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

Laboratory Acoustical Test Report

FC23-0885

Impact Insulation Class, Delta Impact Insulation Class, and Sound Transmission Class

ASTM E492, E2179, E90

December 1, 2023

Test Assembly:
Urban Surfaces 2101 Pearl
Urban Surfaces FloorSilencer Pro
152 mm Concrete Slab

IIC-54
HIIC-55
LIIC- 64
ΔIIC-22
ΔHIIC-24
STC-53

URBAN SURFACES
1121 Olympic Drive
Corona, California 92881

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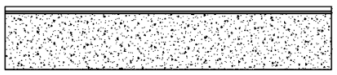
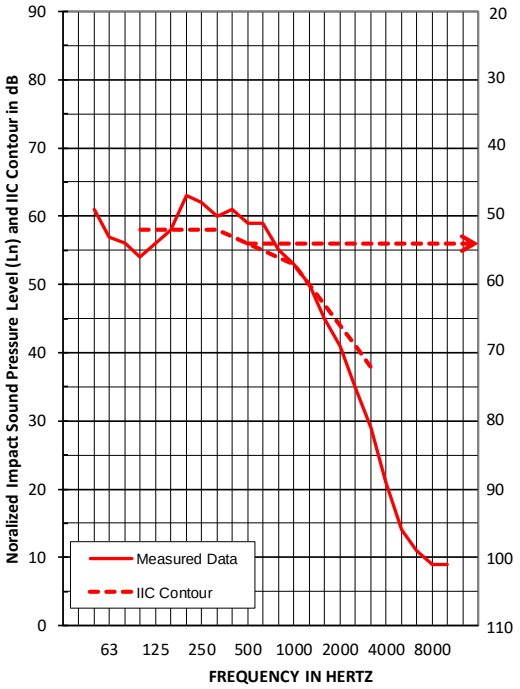
Impact Insulation Class Test FC23-0885: IIC 54



Finish Flooring	2 mm Urban Surfaces 2101 Pearl (Adhered to Sound Mat)
Sound Mat	1.3 mm Urban Surfaces FloorSilencer Pro (Adhered to Assembly)
Assembly Type	152 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

Test Date:	October 14, 2023	
Construction Date:	October 14, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	19.2-19.3	degrees C
Receiving Room Relative Humidity:	65-66	percent



Freq	95% Confidence Limit	Ln
50	2.3	61
63	2.8	57
80	1.8	56
100	0.7	54
125	1.1	56
160	0.8	58
200	0.9	63
250	0.8	62
315	0.6	60
400	0.4	61
500	0.4	59
630	0.3	59
800	0.5	55
1000	0.5	53
1250	0.5	50
1600	0.7	45
2000	0.7	41
2500	0.9	35
3150	1.1	29
4000	1.2	21
5000	1.1	14
6300	0.6	11
8000	0.2	9
10000	0.1	9

Background Affected

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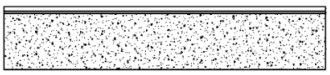
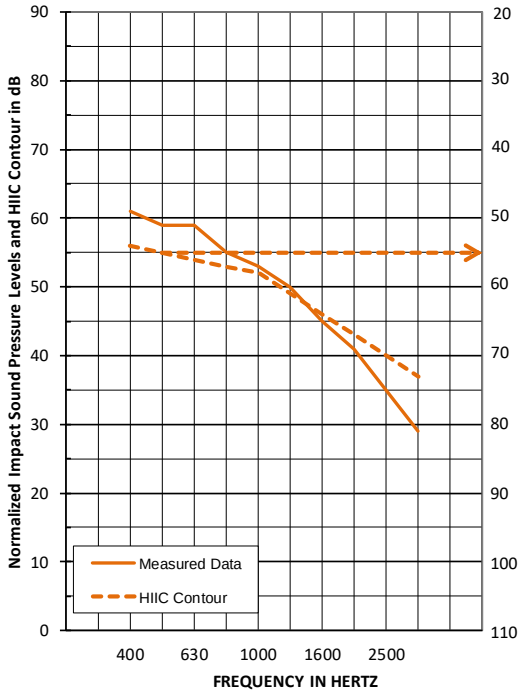
High-frequency Impact Insulation Class Test FC23-0885: HIIC 55



Finish Flooring	2 mm Urban Surfaces 2101 Pearl (Adhered to Sound Mat)
Sound Mat	1.3 mm Urban Surfaces FloorSilencer Pro (Adhered to Assembly)
Assembly Type	152 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

Test Date:	October 14, 2023	
Construction Date:	October 14, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	19.2-19.3	degrees C
Receiving Room Relative Humidity:	65-66	percent



Freq	95% Confidence Limit	Ln
400	0.4	61
500	0.4	59
630	0.3	59
800	0.5	55
1000	0.5	53
1250	0.5	50
1600	0.7	45
2000	0.7	41
2500	0.9	35
3150	1.1	29

No Ln values were affected by background noise or flanking.

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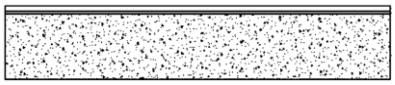
Improvement in Impact Insulation Class Test FC23-0885: ΔIIC 22



Finish Flooring	2 mm Urban Surfaces 2101 Pearl (Adhered to Sound Mat)
Sound Mat	1.3 mm Urban Surfaces FloorSilencer Pro (Adhered to Assembly)
Assembly Type	152 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

Test Date:	October 14, 2023	
Construction Date:	October 14, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	19.2-19.3	degrees C
Receiving Room Relative Humidity:	65-66	percent

Freq	Third-Octave Band Sound Pressure Level				
	Bare Concrete	Floor Tested	Difference in dB	Reference Floor	Final Array
100	55.6	54.3	1.3	67.0	66.0
125	57.8	55.6	2.2	67.5	65.0
160	60.7	58.1	2.6	68.0	65.0
200	66.1	63.3	2.8	68.5	66.0
250	65.2	62.2	3.0	69.0	66.0
315	63.9	59.5	4.4	69.5	65.0
400	66.6	60.7	5.9	70.0	64.0
500	66.2	58.8	7.4	70.5	63.0
630	69.3	59.3	10.0	71.0	61.0
800	69.5	55.3	14.2	71.5	57.0
1000	69.7	52.7	17.0	72.0	55.0
1250	70.2	49.9	20.3	72.0	52.0
1600	69.9	45.4	24.5	72.0	47.0
2000	70.2	41.2	29.0	72.0	43.0
2500	70.3	35.1	35.2	72.0	37.0
3150	70.0	28.8	41.2	72.0	31.0

No receiving levels were affected by background noise.

Calculated Improvement in Impact Insulation Class: ΔIIC 22

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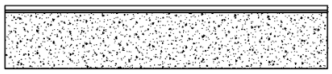
Improvement in High-frequency Impact Insulation Class Test FC23-0885: ΔHIIC 24



Finish Flooring	2 mm Urban Surfaces 2101 Pearl (Adhered to Sound Mat)
Sound Mat	1.3 mm Urban Surfaces FloorSilencer Pro (Adhered to Assembly)
Assembly Type	152 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

Test Date:	October 14, 2023	
Construction Date:	October 14, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	19.2-19.3	degrees C
Receiving Room Relative Humidity:	65-66	percent

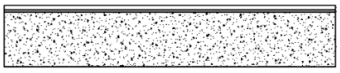
	Third-Octave Band Sound Pressure Level				
Freq	Bare Concrete	Floor Tested	Difference in dB	Reference Floor	Final Array
400	66.6	60.7	5.9	70.0	64.0
500	66.2	58.8	7.4	70.5	63.0
630	69.3	59.3	10.0	71.0	61.0
800	69.5	55.3	14.2	71.5	57.0
1000	69.7	52.7	17.0	72.0	55.0
1250	70.2	49.9	20.3	72.0	52.0
1600	69.9	45.4	24.5	72.0	47.0
2000	70.2	41.2	29.0	72.0	43.0
2500	70.3	35.1	35.2	72.0	37.0
3150	70.0	28.8	41.2	72.0	31.0

No receiving levels were affected by background noise.

Calculated Improvement in High-frequency Impact Insulation Class: ΔHIIC 24

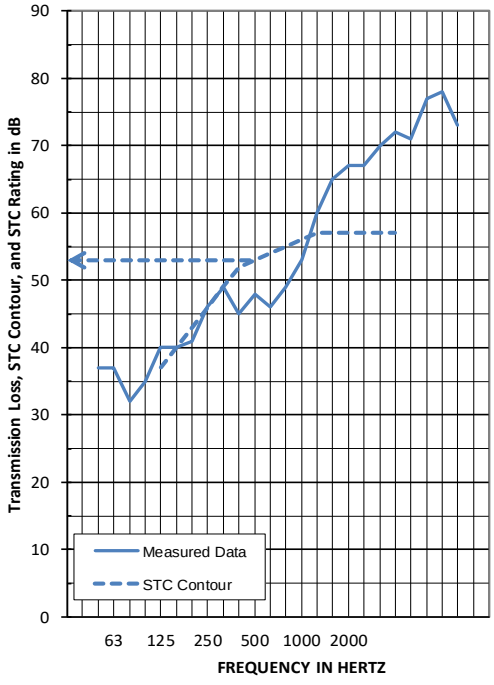
Veneklasen Associates

Sound Transmission Class Test FC23-0885: STC 53



Finish Flooring	2 mm Urban Surfaces 2101 Pearl (Adhered to Sound Mat)
Sound Mat	1.3 mm Urban Surfaces FloorSilencer Pro (Adhered to Assembly)
Assembly Type	152 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

Test Date:	October 14, 2023	
Construction Date:	October 14, 2023	
Test Specimen Area:	11	sq.m.
Source/Receiving Room Volume:	190/159	cu.m.
Source/Receiving Room Temperature:	19.3/18.4	degrees C
Source/Receiving Room Relative Humidity:	65/65	percent



Freq	TL
50	**37**
63	**37**
80	32
100	**35**
125	**40**
160	**40**
200	41
250	46
315	49
400	45
500	48
630	46
800	49
1000	53
1250	60
1600	65
2000	67
2500	67
3150	70
4000	72
5000	71
6300	77
8000	78
10000	73

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-64.

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. Results are presented above.

Commented [SR1]: Required per E2179

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." 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 2101 Pearl;
- Urban Surfaces FloorSilencer Pro;
- Concrete Slab (5000 PSI) with 2-mil Polyethylene Protective Sheeting.

Total mass of the floor-ceiling assembly was 4075 kg, having an area density of 371.1 kg/m^2.

Product/Element	Thickness	Dimensions	Area	Area Density
Urban Surfaces 2101 Pearl	2 mm	1219 mm x 178 mm	10.98 m^2	3.69 kg/m^2
Urban Surfaces FloorSilencer Pro	1.3 mm	914 mm x 3023 mm	10.98 m^2	1.27 kg/m^2
Concrete Slab	152 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:

- Finish flooring: Adhered to underlayment with manufacturer's adhesive using a 0.79 mm by 1.59 mm by 0.79 mm trowel. Adhesive allowed to cure per manufacturer's specifications.
- Flooring underlayment: The underlayment was adhered to 2-mil polyethylene plastic sheeting with the manufacturer's adhesive, which was spread using a 0.79 mm by 1.59 mm by 0.79 mm trowel. Adhesive was allowed to cure per manufacturer's specifications.
- Protective sheeting: 2-mil polyethylene plastic sheeting installed on top of concrete slab. Sheeting adhered to floor slab with Sprayway Fast Tack 85 spray adhesive.
- 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. The test frame was isolated from the structure with a dense neoprene gasket. This slab was an existing assembly, reused. No noticeable shrinkage or cracking was visible.

The assembly was constructed on October 14, 2023.

3.0 TESTING PROTOCOL

This report summarizes laboratory acoustical testing contracted by Veneklasen to be completed for URBAN SURFACES on Urban Surfaces 2101 Pearl over Urban Surfaces FloorSilencer Pro. The scope of the acoustical testing is for Impact Insulation Class (IIC), Low-frequency Impact Insulation Class (LIIC), High-frequency Impact Insulation Class (HIIC), Delta Impact Insulation Class (ΔIIC), Delta High-frequency Impact Insulation Class (ΔHIIC), and Sound Transmission Class (STC), in accordance with ASTM standards E492, E2179, E90.

The tests were conducted on October 14, 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 E2179, “Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission through Concrete Floors”
- 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	03/23
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02587	03/23
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02608	03/23
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02609	03/23
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02610	03/23
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02612	03/23
2-Channel Analog Output	National Instruments	NI 9260	2-Channel Analog Output	INT02611	N/A
Microphone calibrator	Norsonic	34093	Acoustical calibrator	65105	10/22
Receive room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	63739	03/23
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	INT02910	02/23
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	INT02911	02/23
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	63742	03/23
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	63741	05/23
Receive room environmental indicator	Comet	T7510	Temperature and humidity transmitter	63810	10/22
				63811	10/22
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	63740	03/23
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	64905	03/23
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	65103	02/23
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	64910	02/23
Source room microphone	PCB Electronics	378C20	Microphone and preamplifier	INT01089	02/23
Source room environmental indicator	Comet	T7510	Temperature and humidity transmitter	63812	10/22
Tapping machine	Norsonic	Nor277	Tapping machine	INT03333	02/23
Test Chamber Receive Room Volume			159 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 concrete slab observed