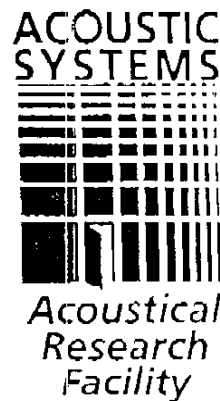


ACOUSTIC SYSTEMS  
ACOUSTICAL RESEARCH FACILITY  
OFFICIAL LABORATORY REPORT  
AS-SA1966



Subject: Sound Absorption Test

Date: August 08, 2002

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

on

Duct Liner – Thickness 1”  
Type A Mount

for

Bonded Logic, Inc.

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## INTRODUCTION

"The sound absorption coefficient is a property of the material composing the surface. It is ideally 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 Coefficients 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 2438 mm in width by 2413 mm in length by 25 mm in depth [96 by 95 by 1 inches]. The test specimen was designed, manufactured, submitted for test, and designated "Duct Liner – Thickness 1" by Bonded Logic, Inc of Chandler, AZ. The test specimen was provided in two (2) equal pieces of the dimension 1219 mm by 2413 mm by 25 mm [48 by 95 by 1 inches], having a density of 32 kg/m<sup>3</sup> [2 pounds per cubic foot]. The specimen components were constructed of: a natural acoustic material of nominal thickness 25 mm [1 inch] and, a nylon/polyester facing material of thickness 0.28 mm [0.011 inches]. The facing material was composed of 30% nylon/70% polyester and possessed a quoted surface density of 0.08 kg/m<sup>2</sup> [1.4 ounces per square yard]. At the request of the client, details of the natural acoustic material's specific 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 5 kg [11 pounds]. The test specimen was tested in a Type A Mount in strict accordance with ASTM E 795 requirements with the nylon/polyester material facing the sound field. The test specimen 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. The center joint of the test specimen was sealed with metal 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 125 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 March 11, 2002

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**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. - Duct Liner - Thickness 1"  
Type A Mount**

1/3 Octave Band Center Freq. (Hz)	Sound Absorption (m <sup>2</sup> )	Uncertainty (+/-)	Notes	Sound Absorption Coefficient	Uncertainty (+/-)
125	0.4	0.7	[a]	0.07	0.10
160	0.6	0.5		0.11	0.08
200	0.9	0.4		0.16	0.06
250	2.0	0.3		0.33	0.04
315	2.6	0.2		0.43	0.03
400	3.2	0.2		0.55	0.03
500	4.2	0.2		0.72	0.03
630	5.1	0.2		0.86	0.03
800	5.5	0.2		0.93	0.03
1000	5.8	0.2		0.99	0.03
1250	5.7	0.2		0.97	0.03
1600	5.7	0.2		0.97	0.03
2000	5.5	0.2		0.93	0.03
2500	5.4	0.2		0.92	0.03
3150	5.5	0.2		0.94	0.03
4000	5.6	0.2		0.96	0.03
5000	5.7	0.2		0.96	0.03
<b>Noise Reduction Coefficient</b>		<b>0.75</b>			

[a] denotes room absorption greater than 0.06 required by ASTM C423. Round robin testing with other laboratories indicates 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 25.1C and 64.6% relative humidity. The precision values [±] tabulated above represent 95% probability that the true mean value lies within the stated range.

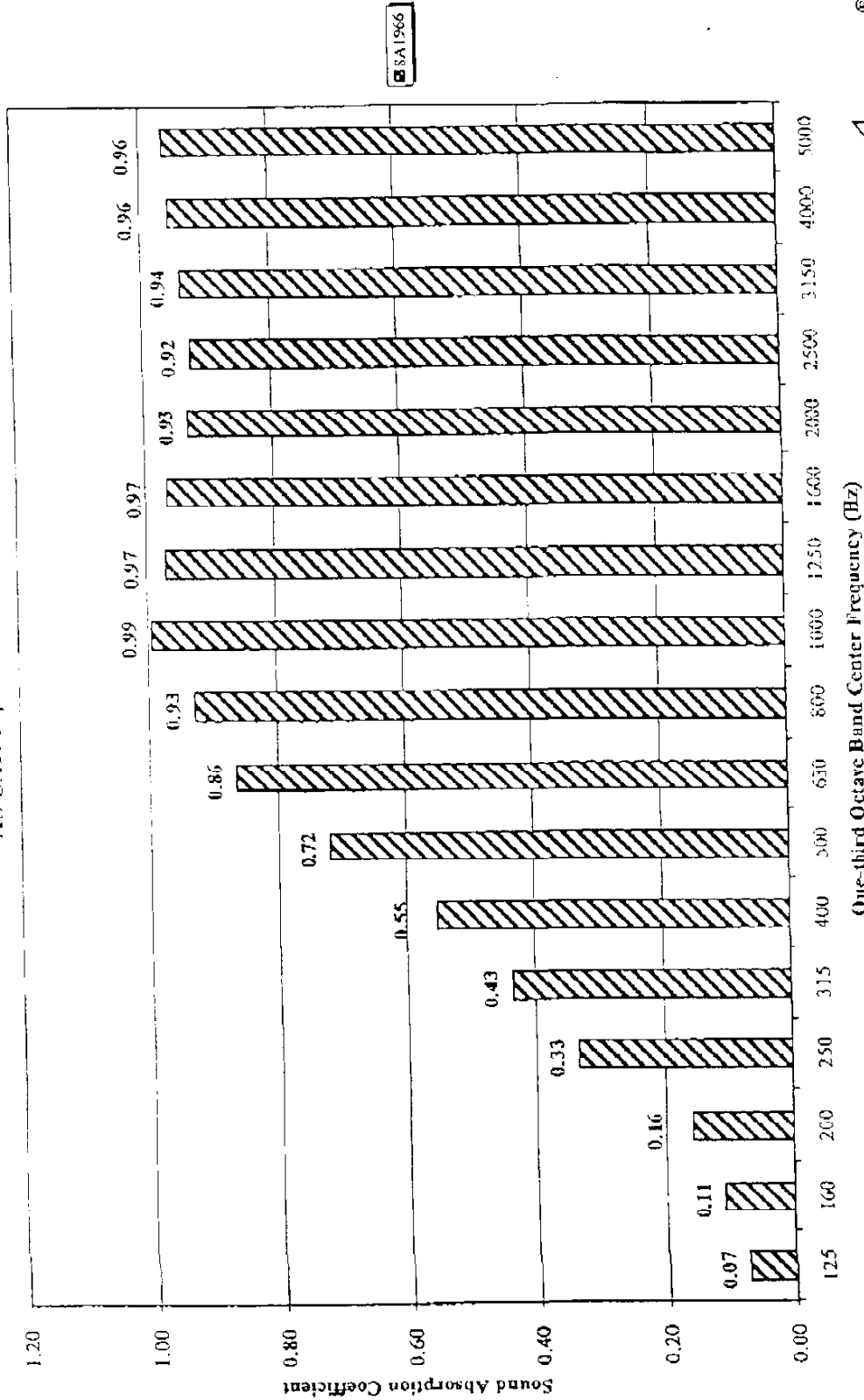
Respectfully Submitted,



Michael C. Black  
Laboratory Technical Director

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Bonded Logic Duct Liner - Thickness 1"
AS-SAI966; NRC 0.75



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