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

Laboratory Acoustical Test Report

FC23-0757

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

ASTM E492, E2179, E90

August 11, 2023

Test Assembly:

Urban Surfaces Studio 12 Luxury Vinyl Plank Flooring
Urban Surfaces Floor Silencer Boost
6-inch 5000 PSI Concrete Slab

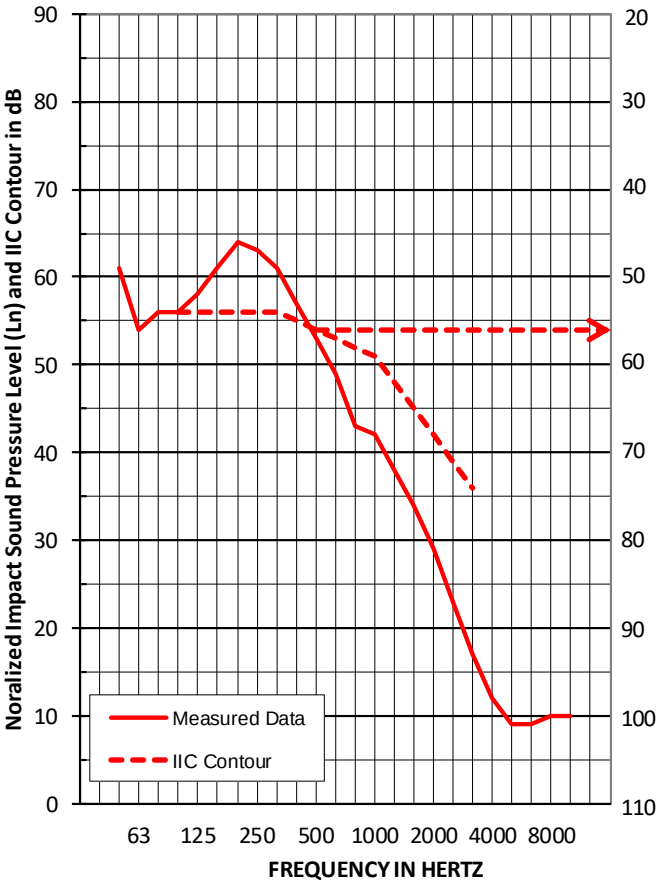
IIC-56
HIIC-63
LIIC-64
ΔIIC-24
ΔHIIC-34
STC-53

URBAN SURFACES
1121 Olympic Drive
Corona, California 92881

Impact Insulation Class Test FC23-0757: IIC 56

Finish Flooring	5 mm Urban Surfaces Studio 12 Luxury Vinyl Plank
Underlayment	6 mm Urban Surfaces Floor Silencer Boost
Assembly Type	152.4 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

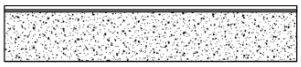
Test Date:	May 8, 2023	
Construction Date:	May 8, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	17.6-17.6	degrees C
Receiving Room Relative Humidity:	68-68	percent



Freq	95% Confidence Limit	Ln
50	2.1	61
63	3.1	54
80	2.7	56
100	0.7	56
125	0.9	58
160	0.8	61
200	1.1	64
250	0.6	63
315	0.4	61
400	0.3	57
500	0.5	53
630	0.3	49
800	0.6	43
1000	0.3	42
1250	0.4	38
1600	0.4	34
2000	0.4	29
2500	0.6	23
3150	0.8	17
4000	0.8	12
5000	0.5	9
6300	0.4	9
8000	0.3	10
10000	0.3	10

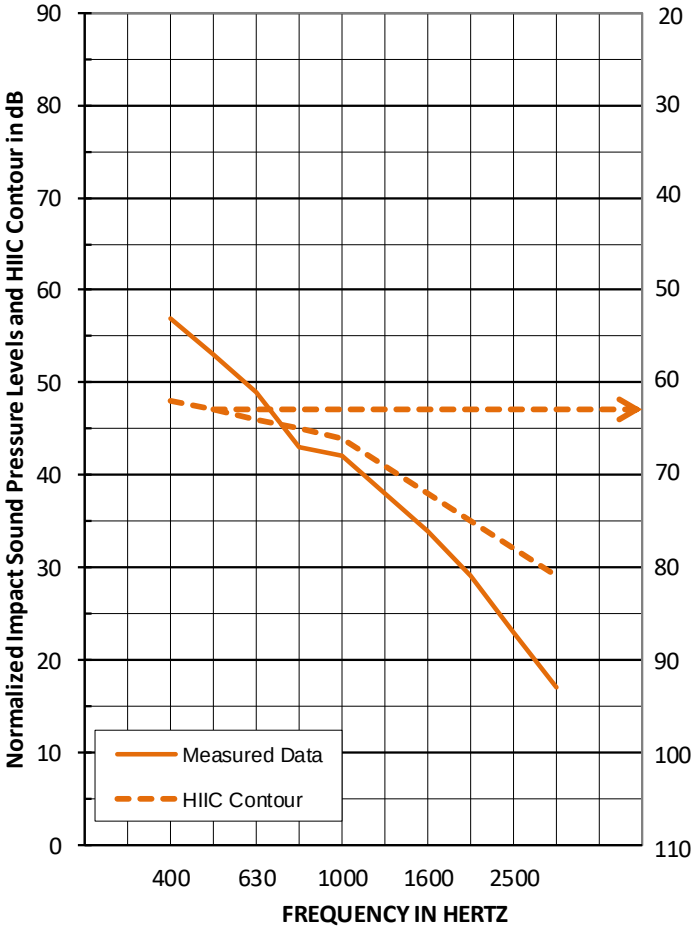
Background Affected

High-frequency Impact Insulation Class Test FC23-0757: HIIC 63



Finish Flooring	5 mm Urban Surfaces Studio 12 Luxury Vinyl Plank
Underlayment	6 mm Urban Surfaces Floor Silencer Boost
Assembly Type	152.4 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

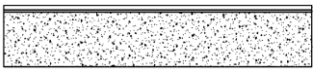
Test Date:	May 8, 2023	
Construction Date:	May 8, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	17.6-17.6	degrees C
Receiving Room Relative Humidity:	68-68	percent



Freq	95% Confidence Limit	Ln
400	0.3	57
500	0.5	53
630	0.3	49
800	0.6	43
1000	0.3	42
1250	0.4	38
1600	0.4	34
2000	0.4	29
2500	0.6	23
3150	0.8	17

No Ln values were affected by background noise or flanking.

Improvement in Impact Insulation Class Test FC23-0757: ΔIIC 24



Finish Flooring	5 mm Urban Surfaces Studio 12 Luxury Vinyl Plank
Underlayment	6 mm Urban Surfaces Floor Silencer Boost
Assembly Type	152.4 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

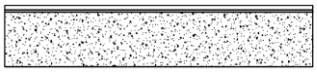
Test Date:	May 8, 2023	
Construction Date:	May 8, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	17.6-17.6	degrees C
Receiving Room Relative Humidity:	68-68	percent

	Third-Octave Band Sound Pressure Level				
Freq	Bare Concrete	Floor Tested	Difference in dB	Reference Floor	Final Array
100	58.3	56.4	1.9	67.0	65.0
125	60.1	58.0	2.1	67.5	65.0
160	62.9	60.7	2.2	68.0	66.0
200	66.8	64.1	2.7	68.5	66.0
250	67.6	62.6	5.0	69.0	64.0
315	68.7	61.4	7.3	69.5	62.0
400	66.7	56.9	9.8	70.0	60.0
500	68.6	53.1	15.5	70.5	55.0
630	71.4	49.1	22.3	71.0	49.0
800	71.0	43.2	27.8	71.5	44.0
1000	72.5	42.3	30.2	72.0	42.0
1250	72.0	38.5	33.5	72.0	38.0
1600	71.9	33.7	38.2	72.0	34.0
2000	72.0	28.7	43.3	72.0	29.0
2500	71.6	22.9	48.7	72.0	23.0
3150	70.6	16.9	53.7	72.0	18.0

No receiving levels were affected by background noise.

Calculated Improvement in Impact Insulation Class: ΔIIC 24

Improvement in High-frequency Impact Insulation Class Test FC23-0757: ΔHIIC 34



Finish Flooring	5 mm Urban Surfaces Studio 12 Luxury Vinyl Plank
Underlayment	6 mm Urban Surfaces Floor Silencer Boost
Assembly Type	152.4 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

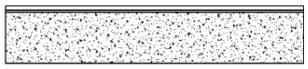
Test Date:	May 8, 2023	
Construction Date:	May 8, 2023	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	159	cu.m.
Receiving RoomTemperature:	17.6-17.6	degrees C
Receiving Room Relative Humidity:	68-68	percent

	Third-Octave Band Sound Pressure Level				
Freq	Bare Concrete	Floor Tested	Difference in dB	Reference Floor	Final Array
400	66.7	56.9	9.8	70.0	60.0
500	68.6	53.1	15.5	70.5	55.0
630	71.4	49.1	22.3	71.0	49.0
800	71.0	43.2	27.8	71.5	44.0
1000	72.5	42.3	30.2	72.0	42.0
1250	72.0	38.5	33.5	72.0	38.0
1600	71.9	33.7	38.2	72.0	34.0
2000	72.0	28.7	43.3	72.0	29.0
2500	71.6	22.9	48.7	72.0	23.0
3150	70.6	16.9	53.7	72.0	18.0

No receiving levels were affected by background noise.

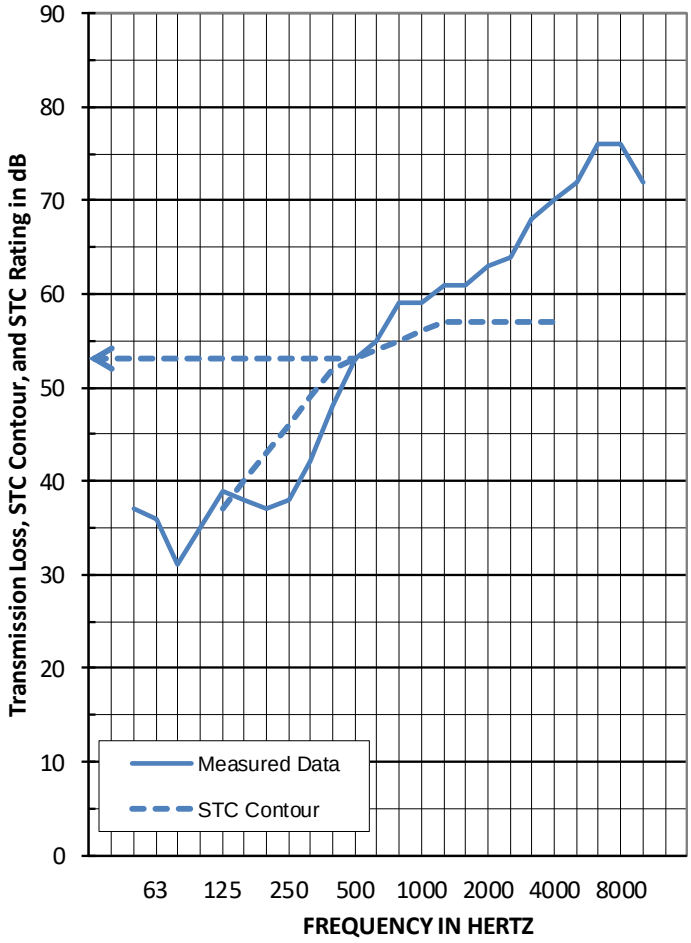
Calculated Improvement in High-frequency Impact Insulation Class: ΔHIIC 34

Sound Transmission Class Test FC23-0757: STC 53



Finish Flooring	5 mm Urban Surfaces Studio 12 Luxury Vinyl Plank
Underlayment	6 mm Urban Surfaces Floor Silencer Boost
Assembly Type	152.4 mm 5000 PSI Concrete Slab
Ceiling	No ceiling

Test Date:	May 8, 2023	
Construction Date:	May 8, 2023	
Test Specimen Area:	11	sq.m.
Source/Receiving Room Volume:	190/159	cu.m.
Source/Receiving Room Temperature:	17.6/19.2	degrees C
Source/Receiving Room Relative Humidity:	68/68	percent



Freq	TL
50	**37**
63	**36**
80	31
100	**35**
125	**39**
160	38
200	37
250	38
315	42
400	48
500	53
630	55
800	59
1000	59
1250	61
1600	61
2000	63
2500	64
3150	68
4000	70
5000	72
6300	76
8000	76
10000	72

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. Averaging time used during measurement of sound pressure levels was 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 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:

- 5 mm Urban Surfaces Studio 12 Luxury Vinyl Plank;
- 6 mm Urban Surfaces Floor Silencer Boost
- 152.4 mm 5000 PSI Concrete Slab.

Total mass of the floor-ceiling assembly was 4140.1 kg, having an area density of 377.05 kg/m^2). This represents the entire area, which was separated into quadrants for the test.

Product/Element	Thickness	Dimensions	Area	Area Density
Urban Surfaces Studio 12 Luxury Vinyl Plank;	5 mm	1219.2 mm x 177.8 mm	10.98 m^2	8.51 kg/m^2
Urban Surfaces Floor Silencer Boost	6 mm	609.6 mm x 914.4 mm	10.98 m^2	2.36 kg/m^2
Concrete Slab	152.4 mm	3023 mm x 3632 mm	10.98 m^2	366.18kg/m^2

2.2 Installation

The materials were installed in the following manner:

- Finish flooring: Loose laid.
- Underlayment: 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. 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 May 8, 2023.

3.0 TESTING PROTOCOL

This report summarizes laboratory acoustical testing contracted by Veneklasen to be completed for URBAN SURFACES on Urban Surfaces Studio 12 Luxury Vinyl Plank over Urban Surfaces Floor Silencer Boost Underlayment and Concrete slab. 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 May 8, 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 E1332, “Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions”
- 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	ASSET #	CAL DATE	
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02572	06/22	*
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02574	06/22	*
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02575	06/22	*
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02576	06/22	*
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02577	06/22	*
2-Channel Analog Input	National Instruments	NI 9250	2-Channel Analog Input	INT02578	06/22	*
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	63741	06/22	
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	63747	06/22	
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63745	08/22	
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	65586	06/22	
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65617	08/22	
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/23	
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63742	02/23	
Source Room Microphone	PCB Electronics	378C20	Microphone and Preamplifier	INT01089	02/23	
Source Room Environmental Indicator	Comet	T7510	Temperature and Humidity Transmitter	63810	10/22	
Tapping Machine	Norsonic	Nor277	Tapping Machine	2776111	04/23	

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

VT RECEIVE ROOM VOLUME	159 m^3
VT 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