

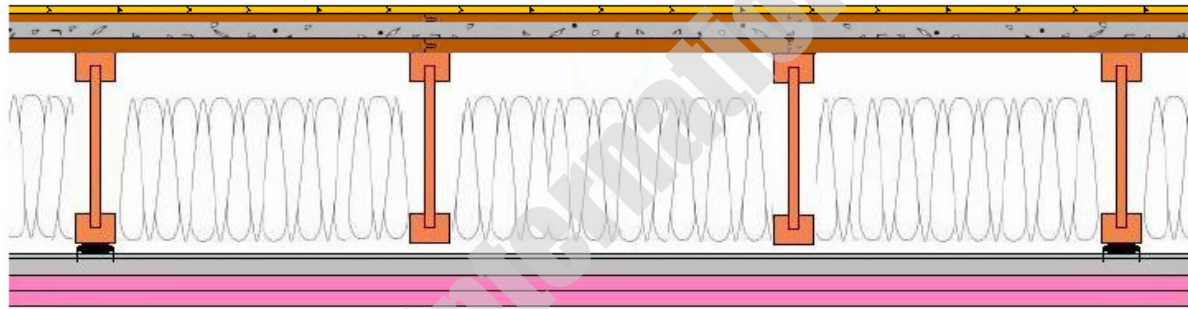
RSIC-1 ACOUSTIC ASSEMBLY

FLOOR/CEILING ASSEMBLY



DIRECT FIX TO TJI

DSA TJI RSIC-1 FSTC 55 FIIC 60



CONSTRUCTION

- * Hardwood Flooring
- * 1/2" Plywood
- * 1-1/2" Light Weight Gypsum Concrete
- * 3/4" Plywood
- * 16" TJI joist
- * 12" Mineral wool 3.5" Fibergalss Batt Insulation
- * RSIC-1 Clips at 48" o.c.
- * 7/8" Drywall Furring Channel 24" o.c.
- * 2 layers 5/8" Gypsum Direct Attached

Test report: DSA 720041-IIC1-NNR1



**FIELD SOUND
TRANSMISSION
CLASS**

FSTC 55



**Fire resistance ratings
ANS/UL
L518, L542**

**FIELD IMPACT
ISOLATION
CLASS**

FIIC 60

DSA Test No:
720041-IIC1

Conducted:
Mar 22, 2004

Prepared for:
Mike Gernhart
PAC International, Inc.
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Report on:

Field Impact Insulation Class (FIIC) Test

Subject:

Waverly Landing Condominiums Floor-Ceiling System between Units 12 and 5

Summary

This report describes a test conducted to determine the Field Impact Insulation Class (FIIC) rating of the floor-ceiling system between the great rooms of Units 12 and 5 at the Waverly Landing Condominiums according to standard test procedures outlined in ASTM Designation E1007-97. The floor-ceiling system tested consisted of the following elements:

- 16" TJI™ joists with one layer of 3/4" plywood, a 1-1/2" layer of lightweight concrete topping and finished with hardwood flooring
- Two layers of 5/8" gypsum wallboard fastened to the underside of the joists with RSIC-1™ Resilient Sound Isolation Clips and 7/8" furring channel (hat channel)
- Two layers of R-19 rock wool and one layer of R-11 fiberglass in the joist cavity

The test met all the requirements of ASTM E1007-97. The assembly tested achieved an FIIC rating of 60.

Tested by:



EXPIRES: 12/31/2005

Joseph C. Begin
Sr. Engineer



Field Impact Insulation Class (FIIC) Test Report

DSA Test No: 720041-IIC1
Conducted on: Mar 22, 2004

For: PAC International, Inc.
On: Waverly Landing Condominiums
Floor-Ceiling System between Units 12 and 5

Conformance to Standards

A Field Impact Insulation Class (FIIC) test was conducted at the request of the PAC International, Inc. to determine the FIIC rating of the floor-ceiling systems located between the great room (living room / dining room / kitchen) of Unit 12 and the great room of Unit 5 at the Waverly Landing Condominiums located at 525 SE Marion St in Portland, OR. The test was conducted in conformance to the test methods and procedures outlined in industry standard ASTM E1007-97¹.

Description of Test Environment

The subject of this test was the floor-ceiling system between the great room of Unit 12 and the great room of Unit 5 at Waverly Landing Condominiums. The impacted floor area was the hardwood floor located approximately in the center of the great room of Unit 12. The sound receiving space for the test was the great room of Unit 5. The receiving space had an open floor plan with carpeting in the living and dining area, and vinyl tile in the kitchen. The living and dining area was furnished with couches, tables, and bookshelves typical of such rooms. The dimensions of the great room floor under test were approximately 23'-9" by 25'-4". The total volume of the receiving space was calculated to be approximately 4,950 cubic feet.

Description of Test Specimen

The test specimen was floor-ceiling system between the great rooms of Unit 12 and Unit 5. The floor construction consisted of 16" TJI™ engineered joists with one layer of 3/4" plywood, a 1 1/2" layer of lightweight concrete over the plywood, and hardwood flooring. The ceiling consisted of two layers of gypsum wallboard fastened to the underside of the joists via RSIC-1™ Resilient Sound Isolation Clips and 7/8" steel furring channel. The joist cavity was filled with two layers of R-19 rock wool, and one layer of R-11 fiberglass insulation.

Description of Test Procedure

The test was conducted in accordance with the procedures outlined in ASTM Designation E1007-97. All measurements were made with a Larson Davis Model 800B sound level meter, which meets the requirements of standard ANSI S1.4 for Type 1 meters², and a Dactron Photon™ real-time analyzer. As specified in Sections 10.1, 10.3 and 10.6 of ASTM E1007-97, a single microphone was moved continuously along a defined traverse in order to obtain the necessary space-average levels. Absorption in the receiving room was calculated from the reverberation time measurement results as prescribed in the test procedure.

Test Results

Table 1 presents the calculated normalized Sound Pressure Level (SPL) values at each of sixteen standard 1/3-octave band test frequencies. Deficiencies in the data relative to an assigned Impact Insulation Class (IIC) curve are presented and used to establish an IIC rating per ASTM Designation E989-89. Table 1 also lists the receiving room absorption values in each frequency band.

¹ American Society for Testing and Materials Designation E1007-97, *Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures*

² American National Standards Institute, S1.4-1983, *Specification for Sound Level Meters*



Field Impact Insulation Class (FIIC) Test Report

DSA Test No: 720041-IIC1
 Conducted on: Mar 22, 2004

For: PAC International, Inc.
 On: Waverly Landing Condominiums
 Floor-Ceiling System between Units 12 and 5

**Table 1 – Normalized Impact Sound Pressure Levels
 Waverly Landing Condominiums Floor-Ceiling System, Units 12 and 5**

1/3 Octave Center Frequency (Hz)	Normalized Impact SPL (dB)	Deficiency (dB)	Receiving Room Absorption (Sabins)	Notes	1/3 Octave Center Frequency (Hz)	Normalized Impact SPL (dB)	Deficiency (dB)	Receiving Room Absorption (Sabins)	Notes
100	57	5	572	3	630	37		491	3
125	57	5	517	3	800	39		466	3
160	59	7	495	3	1000	37		455	3
200	53	1	511	3	1250	32		473	3
250	56	4	561	3	1600	25		472	2 3
315	56	4	561	3	2000	27		486	2 3
400	51		608	3	2500	25		479	2 3
500	43		525	3	3150	25		452	2 3
Total Deficiencies = 26					FIIC = 60				

- Notes:
1. Receiving room volume was less than the ideal value specified in ASTM E1007-97 (6.4) for testing in this frequency band.
 2. Impact noise level in this band was less than 5 dB above ambient. Therefore level indicates only an upper bound of the impact noise level
 3. Room absorption at this frequency was higher than preferred, as specified by ASTM E1007 (11.6)

Field Impact Insulation Class (FIIC)

The rating of the floor-ceiling system tested is FIIC-60. The deficiencies between the normalized impact sound pressure levels and the assigned IIC curve total 26 dB, with no deficiency exceeding 8 dB in any 1/3-octave frequency band.

Figure 1 displays the normalized measured SPL values and the FIIC-60 contour.



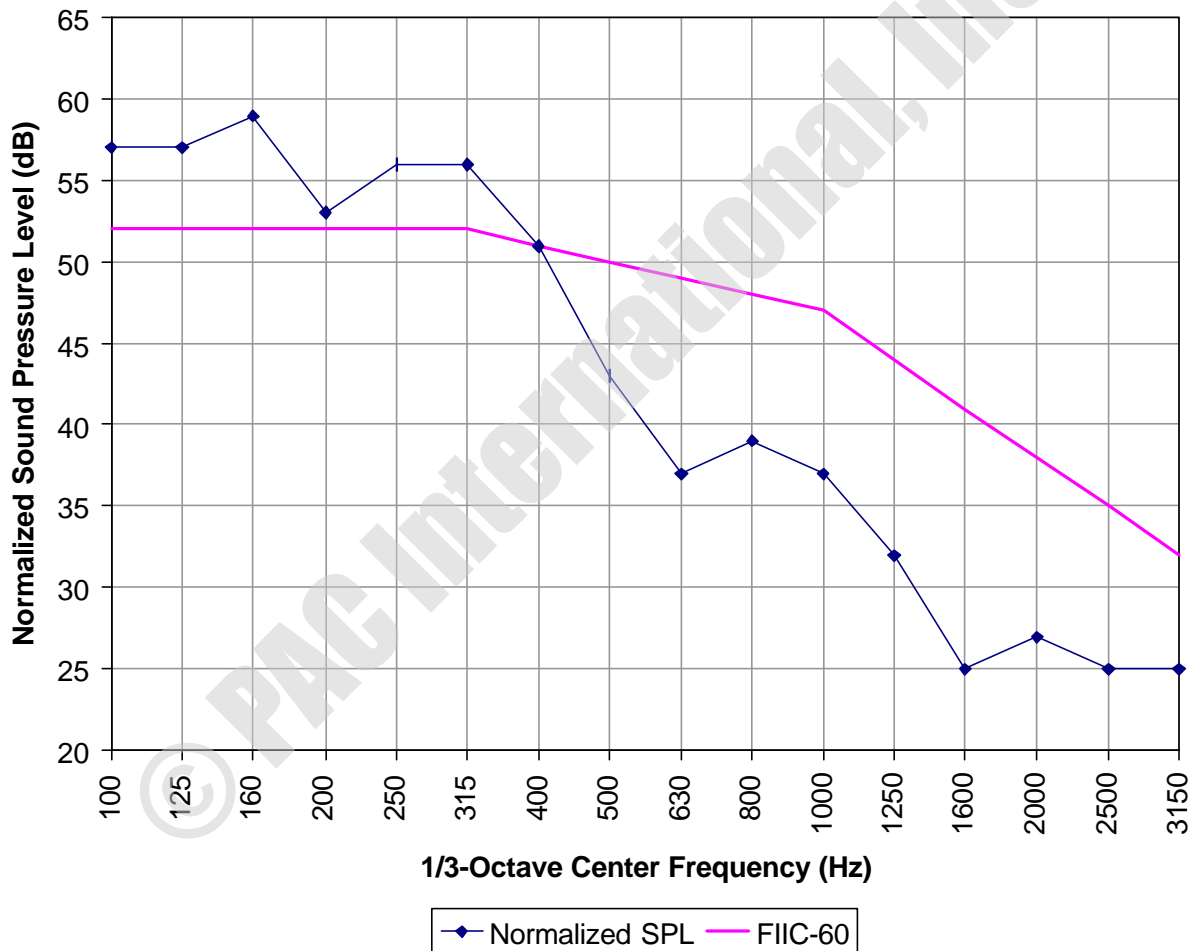
Field Impact Insulation Class (FIIC) Test Report

DSA Test No: 720041-IIC1
Conducted on: Mar 22, 2004

For: PAC International, Inc.
On: Waverly Landing Condominiums
Floor-Ceiling System between Units 12 and 5

Figure 1

Waverly Landing Condominiums Floor-Ceiling System, Units 12 and 5



DSA Test No:
720041-NNR1

Conducted:
Mar 22, 2004

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Report on:
Airborne Sound Insulation Test

Subject:
Waverly Landing Condominiums
Floor-Ceiling System between Units 12 and 5

Summary

This report describes a test conducted to determine the airborne sound insulation rating of a floor-ceiling system between the great rooms of Units 12 and 5 at the Waverly Landing Condominiums according to standard test procedures outlined in ASTM Designation E336-97. The floor-ceiling system tested consisted of the following elements:

- 16" TJI™ joists with one layer of $\frac{3}{4}$ " plywood, a 1- $\frac{1}{2}$ " layer of lightweight concrete topping and finished with hardwood flooring
- Two layers of 5/8" gypsum wallboard fastened to the underside of the joists with RSIC-1™ Resilient Sound Isolation Clips and 7/8" furring channel (hat channel)
- Two layers of R-19 rock wool and one layer of R-11 fiberglass in the joist cavity

The test met all the requirements of ASTM E336-97. The floor-ceiling system tested achieved a Normalized Noise Reduction (NNR) rating of 55.

The NNR rating is reported in lieu of the Field Sound Transmission Class (FSTC) rating because the receiving room absorption was higher than required by ASTM E-336. Although strict adherence to ASTM E-336 would prohibit assigning an FSTC rating in this case, the STC rating calculated from the test data may be of interest. The *STC equivalent* rating calculated from this test data was 56.

Tested by:



EXPIRES: 12/31/2005

Joseph C. Begin
Sr. Engineer



Airborne Sound Insulation Test Report

DSA Test No: 720041-NNR1
Conducted on: Mar 22, 2004

For: PAC International, Inc.
On: Waverly Landing Condominiums
Floor-Ceiling System between Units 12 and 5

Conformance to Standards

An airborne sound insulation field test was conducted at the request of PAC International, Inc. to determine the airborne sound insulation rating of the floor-ceiling systems located between the great room (living room / dining room / kitchen) of Unit 12 and the great room of Unit 5 at the Waverly Landing Condominiums located at 525 SE Marion St in Portland, OR. The test was conducted in conformance to the test methods and procedures outlined in industry standard ASTM E336-97¹.

Description of Test Environment

The subject of this test was the floor-ceiling system between the great room of Unit 12 and the great room of Unit 5 at Waverly Landing Condominiums. The source room for the test was the great room of Unit 12 and the sound receiving space for the test was the great room of Unit 5. The receiving space had an open floor plan with carpeting in the living and dining area, and vinyl tile in the kitchen. The living and dining area was furnished with couches, tables, and bookshelves typical of such rooms. The dimensions of the great room floor under test were approximately 23'9" by 25'4". The total volume of the receiving space was calculated to be approximately 4,950 cubic feet.

Description of Test Specimen

The test specimen was the floor-ceiling system between the great rooms of Unit 12 and Unit 5. The floor construction consisted of 16" TJI™ engineered joists with one layer of ¾ plywood, a 1½ layer of lightweight concrete over the plywood and hardwood flooring. The ceiling consisted of two layers of gypsum wallboard fastened to the underside of the joists via RSIC-1™ Resilient Sound Isolation Clips and 7/8" steel furring channel. The joist cavity was filled with two layers of R-19 rock wool and one layer of R-11 fiberglass insulation.

Description of Test Procedure

The test was conducted in accordance with the procedures outlined in ASTM Designation E336-97. All measurements were made with a Larson Davis Model 800B sound level meter, which meets the requirements of standard ANSI S1.4 for Type 1 meters², and a Dactron Photon™ real-time analyzer. As specified in Sections 10 of ASTM E336-97, a single microphone was moved continuously along a defined traverse in order to obtain the necessary space-average levels. Absorption in the receiving room was calculated from the reverberation time measurement results as prescribed in the test procedure.

Test Results

Table 1 presents the calculated Normalized Noise Reduction (NNR) values at each of sixteen standard 1/3-octave band test frequencies. Deficiencies in the data relative to an assigned NNR curve are presented and used to establish an NNR rating per ASTM Designation E597. Table 1 also lists the receiving room absorption values in each frequency band.

¹ American Society for Testing and Materials Designation E336-97, *Standard Test Method for Measurement of Airborne Sound Insulation in Buildings*

² American National Standards Institute, S1.4-1983, *Specification for Sound Level Meters*



Airborne Sound Insulation Test Report

DSA Test No: 720041-NNR1
 Conducted on: Mar 22, 2004

For: PAC International, Inc.
 On: Waverly Landing Condominiums
 Floor-Ceiling System between Units 12 and 5

Table 1 - Normalized Noise Reduction Values for the Floor-Ceiling System located between Units 12 and 5 of the Waverly Landing Condominiums

1/3-Octave Center Frequency f (Hz)	Avg. SPL in Source Room L ₁ (dB)	Avg. SPL in Receiving Room L ₂ (dB)	Receiving Room Absorption A (sabins)	Normalized Noise Reduction (dB)	Deficiency (dB)	Notes	
125	75.1	39.2	465	37	2		3
160	79.5	36.8	465	44	0		3
200	79.1	37.5	448	42	3		3
250	79.8	38.3	448	42	6		3
315	83.1	38.2	448	45	6		3
400	91.5	42.6	418	49	5		3
500	88.0	37.2	418	51	4		3
630	85.6	31.7	418	55	1		3
800	91.2	30.9	367	61	0		3
1000	94.2	29.8	367	66	0		3
1250	94.5	26.4	367	69	0		3
1600	95.1	25.6	381	71	0		3
2000	99.0	29.3	381	71	0		3
2500	100.2	27.9	381	73	0		3
3150	96.3	21.0	377	76	0		3
4000	91.4	18.0	377	76	0	2	3
NNR-55							
Total Deficiencies = 27							

- Notes: 1. Receiving room volume was less than the ideal value specified in ASTM E 336-97 (A1.3) for testing in this frequency band.
 2. Impact noise level in this band was less than 5 dB above ambient. Therefore level indicates only an upper bound of the impact noise level ASTM E 336-97 (10.5)
 3. Room absorption at this frequency was higher than preferred, as specified by ASTM E 336 (A1.5)

Normalized Noise Reduction (NNR)

The Normalized Noise Reduction rating of the floor-ceiling system tested is NNR-55. The deficiencies between the measured Normalized Noise Reduction values and the assigned NNR curve total 25 dB, with no deficiency exceeding 8 dB in any 1/3-octave frequency band.

The NNR rating is being reported in lieu of the Field Sound Transmission Class (FSTC) rating because the receiving room absorption was higher than required by ASTM E-336.³

Figure 1 displays the Normalized Noise Reduction values and the NNR-55 contour.

³ Although strict adherence to ASTM E-336 would prohibit assigning an FSTC rating to a partition tested under these conditions, the STC rating calculated from the test data may be of interest. The *STC equivalent* calculated from this test data was 56.



Airborne Sound Insulation Test Report

DSA Test No: 720041-NNR1
Conducted on: Mar 22, 2004

For: PAC International, Inc.
On: Waverly Landing Condominiums
Floor-Ceiling System between Units 12 and 5

Figure 1

Normalized Noise Reduction Values

