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

Laboratory Acoustical Test Report

FC21-0018

Impact Insulation Class and Sound Transmission Class

ASTM E492, E90

July 6, 2021

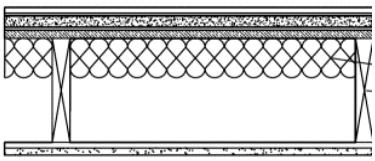
Test Assembly:

Shaw Local Reserve SPC Flooring
Shaw green Dilour Underlayment
Maxxon Gypsum Concrete
Maxxon Acousti-Mat 1/4
Plywood
CertainTeed R-13 Fiberglass Insulation
2x10 Lumber
CEMCO RC1-XD Resilient Channel
Pabco Sound Curb Type X Gypsum Board

IIC-61
HIIC-81
STC-59

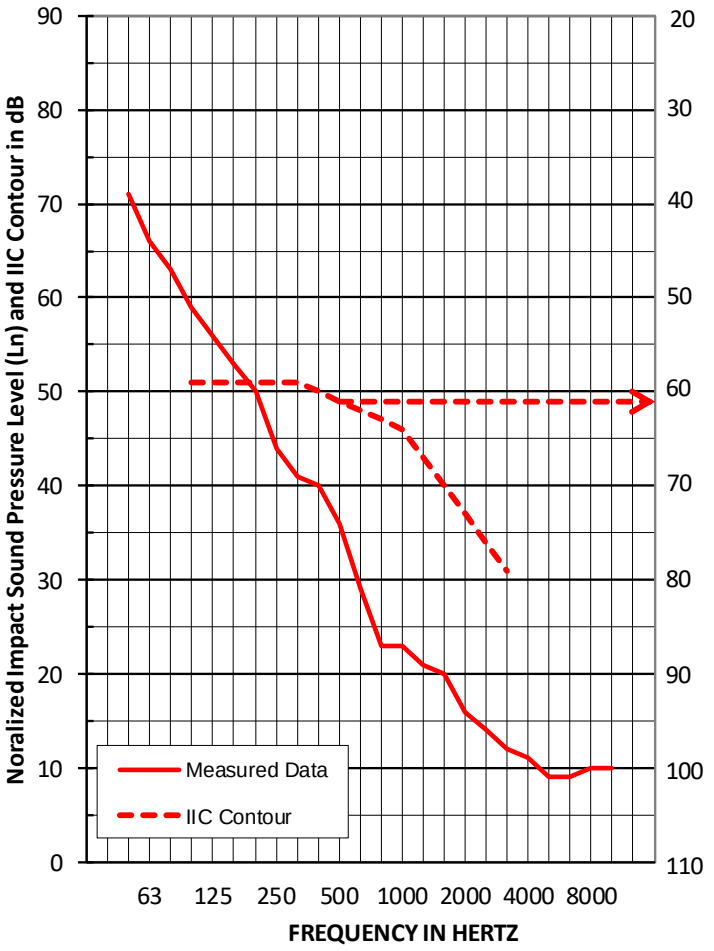
California Extended Metal Company
13191 Crossraods Parkway North Suite 325
City of Industry, CA 91746

Impact Insulation Class Test FC21-0018: IIC 61



Finish Flooring	4 mm Shaw Local Reserve SPC Flooring
Underlayment	4.3 mm Shaw 12 oz green Dilour Underlayment
Gypsum Topping	25.4 Maxxon Gyp-Crete
Sound Mat	6.2 mm Maxxon Acousti-Mat 1/4
Structural Sheathing	18.8 mm Plywood
Insulation	88.9 mm CertainTeed R-13 Fiberglass Insulation
Structural Type	235 mm 2x10 Dimensional Lumber
Resilient Attachment	12.7 mm CEMCO RC1-XD
Finish Ceiling Layer 1	19.1 mm Pabco Sound Curb Type X Gypsum Board

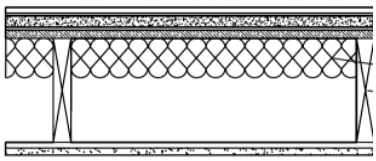
Test Date:	February 16, 2021	
Construction Date:	February 16, 2021	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	158	cu.m.
Receiving RoomTemperature:	19.5-19.6	degrees C
Receiving Room Relative Humidity:	47-47	percent



Freq	95% Confidence Limit	Ln
50	1.4	71
63	3.6	66
80	1.2	63
100	1.5	59
125	1.3	56
160	0.8	53
200	0.8	50
250	0.5	44
315	0.5	41
400	0.5	40
500	0.4	36
630	0.4	29
800	0.4	23
1000	0.4	23
1250	0.5	21
1600	0.4	20
2000	0.3	16
2500	0.4	14
3150	0.6	12
4000	0.6	11
5000	0.4	9
6300	0.3	9
8000	0.3	10
10000	0.2	10

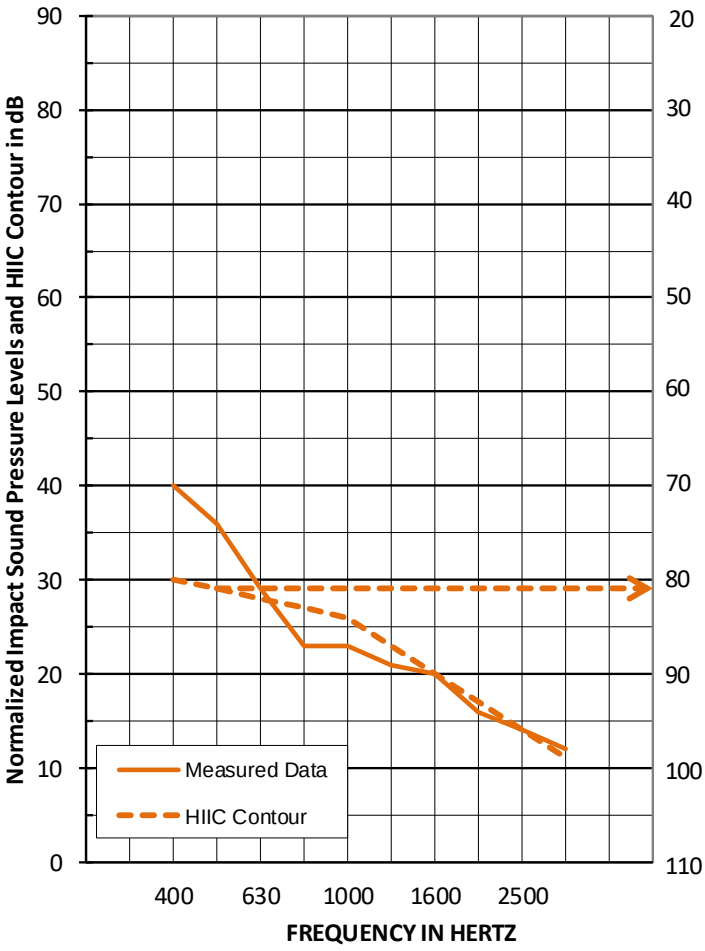
Background Affected

High-frequency Impact Insulation Class Test FC21-0018: HIIC 81



Finish Flooring	4 mm Shaw Local Reserve SPC Flooring
Underlayment	4.3 mm Shaw 12 oz green Dilour Underlayment
Gypsum Topping	25.4 Maxxon Gyp-Crete
Sound Mat	6.2 mm Maxxon Acousti-Mat 1/4
Structural Sheathing	18.8 mm Plywood
Insulation	88.9 mm CertainTeed R-13 Fiberglass Insulation
Structural Type	235 mm 2x10 Dimensional Lumber
Resilient Attachment	12.7 mm CEMCO RC1-XD
Finish Ceiling Layer 1	19.1 mm Pabco Sound Curb Type X Gypsum Board

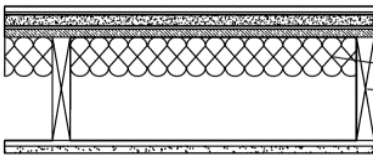
Test Date:	February 16, 2021	
Construction Date:	February 16, 2021	
Test Specimen Area:	11	sq.m.
Receiving Room Volume:	158	cu.m.
Receiving RoomTemperature:	19.5-19.6	degrees C
Receiving Room Relative Humidity:	47-47	percent



Freq	95% Confidence Limit	Ln
400	0.5	40
500	0.4	36
630	0.4	29
800	0.4	23
1000	0.4	23
1250	0.5	21
1600	0.4	20
2000	0.3	16
2500	0.4	14
3150	0.6	12

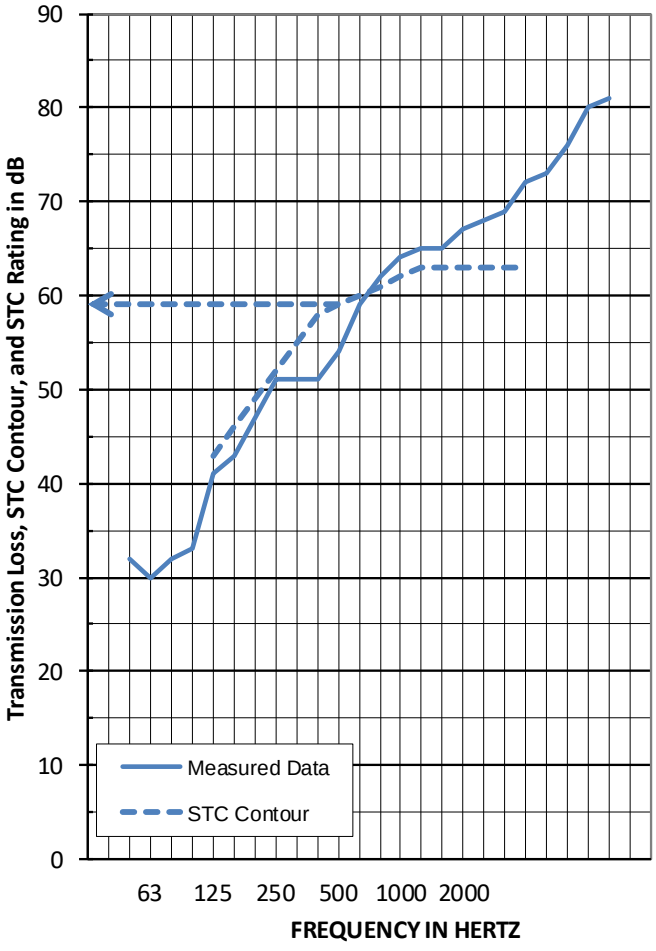
Background Affected

Sound Transmission Class Test FC21-0018: STC 59



Finish Flooring	4 mm Shaw Local Reserve SPC Flooring
Underlayment	4.3 mm Shaw 12 oz green Dilour Underlayment
Gypsum Topping	25.4 Maxxon Gyp-Crete
Sound Mat	6.2 mm Maxxon Acousti-Mat 1/4
Structural Sheathing	18.8 mm Plywood
Insulation	88.9 mm CertainTeed R-13 Fiberglass Insulation
Structural Type	235 mm 2x10 Dimensional Lumber
Resilient Attachment	12.7 mm CEMCO RC1-XD
Finish Ceiling Layer 1	19.1 mm Pabco Sound Curb Type X Gypsum Board

Test Date:	February 16, 2021	
Construction Date:	February 16, 2021	
Test Specimen Area:	11	sq.m.
Source/Receiving Room Volume:	190/158	cu.m.
Source/Receiving Room Temperature:	19.6/18.2	degrees C
Source/Receiving Room Relative Humidity:	47/47	percent



Freq	TL
50	**32**
63	30
80	32
100	33
125	**41**
160	**43**
200	**47**
250	**51**
315	51
400	51
500	54
630	59
800	62
1000	64
1250	65
1600	65
2000	67
2500	68
3150	69
4000	72
5000	73
6300	76
8000	80
10000	81

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 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 Local Reserve SPC Flooring;
- Shaw 12 oz green Dilour Underlayment;
- Maxxon Corporation Gyp-Crete®;
- Maxxon Corporation Acousti-Mat® 1/4 Sound Control Mat;
- Plywood;
- CertainTeed R-13 Fiberglass Insulation;
- 2x10 Dimensional Lumber;
- CEMCO RC1-XD Resilient Channel;
- Pabco® Sound Curb™ Type X Gypsum Board.

Total mass of the floor-ceiling assembly was 1043.9 kg, having an area density of 103.47 kg/m^2. This represents the entire area, which was separated into quadrants for the test.

Product/Element	Thickness	Dimensions	Area	Area Density
SPC Flooring	4 mm	177.8 mm x 1219.2 mm	10.98 m^2	7.1 kg/m^2
Underlayment	4.3 mm	3023 mm x 72 mm	10.98 m^2	1.05 kg/m^2
Maxxon Gyp-Crete®	25.4 mm	3023 mm x 3632 mm	10.98 m^2	48.82 kg/m^2
Maxxon Acousti-Mat® 1/4	6.2 mm	3023 mm x 3632 mm	10.98 m^2	0.3 kg/m^2
Plywood	18.8 mm	1219 mm x 2438 mm	10.98 m^2	10.25 kg/m^2
Fiberglass Insulation	88.9 mm	2940 mm x 406 mm	10.98 m^2	1.03 kg/m^2
Dimensional Lumber	235 mm	2940 mm x 38.1 mm	26.5 lin m	4.3 kg/m
CEMCO RC1-XD Resilient Channel	12.7 mm	3632 mm x 66.7 mm	32.68 lin m	0.34 kg/m
Gypsum Board	19.1 mm	1219 mm x 3023 mm	10.98 m^2	15.14 kg/m^2

2.2 Installation

The materials were installed in the following manner:

- Finish flooring: Adhered to the underlayment with Shaw S-150 spray adhesive. Adhesive was allowed to cure per manufacturer's specifications.
- Underlayment: A sheet of 2 mil polyethylene plastic was adhered to the subfloor topping with Sprayway Fast Tack 85 spray adhesive. The underlayment was adhered to the sheeting with Shaw S-150 spray adhesive. Adhesive was allowed to cure per manufacturer's specifications.
- Gypsum Concrete: Poured directly on top of the sound control mat, cured a minimum of 14 days.
- Sound Mat: Loose laid with seams taped.
- Plywood: Fastened to joists with 76 mm by 3 mm framing nails on 203 mm centers along perimeter and 305 mm centers in the field.
- Fiberglass Insulation: Stapled to bottom of subfloor
- Dimensional Lumber: Fastened to perimeter frame on 406 mm centers using 18-gauge joist hangers and 9- gauge 31.75 mm nails.
- Resilient Channel: Installed on 406 mm centers perpendicular to the trusses. The measured thickness of the metal was 0.7 mm.
- Gypsum Board: Fastened with 25.4 mm fine thread drywall screws on 305 mm centers. Seams and perimeter sealed with Pecora AC-20® Acoustical Sealant and covered with pressure-sensitive tape.

The assembly was constructed on the test date February 16, 2021.

3.0 TESTING PROTOCOL

This report summarizes laboratory acoustical testing contracted by Veneklasen to be completed for California Extended Metal Company on CEMCO RC1-XD Resilient Channel. The scope of the acoustical testing is for Impact Insulation Class (IIC), High-frequency Impact Insulation Class (HIIC), and Sound Transmission Class (STC), in accordance with ASTM standards E492, E90.

The tests were conducted on February 16, 2021. 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 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
Data acquisition unit	National Instruments	PXI-4462	Data acquisition card	65124	12/19
Data acquisition unit	National Instruments	PXI-4462	Data acquisition card	INT01524	04/19
Data acquisition unit	National Instruments	PXI-4462	Data acquisition card	INT01525	04/19
Microphone calibrator	Norsonic	1251	Acoustical calibrator	65105	09/20
Receive room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	65029	03/20
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	63742	03/20
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	65968	01/21
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	63740	04/20
Receive room microphone	PCB Piezotronics	378B20	Microphone and preamplifier	63739	04/20
Receive room environmental indicator	Comet	T7510	Temperature and humidity transmitter	63810	10/20
				63811	10/20
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	63741	06/20
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	65969	04/20
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	63747	09/20
Source room microphone	PCB Piezotronics	378C20	Microphone and preamplifier	63745	09/20
Source room microphone	PCB Electronics	378C20	Microphone and preamplifier	63744	09/20
Source room environmental indicator	Comet	T7510	Temperature and humidity transmitter	63812	10/20
Tapping machine	Norsonic	Nor277	Tapping machine	INT00936	01/20

Test Chamber Receive Room Volume	157.83 m^3 (5591.89 ft^3)
Test Chamber Source Room Volume	190 m^3 (6709.79 ft^3)

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

Photo 2: View of Receive Chamber