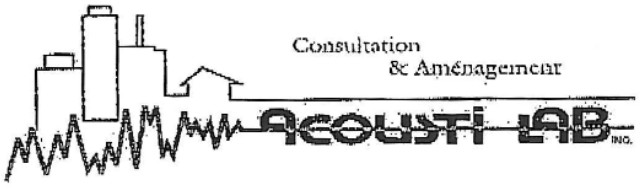

Test report

DURO INTERNATIONAL

59, 36e avenue

St-Eustache (Quebec)

J7P 2Z4

To the attention of Mr François Vaillancourt

ACOUSTIK 3/8"

By

Acousti-Lab Inc.
63, rang Ste-Claire
Ste-Anne-des-Plaines (Quebec)
J0N 1H0

April 18th, 2006

Acoustical Surfaces, Inc.

SOUNDPROOFING, ACOUSTICS, NOISE & VIBRATION CONTROL SPECIALISTS

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We Identify and S.T.O.P. Your Noise Problem

SUMMARY

ANNEXES

Acoustical Surfaces, Inc.
We Identify and S.T.O.P. Your Noise Problems
Sound Transmission Obscuring Products
Soundproofing, Acoustics, Noise & Vibration Control Specialists ™

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OBJECTIVE

The objective of the acoustical expertise is to evaluate the ratings (FIIC) of a floor assembly the Acoustik 3/8".

INTRODUCTION

We wanted this report to be as complete as possible on a technical point of view, nothing was left to hazard. All the content of these documents are meeting with actual standards and are done with the latest and newest instrumentation. All comments or analysis are from years of experience and knowledge is this field. A team work is done on every reports to assure our customers the best expertise possible on the market.

Also in order to avoid the readers to find the report to complicate to understand, we use common words and common technical expressions.

The essentials information has been condensed but the details can be seen in the different annex therefore the results quickly and if needed can obtain further details in the different annex.

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THEORY

The propagation of a sound wave in a room can happen in two ways. The wave could occur from an impact in between two bodies. If one of the body is the floor ceiling or walls separating two dwellings units, this wave is called impact noise. But if the wave is not from an impact it's called airborne noise. For example if a door hits a wall an impact sound wave is created if a baby would cry in an adjacent dwelling an airborne sound is created.

The impact noise starts with an impact with the walls or the floors. The vibrations cause by the impact are transform in sound wave that generate airborne noise on the other side of the walls. The wall / floor becomes a resound source. We can diminish the impact noise by reducing the frequency of resound source as close as possible to the level of audibility. To achieve our goal we use equations of the type mass – spring – mass.

Airborne noise are more complex to alleviate in fact it emits a power almost equal at all frequency opposite to impact noise which transmit mostly in low and medium frequency. The goal is to realize a floor assembly which act as filter on all frequency.

Every material offers a different feature, some are good filters in low frequency some others only perform in medium and high frequency.

But the assembly of two different material can offer different characteristic than use separately.

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Only the experience based on research will determine the best composition of materials for predetermined goal.

The airborne noise is identify by FSTC and the impact noise by the rating FIIC.

These ratings are formulated by normalization and are show with a number exp. FSTC 57. Different assembly can produce a such rating.

Never the less a STC rating will be obtain with a assembly (wall or floor) but will depend on the entire building, in fact the value of a rating can be altered by many decibels because of indirect sources of noise and or adjoining sound.

The indirect noise are the different acoustic vibrations perceived in a dwelling unit that are not coming from walls / floor.

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RESULTS

The chart below illustrate the result of the acoustical test FIIC done with product Acoustik 3/8"

Acoustical results

Tests	Assembly	FIIC
1	¾" Engineered or solid wood Floor furring strip 5/8" X 3 ½" every 10" ***Acoustik 3/8"*** ¾" or 5/8" plywood Joist or beam Acoustic wool 6" Flexible bar 2 X gypsum	50

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CONCLUSION

All the tests procedures and calculation have been done according to the actual standards and recommendations.

For any information concerning this expertise, do not hesitate to contact us at (450) 478-8828.

Robert Ducharme

Acoustician

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ANNEX A

Graphics and results

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ANNEX B

Normalization and instrumentation

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METHOD OF MESUREMENTS UPON NORMALIZATION

ASTM E-336-07 :	Airborne noise measurement in buildings
ASTM E-413-99 :	Determination of STC ratings
ASTM E-1007-04 :	Impact noise measurement in buildings
ASTM E-989-06 :	Determination of impact insulation class
ISO 3382: 1997 :	Measurements of the reverberation time in auditoriums

Normalizations of instruments

CEI 225 (1966):	Analyser of octave band, half octave and third octave for sound and vibrations.

Instrumentation used (Bruel & Kjaer)

Architectural analyser	B&K	#4417
Sound source	B&K	#4224
Tapping machine	B&K	#3204
Micro amplifier	B&K	#2619
Micro 1/2"	B&K	#4165
Measure of sound source	B&K	#4230
Sonometre (Class A)	B&K	#2215

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ANNEX C

Determination of IIC ratings

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DETERMINATION OF IIC RATINGS

1.FIIC RATINGS

The mathematical and the curves relation are provided by the standards E-1007-04 and E-989-06.

ASTM E-1007-04:

$$L_n = L_2 - 10 \log (A_o/A)$$

where

R_n : Normalized impact noise (dB)

L_2 : Normalized sound pressure level (dB)

A_o : Absorption of reference = 10 mSab

A : Absorption of receiving room (mSab)

Approximate air temperature 68°F

$$A = (0.161\ V)/T_{60}$$

where

V : Receiving room volume (m^3)

T_{60}: Reverberation time of the receiving room (seconds)

So

$$L_n = L_2 - 10 \log \{(62.1\ T_{60})/V\}$$

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As specified by the ASTM E-989-06, the FIIC rating is determined as per the following.

The IIC rating of the tested floor/ceiling assembly is determined by sliding the classification curve on the graph representing the normalized sound pressure levels until the following conditions are met (ASTM E-989 standards)

- The sum of the deviations above the normalizing curve should not exceed 32dB.
- The maximum deviation above the normalizing curve should not exceed 8 dB using 1/3 octave frequency.

When the reference curve IIC is placed at is lowest position (meets one of the 2 conditions.

The value red on the left of the vertical axes of the chart at the intersection of the IIC contour and the frequency of 55 Hz and by subtracting this value from the number 110 which will correspond directly to the FIIC value.

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ANNEX D

Technical terms

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DEFINITION OF TECHNICAL TERMS

TRANSMITTING ROOM : The room were the sound transmission has been generated

RECEIVING ROOM : Room receiving noise transmitted by transmitting room

AIRBORNE NOISE : Noise that arrives at a point of interest by propagation through air

IMPACT NOISE : Noise transmitted through a solid structure and vibration through the air

SOUND PRESSURE LEVEL : Sound pressure measure in logarithmic (base 10) with a reference pressure of 0.0002

REVERBERATION TIME : Time needed for the sound pressure level to drop to 60 dB after the noise source is stop

STC RATING : A single number rating obtain from the performance of a partition against airborne noise

IIC RATING : To measure the degree of impact noise isolation provided by a floor/ceiling assembly

FSTC RATING : A sound transmission rating evaluating the performance of a airborne noise isolation under real life conditions

FIIC RATING : A sound transmission rating evaluating the performance of impact noise isolation under real life conditions