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C/o Michel Philippe

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ICF/BUILDING SYSTEM FSTC TEST
REPORT

Dear Mr. Philippe,

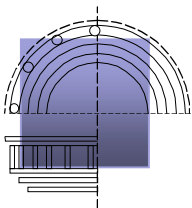
Following is the report on the two FSTC tests we performed on February 28, 2003, in Embrun, La Croissé St., units 3,4 and 5, for two different demising walls.

MEASUREMENT INSTRUMENTS

Sound level measurements were carried out using fully calibrated acoustic test measurement equipment, consisting of the following:

Larson Davis Type 1/2" Condenser Microphone Cartridge
Larson Davis Type Microphone Preamplifier
Brüel and Kjør Type 4220 Pistonphone Calibrator
Larson Davis Type 2900B Real Time Analyzer & Noise Generating Source
Quad amplifier and loudspeakers
Associated Connecting Cables

The sound level measuring system was calibrated prior to the first test. Following the last test, a calibration check was carried out to determine any deviation in the system from its first calibration. There was no deviation found in sound levels between the first calibration and the final calibration check.



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A WEIGHTED SOUND LEVELS

When evaluating the general sound level in a space, the recorded levels in dB are usually weighted with the A scale, a function which is approximately representative of the frequency response of the human ear, which is less sensitive to low frequency than to middle frequency sound. The sound level measure is expressed as *dBA*.

MEASUREMENT PROCEDURE

Test data for each test was collected and arrayed according to the ASTM (American Society for Testing and Materials) E336-84 standard test method for the measurement of airborne sound insulation in buildings. Measurements were made in 1/3-octave bands between 100 Hz and 4000 Hz.

We were not provided with a copy of the floor plans, but we physically measured the relevant dimensions.

The first test was carried for the demising wall between units 4 and 5.

We choose the following layout for the first test:

- We used as Source Room the first room to the left of the front entrance in unit 4.
- We used as Receive Room the first room to the right of the front entrance in unit 5 that has a common wall with the Source Room.

Background noise level was charted before the testing began and was found to be 25.5 dBA in the Receive Room (see record # 4).

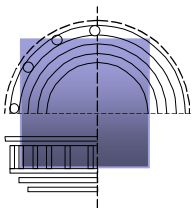
The second test was carried for the demising wall between units 3 and 4.

We choose the following layout for the second test:

- We used as Source Room the main bedroom in unit 3.
- We used as Receive Room the main bedroom in unit 4 that has a common wall with the Source Room.

Background noise level was charted before the testing began and was found to be 25.2 dBA in the Receive Room (see record # 1).

For each test, after measuring the background noise level in the Receive Room, the sound source was installed in the Receiving Room and the rate of sound decay was measured for calculation of reverberation time (amount of time required for sound to decay through 60 decibels).



Then, the sound source was installed in the Source Room. The speakers were located away from the test partition, along the wall opposite to the one tested, near the corners, having random orientation to provide the most uniform sound field possible.

Six microphone measurement positions were used for the Source Room levels for both tests and seven measurement positions for the first, respective nine for the second test, were used for the Receiving Room levels for, all with sound source on.

PARTITION DESCRIPTIONS

The tested partitions were the demising wall assemblies between the Source Room and the Receive Room for each of the tests. We performed FSTC tests of the wall assemblies that took into account the field conditions. The tests accounted for flanking noise and electrical outlet openings in the common wall. This is why the FSTC rating of a wall is usually few points under the STC rating of the same wall type.

The wall construction, as described to us, was:

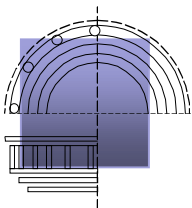
- Drywall
- Styrofoam
- Concrete
- Styrofoam
- Drywall.

The only dimension we were provided is that for the thickness of the concrete, which was 4" for the 4 to 5 partition and 6" for the 3 to 4 partition.

TEST CONDITIONS

For all tests taken at this location, the following apply:

- Microphone minimum of 1 m from any surface
- Exterior windows closed
- Ambient air temperature approximately 20 deg. Celsius
- The rooms were unfinished, with drywall walls and ceilings and hardwood floors.



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MEASUREMENT RESULTS

In the accompanying data sheets and graphs we present the results of all our measurements. The 1/3 octave spectrum of sound transmission loss for the test location is shown on the graphs along with an equivalent STC curve for comparison purposes. The Sound Transmission Class (STC) is a numerical value used to rate acoustic barriers such as walls, partitions, doors, etc. for their effectiveness in blocking human speech sounds. STC ratings for partitions are measured under optimum laboratory conditions, which are rarely achieved in actual construction. Field STC (FSTC) ratings incorporate all elements located within a building and are more representative of actual sound isolation of a party wall for the occupants on both sides of the partition.

The following table summarizes the parameters of the FSTC tests:

Parameter	Test 1 (units 4-5)		Test 2 (units 3-4)	
	Value	Printout #	Value	Printout #
Receive Room Background SPL (dBA) (source OFF)	25.5	4	25.2	1
Source Room SPL (dBA) (source ON)	110.5	3	109.2	2
Receive Room SPL (dBA) (source ON)	59.1	2	57.9	3
Noise Reduction (dBA)	51	-	51	-
Test Wall area (m ²)	6.2	4	11.4	3
Receive Room volume (m ³)	20.9	4	41.2	3
Receive Room RT60	-	1	-	1
FSTC	50	4	51	3

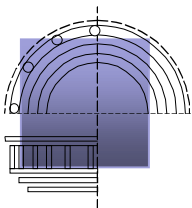
Table 1 – FSTC tests parameters

For Test 1, our measurements determined Field STC-50 (printout #4) for the wall assembly between the units 4 and 5 and for Test 2 to be FSTC-51 (printout #3) for the wall assembly between the units 3 and 4.

Since flanking sound transmission (around the partition) was not evaluated, the FSTC results above should be considered minimum values.

NOTE:

The ASTM standard E336-84 test method stipulates a minimum test room volume of 40 m³ for measurements at 125 Hz to be valid. For Test 1, the Receive Room tested does not have the required minimum volume for valid measurements at 125 Hz. Its volume was 20.9 m³. One way to increase the reliability of measurements at 125 Hz in small rooms is to take a very high number of microphone positions and average them to obtain less effect from the room modes. The E336-84 standard stipulates a minimum of six positions for tests to be valid. We used seven microphone positions to increase precision

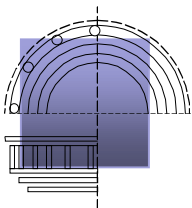


The measured FSTC results for Test 1 might vary slightly from the value we obtained if the tests were performed in rooms meeting the minimum volume requirement of 40 m³. There is no such issue for Test 2.

Should you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,

Tiberiu Spulber
Consultant



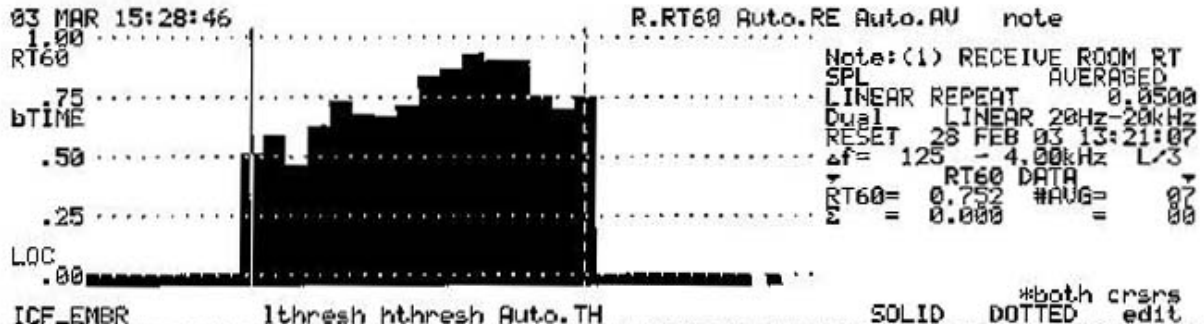
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Date and Time: 03 MAR 03 15:28

Data Type: RT60 data

Recalled from file: ICF_EMBR, record: 1, frame: 1



Data Type: RT60 data

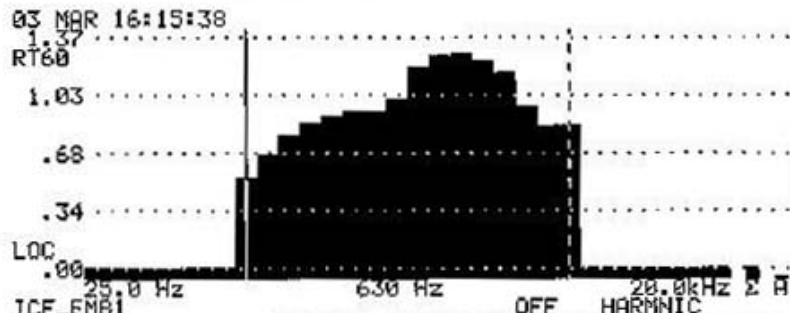
Recalled from file: ICF_EMBR, record: 1, frame: 1

Note: (1) RECEIVE ROOM RT60

Filter	RT60	Count
14	25.0 Hz	0.000 sec 00
15	31.5 Hz	0.000 sec 00
16	40.0 Hz	0.000 sec 00
17	50.0 Hz	0.000 sec 00
18	63.0 Hz	0.000 sec 00
19	80.0 Hz	0.000 sec 00
20	100 Hz	0.000 sec 00
21	125 Hz	0.519 sec 07
22	160 Hz	0.591 sec 07
23	200 Hz	0.468 sec 07
24	250 Hz	0.626 sec 07
25	315 Hz	0.731 sec 07
26	400 Hz	0.680 sec 07
27	500 Hz	0.674 sec 07
28	630 Hz	0.714 sec 07
29	800 Hz	0.839 sec 07
30	1.00kHz	0.869 sec 07
31	1.25kHz	0.929 sec 07
32	1.60kHz	0.905 sec 07
33	2.00kHz	0.898 sec 07
34	2.50kHz	0.756 sec 07
35	3.15kHz	0.701 sec 07
36	4.00kHz	0.752 sec 07
37	5.00kHz	0.000 sec 00
38	6.30kHz	0.000 sec 00
39	8.00kHz	0.000 sec 00
40	10.0kHz	0.000 sec 00
41	12.5kHz	0.000 sec 00
42	16.0kHz	0.000 sec 00
43	20.0kHz	0.000 sec 00
SUM	0.000 sec	00

STATE OF THE ART AK 2900 RTA B5.25

Date and Time: 03 MAR 03 16:15
 Data Type: RT60 data
 Recalled from file: ICF_EMB1, record: 1



Note: (2) RECEIVE ROOM RT
 SPL 0.0000
 LINEAR REPEAT 0.0500
 Dual LINEAR 20Hz-20kHz
 RESET 28 FEB 03 14:56:55
 FILTER #21 125 Hz L/3
 RT60= 0.532 DATA #AVG= 09
 S = 0.000 = 00
 TACH= SPEED=

ICF_EMB1 OFF HARMONIC BOTH *solid char SOLID DOTTED

Data Type: RT60 data
 Recalled from file: ICF_EMB1, record: 1
 Note: (2) RECEIVE ROOM RT60

Filter	RT60	Count
14 25.0 Hz	0.000 sec	00
15 31.5 Hz	0.000 sec	00
16 40.0 Hz	0.000 sec	00
17 50.0 Hz	0.000 sec	00
18 63.0 Hz	0.000 sec	00
19 80.0 Hz	0.000 sec	00
20 100 Hz	0.000 sec	00
21 125 Hz	0.532 sec	09
22 160 Hz	0.673 sec	09
23 200 Hz	0.786 sec	09
24 250 Hz	0.869 sec	09
25 315 Hz	0.904 sec	09
26 400 Hz	0.939 sec	09
27 500 Hz	0.938 sec	09
28 630 Hz	1.004 sec	09
29 800 Hz	1.193 sec	09
30 1.00kHz	1.266 sec	09
31 1.25kHz	1.272 sec	09
32 1.60kHz	1.237 sec	09
33 2.00kHz	1.163 sec	09
34 2.50kHz	0.963 sec	09
35 3.15kHz	0.846 sec	09
36 4.00kHz	0.855 sec	09
37 5.00kHz	0.000 sec	00
38 6.30kHz	0.000 sec	00
39 8.00kHz	0.000 sec	00
40 10.0kHz	0.000 sec	00
41 12.5kHz	0.000 sec	00
42 16.0kHz	0.000 sec	00
43 20.0kHz	0.000 sec	00
SUM	0.000 sec	00

