Laboratory Acoustical Test Report

FC21-0017

Impact Insulation Class and Sound Transmission Class

ASTM E492, E90

July 6, 2021

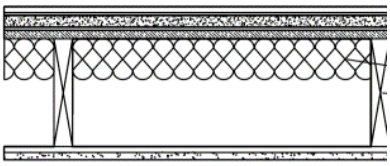
Test Assembly:

Integrated Pad Luxury Vinyl Tile
Shaw GroundWorks Acoustical 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-75
STC-60

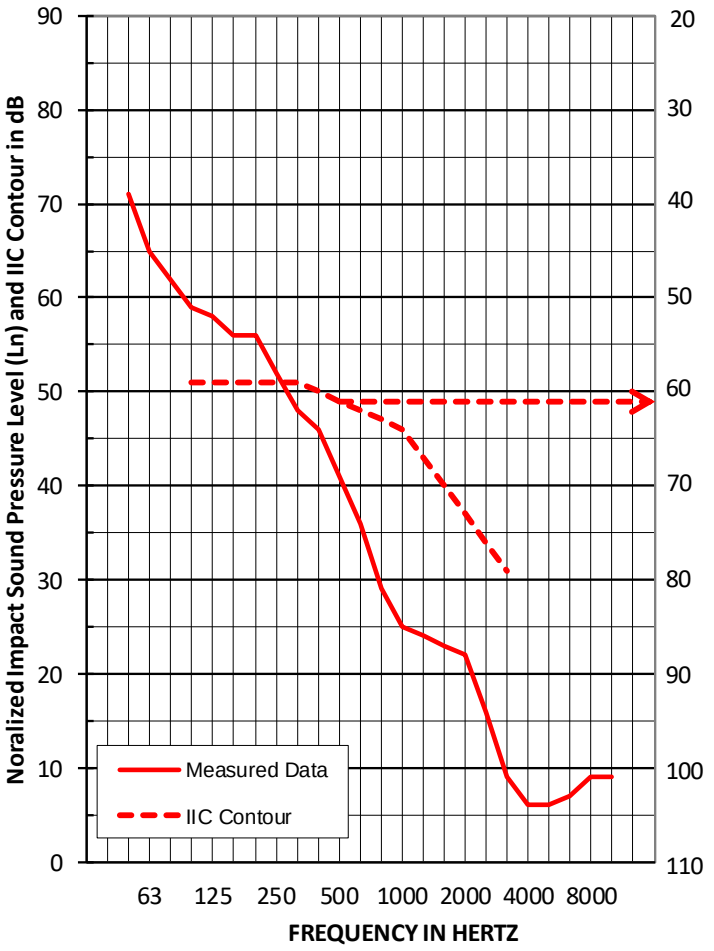
California Expanded Metal Company
13191 Crossroads Parkway North Suite 325
City of Industry, CA 91746

Impact Insulation Class Test FC21-0017: IIC 61



Floor Topping	5 mm 4063V/V4063 Soundscape with Integrated Pad
Underlayment	1.4 mm Shaw GroundWorks Acoustical Underlayment
Gypsum Topping	25.4 mm Maxxon Corporation 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 Resilient Channel
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:	19.5-19.8	degrees C
Receiving Room Relative Humidity:	47-48	percent



Freq	95% Confidence Limit	Ln
50	1.4	71
63	3.5	65
80	1.4	62
100	1.5	59
125	1.3	58
160	0.7	56
200	0.7	56
250	0.5	52
315	0.5	48
400	0.5	46
500	0.4	41
630	0.2	36
800	0.3	29
1000	0.4	25
1250	0.2	24
1600	0.2	23
2000	0.2	22
2500	0.3	16
3150	0.2	9
4000	0.2	6
5000	0.2	6
6300	0.2	7
8000	0.3	9
10000	0.2	9

Background Affected

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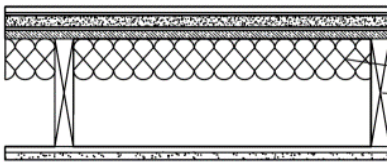
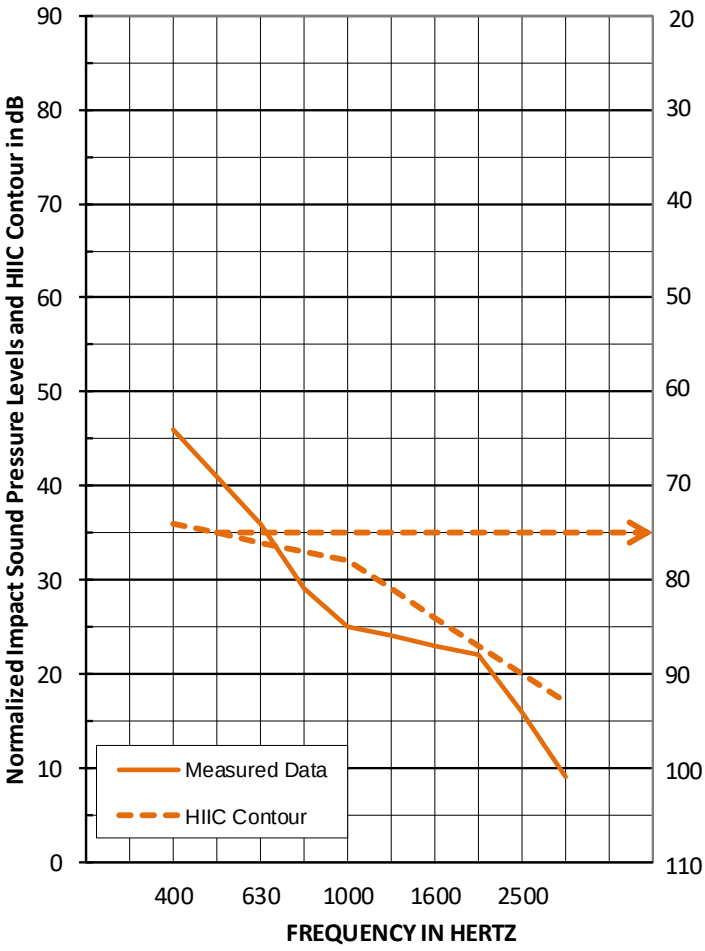
High-frequency Impact Insulation Class Test FC21-0017: HIIC 75



Floor Topping	5 mm 4063V/V4063 Soundscape with Integrated Pad
Underlayment	1.4 mm Shaw GroundWorks Acoustical Underlayment
Gypsum Topping	25.4 mm Maxxon Corporation 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 Resilient Channel
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:	19.5-19.8	degrees C
Receiving Room Relative Humidity:	47-48	percent



Freq	95% Confidence Limit	Ln
400	0.5	46
500	0.4	41
630	0.2	36
800	0.3	29
1000	0.4	25
1250	0.2	24
1600	0.2	23
2000	0.2	22
2500	0.3	16
3150	0.2	9

Background Affected

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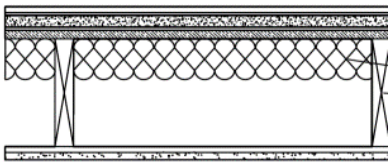
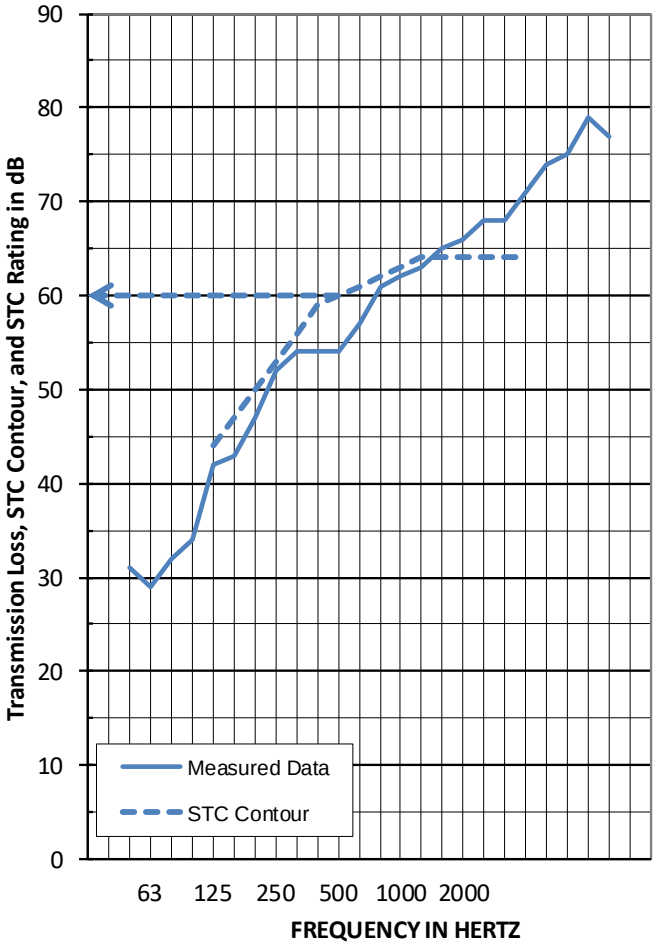
Sound Transmission Class Test FC21-0017: STC 60



Floor Topping	5 mm 4063V/V4063 Soundscape with Integrated Pad
Underlayment	1.4 mm Shaw GroundWorks Acoustical Underlayment
Gypsum Topping	25.4 mm Maxxon Corporation 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 Resilient Channel
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:	19.6/18.4	degrees C
Source/Receiving Room Relative Humidity:	48/48	percent



Freq	TL
50	**31**
63	29
80	32
100	**34**
125	**42**
160	**43**
200	**47**
250	**52**
315	**54**
400	54
500	54
630	57
800	61
1000	62
1250	63
1600	65
2000	66
2500	68
3150	68
4000	71
5000	74
6300	75
8000	79
10000	77

Background Affected

Flanking Affected

Background and Flanking Affected

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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.

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2.0 TEST ASSEMBLY

2.1 Assembly Description

The test assembly consists of:

- 4063V/V4063 Soundscape with Integrated Pad Luxury Vinyl Tile;
- Shaw GroundWorks Acoustical Underlayment;
- Maxxon Corporation Gyp-Crete®;
- Maxxon Corporation Acousti-Mat® 1/4;
- 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 1032.7 kg, having an area density of 87.3 kg/m^2. This represents the entire area, which was separated into quadrants for the test.

Product/Element	Thickness	Dimensions	Area	Area Density
Luxury Vinyl Tile	5 mm	1219.2 mm x 152.4 mm	10.98 m^2	6.63 kg/m^2
Underlayment	1.4 mm	3023 mm x 939.8 mm	10.98 m^2	0.49 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®	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^2
CEMCO RC1-XD Resilient Channel	12.7 mm	3632 mm x 66.7 mm	32.69 lin m	0.34 kg/m^2
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:

- Floor Topping: Adhered to the underlayment with Shaw S-150 spray adhesive. Adhesive was allowed to cure per manufacturer's specifications.
- Underlayment: 2-mil polyethylene plastic sheeting installed on top of concrete slab. The Acoustical Underlayment was adhered to floor slab with 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. No noticeable shrinkage or cracking was visible on the specimen.
- Flooring Underlayment: 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.

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3.0 TESTING PROTOCOL

This report summarizes laboratory acoustical testing contracted by Veneklasen to be completed for California Expanded Metal Company on CEMCO RC1-XD. 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

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