

# RSIC-1 ACOUSTIC ASSEMBLY



## FLOOR/CEILING ASSEMBLY

## DIRECT FIX TO CONCRETE SLAB

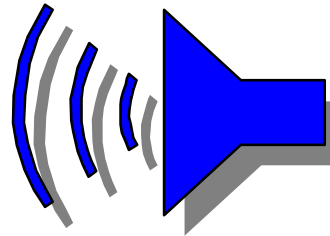


**FCS4 DSWA FIIC 74**



### CONSTRUCTION

- \* 3/8" Hard Wood flooring
- \* 1/16" foam pad / vapor barrier
- \* 8" PT concrete slab
- \* R-8 insulation
- \* RSIC-1 installed 48" oc.
- \* 7/8" furring channel 24" oc.
- \* 1 Layers 5/8" Gypsum Drywall



**SOUND  
TRANSMISSION  
CLASS  
( Insul 5.5 )**

**STC 71**



**Fire resistance ratings  
ANS/UL  
Non combustibile design**

**FIELD IMPACT  
ISOLATION  
CLASS**

**FIIC 74**



Daly-Standlee & Associates, Inc.  
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Beaverton, OR 97005

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fax: 503-646-3385

Report on

# Field Impact Insulation Class (FIIC) Test

Subject:

**Concrete Floor With Resiliently Mounted Ceiling  
Vancouver Center Apartments, Units 424/324**

Prepared for:

Mike Gernhart  
PAC International Inc.  
PO Box 5369  
Aloha OR 97006

DSA Test No: 129031-IIC1  
Conducted: May 12, 2003

## Summary

This report describes a test conducted to determine the Field Impact Insulation Class (FIIC) rating of a floor/ceiling system according to standard test procedures outlined in ASTM Designation E1007-97. The floor/ceiling system tested consisted of the following elements:

- An 8" thick post-tensioned concrete slab
- A single layer of 5/8" gypsum board resiliently mounted to the underside of the slab using PAC International RSIC-1 Resilient Sound Insulation Clips and 7/8" x 25 gauge furring channel.
- The 1-5/8" cavity between the concrete slab and the gypsum board was filled with R8 fiberglass batt insulation.

The test met all the requirements of ASTM E1007-97. When tested with no floor covering (bare concrete), the assembly achieved a FIIC rating of 51).

Tested by:

Joseph C. Begin  
Sr. Engineer

Approved by:



EXPIRES: 6/30/04

Principal

# Field Impact Insulation Class (FIIC) Test Report

For: PAC International Inc.  
On: Vancouver Center Apartments  
Floor/Ceiling System Unit 424 – Unit 324

DSA Test No: 129031-IIC1  
Conducted on: 05/22/2003

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## Conformance to Standards

A structure borne sound insulation field test was conducted at the request of PAC International Inc., to determine the Field Impact Insulation Class (FIIC) rating of a floor/ceiling system located between the living room of upper Unit 424 and the living room of lower Unit 324 at the Vancouver Center Apartments at the corner of 6<sup>th</sup> Avenue and Columbia Street, in Vancouver, Washington. The test was conducted in conformance to the test methods and procedures outlined in the American Society for Testing and Materials and E1007-97.

## Description of Test Environment

The subject of this test was the floor/ceiling system between the living room of Unit 424 and the living room of Unit 324 at the Vancouver Center Apartments. The impacted floor area was the bare concrete floor in the living room of Unit 424. The sound receiving space for the test was the living room area of Unit 324. The receiving space had a bare concrete floor, with gypsum board walls and ceiling, and there were no furnishings in the room at the time of the test. The dimensions of the floor/ceiling under test were approximately 13.9 feet by 12.5 feet. The total volume of the receiving space was calculated to be approximately 1,497 cubic feet.

The room had a set of patio doors to the outside, and on the interior wall, a doorway (without a door) separated the receiving room from the rest of the suite. For the test, the doorway in the interior wall was temporarily covered with two layers of 5/8" gypsum board. To minimize contamination of the test by exterior noise, the patio door was also temporarily covered with two layers of 5/8" gypsum board. The doorway between the living room and the laundry closet was also covered with gypsum board to further minimize potential flanking paths.

## Description of Test Specimen

The test specimen was the bare concrete floor in the living room of Unit 424 and the ceiling above the living room in Unit 324. The floor construction consisted of an 8" thick post-tensioned concrete slab. The ceiling system consisted of one layer of 5/8" Type X gypsum board attached to the underside of the concrete floor slab using PAC International's Resilient Sound Isolation Clip System with 7/8" x 25 gauge furring channel. The RSIC-1 clips were spaced at 24" x 48" OC, and were attached to the concrete slab with 2" powder actuated pins. The furring channel was spaced at 24" OC. The gypsum board was attached to the furring channel using 1-1/4" steel drywall screws. The gypsum board was cut so as to leave a 1/4" to 3/8" gap around the perimeter, where the ceiling meets the wall. This perimeter gap was then caulked with acoustical sealant. The gypsum board was then fire taped to seal all joints and drywall screws.

The ceiling of the receiving room had a 22-1/2" wide by 11-1/2" deep soffit running along the longer wall on one side. This soffit, which contained ducts and pipes, was formed using gypsum board attached to the wall and the concrete slab with 20 gauge steel angles. This soffit was covered with an additional layer of 5/8" gypsum board, resiliently mounted with the PAC RSIC system.

## 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 (SLM), which meets the American National Standards Institute (ANSI) standard for Type 1 meters, and a computer-based spectral analysis program, which allows fast real-time acquisition and analysis of sound data. 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

June 6, 2003



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Attn: Mike Gernhart

From: Daly-Standlee & Associates, Inc.

Joseph C. Begin  
Sr. Engineer

Re: **Supplement to DSA Report No 129031-IIC1**  
**Additional Impact Tests With Floor Covering Samples**  
DSA File #: 129031

## **Introduction**

On May 12, 2003, at the request of PAC International, Daly-Standlee & Associates, Inc. (DSA) conducted a test of a post-tensioned concrete floor with a resiliently mounted ceiling, to determine its Field Impact Insulation Class (FIIC) rating. This test was conducted on a bare concrete floor. As reported in the official test report (DSA report No 129031-IIC1) as tested, the rating of this floor-ceiling system with no floor covering (bare concrete) was FIIC 51.

In addition to the test of the bare floor, several samples of different floor coverings were tested the same evening at the same location. These samples, which measured approximately 4 feet by 4 feet, were tested by placing the sample on the concrete floor, centered on the location of the original test, and then conducting the test with the impact machine centered on the sample. The test was conducted in the manner prescribed in ASTM E1007-97. However, because these were samples only and were not installed over the entire floor, these additional sample tests do not fully meet the requirements of ASTM E1007. Accordingly, these tests are being reported in this supplemental report.

Due to time constraints, and the building owner's desire to not have any samples glued or otherwise fastened to the floor, some of the samples tested may not accurately represent a final installed condition.

Although these additional tests did not fully meet the requirements of ASTM E1007, they provide useful information which may be indicative of the improvement in impact insulation performance with different types of floor finishes.

### **Description of the Samples Tested**

Table 1 lists the tests conducted with a description of the floor finish for each test. Test 1 refers to the base condition (the bare concrete floor).

**Table 1. Description of Test Samples**

<b>Test No</b>	<b>Sample Name</b>	<b>Sample Description</b>
1	Base condition (not a sample)	Bare concrete floor. Floor/ceiling system consisted of an 8" post-tensioned concrete slab with 5/8" gypsum board ceiling mounted to the underside of the slab using PAC International RSIC-1 resilient sound insulation clips and 7/8" x 25 gauge furring channel. The 1-5/8" cavity between the concrete and the gypsum board was filled with R8 insulation.
2	Tile laying on concrete	1/4" x 12" x 12" ceramic tile bonded to 1/4" thick fiber-cement backer board and grouted. Sample was laid on concrete floor, not bonded to it.
3	Tile on Regupol™	Tile sample described in Test 2 with one layer of 5 mm Regupol™ underlayment material placed between the sample and the concrete floor. No adhesive was used.
4	Hardwood on 1/16" foam	3/8" thick x 3" wide pre-finished tongue & groove bevel-edge hardwood (boards made from plywood substrate with 1/16" oak surface) glued at seams and laid on 1/16" foam vapor barrier mat. No adhesive (other than between board edges) was used.
5	Hardwood without foam	Hardwood sample described in Test 4, except that foam was replaced with 0.7 mil poly vapor barrier. No adhesive (other than between board edges) was used.
6	Cushioned vinyl on concrete	Armstrong 1/8" cushioned vinyl flooring laid on concrete floor without adhesive.
7	Carpet with pad	40 oz carpet on 7 lb rebond pad. Sample was laid on concrete with no adhesive or fasteners.
8	Carpet without pad	40 oz carpet without pad. Sample was laid on concrete with no adhesive or fasteners.

### **Test Results**

Test results are listed in Table 2.

**Table 2. Test Results**

<b>Test No</b>	<b>Sample Name</b>	<b>FIIC Equivalent*</b>	<b>Bands in Which Impact Noise Was Less Than 5 dB Above Ambient</b>
1	Base condition (not a sample)	51	none
2	Tile laying on concrete	70*	1000 to 3150 Hz
3	Tile on 5 mm Regupol™	69*	1250 to 3150 Hz
4	Hardwood on 1/16" foam	74*	800 to 3150 Hz
5	Hardwood without foam	72*	3150 Hz
6	Cushioned vinyl on concrete	72*	1250 to 3150 Hz
7	Carpet with pad	87*	All, except 60 Hz
8	Carpet without pad	84*	250 to 3150 Hz

\* Except for Test 1, the base condition, the tests did not fully meet the requirements of ASTM E1007, because a sample, not a completely installed floor covering was tested. Hence the results are reported in Table 2 as an "FIIC Equivalent" rating. (Only the base condition Test 1 may be considered a true FIIC rating.)

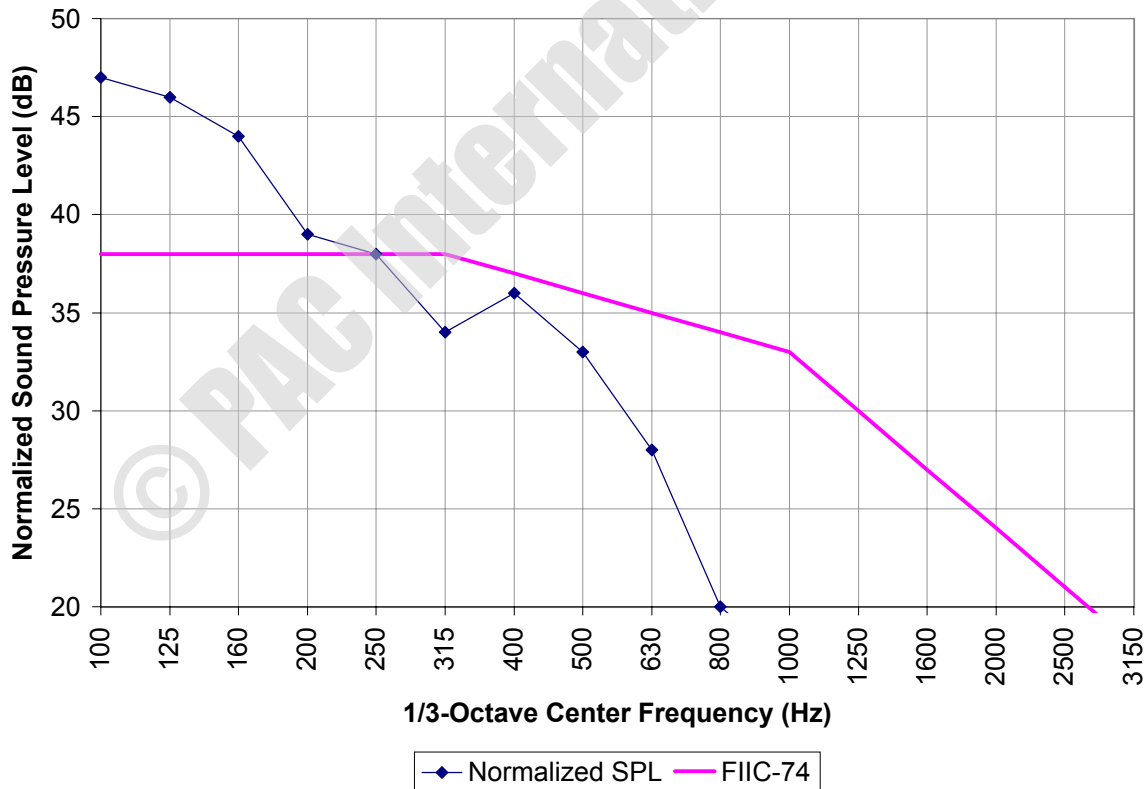
For each test, a sheet is attached that shows the normalized impact sound levels from the test in tabular and graphical form.

**Vancouver Center Apartments - 424/324 - T4 - Hardwood w 1/16" Foam**

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	47	9	129	1	630	28	0	42	
125	46	8	66		800	20	0	42	2
160	44	6	64		1000	17	0	47	2
200	39	1	52		1250	16	0	50	2
250	38	0	49		1600	16	0	54	2
315	34	0	44		2000	15	0	61	2
400	36	0	41		2500	14	0	64	2
500	33	0	39		3150	13	0	61	2
Total Deficiencies = 24					FIIC = 74				

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.

**Vancouver Center Apartments - 424/324 - T4 - Hardwood w 1/16" Foam**



# Sound Insulation Prediction (v5.5)



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PAC

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Margin of error is generally within +/- 3STC

JobName:

Notes:

Job No.:

Page No:

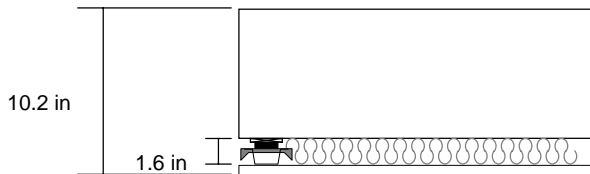
DSA Vanc SCT 71

Date: 25 May 04

Initials:

File name:insul

1 x 8.0 in Concrete



$f_0 = 80$  Hz  
 1 x 0.6 in Type X Gypsum Board  
 thickness 2 in

**STC 71**  
**OITC 51**

Panel size 8.9x13 ft

Surf. mass 97.4 lb/ft<sup>2</sup>

Crit. freq 147 Hz

damping 0.01

Surf. mass 2.9 lb/ft<sup>2</sup>

Crit. freq 1997 Hz

damping 0.01

Frequency (Hz)	TL(dB)	TL(dB)
50	41	
63	40	36
80	33	
100	45	
125	47	47
160	50	
200	56	
250	61	59
315	67	
400	71	
500	75	74
630	79	
800	82	
1000	85	84
1250	87	
1600	88	
2000	87	88
2500	89	
3150	92	
4000	94	93
5000	96	

