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Twin City Testing Corporation

PROJECT NUMBER: 18 00240.1

PAGE: 1 of 4
DATE: April 17, 2000

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The test results contained in this report pertain only to the actual assemblies tested and not necessarily to all similar constructions.

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OUTDOOR/INDOOR TRANSMISSION LOSS (OITL) - ASTM E: 966-92**INTRODUCTION:**

This report presents the results of an Outdoor Indoor Transmission Loss (OITL) tests of an exterior wall bale built system at Lewiston, Idaho. This test was requested by Mr. Joe Allen of Bale Built Inc. on March 21, 2000 and was completed on April 4, 2000.

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TEST RESULTS SUMMARY:

The Outdoor Indoor Transmission Loss (OITL) of the Exterior Facade Assembly between the outside and interior of the bale built home was 57 F-STC obtained for both a bedroom wall facing north and a closet wall facing south. This is 12 points above the minimum UBC requirement of 45. (see REMARKS:)

A tabular and graphical presentation of the data and Specimen Description is presented under "Test Results and Specimen Description".

TEST PROCEDURE and EQUIPMENT:

ASTM standard E966-92, "Field Measurement of Airborne Sound Insulation of Building Facades and Facade Elements", was followed in every respect. The instrumentation was calibrated before and after testing with a sound level calibrator. The F-STC value was obtained by applying the apparent OITL (Outdoor/Indoor Transmission Loss) values to the standard contour of ASTM E413-87. The loudspeaker was placed in a plane parallel to the center plane of the test element at a 45° angle and the center axis pointed at the far edge of the element. The microphone was placed at 6 locations on the exterior surface as outlined in ASTM E966-92 procedure for the "flush mount" technique.

<u>Manufacturer</u>	<u>Model</u>	<u>Description</u>	<u>S/N</u>
IVIE, Inc.	PC-40	Spectrum Analyzer	4587A130
Larson Davis	2541	1/2" Free Field Mic.	1150
Brüel & Kjær	4230	Sound Calibrator	282266 (cal due: 2/11/00)
IVIE, Inc.	IE-20B	Noise Generator 741C853	
Yamaha	MS60S	Monitor Speaker KK01498	

REMARKS:

The OITL (STC) reported by these tests is significantly better than the minimum values required by the UBC. Additional sound isolation may be obtained with use of resilient channel on the inside wall to provide a vibration break to isolate the low frequency noise transmission (125 to 250 Hz frequencies). Using the resilient channel should increase the OITL (STC) by as much as 3 points.

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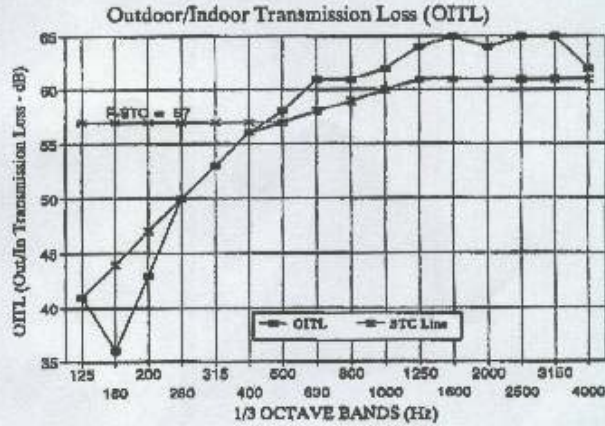
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TEST RESULTS and SPECIMEN IDENTIFICATION -OITL of Bedroom Exterior Facade:

Project: Hale Built Corporation
Specimen: Composite Straw Bale Walls

Test Date: April 4, 2000

F(Hz)* 1/3 octaves	OITL	Def.
125	41	0
180	36	8
250	49	4
315	60	0
400	63	0
500	66	0
630	61	0
800	61	0
1000	62	0
1250	64	0
1600	65	0
2000	64	0
2500	65	0
3150	66	0
4000	62	0
F-STC:	57 (OITL)	
Total Deficiencies:	12	
NIC:	53	



* Where: F(Hz) = 1/3 octave band center frequency; FIL = Field transmission loss; Def. = difference below STC cont

Specimen Description:

Term. Room: Bedroom closet
Source Room: Outside Deck
Area: 120.2 ft²
Volume: 1250.3 ft³
Density: 21.8 psf

	Indoor	Outdoor
Temp, F:	72	60
Rel Hum., %:	45	45

Construction Details:

- 1/4" Hardy plank (lapped press board)
- 1/2" CDX sheathing
- 25' composite straw bale wall
- 1/2" gypsum board
-
-
-
-
-
-

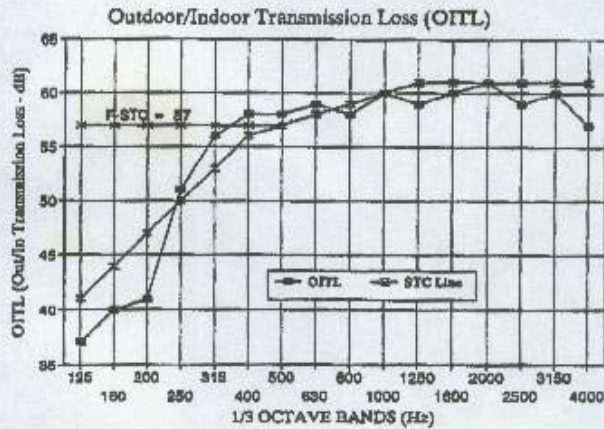
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TEST RESULTS and SPECIMEN IDENTIFICATION OITL of Closet Exterior Facade:

Project: Bals Built Corporation
Specimen: Composite Straw Bale Walls

Test Date: April 4, 2000

F(Hz)* 1/3 octave	OITL	Def.
125	37	4
160	40	4
200	41	6
250	51	0
315	58	0
400	58	0
500	58	0
630	58	0
800	58	1
1000	60	0
1250	59	2
1600	60	1
2000	61	0
2500	59	2
3150	60	1
4000	57	4
F-STC:	57 (OITL)	
Total Deficiencies:		25
NIC:	54	



* Where: F(Hz) = 1/3 octave band center frequency; FTL = Field transmission loss; Def. = difference below STC cont

Specimen Description:

Term. Room: Bedroom
Source Room: Outside
Area: 117.3 ft²
Volume: 1333.6 ft³
Density: 21.8 pcf

	Indoor	Outdoor
Temp, F:	72	60
Rel Hum., %:	45	45

Construction Details:

- 1/4" Hardy plank (lapped press board)
- 1/2" CDX sheathing
- 23" composite straw bale wall
- 1/2" gypsum board

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assembly with the same finishes."

In those tests, conducted in 1993 on two string wheat straw bale wall panels,

Appendix d

Fire! - NOT!

Strawnet@aol.com

Sat, 18 Mar 1995 01:27:52 -0500

- Messages sorted by: [date] [thread] [subject] [author]
- Next message: SLE1@aol.com: "insurance problems"
- Previous message: Strawnet@aol.com: "re: virtual straw"

From: Strawnet@aol.com

Date: Sat, 18 Mar 1995 01:27:52 -0500

Message-Id: <950318012616_531749458aol.com>

To: strawbale@crest.org

Subject: Fire! - NOT!

Regarding the recurring flare-ups of the question of FIRE and straw bale construction, I'd like to extinguish this issue once and for all.

It is actually one of straw bale's advantages, not a vulnerability. There are some Canadian tests done on Luis Gagne's mortared bale wall system that were pretty impressive and resulted in the following report to the Canadian Mortgage and Housing Corporation (CMHC):

"The straw bales/mortar structure wall has proven to be exceptionally resistant to fire. The straw bales hold enough air to provide good insulation value but because they are compacted firmly they don't hold enough air to permit combustion."

"The results of this test were surprising. The mortar-encased straw bale wall withstood the small-scale fire test with a maximum temperature rise of 43.4 degrees C for four hours instead of the required two hours. The surface coating of mortar withstood the test for two hours at temperatures of up to 1010 degrees C before a small crack appeared.

"In comparison, the endurance of a brick veneer wall (made of 100mm bricks, 9.5 mm plywood and gypsum wallboard on the interior) is approximately two and a half hours."

The address on the report is Housing Technology Incentives Program, CMHC, Ottawa, Ontario K1A 0P7

In New Mexico, the ASTM E-119 Small Scale Fire Test that was carried out in the SHB-AGRA Testing Lab in Albuquerque, had similarly impressive results, leading Manuel Fernandez, then state architect and head of Permitting and Plan Approval for the Construction Industries Division (CID) for the State of New Mexico to report to the Construction Industries Commission:

"The results of these tests have proven that a straw bale in-fill wall assembly is a far greater fire resistive assembly than a wood frame wall

assembly with the same finishes."

In those tests, conducted in 1993 on two string wheat straw bale wall panels, the results were amazing even for the bare bale panel tested. In the first test a wall panel made up of the bare bales - unplastered and untreated - lasted for 34.5 minutes before a vertical seam between two bales burned through and the test was stopped. This test requires a 1000 degree F temperature rise in the first 5 minutes and then various temperature levels to be reached at certain times throughout the test period. At the burn-through point, the temperature on the heated side of the bale panel had reached 1550 degrees F, and the temperature rise on the unheated side averaged about 2 degrees F. When the vertical seam burned through, the rest of the bale panel had only charred about 8 or 9 inches deep, roughly 1/2 way through.

On the second wall panel tested, the inside (heated side) was plastered with a gypsum plaster and the outside with cement stucco. This panel was heated to 1942 degrees F during the 2 hour duration of the test and the temperature rise on the unheated side averaged about 12 degrees F. There was some cracking of the plaster on the heated side and where the plaster cracked, there was about 2 inches of charring into the straw. A typical wood frame wall with stucco on the outside and 1/2 inch gypsum wallboard on the inside is nominally a one hour fire wall. A plastered/stuccoed bale wall is probably at least a four hour wall.

Contact the Straw Bale Construction Association in Santa Fe, NM (31 Old Arroyo Chamiso, 87505) or Out On Bale in Tucson, AZ (1037 E. Linden St., 85719) for info on how to obtain these and other test results.

One last note. When the huge, intense Highway 41 fire went through the hills North of San Luis Obispo, California this past August, it destroyed Ken Haggard and Polly Cooper's "fire-resistant" home/architectural studio. Ken's car was on the front page of the newspaper in Tucson - a startling vision of a burned out automobile with a solidified stream of molten aluminum coming from under the car. That aluminum had been Ken's aluminum engine block! This was one unbelievably hot fire. Ken and Polly had two stuccoed straw bale benches built by some local Native American youngsters through an educational program. The benches were built on wooden frames on the ground and stuccoed over. One of the benches had the ends of the 2x4s exposed to the fire and the other didn't. The unexposed one did not burn at all. The one with the exposed wood, did burn - sort of. The wood caught on fire and burned in under the stucco. Over a week later, the bench was still very warm and smoldering, and so they broke the stucco open. Only about half the straw had burned in a week! This conjures up images for me - The house is on fire, dear. Yes I know. Do you think we should move out today? Couldn't we wait til tomorrow? We should call the insurance company and the fire department, but they'll just make such a mess.

Really, fire safety is an advantage, not a problem, except to the extent that the perception of it as a fire hazard exists in people's minds. Still, I

wouldn't leave the bales exposed for long periods of time and remember it is vulnerable with the addition of some other source of fuel - such as the flammable liquid used to torch Bob Lanning's straw bale-wrapped wood frame house in a downtown barrio in Tucson a couple of years ago. I think it should be noted that the perception of straw bale as a fire prone material could make it an attractive nuisance to a pyromaniac. So, if you are building where your house is exposed to a lot of public traffic, it is a good idea to fence it or otherwise protect the bales from the possibility of arson. I hate interjecting this sort of negative stuff, but it makes sense to be aware and prepared, not paranoid. (Para-normal might be good if you could foresee the future).

David Eisenberg
strawnet@aol.com

- Next message: SLE1@aol.com: "insurance problems"
- Previous message: Strawnet@aol.com: "re: virtual straw"