

**C8706.03-113-11-R0**  
**ACOUSTICAL PERFORMANCE TEST REPORT**  
**ASTM E 90 AND ASTM E 492**

**Rendered to**

**ECORE International**

**Series/Model: QT4005**

**Specimen Type: Floor/Ceiling Assembly**

**Overall Size: 3023 mm by 3632 mm**

<b>Summary of Test Results</b>		
<b>Data File</b>	<b>Result</b>	<b>Description (Nominal Dimensions)</b>
C8706.01C	STC 63 IIC 53	2.5 mm Expona Luxury Vinyl Tile, 5 mm Ecore International QT4005 Rubber Underlayment, 25 mm FIRM-FILL® 3310 Gypsum Concrete, 2 mm Ecore International QT4002 Underlayment, 18 mm T&G OSB Subfloor, 406 mm Open Web Truss, 89 mm R-13 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 16 mm USG SHEETROCK® Brand FIRECODE® C core Gypsum Panel

Reference should be made to Architectural Testing, Inc. Report C8706.03-113-11 for complete test specimen description.

## Acoustical Performance Test Report

ECORE International  
715 Fountain Avenue  
Lancaster, Pennsylvania 17601

<b>Report</b>	C8706.03-113-11
<b>Test Date</b>	07/01/13
<b>Report Date</b>	07/24/13
<b>Record Retention End Date</b>	07/24/17

### Project Scope

ECORE International contracted Architectural Testing to conduct airborne sound transmission loss and impact sound transmission tests. A summary of the results is listed in the Test Results section, and the complete test data is included as attachments to this report. The client provided the test specimen.

### Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 413-10, Classification for Rating Sound Insulation

ASTM E 492-09, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)

ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

### Test Procedure

All testing was conducted in the Vertical Transmission (VT) test chambers located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The sound transmission loss test was conducted in accordance with the ASTM E 90 test method using a single direction of measurement. Two background noise sound pressure level and fifty sound absorption measurements were conducted at each of the five microphone positions in the receiving (lower) room. Sound was generated in the source (upper) room, and two sound pressure level measurements were made simultaneously in both rooms, at each of the five microphone positions.

**Test Procedure (Continued)**

The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level and fifty sound absorption measurements were conducted at each of the five microphone positions in the receiving (lower) room. While the tapping machine was operating at each of the four locations on the floor surface, two sound pressure level measurements were made at each of five microphone positions in the receiving (lower) room.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

**Test Conditions**

Source Room		Receive Room	
Maximum Temperature	21.7 °C	Maximum Temperature	23.3 °C
Minimum Temperature	21.6 °C	Minimum Temperature	22.4 °C
Maximum Relative Humidity	54.7 %	Maximum Relative Humidity	60.3 %
Minimum Relative Humidity	52.1 %	Minimum Relative Humidity	56.7 %

**Test Calculations**

The STC (Sound Transmission Class) rating was calculated in accordance with ASTM E 413. The IIC (Impact Insulation Class) rating was calculated in accordance with ASTM E 989.

**Test Specimen Construction**

The floor/ceiling test specimen was constructed in the 3048 mm long by 3658 mm wide by 457 mm high steel frame test opening. A drawing of the installation details is included in the attachments.

Two rows of dense neoprene foam (9.5 mm thick by 76 mm wide) were adhered to the top of the steel test frame bottom flange. The floor/ceiling assembly was placed in the steel frame on top of the dense neoprene foam. The perimeter of the floor/ceiling assembly was sealed to the steel frame with duct seal. Cure time for the gypsum concrete slab was a minimum of 14 days.

An outer frame was constructed from 31.8 mm thick rim board. The rim board was reduced to a depth of 438 mm. The 406 mm depth parallel chord trusses were hung with a JUS414 slant nail joist hanger on 610 mm center flush to the top of the outer frame.

The 18.3 mm tongue and groove OSB subfloor was bedded in Loctite® PL® 400® Subfloor & Deck Adhesive and secured to the trusses with 6d ringed shank nails (spaced 305 mm on center). The 88.9 mm fiberglass batt insulation occupied every cavity between trusses and was held flush to the OSB subfloor with 14 gauge galvanized utility wire.

### Test Specimen Construction (Continued)

The ClarkDietrich Building Systems RC Deluxe™ resilient channels were fastened to the truss bottoms on 406 mm centers with 31.8 mm Type S bugle head screws. The 15.9 mm USG SHEETROCK® Brand FIRECODE® C core gypsum panels were fastened to the resilient channels on 305 mm centers with 25.4 mm Type S bugle head screws. The seams of the gypsum panels were sealed with Pecora AC-20® FTR caulk and covered with Nashua Tape Products 324A premium foil tape.

The 2 mm ECOPE International QT4002 resilient rubber underlayment was loose-laid on top of the OSB subfloor, and the seams were taped with pressure sensitive tape. A layer of 0.05 mm polyethylene sheet was loose-laid on top of the resilient rubber. The 25.4 mm Hacker Industries, Inc. FIRM-FILL® 3310 gypsum concrete was poured on top of the 0.05 mm polyethylene sheet.

A single layer of 0.05 mm polyethylene sheet was adhered to the gypsum concrete. The Gerbert 2525 flooring adhesive was troweled over the protective layer using a 1.5 mm by 1.5 mm by 1.5 mm square notch trowel. A single layer of the QT4005 rubber underlayment was placed on top of the Gerbert 2525 flooring adhesive within one hour of application. A 100-pound roller was used to evenly compress the underlayment into the adhesive.

The Gerbert 2525 flooring adhesive was troweled over the underlayment using a 1.5 mm by 1.5 mm by 1.5 mm square notch trowel. A single layer of the Polyflor Expona luxury vinyl tile was installed on top of the Gerbert 2525 flooring adhesive within one hour of application. A 100-pound roller was used to evenly compress the flooring into the adhesive. The perimeter of the flooring was sealed with duct seal.

### Test Specimen Materials

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight	Total Weight
Luxury Vinyl Tile	914.4 by 101.6	2.51	Polyflor Expona	10.98 m <sup>2</sup>	4.4 kg/m <sup>2</sup>	48.3 kg
Rubber Underlayment	3023 by 1219	5.00	ECOPE International QT4005	10.98 m <sup>2</sup>	3.9 kg/m <sup>2</sup>	42.8 kg
Gypsum Concrete	3023 by 3632	25.40	Hacker Industries, Inc. FIRM-FILL® 3310	10.98 m <sup>2</sup>	51.9 kg/m <sup>2</sup>	569.9 kg
Underlayment	3023 by 3632	2.00	ECOPE International QT4002	10.98 m <sup>2</sup>	1.9 kg/m <sup>2</sup>	20.9 kg
OSB Subfloor	1219 by 2438	18.30	Tongue and Groove OSB Subfloor	10.98 m <sup>2</sup>	11.3 kg/m <sup>2</sup>	124.1 kg
Open Web Truss	2962 by 89	406.00	York PB Truss L/360	20.7 lin m	6.4 kg/m	132.7 kg

**Test Specimen Materials (Continued)**

<b>Material</b>	<b>Dimensions (mm)</b>	<b>Thickness (mm)</b>	<b>Manufacturer and Series</b>	<b>Quantity</b>	<b>Average Weight</b>	<b>Total Weight</b>
Rim Board	2959.1 by 31.8	438.15	Weyerhaeuser TimberStrand® LSL Rim Board	5.92 lin m	8.63 kg/m	51.1 kg
Rim Board	3632 by 31.8	438.15	Weyerhaeuser TimberStrand® LSL Rim Board	7.26 lin m	8.63 kg/m	62.7 kg
Fiberglass Insulation	2962 by 584	88.90	Johns Manville R-13	10.98 m <sup>2</sup>	1.25 kg/m <sup>2</sup>	13.7 kg
Resilient Channels	3632 by 66.7	12.70	ClarkDietrich Building Systems RC Deluxe™	29.1 lin m	0.324 kg/m	9.4 kg
Gypsum Panel	1219 by 3032	15.90	USG SHEETROCK® Brand FIRECODE® C core	10.56 m <sup>2</sup>	11.9 kg/m <sup>2</sup>	125.7 kg

**Comments**

The total weight of the floor/ceiling assembly was 1201.3 kg. Architectural Testing will store samples of the test specimen for four years. Photographs of the test specimen are included in the attachments. The design drawings, included in the attachments, accurately describe the test specimen.

Architectural Testing will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Architectural Testing for the entire test record retention period.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing.

For ARCHITECTURAL TESTING, INC:

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Daniel P. Platts  
Technician I - Acoustical Testing

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Bradlay D. Hunt  
Project Manager - Acoustical Testing

Attachments (7)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*

**Revision Log**

<b><u>Revision</u></b>	<b><u>Date</u></b>	<b><u>Page(s)</u></b>	<b><u>Description</u></b>
R0	07/24/13	N/A	Original Report Issue

## Attachments

### Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	63763	06/12 *
Source Room Microphone	PCB Piezotronics	378B20	63738	04/13
Source Room Microphone	PCB Piezotronics	378B20	63739	04/13
Source Room Microphone	PCB Piezotronics	378B20	63740	04/13
Source Room Microphone	PCB Piezotronics	378B20	63741	04/13
Source Room Microphone	PCB Piezotronics	378B20	63742	04/13
Receive Room Microphone	PCB Piezotronics	378B20	63748	04/13
Receive Room Microphone	PCB Piezotronics	378B20	63744	04/13
Receive Room Microphone	PCB Piezotronics	378B20	63745	04/13
Receive Room Microphone	PCB Piezotronics	378B20	63746	04/13
Receive Room Microphone	PCB Piezotronics	378B20	63747	04/13
Receive Room Environmental Indicator	Comet	T7510	63810	09/12
Receive Room Environmental Indicator	Comet	T7510	63811	09/12
Source Room Environmental Indicator	Comet	T7510	63812	09/12
Microphone Calibrator	Cirrus Research (HP)	CRL 511E	Y001777	06/13
Tapping Machine	Norsonic	N-211	Y003242	03/13

### Test Chambers

VT Receive Room Volume	155.8 m <sup>3</sup>
VT Source Room Volume	190 m <sup>3</sup>

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



**SOUND TRANSMISSION LOSS**  
ASTM E 90



<b>Test Date</b>	07/01/13
<b>Data File No.</b>	C8706.01C
<b>Client</b>	ECORE International
<b>Description</b>	2.5 mm Expona Luxury Vinyl Tile, 5 mm Ecore International QT4005 Rubber Underlayment, 25 mm FIRM-FILL® 3310 Gypsum Concrete, 2 mm Ecore International QT4002 Underlayment, 18 mm T&G OSB Subfloor, 406 mm Open Web Truss, 89 mm R-13 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 16 mm USG SHEETROCK® Brand FIRECODE® C core Gypsum Panel
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel P. Platts

<b>Test Chamber</b>	VT Source Room	VT Receive Room
<b>Temperature</b>	21.7 °C	22.9 °C
<b>Humidity</b>	53.4 %	58.5 %

Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
50	42.4	29.7	107	64	39	6.0	-
63	47.4	23.6	105	67	36	9.0	-
80	49.8	13.9	105	65	41	6.7	-
100	46.1	9.6	104	68	38	4.2	-
125	41.1	8.4	106	64	44	3.0	3
160	31.3	7.6	99	59	43	4.2	7
200	28.8	8.8	102	55	49	2.2	4
250	28.0	8.1	104	55	51	1.9	5
315	25.1	7.4	102	51	55	1.3	4
400	22.1	7.0	104	49	59	1.7	3
500	23.8	6.2	104	47	61	0.9	2
630	21.1	6.1	104	44	63	1.3	1
800	20.1	6.4	104	43	65	1.0	0
1000	23.0	6.3	103	40	67	0.7	0
1250	22.5	6.3	104	40	68	0.8	0
1600	19.0	6.5	104	38	70	0.5	0
2000	13.1	7.1	104	36	71	0.8	0
2500	9.6	7.9	102	34	71	0.6	0
3150	8.4	8.3	101	31	73	0.7	0
4000	7.0	9.4	100	29	73	0.8	0
5000	6.5	10.8	96	22	75	0.9	-
6300	6.6	13.8	92	13	79	0.9	-
8000	6.7	18.0	88	7	80	0.7	-
10000	6.6	23.8	82	5	75	0.8	-

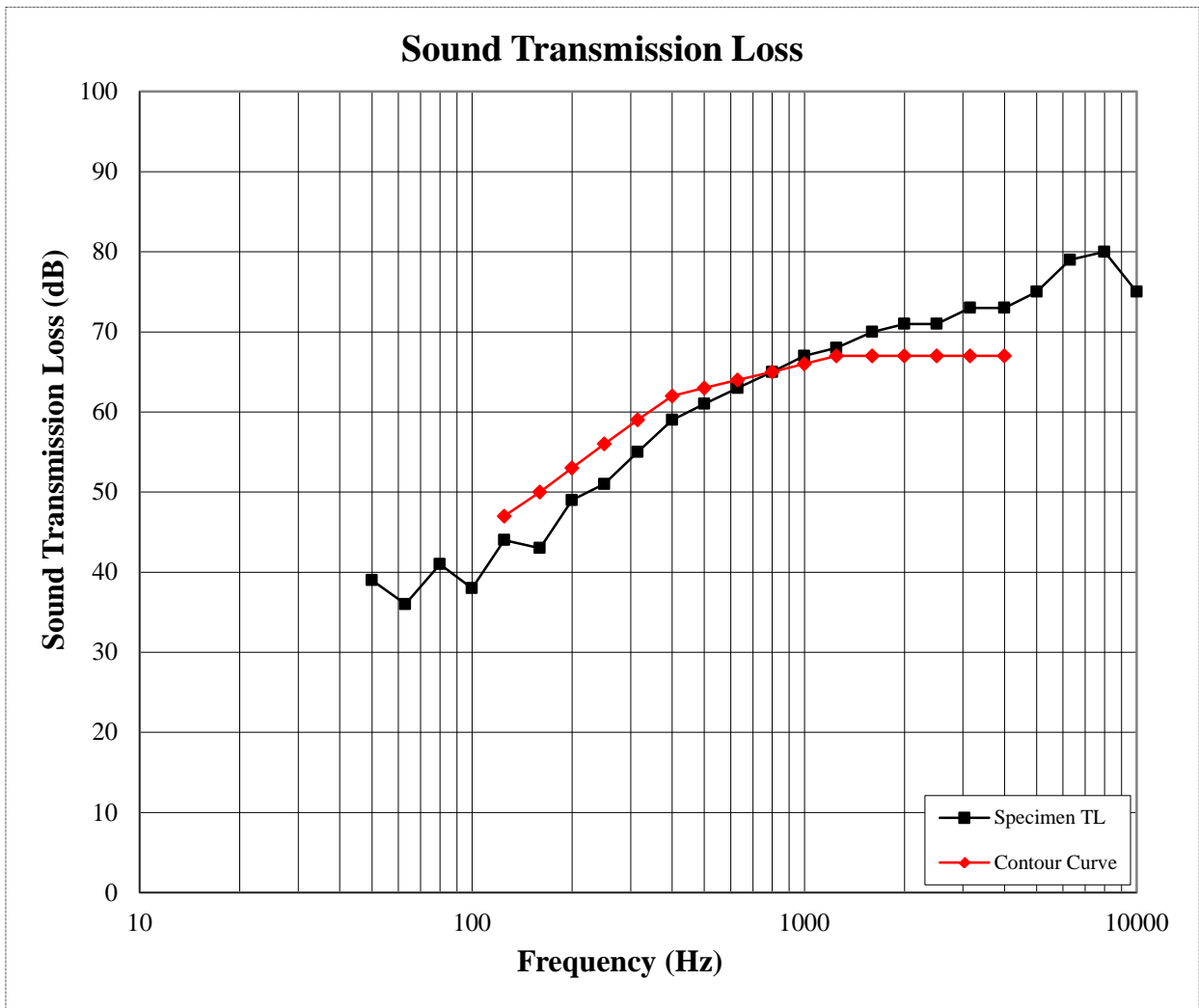
**STC Rating**      **63**      (*Sound Transmission Class*)  
**Deficiencies**      29      (*Sum of Deficiencies*)

- Notes :**
- 1) Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.
  - 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
  - 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

**SOUND TRANSMISSION LOSS**  
ASTM E 90

<b>Test Date</b>	07/01/13
<b>Data File No.</b>	C8706.01C
<b>Client</b>	ECORE International
<b>Description</b>	2.5 mm Expona Luxury Vinyl Tile, 5 mm ECORE International QT4005 Rubber Underlayment, 25 mm FIRM-FILL® 3310 Gypsum Concrete, 2 mm ECORE International QT4002 Underlayment, 18 mm T&G OSB Subfloor, 406 mm Open Web Truss, 89 mm R-13 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 16 mm USG SHEETROCK® Brand FIRECODE® C core Gypsum Panel
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel P. Platts

<b>Test Chamber</b>	VT Source Room	VT Receive Room
<b>Temperature</b>	21.7 °C	22.9 °C
<b>Humidity</b>	53.4 %	58.5 %



**IMPACT TRANSMISSION**  
ASTM E 492



<b>Test Date</b>	07/01/13
<b>Data File No.</b>	C8706.01C
<b>Client</b>	ECORE International
<b>Description</b>	2.5 mm Expona Luxury Vinyl Tile, 5 mm Ecore International QT4005 Rubber Underlayment, 25 mm FIRM-FILL® 3310 Gypsum Concrete, 2 mm Ecore International QT4002 Underlayment, 18 mm T&G OSB Subfloor, 406 mm Open Web Truss, 89 mm R-13 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 16 mm USG SHEETROCK® Brand FIRECODE® C core Gypsum Panel
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel P. Platts

<b>Test Chamber</b>	VT Receive Room
<b>Temperature</b>	22.9 °C
<b>Humidity</b>	58.5 %

Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Normalized Impact SPL (dB)	95% Confidence Limit	Number of Deficiencies
50	41.9	30.3	66	3.91	-
63	49.3	21.8	66	3.55	-
80	60.3	13.3	62	3.68	-
100	41.6	9.5	66	2.19	7
125	39.5	8.5	67	2.21	8
160	34.0	7.5	66	2.55	7
200	27.5	8.7	63	1.55	4
250	28.2	8.2	62	2.19	3
315	25.6	7.5	60	2.09	1
400	24.4	7.1	55	2.04	0
500	24.4	6.3	50	2.90	0
630	21.5	6.1	44	4.39	0
800	21.6	6.4	36	5.58	0
1000	23.3	6.3	28	3.34	0
1250	22.5	6.3	27	3.20	0
1600	18.8	6.4	28	3.59	0
2000	12.2	7.1	29	3.89	0
2500	8.3	7.9	25	7.27	0
3150	7.1	8.3	18	8.33	0
4000	6.3	9.4	11	5.04	-
5000	6.1	10.8	7	1.95	-
6300	6.3	13.8	6	0.56	-
8000	6.6	18.0	7	0.39	-
10000	6.6	23.7	8	0.30	-

**IIC Rating**      **53**      (*Impact Insulation Class*)  
**Deficiencies**      **30**      (*Sum of Deficiencies*)

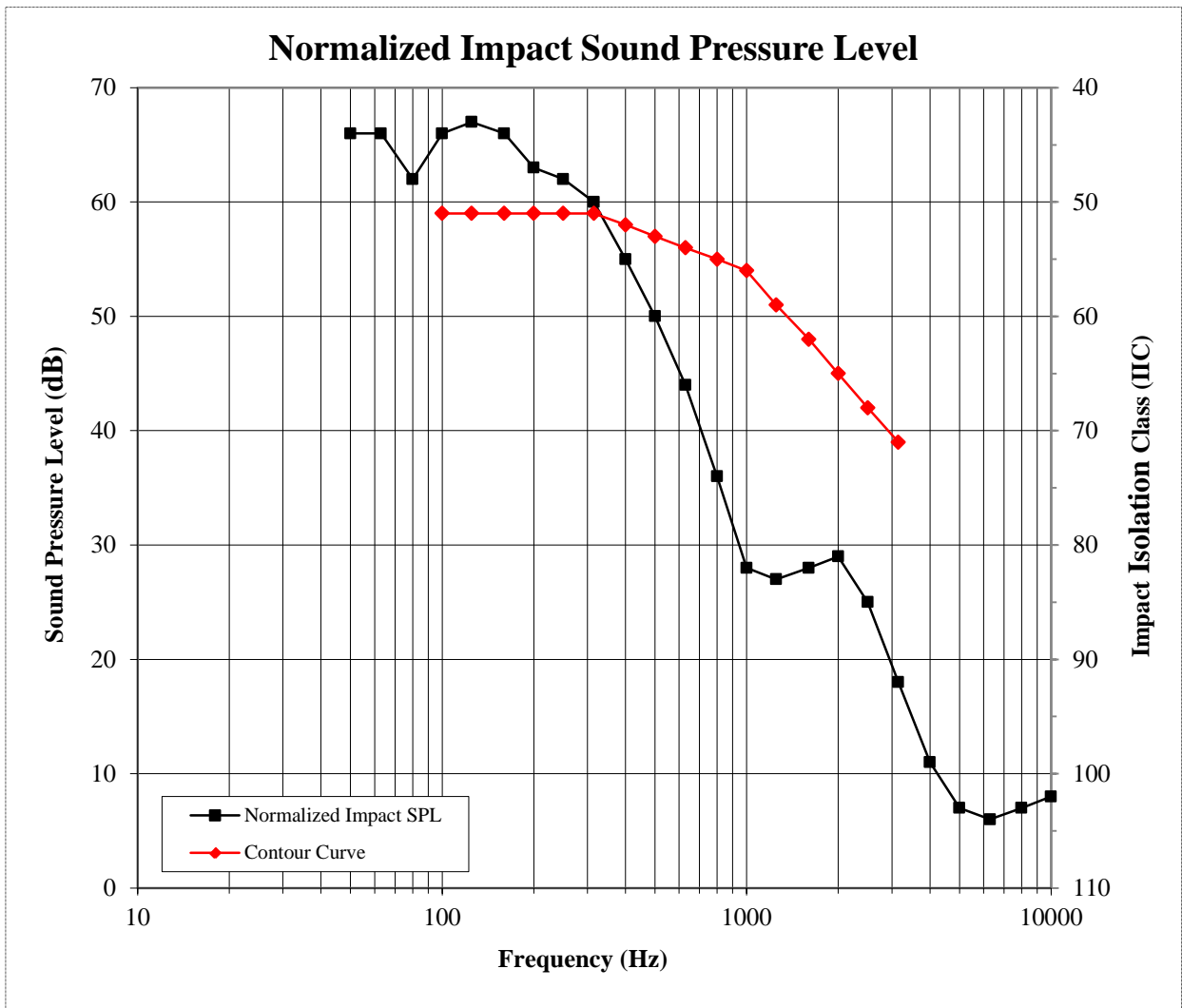
*Note: Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.*

**IMPACT TRANSMISSION**  
 ASTM E 492



<b>Test Date</b>	07/01/13
<b>Data File No.</b>	C8706.01C
<b>Client</b>	ECORE International
<b>Description</b>	2.5 mm Expona Luxury Vinyl Tile, 5 mm ECORE International QT4005 Rubber Underlayment, 25 mm FIRM-FILL® 3310 Gypsum Concrete, 2 mm ECORE International QT4002 Underlayment, 18 mm T&G OSB Subfloor, 406 mm Open Web Truss, 89 mm R-13 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 16 mm USG SHEETROCK® Brand FIRECODE® C core Gypsum Panel
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel P. Platts

<b>Test Chamber</b>	VT Receive Room
<b>Temperature</b>	22.9 °C
<b>Humidity</b>	58.5 %



**Photographs**



**Source Room View of Test Specimen Installation**

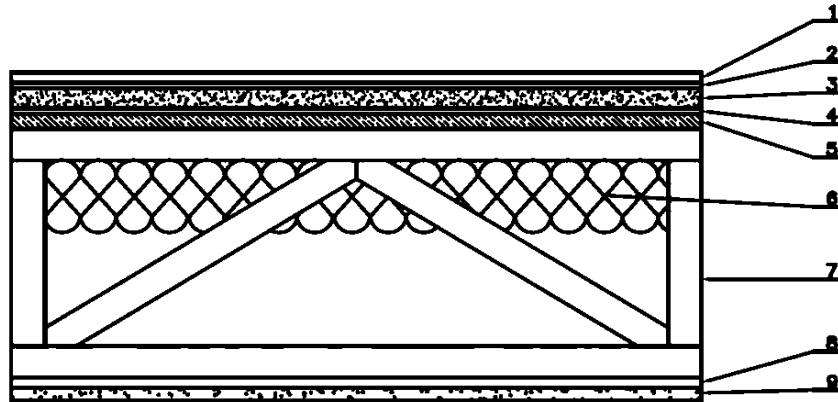


**Receive Room View of Test Specimen Installation**

**Drawings**



**Test Specimen Installation**



**Cross Section View of Test Specimen**