

**D0875.02-113-11-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>
D0875.02A	STC 64 IIC 52	7 mm Ceramic Tile, 8 mm Cement Board, 5 mm Ecore International QT4005 Underlayment, 18.3 mm T&G OSB Subfloor, 457 mm Open Web Truss, 165 mm R-19 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 15.9 Fire-Shield C™ Gypsum Board

Reference should be made to Architectural Testing, Inc. Report D0875.02-113-11 for complete test specimen description.

## Acoustical Performance Test Report

ECORE International  
715 Fountain Avenue  
Lancaster, Pennsylvania 17601

<b>Report</b>	D0875.02-113-11
<b>Test Date</b>	10/17/13
<b>Report Date</b>	10/30/13
<b>Record Retention End Date</b>	10/30/17

### 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 at Architectural Testing, Inc. located in York, Pennsylvania. The microphones were calibrated before

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	22.6 °C	Maximum Temperature	21.9 °C
Minimum Temperature	22.1 °C	Minimum Temperature	21.3 °C
Maximum Relative Humidity	64.0 %	Maximum Relative Humidity	67.3 %
Minimum Relative Humidity	61.0 %	Minimum Relative Humidity	64.4 %

**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.

An outer frame was constructed from 31.8 mm thick rim board. The rim board was reduced to a depth of 489 mm. The 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 tongue and groove OSB subfloor was secured to the trusses with 6d ringed shank nails (spaced 305 mm on center). The fiberglass batt insulation occupied every cavity between trusses and was held flush to the OSB subfloor with 14 gauge staples attached to the joists. 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.

### Test Specimen Construction (Continued)

The Gold Bond® Fire-Shield C™ 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.

A single layer of 0.05 mm polyethylene sheet was adhered to OSB subfloor. EGRIP III 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 ECORE International QT4005 was placed on top of the EGRIP III flooring adhesive within 30 minutes of application.

TEC latex-modified mortar was then mixed as per manufacturer's specifications and troweled on top of the ECORE International QT4005 using a 6.4 mm by 6.4 mm by 6.4 mm square notch trowel. The cement board was placed into the bed of mortar and TEC latex-modified mortar also was used to cover the joints of the cement board. The mortar was allowed to cure for more than 24 hours.

TEC latex-modified mortar was then mixed as per manufacturer's specifications and troweled on top of the cement board using a 6.35 mm by 6.35 mm by 6.35 mm square notch trowel. The ceramic tiles were then set with light pressure into the bed of mortar and separated by 6.35 mm spacers. The mortar was allowed to cure for more than 24 hours.

TEC sanded grout was mixed as per manufacturer's specifications and trowelled into the 6.4 mm spaces between the ceramic tiles using a grout float. All excess grout was cleaned using a wet sponge. The grout was allowed to cure for more than 24 hours before testing.

The perimeter of the specimen was sealed to the test frame with duct seal. The perimeter of the ceramic tile floor was sealed to a wooden frame with duct seal.

### Test Specimen Materials

Material	Dimensions	Thickness	Manufacturer and Series	Quantity	Average Weight	Total Weight
Ceramic Tile	300 mm by 300 mm	7 mm	Project Source	10.98 m <sup>2</sup>	13.82 kg/m <sup>2</sup>	151.7 kg
Cement Board	1524 mm by 914.4 mm	6.4 mm	DUROCK™	10.98 m <sup>2</sup>	12.37 kg/m <sup>2</sup>	135.8 kg
Underlayment	3023 mm by 3632 mm	5 mm	ECORE International QT4005	10.98 m <sup>2</sup>	3.9 kg/m <sup>2</sup>	42.8 kg
OSB Subfloor	1219 mm by 2438 mm	18.3 mm	Tongue and Groove OSB Subfloor	10.98 m <sup>2</sup>	11.3 kg/m <sup>2</sup>	124.1 kg

**Test Specimen Materials (Continued)**

<b>Material</b>	<b>Dimensions</b>	<b>Thickness</b>	<b>Manufacturer and Series</b>	<b>Quantity</b>	<b>Average Weight</b>	<b>Total Weight</b>
Open Web Truss	2959.1 mm by 89 mm	457 mm	York PB Truss L/360	20.7 lin m	7.29 kg/m	150.9 kg
Rim Board	2959.1 mm by 31.8 mm	489 mm	Weyerhaeuser TimberStrand® LSL Rim Board	5.92 lin m	11.54 kg/m	68.3 kg
Rim Board	3632 mm by 31.8 mm	489 mm	Weyerhaeuser TimberStrand® LSL Rim Board	7.26 lin m	11.54 kg/m	83.8 kg
Fiberglass Insulation	2962 mm by 584 mm	165 mm	Gaurdian Pro-Cut Batts Kraft Faced R-19	10.98 m <sup>2</sup>	1.55 kg/m <sup>2</sup>	17 kg
Resilient Channels	3632 mm by 66.7 mm	12.7 mm	ClarkDietrich Building Systems RC Deluxe™	29.1 lin m	0.324 kg/m	9.4 kg
Gypsum Panel	1219 mm by 3032 mm	15.9 mm	Gold Bond® Fire-Shield C™ Gypsum Board	10.56 m <sup>2</sup>	10.74 kg/m <sup>2</sup>	113.4 kg

**Comments**

The total weight of the floor/ceiling assembly was 897.2 kg. Photographs of the test specimen are included in the attachments. The design drawing, included in the attachments, accurately describes 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 B. Mohler  
Technician I - Acoustical Testing

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Bradlay D. Hunt  
Project Manager - Acoustical Testing

Attachments (8)

*\* Stated by Client/Manufacturer*

*N/A - Non Applicable*

### Revision Log

<u>Revision</u>	<u>Date</u>	<u>Page(s)</u>	<u>Description</u>
R0	10/30/13	N/A	Original Report Issue

**Attachments**

**Instrumentation**

<b>Instrument</b>	<b>Manufacturer</b>	<b>Model</b>	<b>ATI Number</b>	<b>Date of Calibration</b>
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	64340	02/13
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>



**SOUND TRANSMISSION LOSS**  
ASTM E 90



<b>Test Date</b>	10/17/13
<b>Data File No.</b>	D0875.02A
<b>Client</b>	ECORE International
<b>Description</b>	7 mm Ceramic Tile, 8 mm Cement Board, 5 mm Ecore International QT4005 Underlayment, 18.3 mm T&G OSB Subfloor, 457 mm Open Web Truss, 165 mm R-19 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 15.9 Fire-Shield C™ Gypsum Board
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

<b>Test Chamber</b>	VT Source Room	VT Receive Room
<b>Temperature</b>	22.28	21.51
<b>Humidity</b>	62.79	66.03

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	43.8	26.2	95.5	56	37	5.4	-
63	52.5	20.5	94.0	58	34	7.9	-
80	64.0	12.2	100.2	63	37	6.6	-
100	46.9	8.7	97.9	60	40	3.7	-
125	42.4	8.9	99.9	58	44	4.8	4
160	40.5	8.1	96.8	54	45	2.3	6
200	34.6	9.3	96.8	51	48	2.6	6
250	32.1	9.0	97.1	47	52	2.2	5
315	31.2	7.7	97.5	45	55	1.0	5
400	28.3	7.0	96.2	40	60	0.8	3
500	28.4	6.6	95.8	37	62	1.1	2
630	29.2	6.5	96.6	35	66	0.8	0
800	30.6	6.6	96.4	33	67	0.8	0
1000	31.2	6.7	97.0	33	67	0.9	0
1250	32.1	6.7	96.5	32	68	0.4	0
1600	30.3	6.8	96.9	32	68	1.0	0
2000	24.0	7.4	97.3	33	68	0.6	0
2500	22.6	8.3	97.0	30	70	0.8	0
3150	21.1	8.7	96.3	25	73	0.9	0
4000	18.7	9.7	96.6	23	75	0.5	0
5000	14.0	11.2	96.5	20	77	0.8	-
6300	12.1	14.0	90.2	10	80	0.7	-
8000	10.9	18.3	89.0	7	81	0.6	-
10000	7.9	23.1	83.7	5	77	0.6	-

**STC Rating**      **64**      (*Sound Transmission Class*)

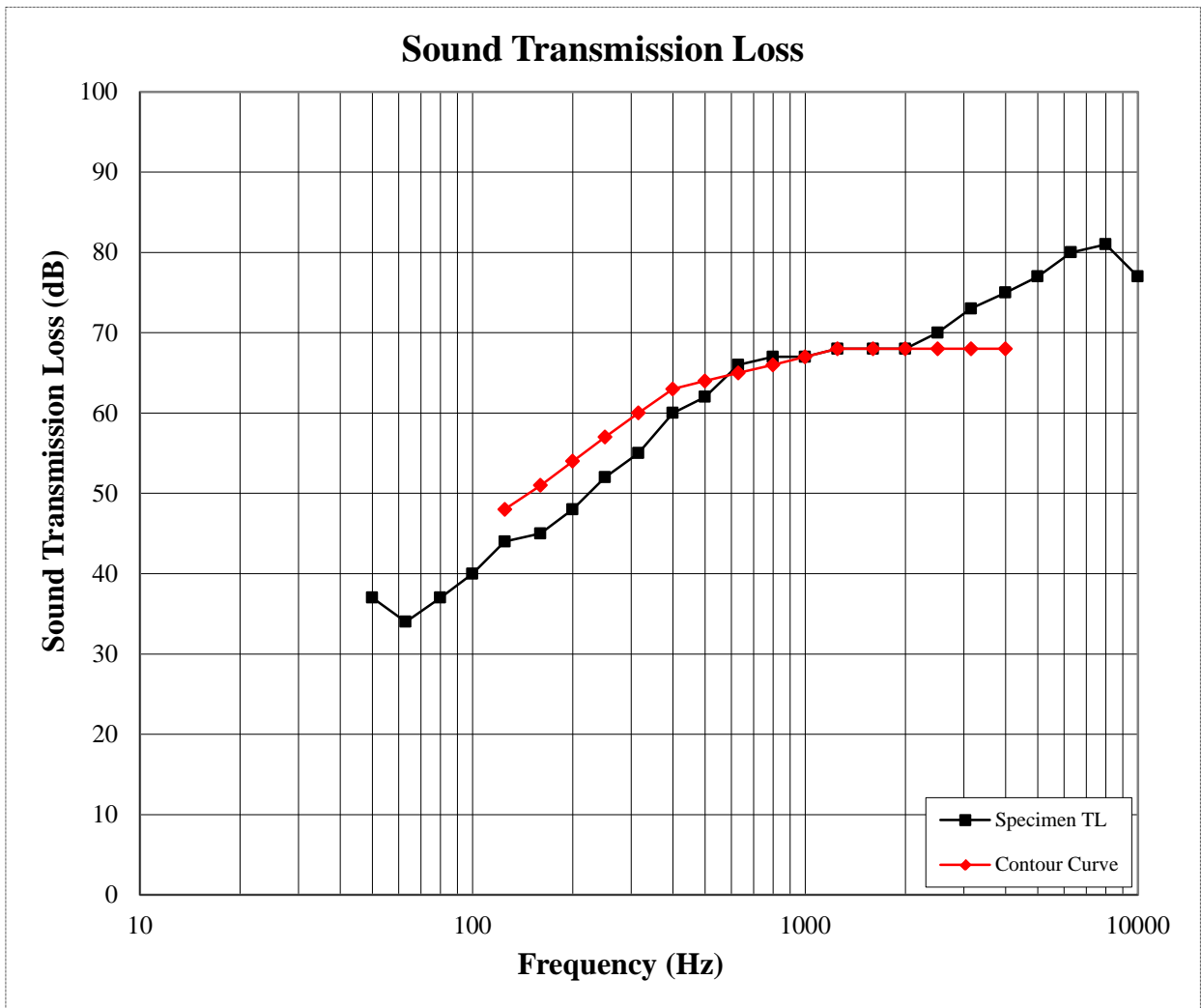
**Deficiencies**      31      (*Sum of Deficiencies*)

- 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>	10/17/13
<b>Data File No.</b>	D0875.02A
<b>Client</b>	ECORE International
<b>Description</b>	7 mm Ceramic Tile, 8 mm Cement Board, 5 mm ECORE International QT4005 Underlayment, 18.3 mm T&G OSB Subfloor, 457 mm Open Web Truss, 165 mm R-19 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 15.9 Fire-Shield C™ Gypsum Board
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

<b>Test Chamber</b>	VT Source Room	VT Receive Room
<b>Temperature</b>	22.28	21.51
<b>Humidity</b>	62.79	66.03



**IMPACT TRANSMISSION**  
ASTM E 492

<b>Test Date</b>	10/17/13
<b>Data File No.</b>	D0875.02A
<b>Client</b>	ECORE International
<b>Description</b>	7 mm Ceramic Tile, 8 mm Cement Board, 5 mm E CORE International QT4005 Underlayment, 18.3 mm T&G OSB Subfloor, 457 mm Open Web Truss, 165 mm R-19 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 15.9 Fire-Shield C™ Gypsum Board
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

<b>Test Chamber</b>	VT Receive Room
<b>Temperature</b>	21.51
<b>Humidity</b>	66.03

Freq (Hz)	Background SPL (dB)	Absorption (m <sup>2</sup> )	Normalized Impact SPL (dB)	95% Confidence Limit	Number of Deficiencies
50	42.0	25.2	63	7.1	-
63	51.6	20.8	64	3.8	-
80	64.1	12.3	65	3.5	-
100	47.1	8.9	60	3.1	0
125	41.7	8.9	60	1.2	0
160	39.6	7.9	60	1.6	0
200	31.6	9.3	63	1.4	3
250	28.9	9.0	61	3.0	1
315	28.4	7.7	59	4.2	0
400	27.1	7.0	58	2.1	0
500	26.3	6.5	58	1.1	0
630	26.2	6.5	57	0.8	0
800	27.9	6.6	54	1.7	0
1000	26.7	6.7	52	2.4	0
1250	26.7	6.7	51	2.5	0
1600	24.6	6.8	51	2.8	2
2000	18.6	7.4	53	3.2	7
2500	15.4	8.3	51	2.4	8
3150	13.3	8.7	44	4.7	4
4000	11.7	9.7	33	5.8	-
5000	8.9	11.2	26	7.3	-
6300	7.0	14.0	20	6.7	-
8000	6.5	18.2	11	4.3	-
10000	6.5	22.9	9	1.1	-

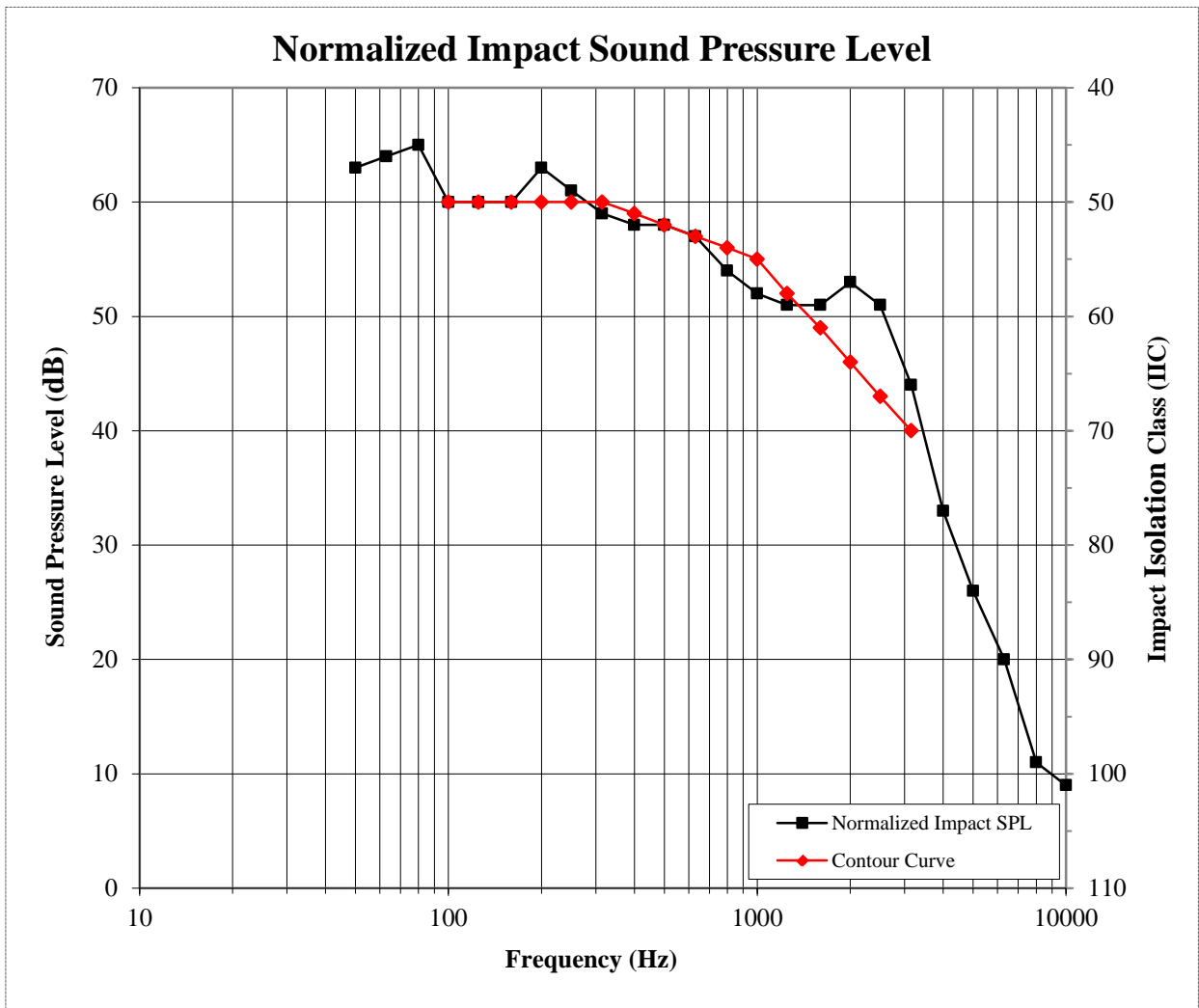
**IIC Rating**      **52**      *(Impact Insulation Class)*  
**Deficiencies**    **25**      *(Sum of Deficiencies)*

*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>	10/17/13
<b>Data File No.</b>	D0875.02A
<b>Client</b>	ECORE International
<b>Description</b>	7 mm Ceramic Tile, 8 mm Cement Board, 5 mm Ecore International QT4005 Underlayment, 18.3 mm T&G OSB Subfloor, 457 mm Open Web Truss, 165 mm R-19 Fiberglass Insulation, 13 mm RC Deluxe™ Resilient Channels, 15.9 Fire-Shield C™ Gypsum Board
<b>Specimen Area</b>	10.98 m <sup>2</sup>
<b>Technician</b>	Daniel B. Mohler

<b>Test Chamber</b>	VT Receive Room
<b>Temperature</b>	21.51
<b>Humidity</b>	66.03



**Photographs**



**Source Room View of Test Specimen Installation**



**Receive Room View of Test Specimen Installation**

**Photographs**



**Source Room View of Sample Corner**

**Drawing**



**Test Specimen Installation**