Veneklasen Associates
Consultants in Acoustics | Noise | Vibration | AV | IT

Laboratory Acoustical Test Report

FC23-0776

Impact Insulation Class and Sound Transmission Class

ASTM E492, E90

August 24, 2023

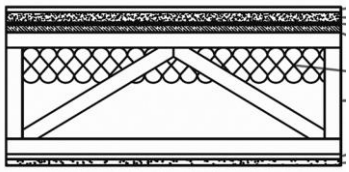
Test Assembly:

Shaw Engineered Wood
Oriented Strand Board Sheathing
MiTek PS10 Truss
Unfaced R-11 Fiberglass Insulation
Resilient Channel
Gypsum Panel

IIC- 52
HIIC- 56
LIIC-35
STC-54

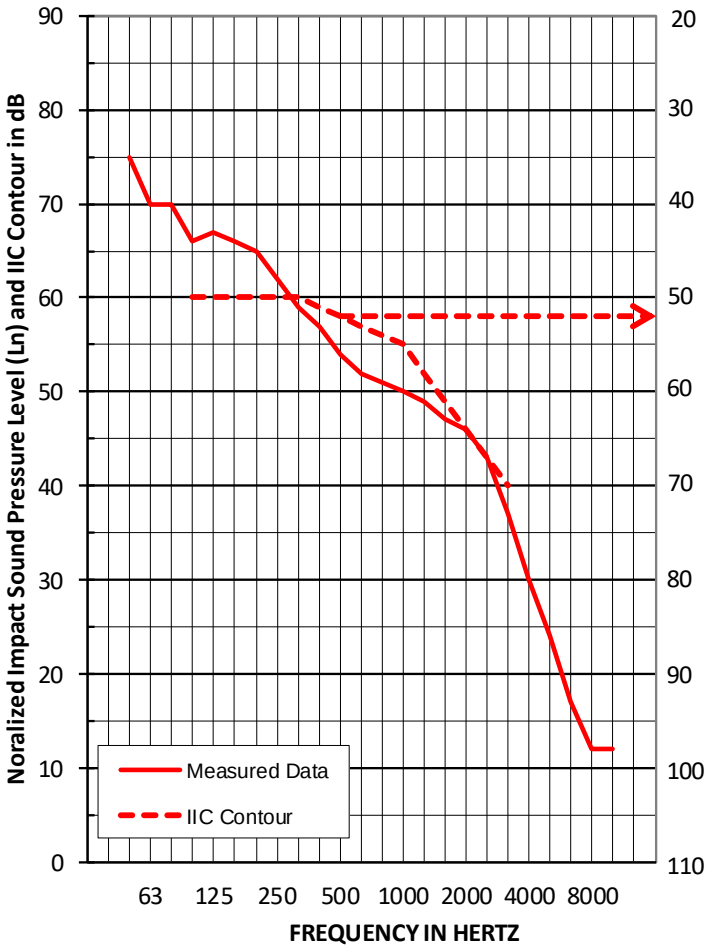
MiTek
16023 Swingley Ridge Road
Chesterfield, MO 63017

Impact Insulation Class Test FC23-0776: IIC 52



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	235 mm MiTek PS10 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

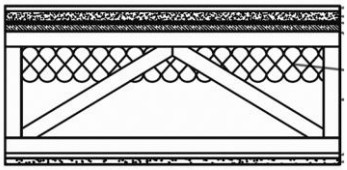
Test Date:	February 18, 2023	
Construction Date:	February 18, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	156	cu.m.
Receiving RoomTemperature:	16.2-16.3	degrees C
Receiving Room Relative Humidity:	56-56	percent



Freq	95% Confidence Limit	Ln
50	1.3	75
63	3.2	70
80	2.4	70
100	1.0	66
125	1.5	67
160	0.9	66
200	0.6	65
250	0.5	62
315	0.5	59
400	0.4	57
500	0.3	54
630	0.4	52
800	0.3	51
1000	0.4	50
1250	0.3	49
1600	0.2	47
2000	0.4	46
2500	0.5	43
3150	0.5	37
4000	0.5	30
5000	0.5	24
6300	0.7	17
8000	0.4	12
10000	0.4	12

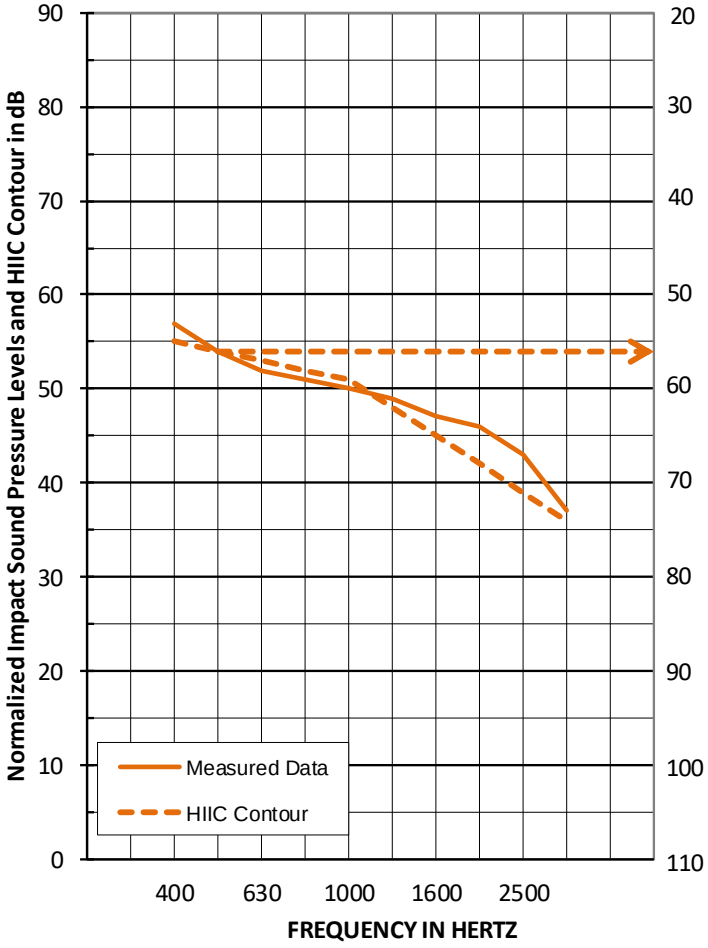
Background Affected

High-frequency Impact Insulation Class Test FC23-0776: 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	235 mm MiTek PS10 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

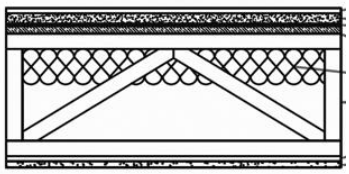
Test Date:	February 18, 2023	
Construction Date:	February 18, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	156	cu.m.
Receiving RoomTemperature:	16.2-16.3	degrees C
Receiving Room Relative Humidity:	56-56	percent



Freq	95% Confidence Limit	Ln
400	0.4	57
500	0.3	54
630	0.4	52
800	0.3	51
1000	0.4	50
1250	0.3	49
1600	0.2	47
2000	0.4	46
2500	0.5	43
3150	0.5	37

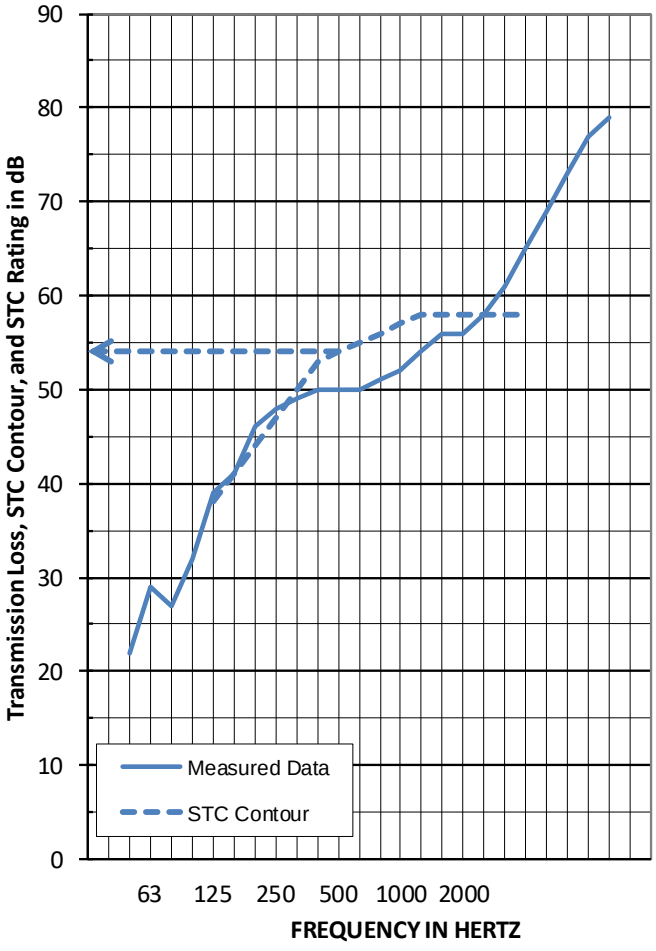
No Ln values were affected by background noise or flanking.

Sound Transmission Class Test FC23-0776: 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	235 mm MiTek PS10 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 18, 2023	
Construction Date:	February 18, 2023	
Test Specimen Area:	11	sq.m.
Source/Receiving Room Volume:	190/156	cu.m.
Source/Receiving Room Temperature:	16.5/16.2	degrees C
Source/Receiving Room Relative Humidity:	56/56	percent



Freq	TL
50	22
63	29
80	27
100	32
125	**39**
160	**41**
200	**46**
250	48
315	49
400	50
500	50
630	50
800	51
1000	52
1250	54
1600	56
2000	56
2500	58
3150	61
4000	65
5000	69
6300	73
8000	77
10000	**79**

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 PS10 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 560 kg, having an area density of 51.0 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
Posi-Strut Truss	235 mm	88.9 mm x 2933.7 mm	7 trusses	10.9 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:

- Engineered wood: 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 joist 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 18, 2023.

3.0 TESTING PROTOCOL

This report summarizes laboratory acoustical testing contracted by Veneklasen to be completed for MiTek on MiTek's PS10 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 18, 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			156 m³		
Test Chamber Source Room Volume			190 m³		

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

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