Laboratory Acoustical Test Report

FC22-0551R2

Impact Insulation Class and Sound Transmission Class

ASTM E492, E90

October 17, 2024

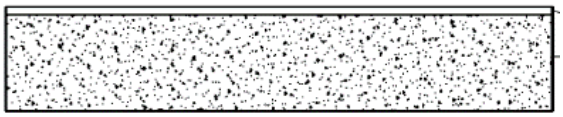
Test Assembly:

Urban Surfaces Studio 12/20 SPC Flooring
5000 PSI Concrete Slab

IIC-57
HIIC-61
LIIC-70
ΔIIC-25
ΔHIIC-30
STC-52

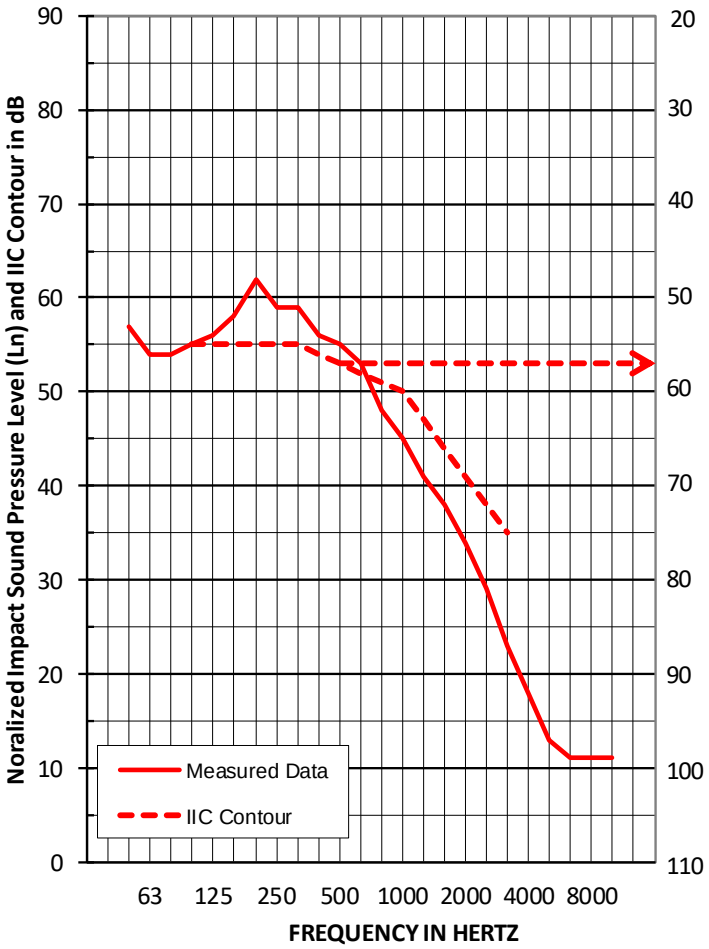
Veneklasen Associates
1711 16th Street
Santa Monica, California

Impact Insulation Class Test FC22-0551: IIC 57



Finish Flooring	5 mm Urban Surfaces Studio 12/20 SPC Flooring
Assembly Type	152.4 mm 5000 PSI Concrete

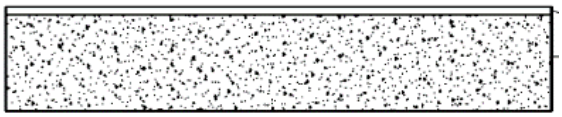
Test Date:	September 17, 2022	
Construction Date:	September 17, 2022	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	22.6-22.5	degrees C
Receiving Room Relative Humidity:	57-58	percent



Freq	95% Confidence Limit	Ln
50	1.7	57
63	3.1	54
80	2.3	54
100	1.0	55
125	1.3	56
160	1.0	58
200	1.0	62
250	0.4	59
315	0.7	59
400	0.5	56
500	0.5	55
630	0.3	53
800	0.5	48
1000	0.3	45
1250	0.4	41
1600	0.4	38
2000	0.7	34
2500	0.7	29
3150	0.8	23
4000	0.8	18
5000	0.8	13
6300	0.5	11
8000	0.6	11
10000	0.6	11

Background Affected

High-frequency Impact Insulation Class Test FC22-0551: HIIC 61



Finish Flooring	5 mm Urban Surfaces Studio 12/20 SPC Flooring
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Test Date:	September 17, 2022	
Construction Date:	September 17, 2022	
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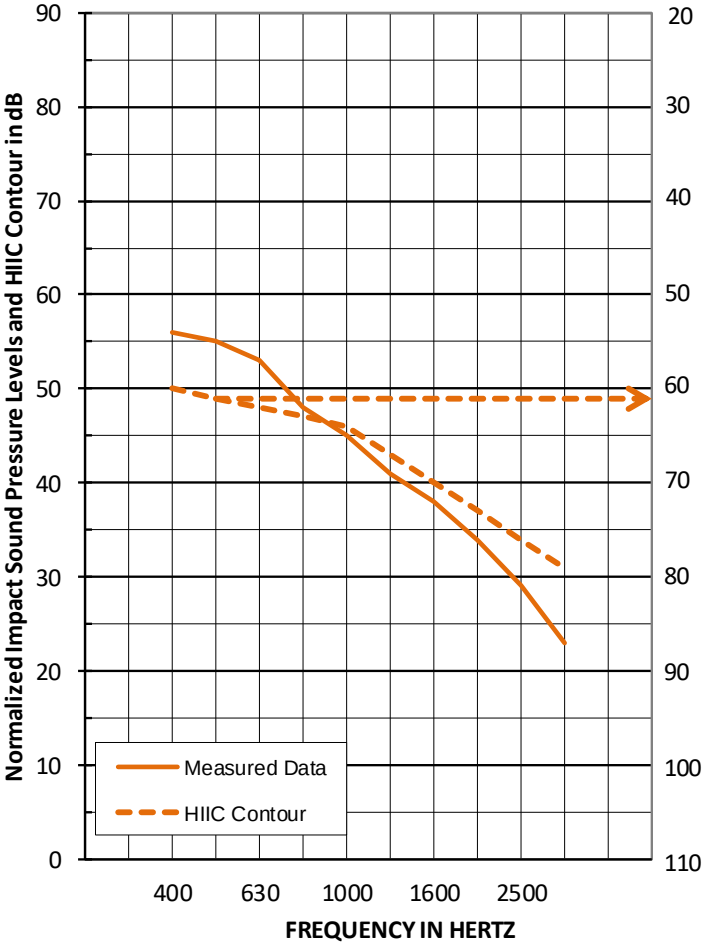
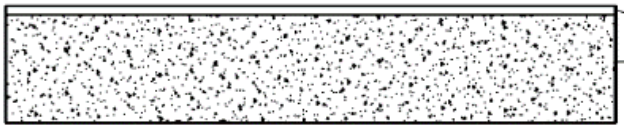
Receiving RoomTemperature:	22.6-22.5	degrees C
Receiving Room Relative Humidity:	57-58	percent



Freq	95% Confidence Limit	Ln
400	0.5	56
500	0.5	55
630	0.3	53
800	0.5	48
1000	0.3	45
1250	0.4	41
1600	0.4	38
2000	0.7	34
2500	0.7	29
3150	0.8	23

No Ln values were affected by background noise or flanking.

Improvement in Impact Insulation Class Test FC22-0551: ΔIIC 25



Finish Flooring	5 mm Urban Surfaces Studio 12/20 SPC Flooring
Assembly Type	152.4 mm 5000 PSI Concrete

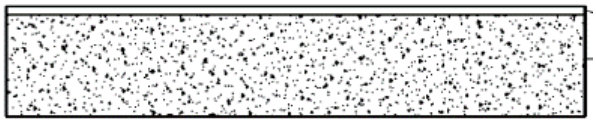
Test Date:	September 17, 2022	
Construction Date:	September 17, 2022	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	22.6-22.5	degrees C
Receiving Room Relative Humidity:	57-58	percent

	Third-Octave Band Sound Pressure Level				
Freq	Bare Concrete	Floor Tested	Difference in dB	Reference Floor	Final Array
100	56.9	54.7	2.2	67.0	64.8
125	58.4	56.1	2.3	67.5	65.2
160	61.9	58.4	3.5	68.0	64.5
200	66.3	61.8	4.5	68.5	64.0
250	65.6	59.5	6.1	69.0	62.9
315	67.2	58.8	8.4	69.5	61.1
400	68.1	56.5	11.6	70.0	58.4
500	67.8	54.9	12.9	70.5	57.6
630	68.8	53.4	15.4	71.0	55.6
800	70.9	48.5	22.4	71.5	49.1
1000	71.7	45.1	26.6	72.0	45.4
1250	71.6	40.7	30.9	72.0	41.1
1600	71.6	37.7	33.9	72.0	38.1
2000	71.2	33.5	37.7	72.0	34.3
2500	71.2	29.3	41.9	72.0	30.1
3150	70.3	22.8	47.5	72.0	24.5

No receiving levels were affected by background noise.

Calculated Improvement in Impact Insulation Class: ΔIIC 25

Improvement in High-frequency Impact Insulation Class Test FC22-0551: ΔHIIC 30



Finish Flooring	5 mm Urban Surfaces Studio 12/20 SPC Flooring
Assembly Type	152.4 mm 5000 PSI Concrete

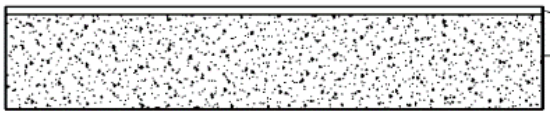
Test Date:	September 17, 2022	
Construction Date:	September 17, 2022	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	22.6-22.5	degrees C
Receiving Room Relative Humidity:	57-58	percent

	Third-Octave Band Sound Pressure Level				
Freq	Bare Concrete	Floor Tested	Difference in dB	Reference Floor	Final Array
400	68.1	56.5	11.6	70.0	58.4
500	67.8	54.9	12.9	70.5	57.6
630	68.8	53.4	15.4	71.0	55.6
800	70.9	48.5	22.4	71.5	49.1
1000	71.7	45.1	26.6	72.0	45.4
1250	71.6	40.7	30.9	72.0	41.1
1600	71.6	37.7	33.9	72.0	38.1
2000	71.2	33.5	37.7	72.0	34.3
2500	71.2	29.3	41.9	72.0	30.1
3150	70.3	22.8	47.5	72.0	24.5

No receiving levels were affected by background noise.

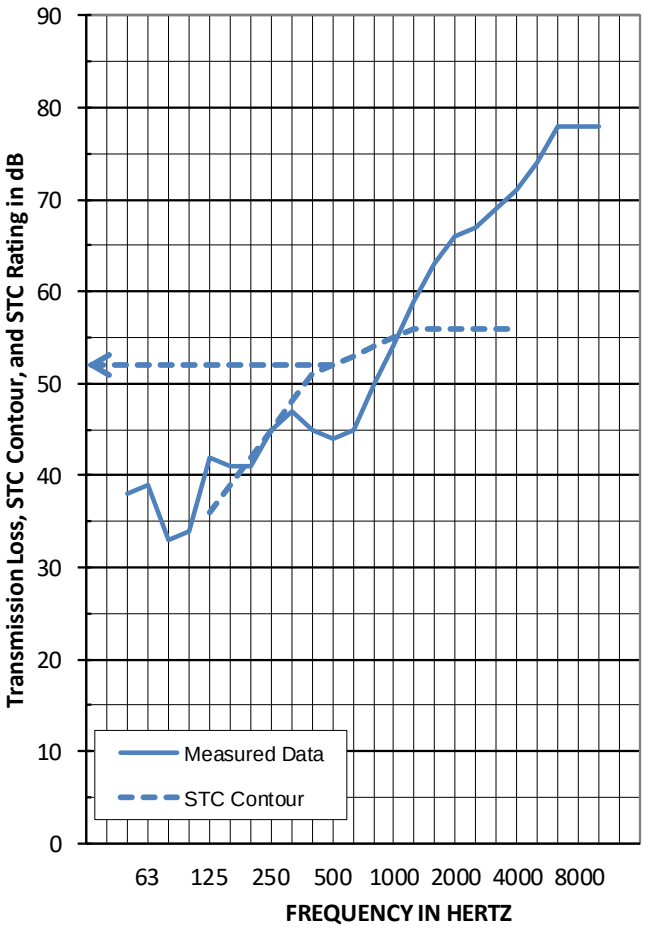
Calculated Improvement in High-frequency Impact Insulation Class: ΔHIIC 30

Sound Transmission Class Test FC22-0551: STC 52



Finish Flooring	5 mm Urban Surfaces Studio 12/20 SPC Flooring
Assembly Type	152.4 mm 5000 PSI Concrete

Test Date:	September 17, 2022	
Construction Date:	September 17, 2022	
Test Specimen Area:	11	sq.m.
Source/Receiving Room Volume:	190/159	cu.m.
Source/Receiving Room Temperature:	22.5/22.4	degrees C
Source/Receiving Room Relative Humidity:	58/58	percent



Freq	TL
50	**38**
63	**39**
80	33
100	**34**
125	**42**
160	**41**
200	41
250	45
315	47
400	45
500	44
630	45
800	50
1000	54
1250	59
1600	63
2000	66
2500	67
3150	69
4000	71
5000	74
6300	78
8000	78
10000	78

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-70.

1.4 Delta Impact Insulation Class Tests

All tests were conducted in accordance with ASTM E2179, "Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission through Concrete Floors." The Delta Impact Insulation Class (ΔIIC) describes the effectiveness of floor coverings in reducing impact noise from a standard tapping machine. The test is conducted exclusively using concrete subfloor assemblies. Averaging time used during measurement of sound pressure levels was 18 seconds. Results are presented above.

1.5 High-frequency Delta Impact Insulation Class Tests

The ΔHIIC is the High-frequency Delta Impact Insulation Class and is meant to describe the effectiveness of floor coverings in reducing impact noise from a standard tapping machine within the high-frequency range per ASTM E3222. The higher the value, the more effective the floor covering at reducing high-frequency impact sounds.

All tests were conducted in accordance with ASTM E2179, "Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission through

Concrete Floors," using ASTM E3222 "Standard Classification for Determination of High-frequency Impact Sound Ratings." Averaging time used during measurement of sound pressure levels was 18 seconds. Results are presented above.

1.6 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:

- Urban Surfaces Studio 12/20 SPC Flooring, Finish Flooring;
- 5000 PSI Concrete Slab, Concrete Slab;

Total mass of the floor-ceiling assembly was 4111.7 kg, having an area density of 374.46 kg/m^2).

Product/Element	Thickness	Dimensions	Area	Area Density
Urban Surfaces Studio 12/20	5 mm	1219 mm x 178 mm	10.98 m^2	8.28 kg/m^2
Concrete Slab	152.4 mm	3023 mm x 3632 mm	10.98 m^2	366.18 kg/m^2

2.2 Installation

The materials were installed in the following manner:

- Urban Surfaces Studio 12/20 SPC Flooring: Loose laid
- Concrete Slab: Installed in a test frame flush to the source room. Mats of #5 reinforcing bars were placed 25.4 mm from both the top and bottom of the slab, with bars spaced on 305 mm centers in both directions. No noticeable shrinkage or cracking was visible on the specimen.

The assembly was constructed on September 17, 2022.

3.0 TESTING PROTOCOL

This report summarizes laboratory acoustical testing contracted by Veneklasen to be completed for Veneklasen Associates on 5.0 mm Urban Surfaces Studio 12/20 SPC Flooring. The scope of the acoustical testing is for Impact Insulation Class (IIC), High-frequency Impact Insulation Class (HIIC), Low-frequency Impact Insulation Class (LIIC), Delta Impact Insulation Class (ΔIIC), Delta High-frequency Impact Insulation Class (ΔHIIC), and Sound Transmission Class (STC), in accordance with ASTM standards E492, E90.

The tests were conducted on September 17, 2022. 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 E2179, “Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission through Concrete Floors”
- 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
Microphone Calibrator	Norsonic	34093	Acoustical Calibrator	65105	10/21
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	64340	10/21
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63744	09/21
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	65968	01/22
Receive Room Environmental Indicator	Comet	T7510	Temperature and Humidity Transmitter	63810 63811	10/21 10/21
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/22
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64902	12/21
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63739	07/22
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	63812	10/21
Tapping Machine	Norsonic	Nor277	Tapping Machine	INT00936	02/22
Test Chamber Receive Room Volume			158.86 m³ (5610.1 ft³)		
Test Chamber Source Room Volume			190 m³ (6709.79 ft³)		

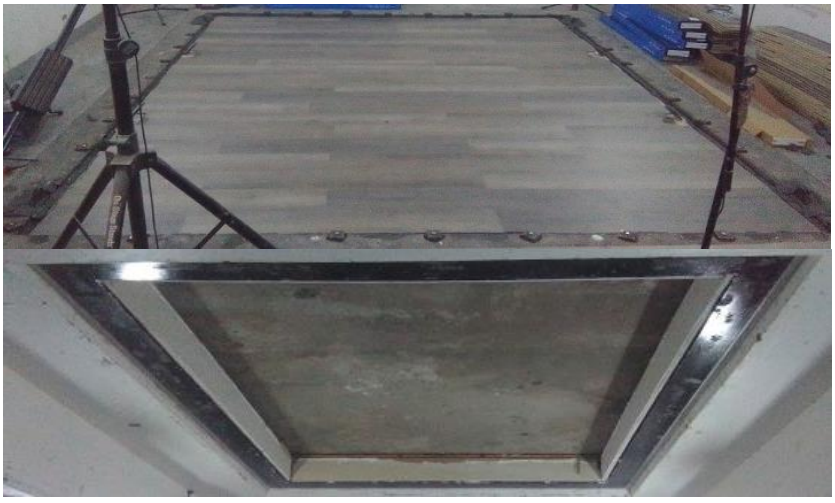


Photo 1: View of Source Chamber, finish flooring installation observed

Photo 2: View of Receive Chamber, bottom of ceiling observed