Description	3.5 mm Forbo Marmoleum Decibel Sheet Vinyl, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

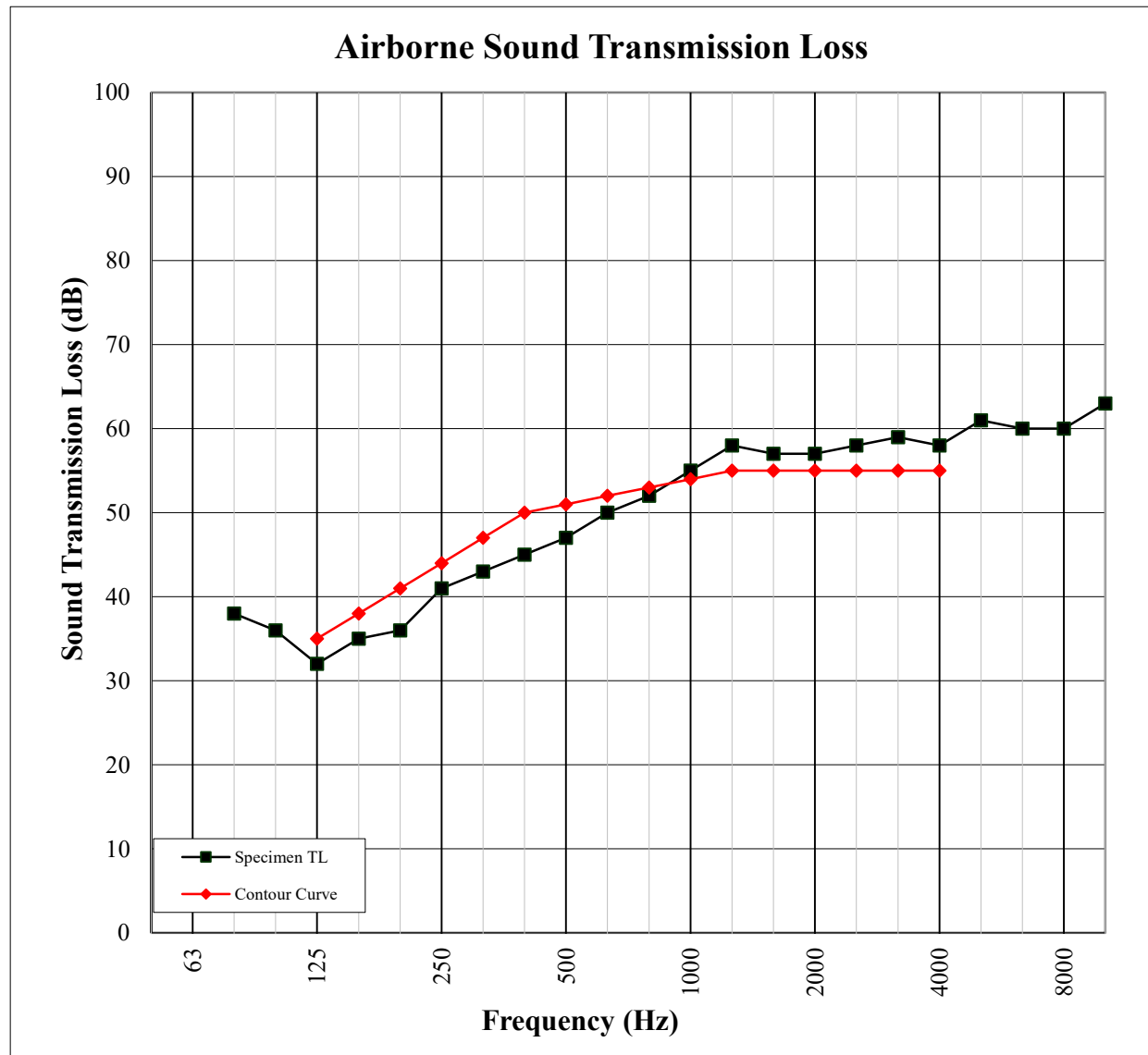
Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	39.6	15.6	119	80	38	3.50	-
100	34.3	13.0	108	73	36	1.70	-
125	33.0	10.7	103	72	32	2.40	3
160	29.1	10.0	105	70	35	1.50	3
200	25.2	10.8	104	68	36	1.60	5
250	25.8	10.1	103	63	41	1.10	3
315	24.9	10.6	105	63	43	0.90	4
400	21.7	8.4	103	59	45	0.30	5
500	27.0	7.7	102	57	47	0.60	4
630	23.5	7.6	102	54	50	0.50	2
800	21.7	7.7	102	52	52	0.50	1
1000	19.1	7.6	102	49	55	0.40	0
1250	17.6	7.6	100	45	58	0.40	0
1600	14.4	8.0	101	45	57	0.50	0
2000	9.5	8.7	100	44	57	0.20	0
2500	7.2	9.5	96	39	58	0.60	0
3150	6.5	10.6	98	39	59	0.70	0
4000	6.5	12.3	98	40	58	0.70	0
5000	6.8	14.4	96	34	61	0.70	-
6300	7.2	17.9	93	31	60	0.70	-
8000	7.5	24.0	93	30	60	1.00	-
10000	7.7	29.7	92	26	63	1.30	-

STC Rating      **51**      *(Sound Transmission Class)*  
Deficiencies      30      *(Sum of Deficiencies)*

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

# **AIRBORNE SOUND TRANSMISSION LOSS** ASTM E 90

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.02
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	3.5 mm Forbo Marmoleum Decibel Sheet Vinyl, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler



# IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/02/16
Data File No.	G2463.02
Client	The Framework Project, LLC
Description	3.5 mm Forbo Marmoleum Decibel Sheet Vinyl, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m²
Technician	Daniel B. Mohler

Freq (Hz)	Background SPL (dB)	Absorption (m²)	Normalized Impact SPL (dB)	95% Confidence Limit	Number of Deficiencies
80	40.1	17.2	60	4.6	-
100	36.8	11.5	65	2.8	1
125	34.1	9.9	70	2.6	6
160	29.8	10.2	70	1.7	6
200	29.1	11.1	71	2.2	7
250	26.9	10.9	69	2.0	5
315	25.8	10.5	68	1.3	4
400	23.1	8.7	64	1.1	1
500	27.1	7.7	60	0.6	0
630	24.3	7.7	54	0.4	0
800	22.4	7.7	49	0.4	0
1000	19.8	7.7	44	0.3	0
1250	18.2	7.5	36	0.4	0
1600	14.9	8.0	29	0.3	0
2000	9.5	8.9	23	0.3	0
2500	7.1	9.7	18	0.3	0
3150	6.3	10.6	13	0.7	0
4000	6.3	12.3	8	1.2	-
5000	6.6	14.5	7	1.4	-
6300	7.0	17.8	8	1.5	-
8000	7.4	24.2	9	1.6	-
10000	7.6	30.0	10	1.5	-

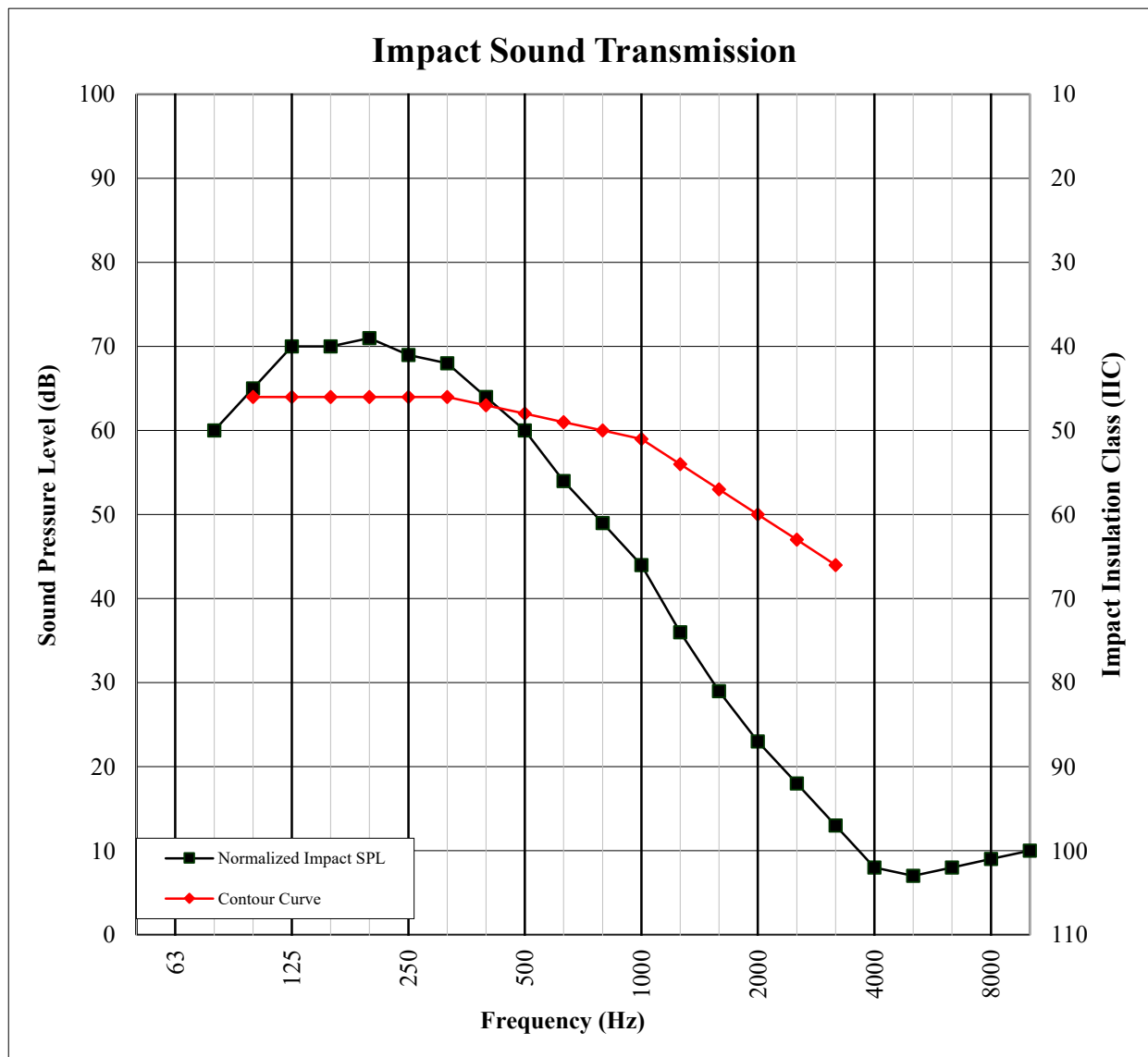
**IIC Rating**      **48**      *(Impact Insulation Class)*  
**Deficiencies**      **30**      *(Sum of Deficiencies)*

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

## IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/02/16
Data File No.	G2463.02
Client	The Framework Project, LLC
Description	3.5 mm Forbo Marmoleum Decibel Sheet Vinyl, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

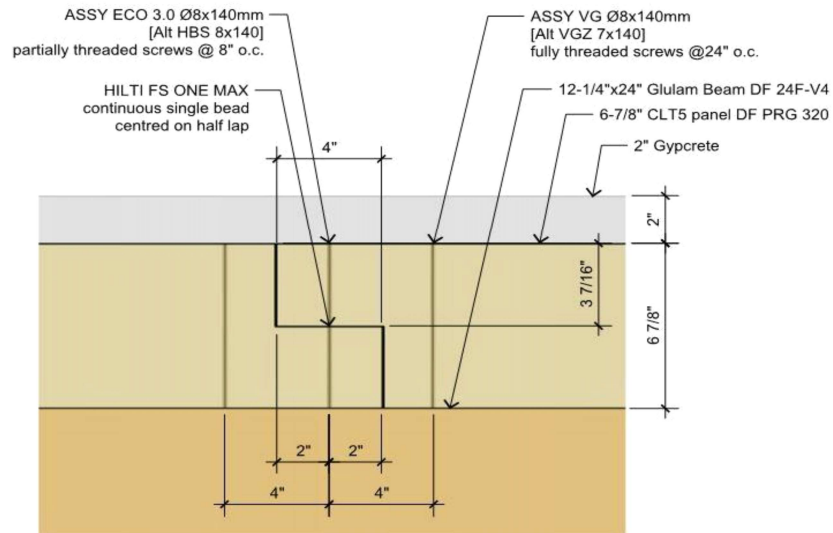


**Photograph**



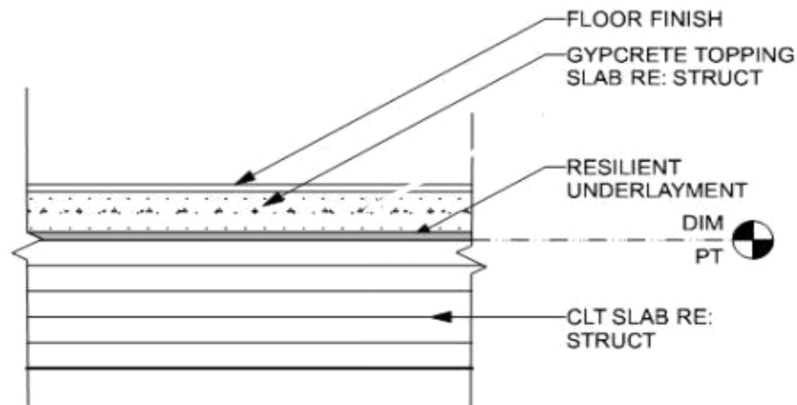
**Source Room View of Test Specimen Installation**

## Drawings



### B: HALF LAP

### CLT Half Lap Fastening Detail



### Cross-Section Installation Detail

**REPORT DELIVERABLE 19-F:**  
**Test 3b: Sound and Impact Transmission Test -**  
**Marmoleum**



**G2463.07-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**THE FRAMEWORK PROJECT, LLC**

**Series/Model: Maxxon Corporation Gyp-Crete® Gypsum Concrete over Maxxon Corporation Enkasonic HP Sound Control Mat - Forbo Marmoleum Decibel with Armstrong S-1837 Quiet Comfort**

**Specimen Type: Cross Laminated Timber - 175 mm**

**Overall Size: 3023 mm by 3632 mm**

<b>STC</b>	<b>51</b>
<b>IIC</b>	<b>53</b>

**Test Specimen Identification:**

Floor Topping: 3.5 mm Forbo Marmoleum Decibel Sheet Vinyl

Floor Underlayment: 2 mm Armstrong S-1837 Quiet Comfort Underlayment

Subfloor Topping: 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete

Subfloor Underlayment: 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat

Floor Slab: 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber

Reference should be made to Intertek-ATI Report G2463.07-113-11 for complete test specimen description. This page alone is not a complete report.





## Acoustical Performance Test Report

THE FRAMEWORK PROJECT, LLC  
116 NW 17th Avenue  
Portland, Oregon 97209

**Report** G2463.07-113-11  
**Test Date** 11/03/16  
**Report Date** 12/01/16

### Project Scope

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The full test specimen was assembled on the day of testing by Intertek-ATI. All materials provided by the client were installed on an existing Intertek-ATI assembly (Cross Laminated Timber - 175 mm) utilizing Intertek-ATI-supplied

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09(2016)e1, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the VT test chambers at Intertek-ATI located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 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.

### Test Procedure (Continued)

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

### Test Conditions

Source Room		Receive Room	
Average Temperature	20.4°C	Average Temperature	20.2°C
Average Relative Humidity	77%	Average Relative Humidity	49%

### Test Calculations

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

### Test Specimen Materials and Installation Details

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Sheet Vinyl	3023 by 3632	3.5	Forbo Marmoleum Decibel	10.98 m <sup>2</sup>	3.03 kg/m <sup>2</sup>
	<i>Note: Installed per manufacturer's specifications</i>				
Underlayment	3023 by 1219	2.0	Armstrong S-1837 Quiet Comfort	10.98 m <sup>2</sup>	0.01 kg/m <sup>2</sup>
	<i>Note: Loose laid</i>				
Gypsum Concrete	3023 by 3632	50.8	Maxxon Corporation Gyp-Crete®	10.98 m <sup>2</sup>	94.42 kg/m <sup>2</sup>
	<i>Note: Poured directly on top of the sound control mat, cured a minimum of 14 days.</i>				
Sound Control Mat	3023 by 3632	11.0	Maxxon Corporation Enkasonic HP	10.98 m <sup>2</sup>	0.88 kg/m <sup>2</sup>
	<i>Note: Loose laid with seams taped and perimeter isolated with foam</i>				
Cross Laminated Timber	3023 by 3632	175.0	CLT5 Panel DF PRG 320	10.98 m <sup>2</sup>	113.19 kg/m <sup>2</sup>
	<i>Note: Two equal size pieces fastened together as per attached drawing. Installed in a test frame flush to the source room.</i>				

### Comments

The total weight of the floor/ceiling assembly was 2322.6 kg. Intertek-ATI will store samples of the test specimen for four years. A photograph of the test specimen is included in the attachments. A drawing of the test specimen is included in the attachments.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

**This report may not be reproduced, except in full, without the written approval of Intertek-ATI.**

FOR INTERTEK-ATI:

  
Digitally Signed by: Daniel Mohler

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Daniel B. Mohler  
Project Lead - Acoustical Testing

  
Digitally Signed by: Jordan Strybos

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Jordan Strybos  
Project Manager - Acoustical Testing

Attachments (7 pages): This report is complete only when all attachments listed are included.

- Instrumentation (1)
- Airborne Sound Transmission Loss Data (2)
- Impact Sound Transmission Data (2)
- Photographs (1)
- Drawings (1)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*



### Revision Log

<u>Revision</u>	<u>Date</u>	<u>Page(s)</u>	<u>Description</u>
R0	12/01/16	N/A	Original Report Issue

## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	65124	06/16 *
Microphone Calibrator	Norsonic	1251	INT00127	01/16
Receive Room Microphone	PCB Piezotronics	378B20	63748	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63744	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63745	06/16
Receive Room Microphone	PCB Piezotronics	378C20	65617	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63747	06/16
Receive Room Environmental Indicator	Comet	T7510	63810	10/16
			63811	10/16
Source Room Microphone	PCB Piezotronics	378B20	63738	05/16
Source Room Microphone	PCB Piezotronics	378B20	63739	05/16
Source Room Microphone	PCB Piezotronics	378B20	63740	05/16
Source Room Microphone	PCB Piezotronics	378B20	63742	05/16
Source Room Microphone	Scantek	378B20	63741	05/16
Source Room Environmental Indicator	Comet	T7510	63812	11/15
Tapping Machine	Look Line s.r.l.	EM50 (TM50)	65351	02/16

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

### Test Chambers

VT Receive Room Volume	158.22 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>

# AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/03/16
Data File No.	G2463.07
Client	The Framework Project, LLC
Description	3.5 mm Forbo Marmoleum Decibel Sheet Vinyl, 2 mm Armstrong S-1837 Quiet Comfort Underlayment, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

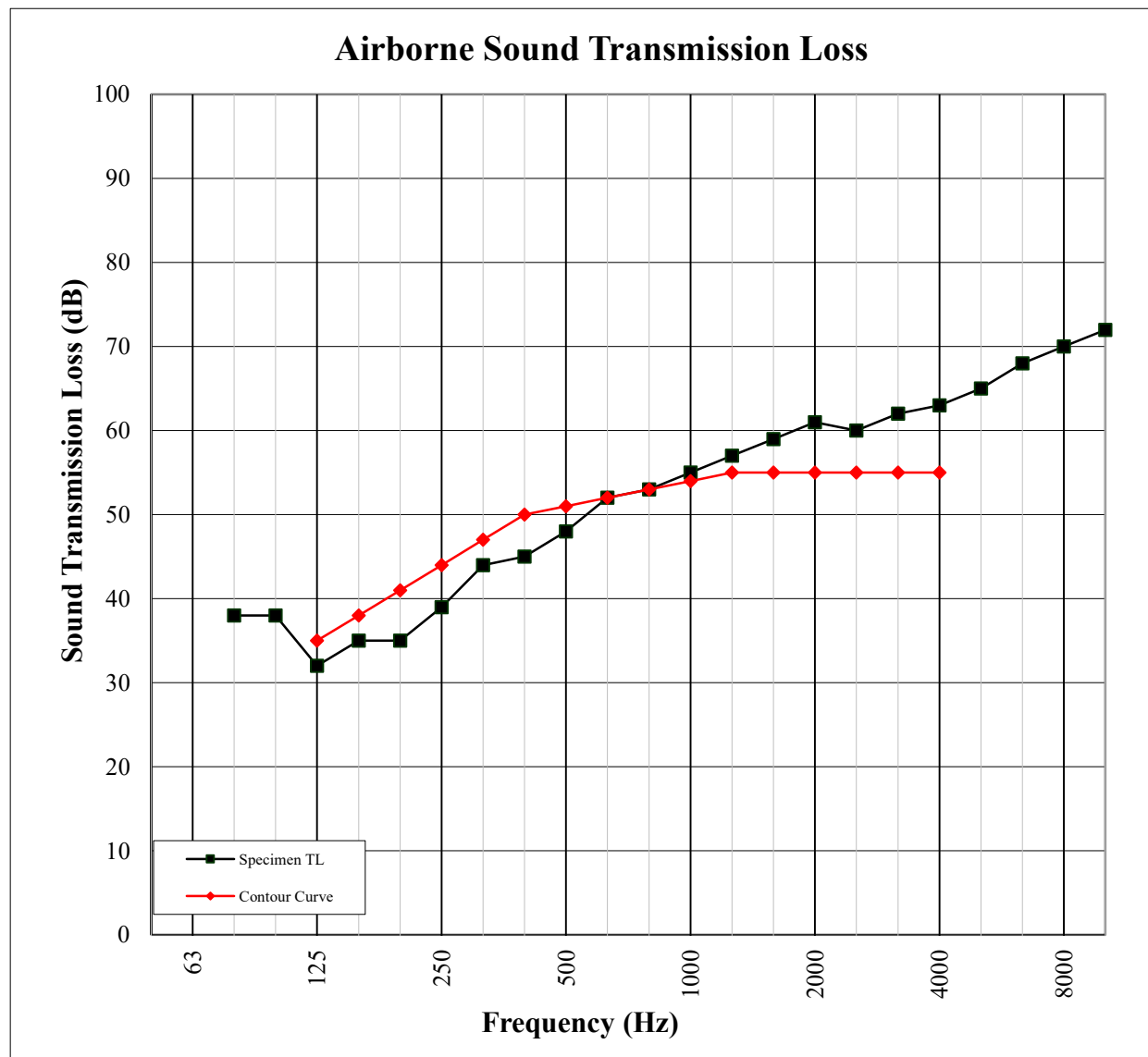
Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	40.4	17.4	118	80	38	4.00	-
100	29.7	12.4	108	72	38	1.50	-
125	32.1	10.1	103	71	32	2.30	3
160	28.3	9.7	104	70	35	1.60	3
200	23.1	11.5	103	68	35	1.70	6
250	25.2	10.6	102	63	39	1.30	5
315	21.6	10.0	105	62	44	0.60	3
400	20.9	8.5	102	58	45	0.70	5
500	23.6	7.7	101	55	48	0.40	3
630	18.9	7.3	101	51	52	0.60	0
800	16.6	7.8	101	51	53	0.40	0
1000	14.7	7.6	100	47	55	0.50	0
1250	13.8	7.3	99	44	57	0.70	0
1600	11.0	7.5	100	43	59	0.40	0
2000	7.2	8.3	99	41	61	0.30	0
2500	6.4	9.2	96	37	60	0.40	0
3150	5.9	9.8	98	37	62	0.50	0
4000	6.2	11.1	98	35	63	0.50	0
5000	6.7	12.7	96	30	65	0.50	-
6300	7.1	15.3	93	24	68	0.90	-
8000	7.5	20.0	94	23	70	1.30	-
10000	7.7	24.2	92	18	72	1.10	-

STC Rating      **51**      *(Sound Transmission Class)*  
Deficiencies      28      *(Sum of Deficiencies)*

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

# **AIRBORNE SOUND TRANSMISSION LOSS** ASTM E 90

<b>Test Date</b>	11/03/16
<b>Data File No.</b>	G2463.07
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	3.5 mm Forbo Marmoleum Decibel Sheet Vinyl, 2 mm Armstrong S-1837 Quiet Comfort Underlayment, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler





G2463.07-113-11-R0



# IMPACT SOUND TRANSMISSION

ASTM E 492

<b>Test Date</b>	11/03/16
<b>Data File No.</b>	G2463.07
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	3.5 mm Forbo Marmoleum Decibel Sheet Vinyl, 2 mm Armstrong S-1837 Quiet Comfort Underlayment, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

<b>Freq</b> (Hz)	<b>Background SPL</b> (dB)	<b>Absorption</b> (m <sup>2</sup> )	<b>Normalized Impact SPL</b> (dB)	<b>95% Confidence Limit</b>	<b>Number of Deficiencies</b>
80	39.7	16.1	59	3.6	-
100	30.7	13.7	63	2.4	4
125	32.4	9.9	65	2.6	6
160	27.9	9.4	65	1.6	6
200	23.1	10.9	66	1.8	7
250	25.1	10.0	64	1.7	5
315	22.5	10.1	62	0.8	3
400	20.8	8.6	56	0.5	0
500	23.3	7.6	49	0.7	0
630	20.2	7.4	40	0.5	0
800	19.3	7.7	35	0.4	0
1000	17.3	7.5	28	0.4	0
1250	17.0	7.4	19	0.1	0
1600	14.1	7.6	17	0.3	0
2000	9.4	8.3	12	0.3	0
2500	7.8	9.1	9	0.6	0
3150	6.4	9.8	5	1.2	0
4000	6.1	11.1	5	1.6	-
5000	6.5	12.7	5	1.8	-
6300	6.8	15.2	7	1.8	-
8000	7.2	20.1	8	1.8	-
10000	7.4	24.2	9	1.8	-

**IIC Rating**      **53**      *(Impact Insulation Class)*  
**Deficiencies**      **31**      *(Sum of Deficiencies)*

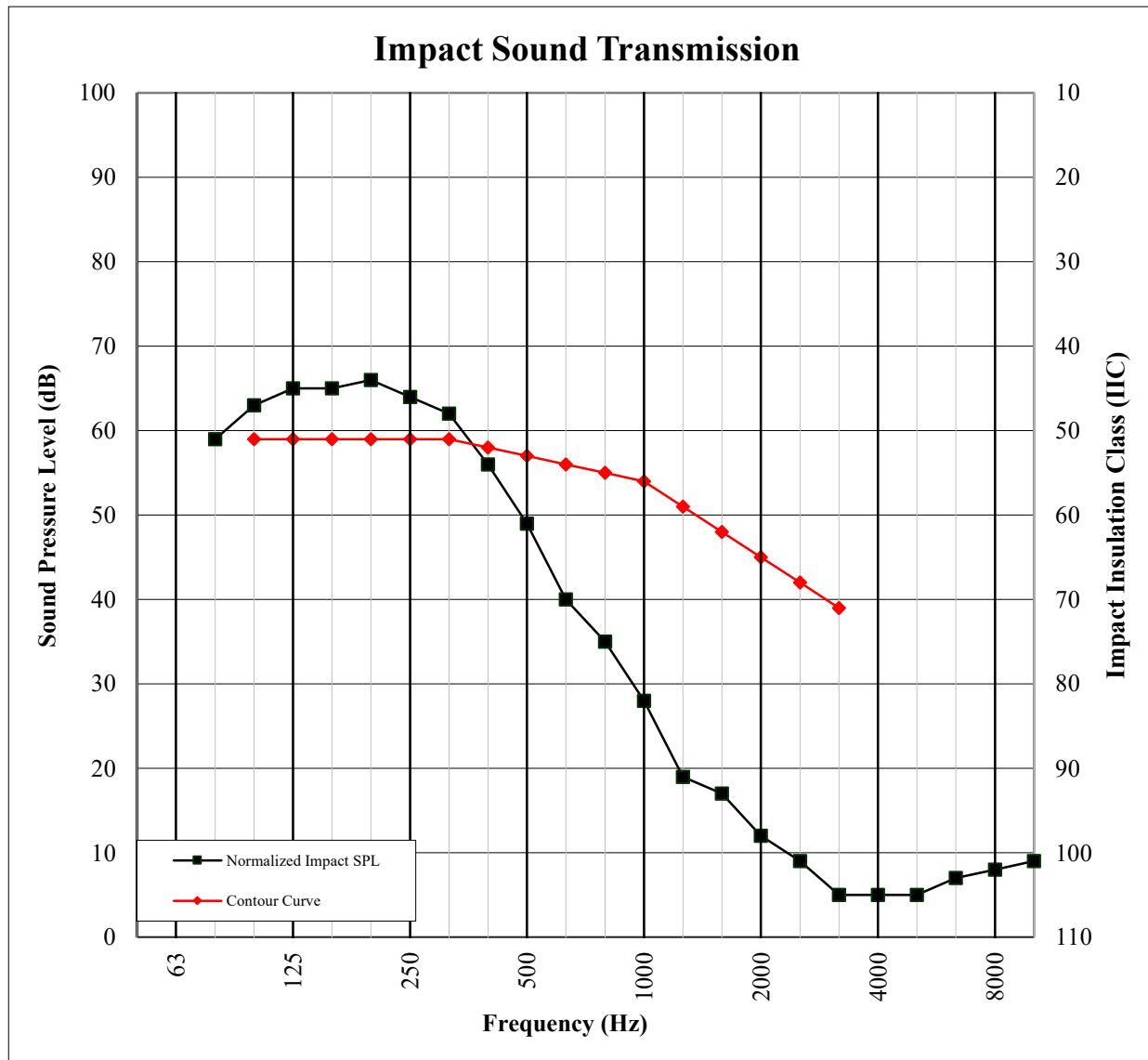
**Note:**      Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.



## IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/03/16
Data File No.	G2463.07
Client	The Framework Project, LLC
Description	3.5 mm Forbo Marmoleum Decibel Sheet Vinyl, 2 mm Armstrong S-1837 Quiet Comfort Underlayment, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

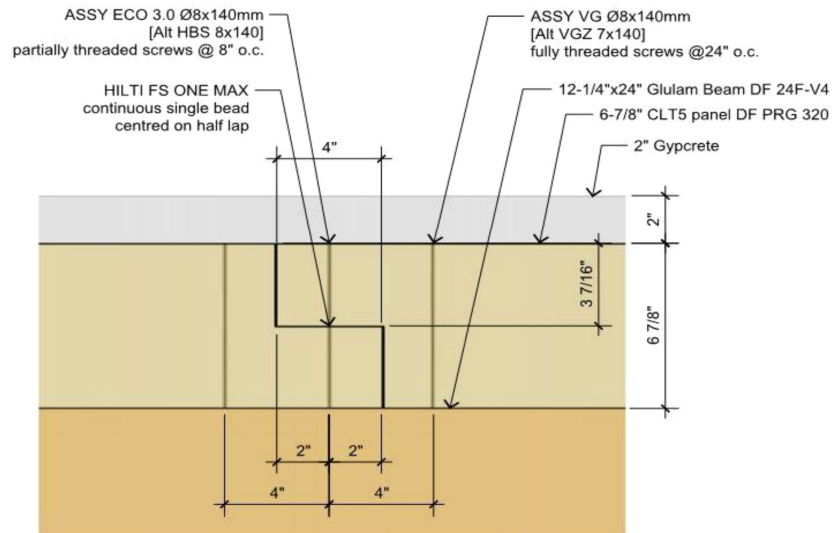


**Photograph**



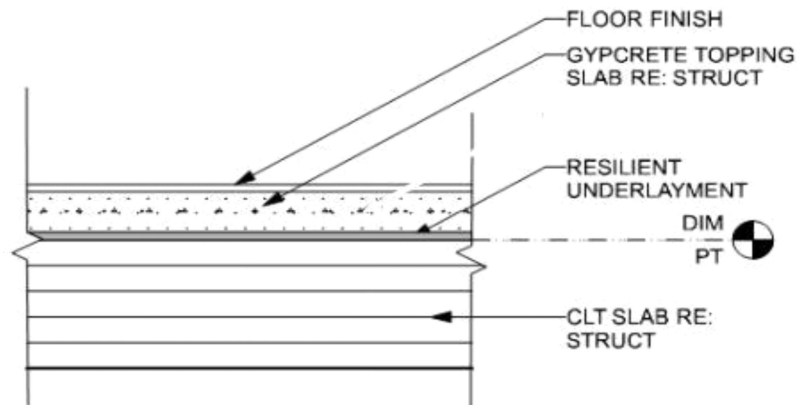
**Source Room View of Test Specimen Installation**

## Drawings



### B: HALF LAP

### CLT Half Lap Fastening Detail



### Cross-Section Installation Detail

REPORT DELIVERABLE 19-G:  
Test 4: Sound and Impact Transmission Test -  
Carpet



**G2463.03-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**THE FRAMEWORK PROJECT, LLC**

**Series/Model: Maxxon Corporation Gyp-Crete® Gypsum Concrete over Maxxon Corporation  
Enkasonic HP Sound Control Mat - Mohawk Industries Print Base Carpet Tile**

**Specimen Type: Cross Laminated Timber - 175 mm**

**Overall Size: 3023 mm by 3632 mm**

<b>STC</b>	<b>50</b>
<b>IIC</b>	<b>66</b>

**Test Specimen Identification:**

Floor Topping: 12 mm Mohawk Industries Print Base Carpet Tile

Subfloor Topping: 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete

Subfloor Underlayment: 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat

Floor Slab: 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber

Reference should be made to Intertek-ATI Report G2463.03-113-11 for complete test specimen description. This page alone is not a complete report.



## Acoustical Performance Test Report

THE FRAMEWORK PROJECT, LLC  
116 NW 17th Avenue  
Portland, Oregon 97209

**Report** G2463.03-113-11  
**Test Date** 11/02/16  
**Report Date** 12/01/16

### Project Scope

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The full test specimen was assembled on the day of testing by Intertek-ATI. All materials provided by the client were installed on an existing Intertek-ATI assembly (Cross Laminated Timber - 175 mm) utilizing Intertek-ATI-supplied

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09(2016)e1, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the VT test chambers at Intertek-ATI located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 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.

### Test Procedure (Continued)

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

### Test Conditions

Source Room		Receive Room	
Average Temperature	19.8°C	Average Temperature	20.2°C
Average Relative Humidity	51%	Average Relative Humidity	49%

### Test Calculations

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

### Test Specimen Materials and Installation Details

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Carpet Tile	609.6 by 609.6	12.0	Mohawk Industries Print Base	10.98 m <sup>2</sup>	4.46 kg/m <sup>2</sup>
	<i>Note: Loose laid</i>				
Gypsum Concrete	3023 by 3632	50.8	Maxxon Corporation Gyp-Crete®	10.98 m <sup>2</sup>	94.42 kg/m <sup>2</sup>
	<i>Note: Poured directly on top of the sound control mat, cured a minimum of 14 days.</i>				
Sound Control Mat	3023 by 3632	11.0	Maxxon Corporation Enkasonic HP	10.98 m <sup>2</sup>	0.88 kg/m <sup>2</sup>
	<i>Note: Loose laid with seams taped and perimeter isolated with foam</i>				
Cross Laminated Timber	3023 by 3632	175.0	CLT5 Panel DF PRG 320	10.98 m <sup>2</sup>	113.19 kg/m <sup>2</sup>
	<i>Note: Two equal size pieces fastened together as per attached drawing. Installed in a test frame flush to the source room.</i>				

### Comments

The total weight of the floor/ceiling assembly was 2338.2 kg. Intertek-ATI will store samples of the test specimen for four years. A photograph of the test specimen is included in the attachments. A drawing of the test specimen is included in the attachments.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

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**This report may not be reproduced, except in full, without the written approval of Intertek-ATI.**

FOR INTERTEK-ATI:

  
Digitally Signed by: Daniel Mohler

---

Daniel B. Mohler  
Project Lead - Acoustical Testing

  
Digitally Signed by: Jordan Strybos

---

Jordan Strybos  
Project Manager - Acoustical Testing

Attachments (7 pages): This report is complete only when all attachments listed are included.

- Instrumentation (1)
- Airborne Sound Transmission Loss Data (2)
- Impact Sound Transmission Data (2)
- Photographs (1)
- Drawings (1)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*





### Revision Log

<b><u>Revision</u></b>	<b><u>Date</u></b>	<b><u>Page(s)</u></b>	<b><u>Description</u></b>
R0	12/01/16	N/A	Original Report Issue

## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	65124	06/16 *
Microphone Calibrator	Norsonic	1251	INT00127	01/16
Receive Room Microphone	PCB Piezotronics	378B20	63748	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63744	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63745	06/16
Receive Room Microphone	PCB Piezotronics	378C20	65617	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63747	06/16
Receive Room Environmental Indicator	Comet	T7510	63810	10/16
			63811	10/16
Source Room Microphone	PCB Piezotronics	378B20	63738	05/16
Source Room Microphone	PCB Piezotronics	378B20	63739	05/16
Source Room Microphone	PCB Piezotronics	378B20	63740	05/16
Source Room Microphone	PCB Piezotronics	378B20	63742	05/16
Source Room Microphone	Scantek	378B20	63741	05/16
Source Room Environmental Indicator	Comet	T7510	63812	11/15
Tapping Machine	Look Line s.r.l.	EM50 (TM50)	65351	02/16

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

### Test Chambers

VT Receive Room Volume	158.22 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>



G2463.03-113-11-R0

**AIRBORNE SOUND TRANSMISSION LOSS**  
ASTM E 90

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.03
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	12 mm Mohawk Industries Print Base Carpet Tile, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

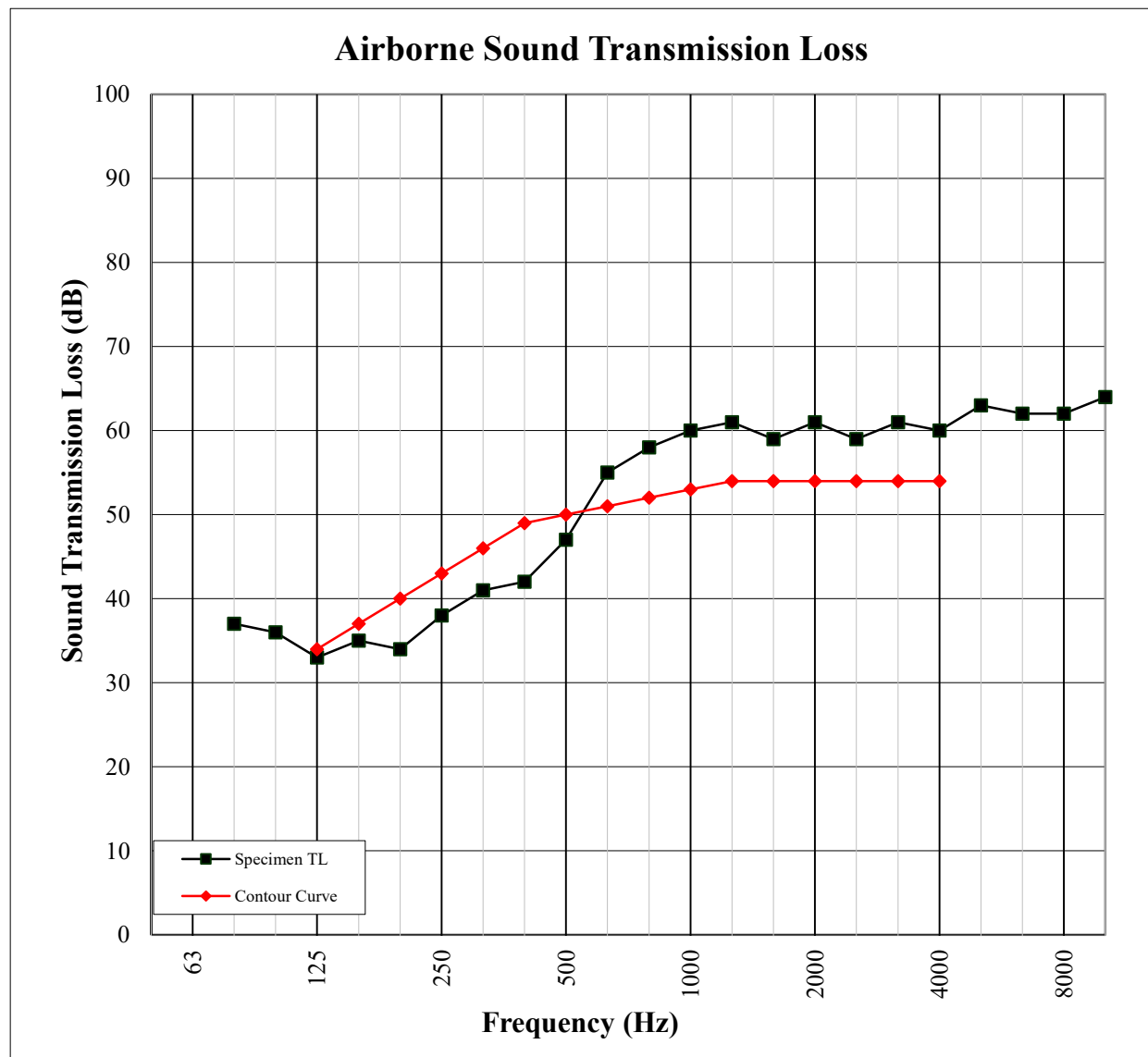
<b>Freq</b> (Hz)	<b>Background SPL</b> (dB)	<b>Absorption</b> (m <sup>2</sup> )	<b>Source SPL</b> (dB)	<b>Receive SPL</b> (dB)	<b>Specimen TL</b> (dB)	<b>95% Confidence Limit</b>	<b>Number of Deficiencies</b>
80	33.8	16.4	118	80	37	3.60	-
100	29.8	11.8	108	72	36	2.20	-
125	32.1	10.5	104	72	33	2.10	1
160	25.4	9.8	105	72	35	1.20	2
200	22.1	10.7	103	69	34	1.90	6
250	25.4	10.4	102	64	38	1.10	5
315	22.1	10.3	104	64	41	0.80	5
400	19.3	8.4	101	60	42	0.50	7
500	24.6	7.6	100	55	47	0.40	3
630	23.7	7.5	101	49	55	0.40	0
800	23.8	7.8	102	46	58	0.60	0
1000	20.5	7.6	101	43	60	0.40	0
1250	18.7	7.6	99	41	61	0.70	0
1600	15.4	7.8	99	42	59	0.50	0
2000	9.8	8.7	99	40	61	0.40	0
2500	6.6	9.8	95	37	59	0.70	0
3150	5.6	10.7	97	36	61	0.70	0
4000	5.6	12.3	97	36	60	0.60	0
5000	6.0	14.3	95	31	63	0.80	-
6300	6.5	17.8	92	28	62	0.80	-
8000	6.9	23.6	93	28	62	1.10	-
10000	7.2	29.0	91	24	64	1.40	-

**STC Rating**      **50**      *(Sound Transmission Class)*  
**Deficiencies**      **29**      *(Sum of Deficiencies)*

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

# **AIRBORNE SOUND TRANSMISSION LOSS** ASTM E 90

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.03
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	12 mm Mohawk Industries Print Base Carpet Tile, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler





G2463.03-113-11-R0



# IMPACT SOUND TRANSMISSION

ASTM E 492

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.03
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	12 mm Mohawk Industries Print Base Carpet Tile, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

<b>Freq</b> (Hz)	<b>Background SPL</b> (dB)	<b>Absorption</b> (m <sup>2</sup> )	<b>Normalized Impact SPL</b> (dB)	<b>95% Confidence Limit</b>	<b>Number of Deficiencies</b>
80	35.0	17.5	53	2.4	-
100	29.0	13.8	54	2.3	8
125	31.7	10.1	54	2.7	8
160	25.2	10.1	47	1.6	1
200	21.5	11.3	44	2.1	0
250	25.1	10.5	39	1.3	0
315	21.7	10.4	34	0.9	0
400	19.5	8.5	31	0.9	0
500	23.5	7.8	24	3.1	0
630	21.8	7.6	21	0.5	0
800	22.3	7.6	19	0.6	0
1000	19.0	7.6	16	0.7	0
1250	16.6	7.6	15	0.1	0
1600	13.9	7.7	12	0.2	0
2000	8.9	8.8	8	0.6	0
2500	6.2	9.7	5	0.9	0
3150	5.3	10.4	5	1.0	0
4000	5.5	12.3	5	1.3	-
5000	5.9	14.5	6	1.4	-
6300	6.4	18.2	7	1.3	-
8000	6.9	23.9	9	1.4	-
10000	7.2	29.4	10	1.4	-

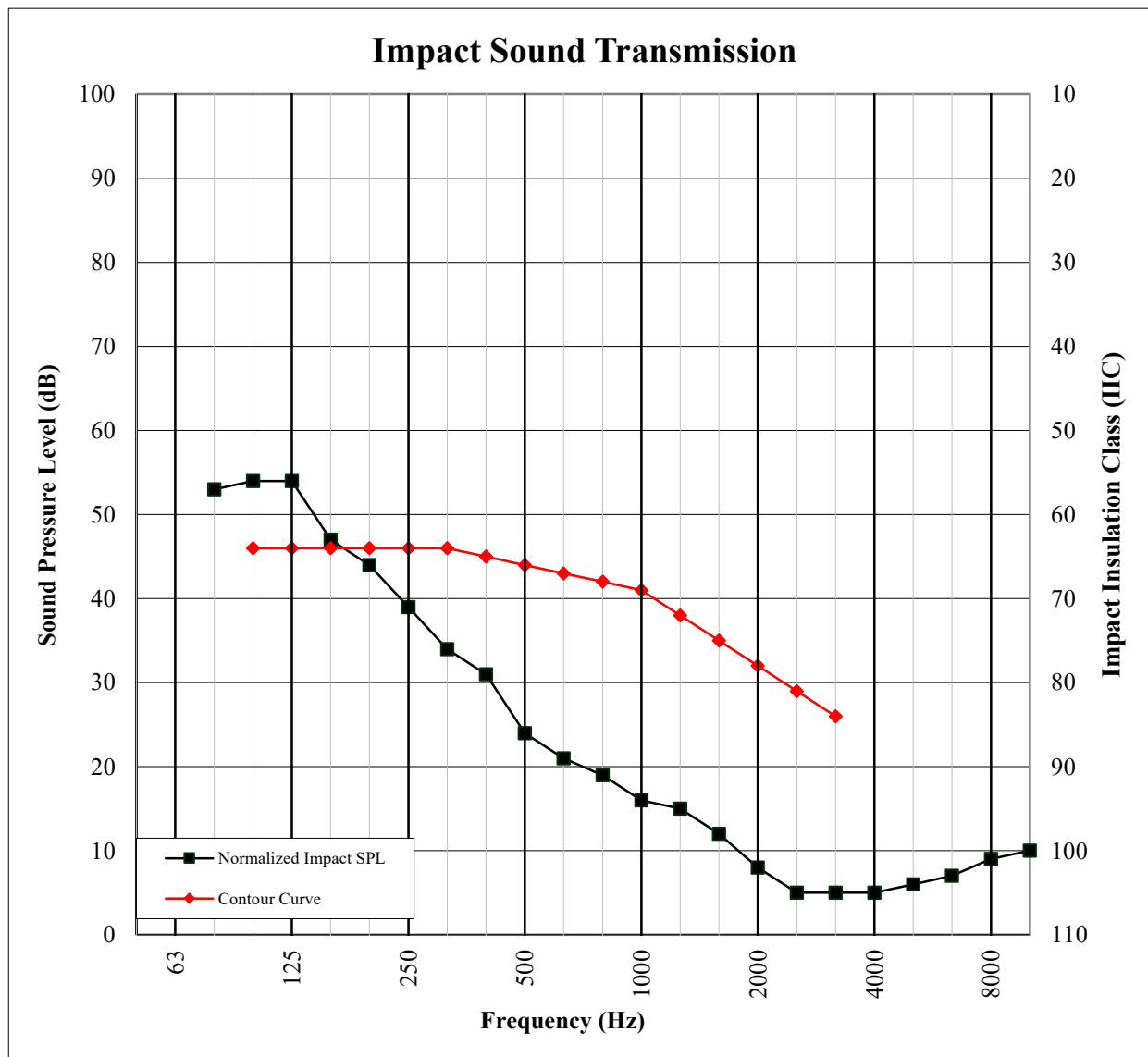
**IIC Rating**      **66**      *(Impact Insulation Class)*  
**Deficiencies**      **17**      *(Sum of Deficiencies)*

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

## IMPACT SOUND TRANSMISSION

ASTM E 492

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.03
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	12 mm Mohawk Industries Print Base Carpet Tile, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

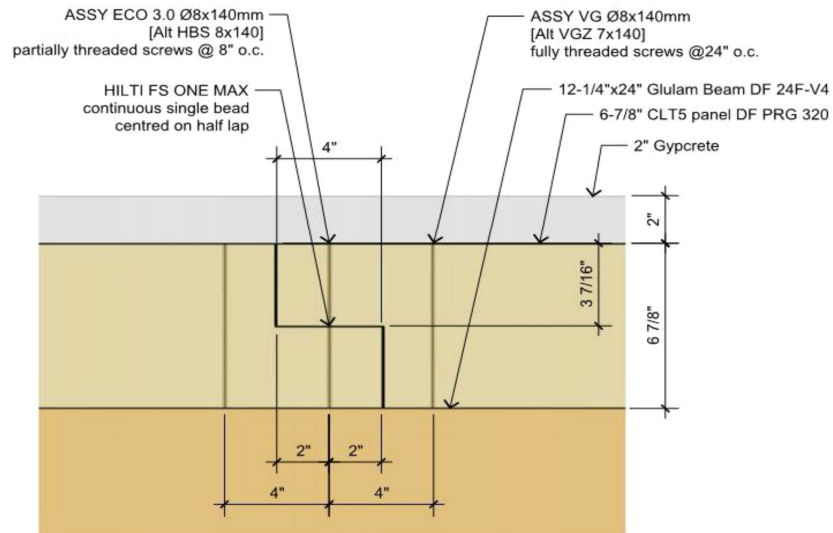


**Photograph**



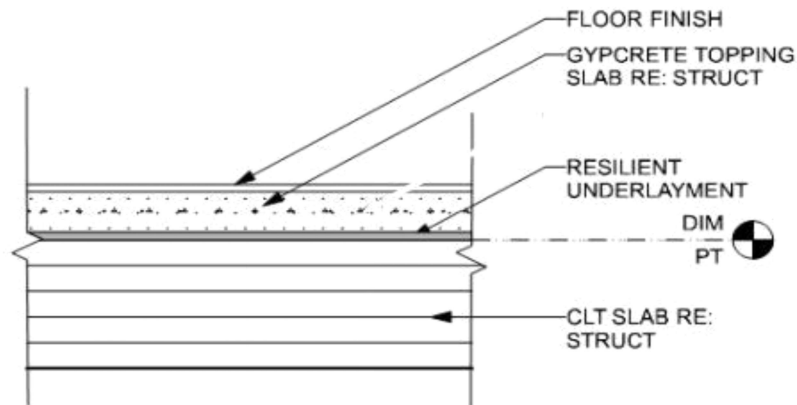
**Source Room View of Test Specimen Installation**

## Drawings



### B: HALF LAP

### CLT Half Lap Fastening Detail



### Cross-Section Installation Detail



REPORT DELIVERABLE 19-H:  
Test 5a: Sound and Impact Transmission Test -  
Luxury Vinyl Plank



**G2463.04-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**THE FRAMEWORK PROJECT, LLC**

**Series/Model: Maxxon Corporation Gyp-Crete® Gypsum Concrete over Maxxon Corporation Enkasonic HP Sound Control Mat - Armstrong Click-Lock Luxury Vinyl Tile**

**Specimen Type: Cross Laminated Timber - 175 mm**

**Overall Size: 3023 mm by 3632 mm**

<b>STC</b>	<b>52</b>
<b>IIC</b>	<b>44</b>

**Test Specimen Identification:**

Floor Topping: 4 mm Armstrong Click-Lock Luxury Vinyl Tile

Subfloor Topping: 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete

Subfloor Underlayment: 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat

Floor Slab: 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber

Reference should be made to Intertek-ATI Report G2463.04-113-11 for complete test specimen description. This page alone is not a complete report.



## Acoustical Performance Test Report

THE FRAMEWORK PROJECT, LLC  
116 NW 17th Avenue  
Portland, Oregon 97209

**Report** G2463.04-113-11  
**Test Date** 11/02/16  
**Report Date** 12/01/16

### Project Scope

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The full test specimen was assembled on the day of testing by Intertek-ATI. All materials provided by the client were installed on an existing Intertek-ATI assembly (Cross Laminated Timber - 175 mm) utilizing Intertek-ATI-supplied

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09(2016)e1, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the VT test chambers at Intertek-ATI located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 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.

### Test Procedure (Continued)

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

### Test Conditions

Source Room		Receive Room	
Average Temperature	20.2°C	Average Temperature	20.2°C
Average Relative Humidity	55%	Average Relative Humidity	49%

### Test Calculations

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

### Test Specimen Materials and Installation Details

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Click-Lock Luxury Vinyl Tile	914.4 by 203.2	4.0	Armstrong	10.98 m <sup>2</sup>	5.37 kg/m <sup>2</sup>
	<i>Note: Loose laid</i>				
Gypsum Concrete	3023 by 3632	50.8	Maxxon Corporation Gyp-Crete®	10.98 m <sup>2</sup>	94.42 kg/m <sup>2</sup>
	<i>Note: Poured directly on top of the sound control mat, cured a minimum of 14 days.</i>				
Sound Control Mat	3023 by 3632	11.0	Maxxon Corporation Enkasonic HP	10.98 m <sup>2</sup>	0.88 kg/m <sup>2</sup>
	<i>Note: Loose laid with seams taped and perimeter isolated with foam</i>				
Cross Laminated Timber	3023 by 3632	175.0	CLT5 Panel DF PRG 320	10.98 m <sup>2</sup>	113.19 kg/m <sup>2</sup>
	<i>Note: Two equal size pieces fastened together as per attached drawing. Installed in a test frame flush to the source room.</i>				

### Comments

The total weight of the floor/ceiling assembly was 2348.2 kg. Intertek-ATI will store samples of the test specimen for four years. A photograph of the test specimen is included in the attachments. A drawing of the test specimen is included in the attachments.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

**This report may not be reproduced, except in full, without the written approval of Intertek-ATI.**

FOR INTERTEK-ATI:

  
Digitally Signed by: Daniel Mohler

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Daniel B. Mohler  
Project Lead - Acoustical Testing

  
Digitally Signed by: Jordan Strybos

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Jordan Strybos  
Project Manager - Acoustical Testing

Attachments (7 pages): This report is complete only when all attachments listed are included.

- Instrumentation (1)
- Airborne Sound Transmission Loss Data (2)
- Impact Sound Transmission Data (2)
- Photographs (1)
- Drawings (1)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*



### Revision Log

<b><u>Revision</u></b>	<b><u>Date</u></b>	<b><u>Page(s)</u></b>	<b><u>Description</u></b>
R0	12/01/16	N/A	Original Report Issue

## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	65124	06/16 *
Microphone Calibrator	Norsonic	1251	INT00127	01/16
Receive Room Microphone	PCB Piezotronics	378B20	63748	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63744	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63745	06/16
Receive Room Microphone	PCB Piezotronics	378C20	65617	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63747	06/16
Receive Room Environmental Indicator	Comet	T7510	63810	10/16
			63811	10/16
Source Room Microphone	PCB Piezotronics	378B20	63738	05/16
Source Room Microphone	PCB Piezotronics	378B20	63739	05/16
Source Room Microphone	PCB Piezotronics	378B20	63740	05/16
Source Room Microphone	PCB Piezotronics	378B20	63742	05/16
Source Room Microphone	Scantek	378B20	63741	05/16
Source Room Environmental Indicator	Comet	T7510	63812	11/15
Tapping Machine	Look Line s.r.l.	EM50 (TM50)	65351	02/16

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

### Test Chambers

VT Receive Room Volume	158.22 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>



G2463.04-113-11-R0



# AIRBORNE SOUND TRANSMISSION LOSS

## ASTM E 90

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.04
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	4 mm Armstrong Click-Lock Luxury Vinyl Tile, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	30.6	17.3	118	80	37	4.30	-
100	28.9	13.5	108	72	36	1.80	-
125	29.2	10.2	104	70	34	2.00	2
160	24.6	10.1	105	70	36	1.30	3
200	21.3	11.0	103	67	37	1.90	5
250	25.2	10.4	102	62	40	1.40	5
315	20.8	10.3	105	61	44	0.70	4
400	18.9	8.3	103	57	47	0.40	4
500	25.8	7.6	101	55	48	0.80	4
630	22.3	7.6	101	51	53	0.60	0
800	24.4	7.7	102	49	55	0.70	0
1000	19.3	7.8	101	46	57	0.40	0
1250	18.2	7.7	100	43	59	0.50	0
1600	18.0	7.8	100	43	58	0.40	0
2000	12.1	8.7	100	42	60	0.30	0
2500	8.8	9.7	96	38	59	0.70	0
3150	6.5	10.7	98	38	61	0.70	0
4000	5.4	12.2	98	38	59	0.60	0
5000	6.0	14.3	96	32	62	0.60	-
6300	6.4	17.7	93	30	61	0.70	-
8000	6.9	23.8	94	29	62	0.90	-
10000	7.1	29.4	92	26	63	1.40	-

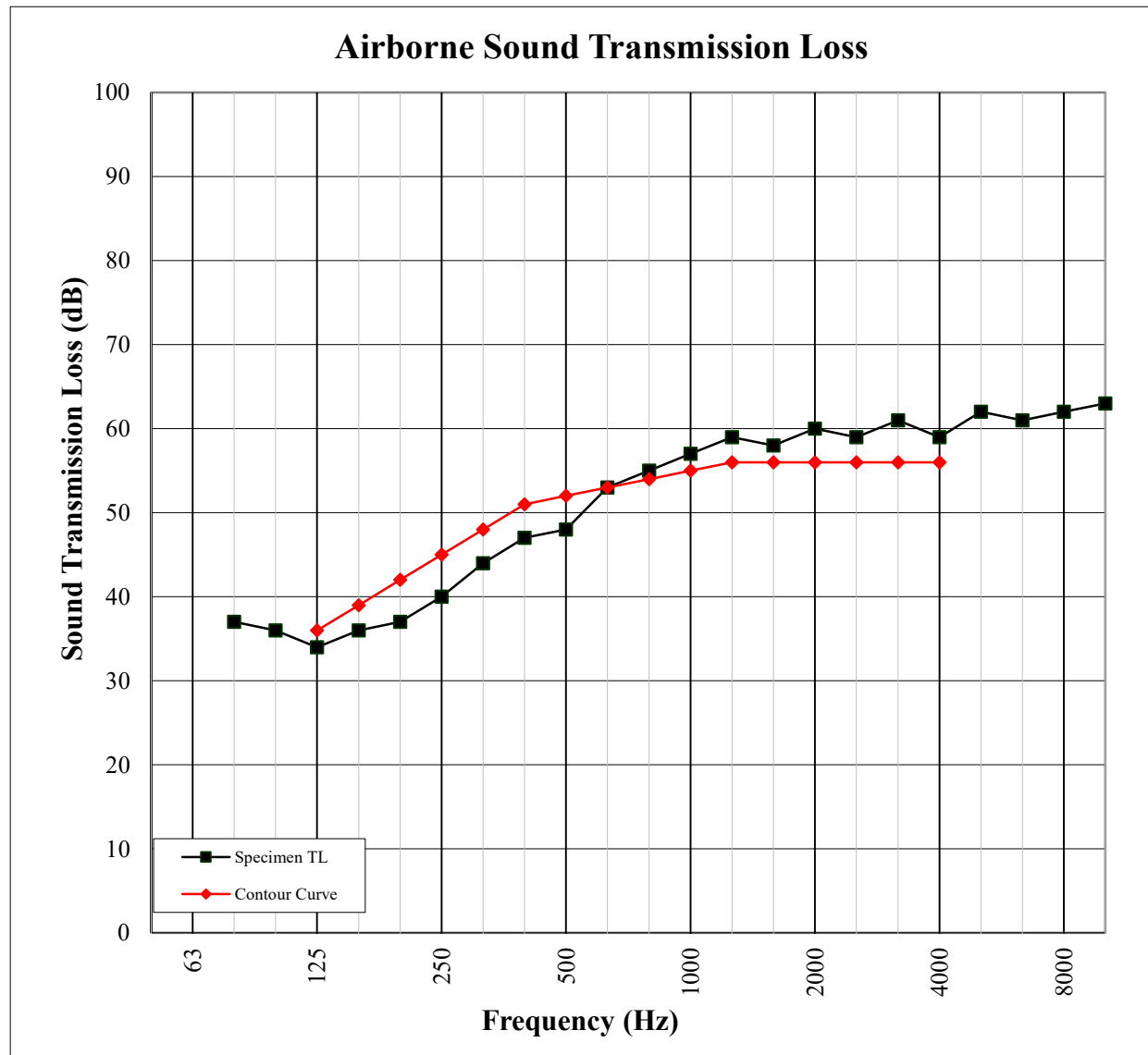
**STC Rating**      **52**      *(Sound Transmission Class)*  
**Deficiencies**      **27**      *(Sum of Deficiencies)*

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



# **AIRBORNE SOUND TRANSMISSION LOSS** ASTM E 90

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.04
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	4 mm Armstrong Click-Lock Luxury Vinyl Tile, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler





G2463.04-113-11-R0



# IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/02/16
Data File No.	G2463.04
Client	The Framework Project, LLC
Description	4 mm Armstrong Click-Lock Luxury Vinyl Tile, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Normalized Impact SPL (dB)	95% Confidence Limit	Number of Deficiencies
80	28.7	17.1	59	3.4	-
100	28.1	12.3	64	2.4	0
125	28.7	10.2	69	2.7	1
160	24.5	10.3	70	1.4	2
200	21.5	11.2	71	2.1	3
250	25.2	10.7	70	2.2	2
315	19.6	10.2	69	1.3	1
400	19.4	8.4	67	1.0	0
500	23.5	7.7	65	0.6	0
630	24.3	7.6	63	0.3	0
800	25.1	7.7	60	0.4	0
1000	22.7	7.6	56	0.4	0
1250	21.4	7.6	56	0.4	0
1600	19.7	7.8	57	0.3	0
2000	14.0	8.7	57	0.5	3
2500	8.4	9.9	57	0.3	6
3150	5.6	10.7	54	0.4	6
4000	5.3	12.2	48	1.0	-
5000	5.9	14.4	40	0.5	-
6300	6.4	17.9	27	0.7	-
8000	6.8	24.0	15	1.1	-
10000	7.1	28.6	11	1.2	-

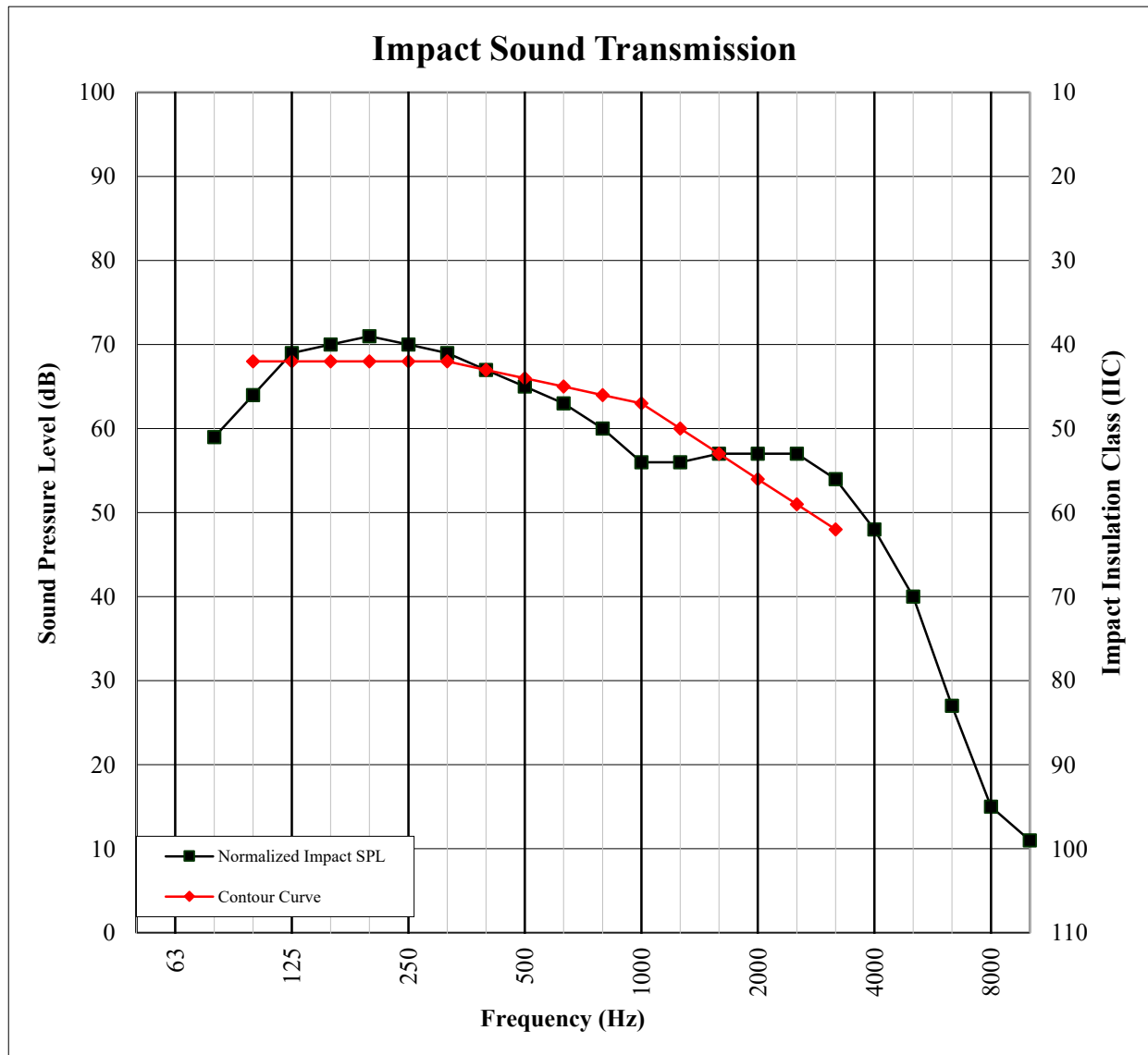
**IIC Rating**      **44**      *(Impact Insulation Class)*  
**Deficiencies**      **24**      *(Sum of Deficiencies)*

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

## IMPACT SOUND TRANSMISSION

ASTM E 492

<b>Test Date</b>	11/02/16
<b>Data File No.</b>	G2463.04
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	4 mm Armstrong Click-Lock Luxury Vinyl Tile, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

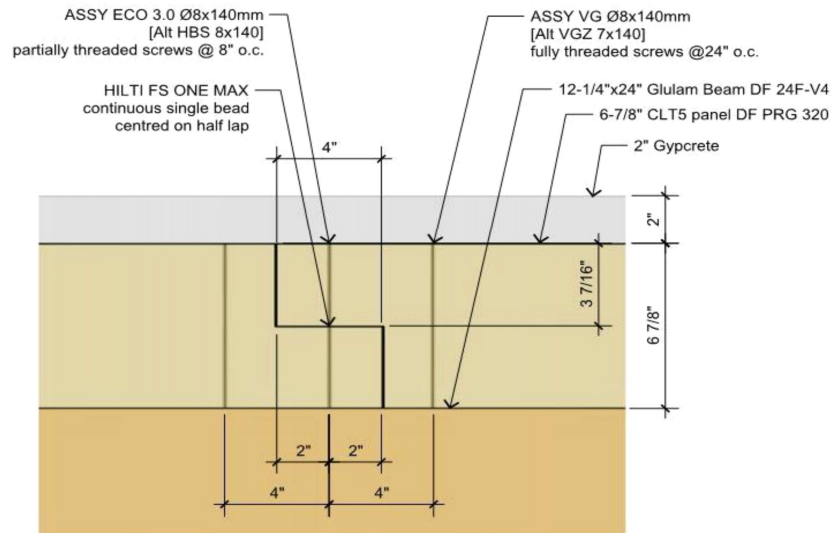


**Photograph**



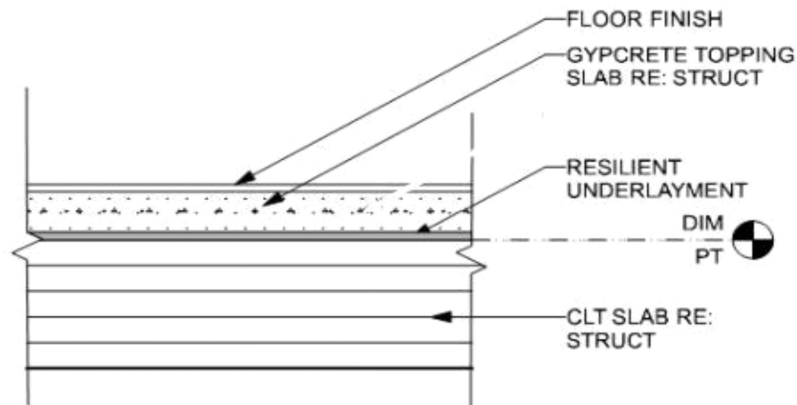
**Source Room View of Test Specimen Installation**

## Drawings



### B: HALF LAP

### CLT Half Lap Fastening Detail



### Cross-Section Installation Detail

REPORT DELIVERABLE 19-I:  
Test 5b: Sound and Impact Transmission Test -  
Luxury Vinyl Plank



**G2463.08-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**THE FRAMEWORK PROJECT, LLC**

**Series/Model: Maxxon Corporation Gyp-Crete® Gypsum Concrete over Maxxon Corporation Enkasonic HP - Armstrong Natural Creations Luxury Vinyl Tile with Armstrong S-1837 Quiet Comfort**

**Specimen Type: Cross Laminated Timber - 175 mm**

**Overall Size: 3023 mm by 3632 mm**

<b>STC</b>	<b>52</b>
<b>IIC</b>	<b>51</b>

**Test Specimen Identification:**

Floor Topping: 4 mm Armstrong Natural Creations Luxury Vinyl Tile with I-Set Technology

Floor Underlayment: 2 mm Armstrong S-1837 Quiet Comfort Underlayment

Subfloor Topping: 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete

Subfloor Underlayment: 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat

Floor Slab: 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber

Reference should be made to Intertek-ATI Report G2463.08-113-11 for complete test specimen description. This page alone is not a complete report.



## Acoustical Performance Test Report

THE FRAMEWORK PROJECT, LLC  
116 NW 17th Avenue  
Portland, Oregon 97209

**Report** G2463.08-113-11  
**Test Date** 11/03/16  
**Report Date** 12/01/16

### Project Scope

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The full test specimen was assembled on the day of testing by Intertek-ATI. All materials provided by the client were installed on an existing Intertek-ATI assembly (Cross Laminated Timber - 175 mm) utilizing Intertek-ATI-supplied

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09(2016)e1, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the VT test chambers at Intertek-ATI located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 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.



### Test Procedure (Continued)

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

### Test Conditions

Source Room		Receive Room	
Average Temperature	20.4°C	Average Temperature	20.2°C
Average Relative Humidity	78%	Average Relative Humidity	49%

### Test Calculations

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

### Test Specimen Materials and Installation Details

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Luxury Vinyl Tile with I-Set Technology	914.4 by 203.2	4.0	Armstrong Natural Creations	10.98 m <sup>2</sup>	5.37 kg/m <sup>2</sup>
	<i>Note: Loose laid</i>				
Underlayment	3023 by 1219	2.0	Armstrong S-1837 Quiet Comfort	10.98 m <sup>2</sup>	0.01 kg/m <sup>2</sup>
	<i>Note: Loose laid</i>				
Gypsum Concrete	3023 by 3632	50.8	Maxxon Corporation Gyp-Crete®	10.98 m <sup>2</sup>	94.42 kg/m <sup>2</sup>
	<i>Note: Poured directly on top of the sound control mat, cured a minimum of 14 days.</i>				
Sound Control Mat	3023 by 3632	11.0	Maxxon Corporation Enkasonic HP	10.98 m <sup>2</sup>	0.88 kg/m <sup>2</sup>
	<i>Note: Loose laid with seams taped and perimeter isolated with foam</i>				
Cross Laminated Timber	3023 by 3632	175.0	CLT5 Panel DF PRG 320	10.98 m <sup>2</sup>	113.19 kg/m <sup>2</sup>
	<i>Note: Two equal size pieces fastened together as per attached drawing. Installed in a test frame flush to the source room.</i>				

### Comments

The total weight of the floor/ceiling assembly was 2348.3 kg. Intertek-ATI 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.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

**This report may not be reproduced, except in full, without the written approval of Intertek-ATI.**

FOR INTERTEK-ATI:

  
Digitally Signed by: Daniel Mohler

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Daniel B. Mohler  
Project Lead - Acoustical Testing

  
Digitally Signed by: Jordan Strybos

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Jordan Strybos  
Project Manager - Acoustical Testing

Attachments (7 pages): This report is complete only when all attachments listed are included.

- Instrumentation (1)
- Airborne Sound Transmission Loss Data (2)
- Impact Sound Transmission Data (2)
- Photographs (1)
- Drawings (1)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*



### Revision Log

<u>Revision</u>	<u>Date</u>	<u>Page(s)</u>	<u>Description</u>
R0	12/01/16	N/A	Original Report Issue

## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	65124	06/16 *
Microphone Calibrator	Norsonic	1251	INT00127	01/16
Receive Room Microphone	PCB Piezotronics	378B20	63748	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63744	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63745	06/16
Receive Room Microphone	PCB Piezotronics	378C20	65617	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63747	06/16
Receive Room Environmental Indicator	Comet	T7510	63810	10/16
			63811	10/16
Source Room Microphone	PCB Piezotronics	378B20	63738	05/16
Source Room Microphone	PCB Piezotronics	378B20	63739	05/16
Source Room Microphone	PCB Piezotronics	378B20	63740	05/16
Source Room Microphone	PCB Piezotronics	378B20	63742	05/16
Source Room Microphone	Scantek	378B20	63741	05/16
Source Room Environmental Indicator	Comet	T7510	63812	11/15
Tapping Machine	Look Line s.r.l.	EM50 (TM50)	65351	02/16

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

### Test Chambers

VT Receive Room Volume	158.22 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>

# AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/03/16
Data File No.	G2463.08
Client	The Framework Project, LLC
Description	4 mm Armstrong Natural Creations Luxury Vinyl Tile with I-Set Technology, 2 mm Armstrong S-1837 Quiet Comfort Underlayment, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

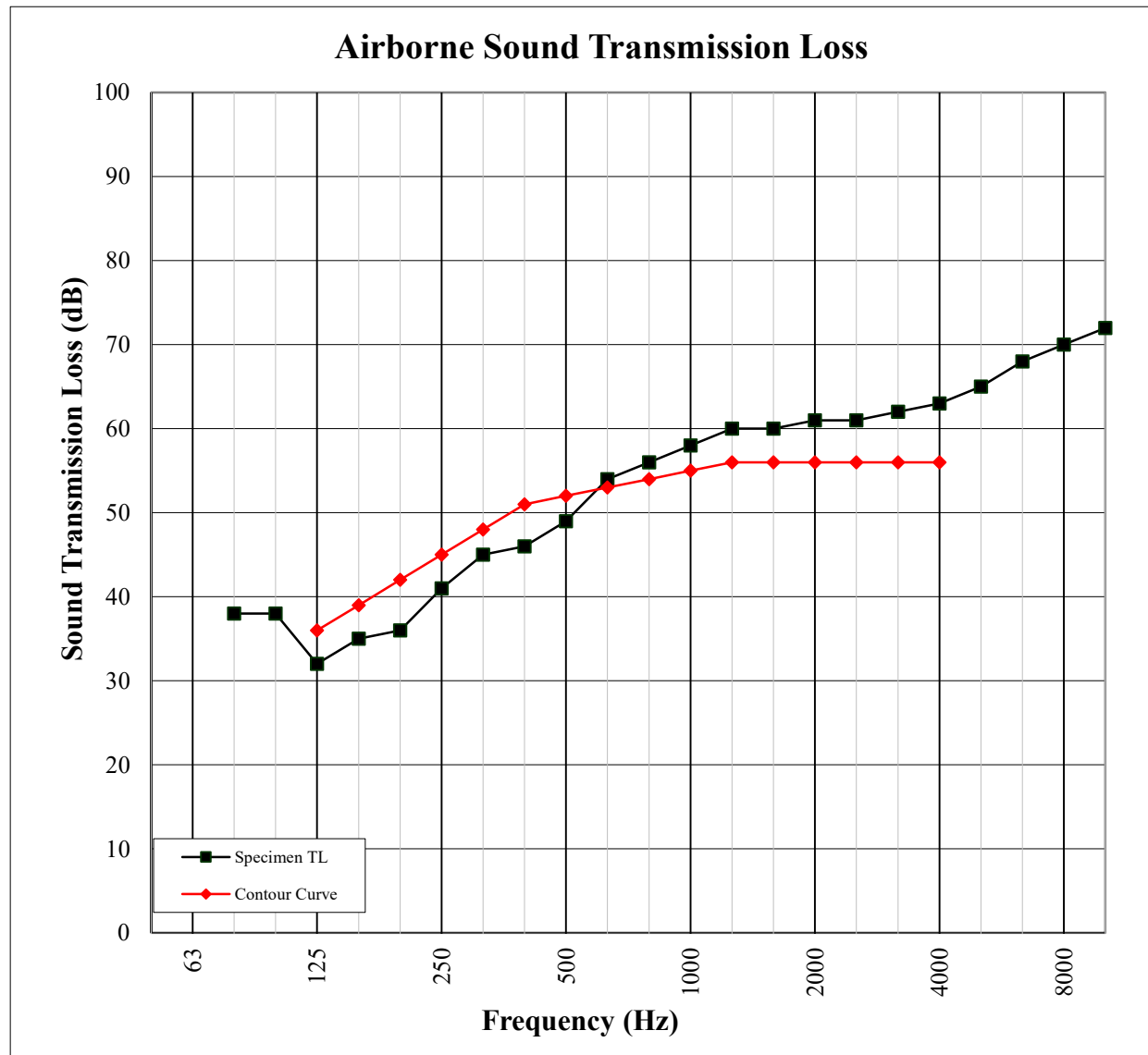
Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	41.5	16.2	118	80	38	3.90	-
100	37.6	11.6	108	71	38	1.50	-
125	37.7	10.2	103	71	32	2.70	4
160	35.3	9.9	104	70	35	1.40	4
200	29.1	10.9	103	68	36	1.50	6
250	30.4	10.2	102	62	41	1.30	4
315	30.1	10.1	105	61	45	0.40	3
400	26.8	8.2	102	57	46	0.50	5
500	27.2	7.5	101	54	49	0.60	3
630	24.4	7.2	101	49	54	0.70	0
800	21.2	7.7	101	48	56	0.40	0
1000	18.6	7.5	101	45	58	0.30	0
1250	17.0	7.3	100	42	60	0.70	0
1600	15.1	7.5	100	42	60	0.40	0
2000	10.1	8.2	99	41	61	0.30	0
2500	7.2	9.1	96	36	61	0.50	0
3150	6.2	9.7	98	37	62	0.60	0
4000	6.3	11.1	98	35	63	0.50	0
5000	6.6	12.8	96	30	65	0.60	-
6300	7.1	15.2	93	24	68	1.00	-
8000	7.5	20.2	94	23	70	1.20	-
10000	7.8	23.8	92	19	72	1.20	-

STC Rating      **52**      *(Sound Transmission Class)*  
Deficiencies      29      *(Sum of Deficiencies)*

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

# **AIRBORNE SOUND TRANSMISSION LOSS** ASTM E 90

<b>Test Date</b>	11/03/16
<b>Data File No.</b>	G2463.08
<b>Client</b>	The Framework Project, LLC
<b>Description</b>	4 mm Armstrong Natural Creations Luxury Vinyl Tile with I-Set Technology, 2 mm Armstrong S-1837 Quiet Comfort Underlayment, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler





G2463.08-113-11-R0



# IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/03/16
Data File No.	G2463.08
Client	The Framework Project, LLC
Description	4 mm Armstrong Natural Creations Luxury Vinyl Tile with I-Set Technology, 2 mm Armstrong S-1837 Quiet Comfort Underlayment, 50.8 mm Maxxon Corporation Gyp-Crete® Gypsum Concrete, 11 mm Maxxon Corporation Enkasonic HP Sound Control Mat, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

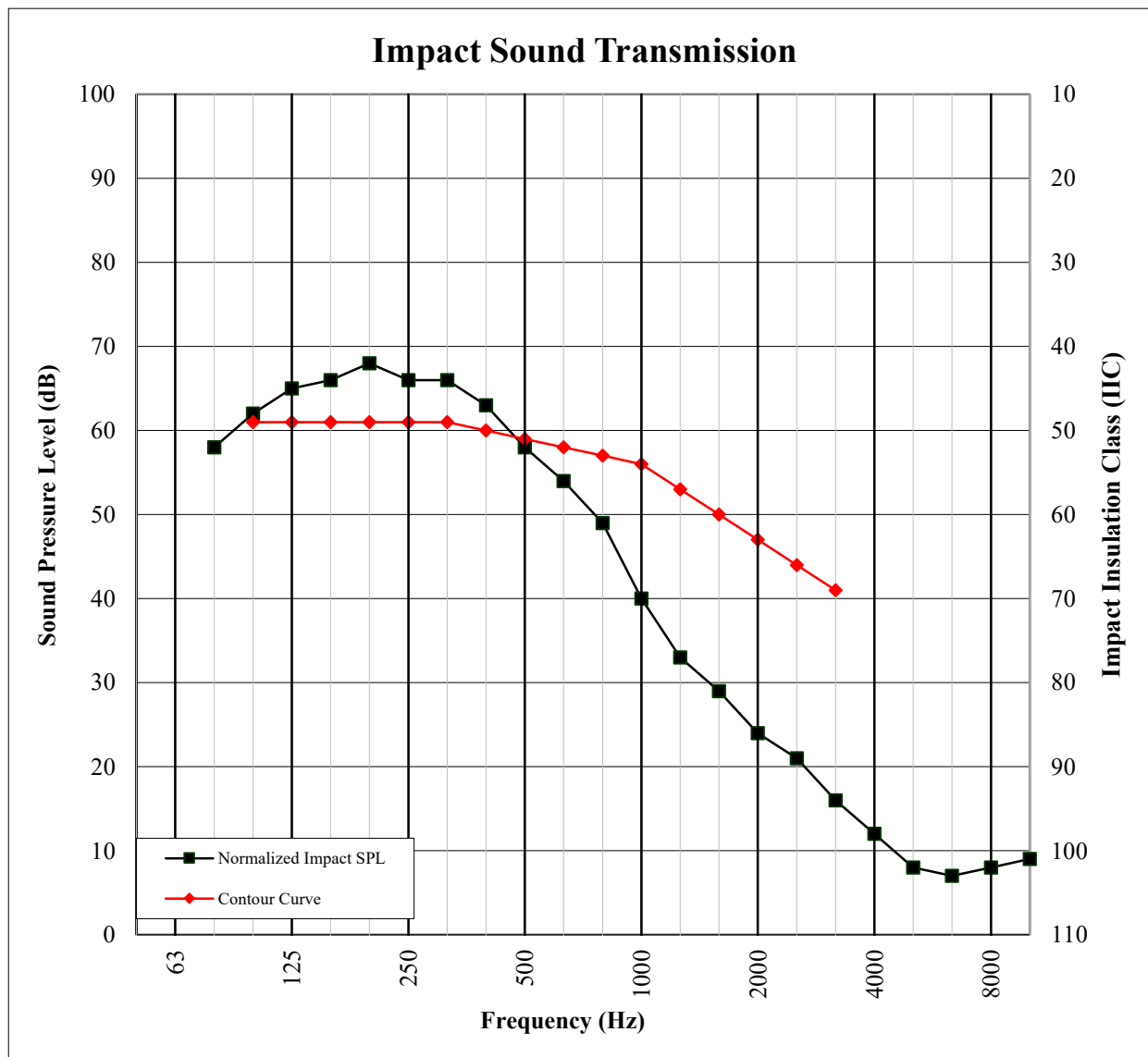
Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Normalized Impact SPL (dB)	95% Confidence Limit	Number of Deficiencies
80	39.6	16.9	58	3.0	-
100	29.3	12.6	62	2.1	1
125	31.1	10.9	65	2.0	4
160	27.1	10.5	66	1.3	5
200	23.8	11.0	68	2.0	7
250	26.1	10.5	66	1.8	5
315	23.1	10.0	66	0.7	5
400	21.1	8.2	63	0.4	3
500	24.2	7.7	58	0.9	0
630	21.0	7.3	54	0.6	0
800	19.9	7.7	49	0.4	0
1000	16.9	7.4	40	0.4	0
1250	15.5	7.3	33	0.2	0
1600	12.3	7.5	29	0.6	0
2000	8.0	8.3	24	0.2	0
2500	6.2	9.1	21	0.4	0
3150	5.9	9.9	16	0.2	0
4000	6.2	11.0	12	0.7	-
5000	6.6	12.7	8	1.0	-
6300	7.1	15.2	7	1.6	-
8000	7.5	20.0	8	1.6	-
10000	7.8	24.0	9	1.6	-

**IIC Rating**      **51**      *(Impact Insulation Class)*  
**Deficiencies**      **30**      *(Sum of Deficiencies)*

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

# IMPACT SOUND TRANSMISSION ASTM E 492

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Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler



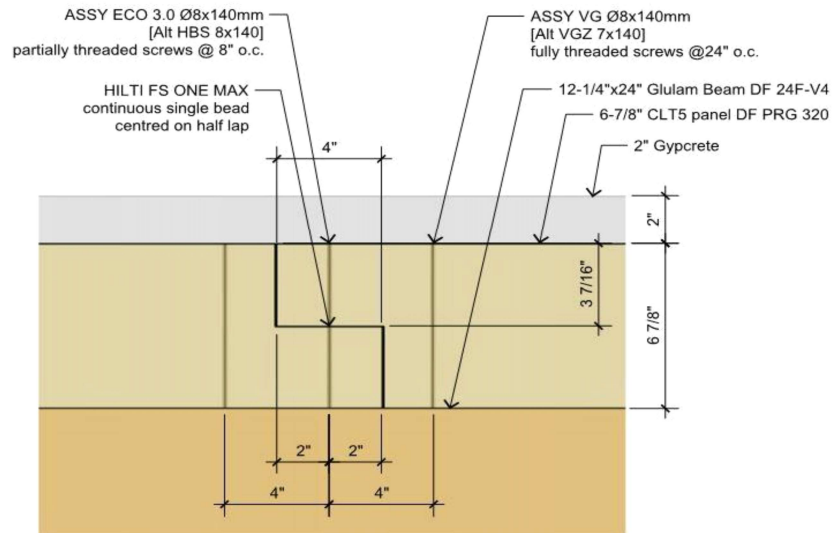


**Photograph**



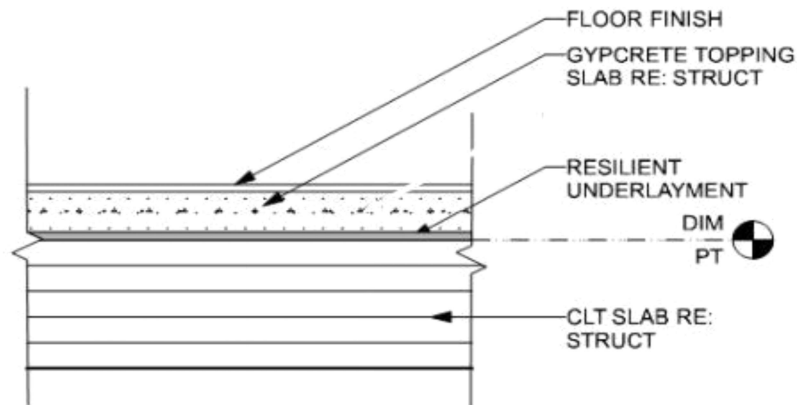
**Source Room View of Test Specimen Installation**

## Drawing



### B: HALF LAP

### CLT Half Lap Fastening Detail



### Cross-Section Installation Detail

REPORT DELIVERABLE 19-J:  
Test 6: Sound and Impact Transmission Test -  
Mechanical Roof



**G2463.05-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**THE FRAMEWORK PROJECT, LLC**

**Series/Model: Concrete over Kinetics Noise Control Roll-out Isolation Material**

**Specimen Type: Cross Laminated Timber - 175 mm**

**Overall Size: 3023 mm by 3632 mm**

<b>STC</b>	<b>58</b>
<b>IIC</b>	<b>55</b>

**Test Specimen Identification:**

Subfloor Topping: 82.55 mm Concrete

Subfloor Underlayment: 50.8 mm Kinetics Noise Control Roll-out Isolation Material

Floor Slab: 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber

Reference should be made to Intertek-ATI Report G2463.05-113-11 for complete test specimen description. This page alone is not a complete report.



## Acoustical Performance Test Report

THE FRAMEWORK PROJECT, LLC  
116 NW 17th Avenue  
Portland, Oregon 97209

**Report** G2463.05-113-11  
**Test Date** 11/02/16  
**Report Date** 11/29/16

### Project Scope

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted to conduct airborne sound transmission loss and impact sound transmission tests. The complete test data is included as attachments to this report. The full test specimen was assembled on the day of testing by Intertek-ATI. All materials provided by the client were installed on an existing Intertek-ATI assembly (Cross Laminated Timber - 175 mm) utilizing Intertek-ATI-supplied

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09(2016)e1, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the VT test chambers at Intertek-ATI located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The airborne transmission loss test was conducted in accordance with the ASTM E 90 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.

### Test Procedure (Continued)

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

### Test Conditions

Source Room		Receive Room	
Average Temperature	19.4°C	Average Temperature	20.2°C
Average Relative Humidity	63%	Average Relative Humidity	49%

### Test Calculations

The STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E 413 and ASTM E 989, respectively.

### Test Specimen Materials and Installation Details

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight
Concrete	3023 by 3632	82.5	N/A	10.98 m <sup>2</sup>	205.06 kg/m <sup>2</sup>
	<i>Note: Poured directly on the Kinetics RIM System and cured a minimum of 28 days.</i>				
Roll-out Isolation Material	3023 by 3632	50.8	Kinetics Noise Control	10.98 m <sup>2</sup>	1.2 kg/m <sup>2</sup>
	<i>Note: Installed per the manufacturer's specifications (see attached drawing)</i>				
Cross Laminated Timber	3023 by 3632	175.0	CLT5 Panel DF PRG 320	10.98 m <sup>2</sup>	113.19 kg/m <sup>2</sup>
	<i>Note: Two equal size pieces fastened together as per attached drawing. Installed in a test frame flush to the source room.</i>				

### Comments

The total weight of the floor/ceiling assembly was 3507.6 kg. Intertek-ATI 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.

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

**This report may not be reproduced, except in full, without the written approval of Intertek-ATI.**

FOR INTERTEK-ATI:

  
Digitally Signed by: Daniel Mohler

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Daniel B. Mohler  
Project Lead - Acoustical Testing

  
Digitally Signed by: Jordan Strybos

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Jordan Strybos  
Project Manager - Acoustical Testing

Attachments (7 pages): This report is complete only when all attachments listed are included.

- Instrumentation (1)
- Airborne Sound Transmission Loss Data (2)
- Impact Sound Transmission Data (2)
- Photographs (1)
- Drawings (1)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*



### Revision Log

<u>Revision</u>	<u>Date</u>	<u>Page(s)</u>	<u>Description</u>
R0	11/29/16	N/A	Original Report Issue



## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	65124	06/16 *
Microphone Calibrator	Norsonic	1251	INT00127	01/16
Receive Room Microphone	PCB Piezotronics	378B20	63748	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63744	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63745	06/16
Receive Room Microphone	PCB Piezotronics	378C20	65617	06/16
Receive Room Microphone	PCB Piezotronics	378B20	63747	06/16
Receive Room Environmental Indicator	Comet	T7510	63810	10/16
			63811	10/16
Source Room Microphone	PCB Piezotronics	378B20	63738	05/16
Source Room Microphone	PCB Piezotronics	378B20	63739	05/16
Source Room Microphone	PCB Piezotronics	378B20	63740	05/16
Source Room Microphone	PCB Piezotronics	378B20	63742	05/16
Source Room Microphone	Scantek	378B20	63741	05/16
Source Room Environmental Indicator	Comet	T7510	63812	11/15
Tapping Machine	Look Line s.r.l.	EM50 (TM50)	65351	02/16

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

### Test Chambers

VT Receive Room Volume	157.31 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>

# AIRBORNE SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	11/02/16
Data File No.	G2463.05
Client	The Framework Project, LLC
Description	82.55 mm Concrete, 50.8 mm Kinetics Noise Control Roll-out Isolation Material, 175 mm CLT5 Panel DF PRG 320 Cross Laminated Timber
Specimen Area	10.98 m <sup>2</sup>
Technician	Daniel B. Mohler

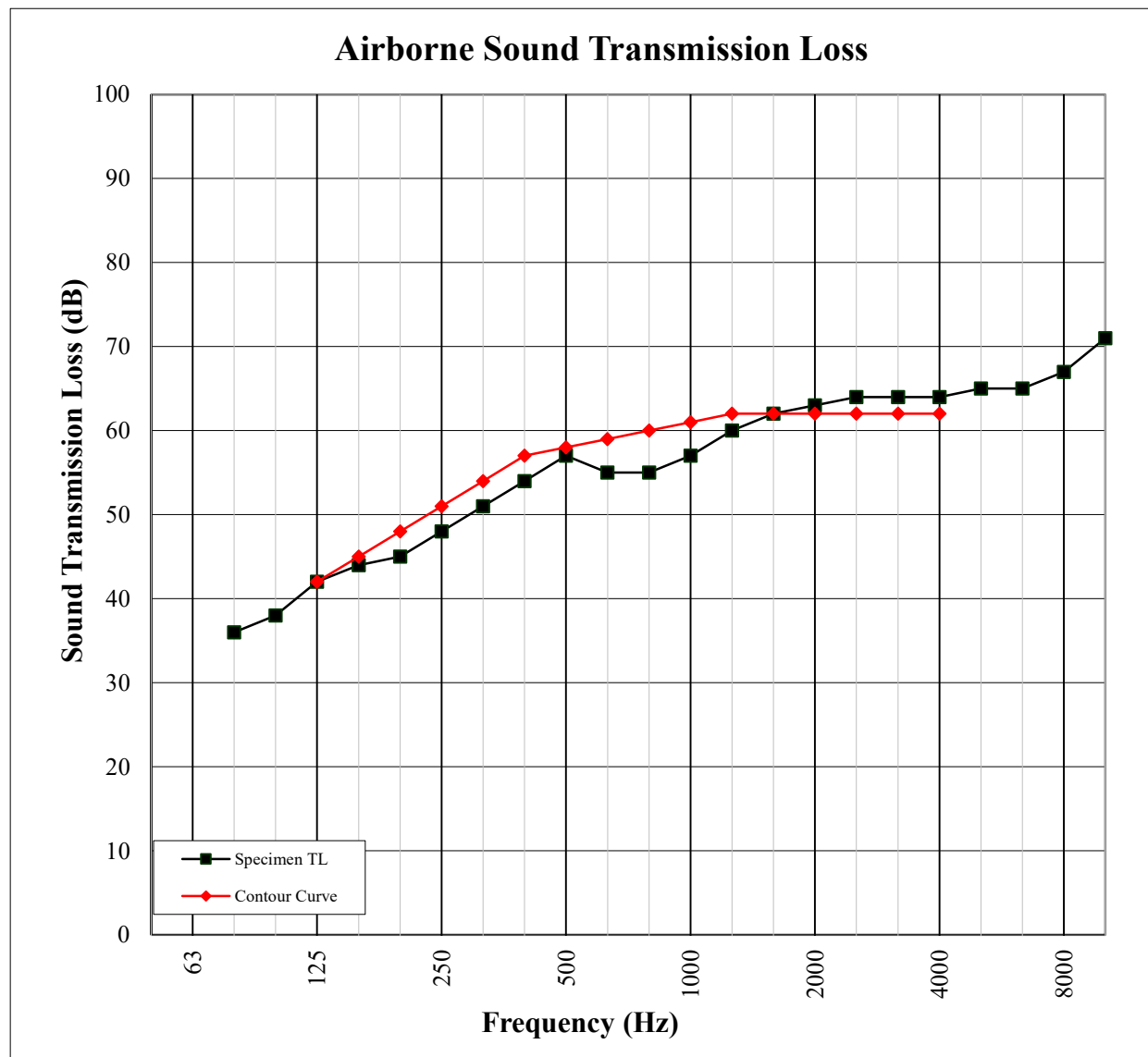
Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	34.0	17.2	119	81	36	3.40	-
100	34.0	13.8	108	70	38	2.70	-
125	32.8	10.4	104	63	42	1.40	0
160	29.9	10.0	105	63	44	1.70	1
200	24.6	10.8	103	60	45	1.80	3
250	28.0	9.5	102	55	48	0.70	3
315	22.5	9.9	105	55	51	0.90	3
400	20.6	8.2	102	50	54	0.80	3
500	23.9	7.7	101	47	57	0.40	1
630	22.3	7.7	101	48	55	0.40	4
800	20.8	7.9	102	49	55	0.70	5
1000	23.5	7.6	102	47	57	0.50	4
1250	22.3	7.6	100	43	60	0.50	2
1600	18.6	7.5	100	41	62	0.20	0
2000	17.5	8.3	100	39	63	0.30	0
2500	15.2	9.2	96	34	64	0.50	0
3150	14.5	10.1	98	35	64	0.50	0
4000	12.3	11.8	98	34	64	0.40	0
5000	10.9	13.7	96	30	65	0.60	-
6300	10.3	16.7	93	26	65	0.80	-
8000	10.8	22.4	94	25	67	0.90	-
10000	10.3	27.9	92	18	71	1.00	-

STC Rating      **58**      *(Sound Transmission Class)*  
Deficiencies      29      *(Sum of Deficiencies)*

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

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<b>Technician</b>	Daniel B. Mohler





G2463.05-113-11-R0



# IMPACT SOUND TRANSMISSION

ASTM E 492

Test Date	11/02/16
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80	33.6	16.5	55	3.3	-
100	33.7	12.2	53	2.6	0
125	30.9	10.2	53	1.8	0
160	27.6	10.0	56	1.7	0
200	24.4	10.5	54	0.8	0
250	27.8	9.9	59	1.0	2
315	21.7	9.5	57	0.9	0
400	20.0	8.2	56	1.1	0
500	21.5	7.6	56	0.5	1
630	19.5	7.8	54	0.7	0
800	18.8	7.8	55	0.6	2
1000	16.9	7.7	53	0.3	1
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1600	12.4	7.4	49	0.3	3
2000	7.8	8.3	48	0.4	5
2500	6.4	9.2	45	0.5	5
3150	5.3	10.2	44	0.6	7
4000	5.2	11.7	45	1.1	-
5000	5.9	13.6	44	0.9	-
6300	6.2	16.7	39	1.1	-
8000	6.6	22.2	32	1.7	-
10000	6.8	27.5	20	2.1	-

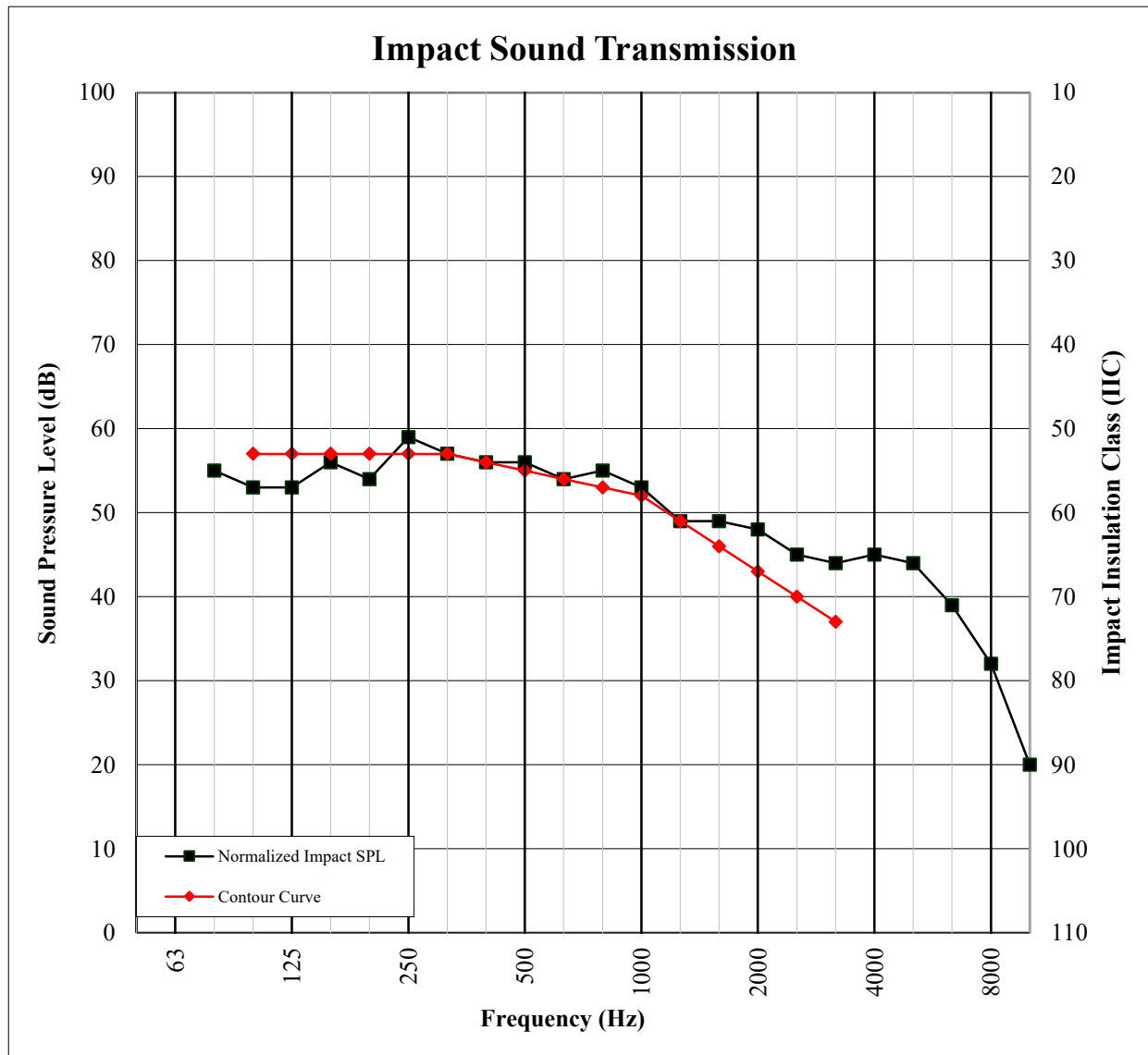
**IIC Rating**      **55**      *(Impact Insulation Class)*  
**Deficiencies**      **26**      *(Sum of Deficiencies)*

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

## IMPACT SOUND TRANSMISSION

ASTM E 492

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<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler



## Photographs

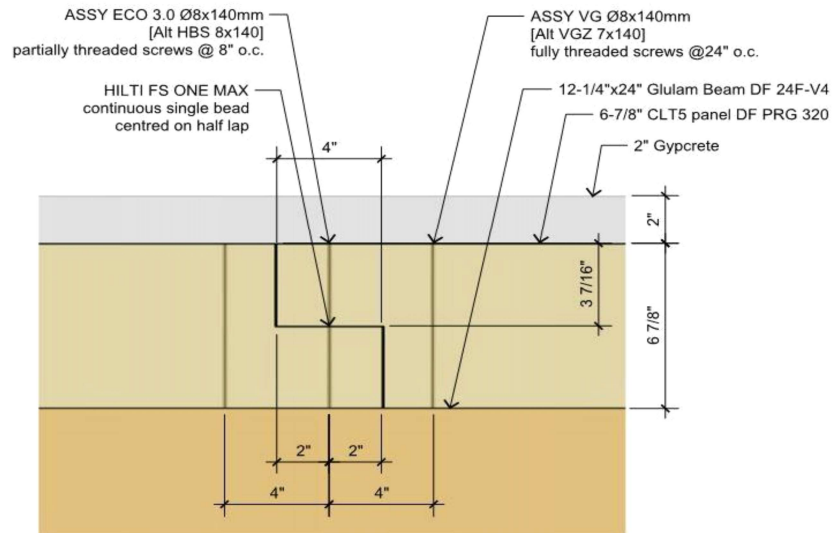


**Construction of Test Specimen**



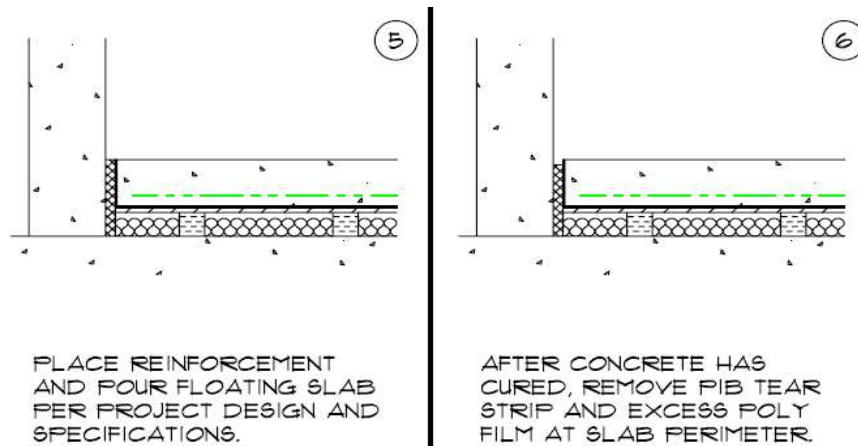
**Construction of Test Specimen**

## Drawing



### B: HALF LAP

### CLT Half Lap Fastening Detail



### Subfloor Installation Detail