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ACOUSTIC SYSTEMS ACOUSTICAL RESEARCH FACILITY OFFICIAL LABORATORY REPORT AS-SA1713



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

Cotton Acoustical Board –
Thickness 1", Density 6 pcf

for

Rendered by Manufacturer and released to
Acoustical Surfaces
123 Columbia Court North
Chaska, MN 55318

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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: 2734 mm in width by 2438 mm in length by 25.4 mm in depth [108 x 96 x 1 inch]. The test specimen was designed, manufactured, submitted for test, and designated "Cotton Acoustical Board – Thickness 1", Density 6 pcf" by manufacturer for Acoustical Surfaces Inc. 123 Columbia Court North, Suite 201, Chaska MN 55318. The manufacturer provided the test specimen in two (2) equal pieces of the dimension 1219 mm by 2743 mm by 25.4 mm [54 x 96 x 1 inch], having a density of 96 kg/m³ [6 pounds per cubic foot]. At the request of the client, additional details of the material's composition are withheld from this report 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 17 kg [37 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. The center seam of the test specimen was also sealed with metal foil 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 m³ 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 absorptions 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 rotation microphone boom and a Norsonic Instruments 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, Texas, 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

Cotton Acoustical Board – Thickness 1", Density 6 pcf

1/3 Octave Band Center Freq. (Hz)	Sound Absorption (m ²)	Uncertainty (+/-)	NOTES	Sound Absorption Coefficient	Uncertainty (+/-)
125	0.5	0.7	[a]	0.07	0.10
160	1.0	0.5		0.14	0.08
200	1.2	0.4		0.17	0.06
250	2.0	0.3		0.30	0.04
315	3.1	0.2		0.46	0.03
400	4.7	0.2		0.70	0.03
500	5.8	0.2		0.86	0.03
630	6.5	0.2		0.96	0.03
800	7.0	0.2		1.04	0.03
1000	7.3	0.2		1.10	0.03
1250	7.3	0.2		1.09	0.03
1600	7.2	0.2		1.08	0.03
2000	7.0	0.2		1.05	0.03
2500	6.8	0.2		1.02	0.03
3150	6.8	0.2		1.02	0.03
4000	6.9	0.2		1.03	0.03
5000	6.9	0.2		1.03	0.03
Noise Reduction Coefficient		0.85			

a) denotes empty room absorption was greater than 0.06 as 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 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 25.6C and 62.0% 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

**Cotton Acoustic Board—Thickness 1". Density 6 pcf
AS-SA1713; NRC 0.85**

