

**ACOUSTIC SYSTEMS  
ACOUSTICAL RESEARCH FACILITY  
OFFICIAL LABORATORY REPORT  
AS-SA1711**



**Subject: Sound Absorption Test**

**Date: September 18, 2000**

**Contents: Sound Absorption Data, One-third Octave bands  
Absorption Coefficients, One-third Octave bands  
Noise Reduction Coefficient**

on

**UltraTouch Natural Fiber Insulation Batt R-19 (Thickness 5-1/2")**

for

**Bonded Logic, Inc.**

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## INTRODUCTION

"The sound absorption coefficient is a property of the material composing the surface. It is ideal defined as the fraction of the randomly incident sound power absorbed by the surface."

[ASTM C 423]

## APPLICABLE STANDARDS

ASTM C 423 – 90a "Standard Test Method for Sound Absorption and Sound Absorption Coefficient by the Reverberation Room Method"

ASTM E 795 – 93 "Standard Practices for Mounting Test Specimens during Sound Absorption Tests"

## TEST SPECIMEN

The test specimen consisted of composition acoustic material whose overall dimensions were 2718 mm in width by 2432 mm in length by 140 mm in depth [107 by 95-3/4 by 5-1/2 inches]. The test specimen was designed, manufactured, submitted for test, and designated "UltraTouch Natural Fiber Insulation Batt R 19 (Thickness 5-1/2")" by Bonded Logic, Inc. of Chandler, AZ. The test specimen was provided in two (2) equal pieces of the nominal dimension 1359 mm by 2423 mm by 140 mm [53-1/2 by 95-3/8 by 5-1/2 inches], having a nominal density of 24 kg/m<sup>3</sup> [1.5 pounds per cubic foot]. At the request of the client additional details of the material's composition are withheld for the purposes of safeguarding proprietary control over this product. (These construction details remain as part of the controlled test file to fulfill test specimen documentation requirements.)

The weight of the test specimen was 21.3 kg [47 pounds]. The test specimen was tested in a **Type A Mount** in strict accordance with ASTM E 795 requirements. The edges were flashed with sheet metal flashings and sealed to the specimen with metal foil tape. The flashings were then sealed to the reverberation chamber floor with duct tape.

## DESCRIPTION OF TEST

The decay rate of sound [which is inversely related to sound absorption] is measured upon terminating a steady-state broadband pink noise signal in the 254 m<sup>3</sup> reverberation chamber. Five ensemble averages containing thirty-two decays each are measured with both the test specimen inside of and removed from the chamber. The difference between these sound absorption tests at a given frequency is defined as the sound absorption of the specimen. The Sound Absorption Coefficient is the sound absorption per unit area of the test specimen. The Noise Reduction Coefficient (NRC) is a four-frequency average of the Sound Absorption Coefficient. A rotating microphone boom and a Norsonic NI-830 Dual Channel Real Time Analyzer, computer controlled using custom software, are used for all measurements. Measurements are made in the ISO-preferred one-third octave bands from 100 Hz to 5000 Hz. The test was conducted in strict accordance with ASTM C 423 – 90a except where noted. This test took place at ACOUSTIC SYSTEMS ACOUSTICAL RESEARCH FACILITY, Austin, TX, on September 7, 2000.

## SOUND ABSORPTION DATA

The measured Sound Absorption [in units of area] and Sound Absorption Coefficients of the test specimen at the preferred one-third octave band center frequencies are tabulated below and then presented graphically.

### Bonded Logic, Inc. – UltraTouch Natural Fiber Insulation Batt R-19 (Thickness 5-1/2")

1/3 Octave Band Center Freq. (Hz)	Sound Absorption (m <sup>2</sup> )	Uncertainty (+/-)	Notes	Sound Absorption Coefficient	Uncertainty (+/-)
125	6.4	0.7	[a]	0.97	0.10
160	7.1	0.5		1.08	0.08
200	8.9	0.4		1.35	0.06
250	9.1	0.3		1.37	0.04
315	8.9	0.2		1.35	0.03
400	8.5	0.2		1.29	0.03
500	8.1	0.2		1.23	0.03
630	7.7	0.2		1.17	0.03
800	7.2	0.2		1.10	0.03
1000	6.9	0.2		1.05	0.03
1250	6.8	0.2		1.03	0.03
1600	6.8	0.2		1.03	0.03
2000	6.6	0.2		1.00	0.03
2500	6.5	0.2		0.98	0.03
3150	6.6	0.2		1.01	0.03
4000	6.6	0.2		1.01	0.03
5000	6.6	0.2		1.01	0.03
Noise Reduction Coefficient		1.15			

[a] denotes room absorption greater than 0.06 required by ASTM C423. Round robin testing with other laboratories indicate results are nevertheless reliable at 125 Hz. [b] denotes that a significant effect due to changes in test chamber test temperature and humidity was noted. Actual results in these bands are typically not greater than 1.00. [c] due to the very low absorption of the specimen tested, actual absorption values cannot be determined within the reverberation time uncertainties of the chamber itself. The result for this band should be considered inconclusive.

During the test, environmental conditions in the reverberation chamber were 23.1C and 65.6% relative humidity. The precision values  $[\pm]$  tabulated above represent 95% probability that the true mean value lies within the stated range.

Respectfully Submitted,



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Laboratory Technical Director