

Laboratory Acoustical Test Report

FC23-0771

Impact Insulation Class and Sound Transmission Class

ASTM E492, E90

August 22, 2023

Test Assembly:

Shaw Engineered Wood
Oriented Strand Board Sheathing
MiTek Open Web Truss
Unfaced R-11 Fiberglass Insulation
Resilient Channel
Gypsum Panel

IIC- 51

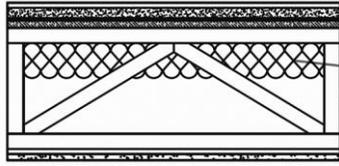
HIIC- 56

LIIC-35

STC-54

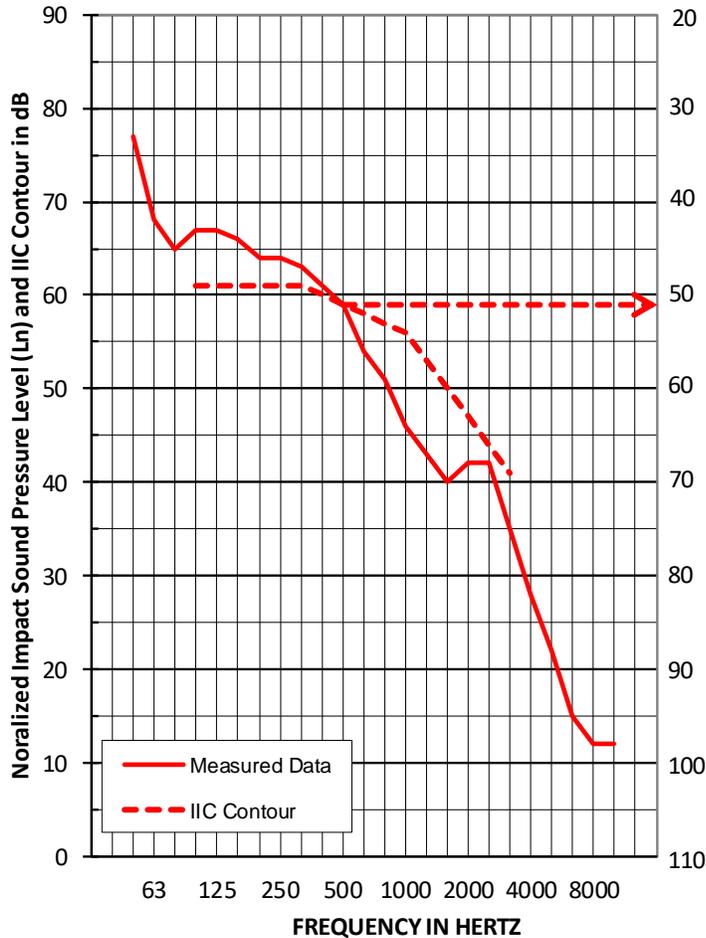
MiTek
16023 Swingley Ridge Road
Chesterfield, MO 63017

Impact Insulation Class Test FC23-0771: IIC 51



Finish Flooring	8.35 mm Shaw Engineered Wood
Subfloor	11.9 mm Oriented Strand Board Sheathing
Subfloor Panel	18.3 mm Oriented Strand Board Sheathing
Truss	254 mm MiTek Open Web Truss
Insulation	88.9 mm Johns Manville Unfaced R-11 Fiberglass Insulation
Resilient Channel	12.7 mm ClarkDietrich RC Deluxe™ Resilient Channel
Gypsum Panel	15.9 mm National Gypsum Type C Gypsum Panel

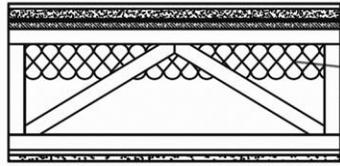
Test Date: February 10, 2023
 Construction Date: February 10, 2023
 Test Specimen Area: 11 sq.m.
 Receiving Room Volume: 157 cu.m.
 Receiving Room Temperature: 17.7-17.7 degrees C
 Receiving Room Relative Humidity: 54-54 percent



95% Confidence		
Freq	Limit	Ln
50	1.9	77
63	3.7	68
80	2.5	65
100	1.8	67
125	1.2	67
160	0.6	66
200	1.0	64
250	0.4	64
315	0.5	63
400	0.5	61
500	0.6	59
630	0.3	54
800	0.4	51
1000	0.2	46
1250	0.3	43
1600	0.2	40
2000	0.2	42
2500	0.2	42
3150	0.3	35
4000	0.5	28
5000	0.5	22
6300	0.7	<u>15</u>
8000	0.5	<u>12</u>
10000	0.4	<u>12</u>

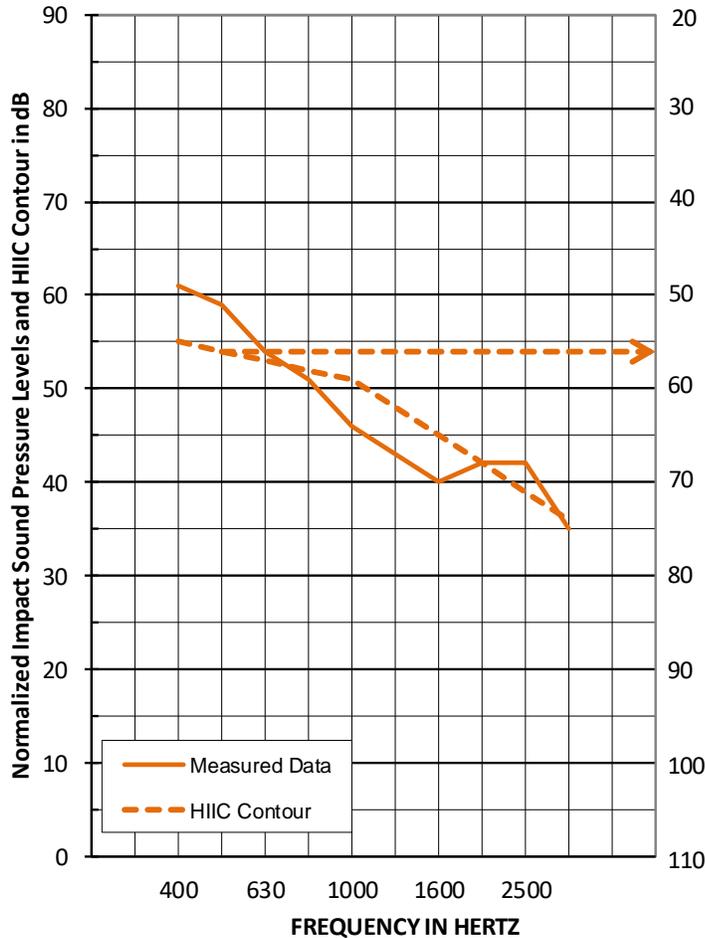
Background Affected

High-frequency Impact Insulation Class Test FC23-0771: HIIC 56



Finish Flooring	8.35 mm Shaw Engineered Wood
Subfloor	11.9 mm Oriented Strand Board Sheathing
Subfloor Panel	18.3 mm Oriented Strand Board Sheathing
Truss	254 mm MiTek Open Web Truss
Insulation	88.9 mm Johns Manville Unfaced R-11 Fiberglass Insulation
Resilient Channel	12.7 mm ClarkDietrich RC Deluxe™ Resilient Channel
Gypsum Panel	15.9 mm National Gypsum Type C Gypsum Panel

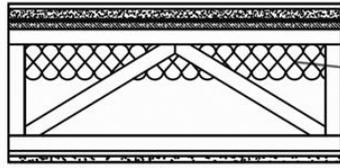
Test Date: February 10, 2023
 Construction Date: February 10, 2023
 Test Specimen Area: 11 sq.m.
 Receiving Room Volume: 157 cu.m.
 Receiving Room Temperature: 17.7-17.7 degrees C
 Receiving Room Relative Humidity: 54-54 percent



95% Confidence		
Freq	Limit	Ln
400	0.5	61
500	0.6	59
630	0.3	54
800	0.4	51
1000	0.2	46
1250	0.3	43
1600	0.2	40
2000	0.2	42
2500	0.2	42
3150	0.3	35

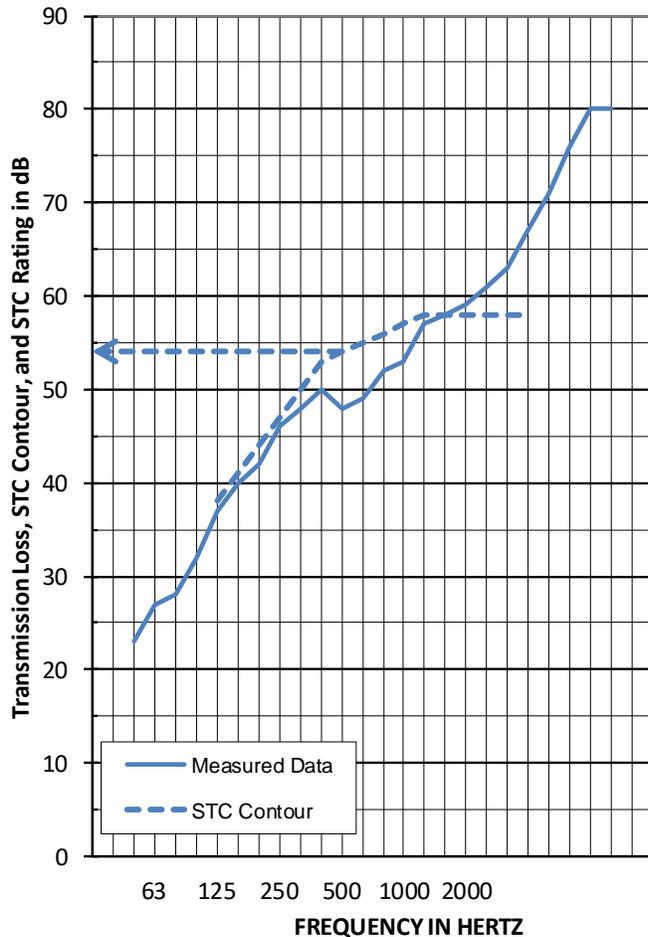
No Ln values were affected by background noise or flanking.

Sound Transmission Class Test FC23-0771: STC 54



Finish Flooring	8.35 mm Shaw Engineered Wood
Subfloor	11.9 mm Oriented Strand Board Sheathing
Subfloor Panel	18.3 mm Oriented Strand Board Sheathing
Truss	254 mm MiTek Open Web Truss
Insulation	88.9 mm Johns Manville Unfaced R-11 Fiberglass Insulation
Resilient Channel	12.7 mm ClarkDietrich RC Deluxe™ Resilient Channel
Gypsum Panel	15.9 mm National Gypsum Type C Gypsum Panel

Test Date: February 10, 2023
 Construction Date: February 10, 2023
 Test Specimen Area: 11 sq.m.
 Source/Receiving Room Volume: 190/157 cu.m.
 Source/Receiving Room Temperature: 17.7/17.7 degrees C
 Source/Receiving Room Relative Humidity: 54/54 percent



Freq	TL
50	23
63	27
80	28
100	32
125	37
160	40
200	42
250	46
315	48
400	50
500	48
630	49
800	52
1000	53
1250	57
1600	58
2000	59
2500	61
3150	63
4000	67
5000	71
6300	<u>76</u>
8000	<u>80</u>
10000	<u>80</u>

Background Affected

Flanking Affected

Background and Flanking Affected

1.0 TEST PROCEDURES

1.1 Impact Insulation Tests

All tests were conducted in accordance with ASTM E492, "Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine." The IIC is a single-number rating derived from the Impact Sound Pressure Level in accordance with ASTM E989, "Standard Classification for Determination of Impact Insulation Class (IIC)." Results are presented above.

95% confidence intervals represent uncertainty for microphone averaging, not tapping positions.

1.2 High-frequency Impact Insulation Class Tests

The HIIC is the High-frequency Impact Insulation Class and is meant to assess the high-frequency impact noise on a floor-ceiling assembly. The higher the value, the better the floor, meaning less noise from high-frequency impacts in the space below.

All tests were conducted in accordance with the requirements of ASTM E492, "Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine," using ASTM E3222 "Standard Classification for Determination of High-frequency Impact Sound Ratings" to calculate the High-frequency Impact Insulation Class (HIIC). Results are presented above.

1.3 Low-frequency Impact Insulation Class Tests

The LIIC is the Low-frequency Impact Insulation Class and is meant to assess the low-frequency impact noise on a floor-ceiling assembly. The higher the value, the better the floor, meaning less noise from low-frequency impacts in the space below.

All tests were conducted in accordance with the requirements of ASTM E492, "Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine," using ASTM E3207 "Standard Classification for Determination of Low-frequency Impact Noise Ratings" to calculate the Low-frequency Impact Insulation Class (LIIC).

Measured result is LIIC-35.

1.4 Transmission Loss Tests

All tests were conducted in accordance with ASTM E90, "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions," using the single-direction method. STC is a single-number rating derived from measured values of Sound Transmission Loss through a test specimen in accordance with ASTM E413, "Classification for Rating Sound Insulation." Results are presented above.

2.0 TEST ASSEMBLY

2.1 Assembly Description

The test assembly consists of:

- Shaw Engineered Wood;
- Oriented Strand Board Sheathing;
- Oriented Strand Board Sheathing;
- MiTek Open Web Truss;
- Johns Manville Unfaced R-11 Fiberglass Insulation;
- ClarkDietrich RC Deluxe™ Resilient Channel;
- National Gypsum Type C Gypsum Panel.

Total mass of the floor-ceiling assembly was 558 kg, having an area density of 50.8 kg/m²).

Product/Element	Thickness	Dimensions	Area ^a	Area Density
Engineered Wood	8.3 mm	127 mm x [varied]	10.98 m ²	7.31 kg/m ²
Oriented Strand Board Sheathing	11.9 mm	1219 mm x 2438 mm	10.98 m ²	11.71 kg/m ²
Oriented Strand Board Sheathing	18.3 mm	1219 mm x 2438 mm	10.98 m ²	11.71 kg/m ²
Open Web Truss	254 mm	88.9 mm x 2933.7 mm	7 trusses	10.6 kg/truss
Fiberglass Insulation	88.9 mm	520.7 mm x 3023 mm	10.98 m ²	1.32 kg/m ²
Resilient Channel	12.7 mm	68.6 mm x 2902 mm	23.2 m	0.03 kg/m ²
Gypsum Panel	15.9 mm	1219 mm x 3023 mm	10.98 m ²	11.9 kg/m ²

^a Where applicable, length or quantity provided instead of area.

2.2 Installation

The materials were installed in the following manner:

- Finish flooring: Loose laid.
- Oriented strand board sheathing: Upper layer fastened to trusses with 6D framing nails 305 mm centers perimeter and in the field. Lower layer fastened to trusses with 8D framing nails 305 mm centers perimeter and in the field.
- Trusses: Installed on 610 mm centers using MiTek hanger brackets.
- Fiberglass insulation: Installed in the cavity between trusses, draped over the resilient channels.
- Resilient channel: Installed on 406 mm centers perpendicular to the trusses.
- Gypsum panel: Fastened to the channels on 203 mm centers with 31.8 mm Type S bugle head screws. The seams of the gypsum panels were sealed with Pecora AC-20 FTR caulk and covered with pressure sensitive tape.

The assembly was constructed on February 10, 2023.

3.0 TESTING PROTOCOL

This report summarizes laboratory acoustical testing contracted by Veneklasen to be completed for MiTek on MiTek's Open Web Truss under Shaw Engineered Wood. The scope of the acoustical testing is for Impact Insulation Class (IIC), Low-frequency Impact Insulation Class (LIIC), High-frequency Impact Insulation Class (HIIC), and Sound Transmission Class (STC), in accordance with ASTM standards E492, E90.

The tests were conducted on February 10, 2023. Details of the tests are contained in this report. Testing was completed in strict accordance with the following standards:

- ASTM E90, "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions"
- ASTM E413, "Classification for Rating Sound Insulation"
- ASTM E492, "Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine"
- ASTM E989, "Standard Classification for Determination of Impact Insulation Class (IIC)"
- ASTM E2235, "Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods"
- ASTM E3207, "Standard Classification for Determination of Low-frequency Impact Noise Ratings."
- ASTM E3222, "Standard Classification for Determination of High-frequency Impact Sound Ratings."

3.1 Equipment

Equipment list and information associated with this test, including calibration information, is included in the Appendix.

3.2 Accreditation and Reporting

Report must be distributed in its entirety except with written authorization from Veneklasen Associates. Test was conducted at IAS-accredited test facility; the full report is available upon request. Detailed test procedures, data for flanking limit tests, repeatability measurements, and reference specimen tests are available on request.

Veneklasen Associates provides no warranties, expressed or implied, regarding the structural integrity or fitness of these assemblies for a specific installation. Any advertising which utilizes this test report or test data must not imply product certification or endorsement by Veneklasen Associates, NVLAP, NIST or the U.S. Government.

Sincerely,
Veneklasen Associates, Inc.



John LoVerde, FASA
Principal

APPENDIX

Test Equipment and Photos

Instrument	Manufacturer	Model	Description	Serial Number	Calibration Date
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02586	04/22
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02587	04/22
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02608	04/22
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02609	04/22
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02610	04/22
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02612	04/22
2-Channel Analog Input	National Instruments	NI 9260	2-Channel Analog Output	INT02573	04/22
Microphone calibrator	Norsonic	34093	Acoustical calibrator	65105	10/22
Receive room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	63741	06/22
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	63740	04/22
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	65969	06/22
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	63747	01/23
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	65968	01/23
Receive room environmental indicator	Comet	T7510	Temperature and humidity transmitter	63812	10/22
				63811	10/22
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	65103	02/22
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	65617	08/22
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	63739	04/22
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	63742	04/22
Source room microphone	PCB Electronics	378C20	Microphone and preamplifier	64906	04/22
Source room environmental indicator	Comet	T7510	Temperature and humidity transmitter	63810	10/22
Tapping machine	Norsonic	Nor277	Tapping machine	2776111	04/22
Test Chamber Receive Room Volume			157 m ³		
Test Chamber Source Room Volume			190 m ³		



Photo 1: View of Source Chamber, finish flooring installation observed



Photo 2: View of Receive Chamber, bottom of gypsum panel observed