

TEST REPORT

Intertek

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EVALUATION CENTER

INTERTEK TESTING SERVICES NA LTD.
1500 BRIGANTINE DRIVE
COQUITLAM, BC V3K 7C1

RENDERED TO

MONOGLASS INC.
922-1200 WEST 73rd AVENUE
VANCOUVER, BC V6P 6G5

PRODUCT EVALUATED: Sonoglass Acoustic Treatment
EVALUATION PROPERTY: Physical properties

Report of Sonoglass Acoustic Treatment insulation for physical testing with selected ASTM requirements.

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for Monoglass Inc. on an insulation product. Testing was conducted in accordance with the following test methods:

- ASTM E736-06, *Standard Test Method for Cohesion/Adhesion of Spray Fire-Resistive Materials Applied to Structural Members*
- ASTM E761-05, *Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members*
- ASTM E8596-06, *Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members*

This evaluation was completed during the month of May 2008.

3 Test Samples

3.1. SAMPLE SELECTION

The client submitted samples to the Evaluation Center on May 5, 2008. Samples were not independently selected for testing.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The product was identified as Sonoglass Acoustic Treatment, spray-applied fiberglass insulation.

4 Testing and Evaluation Methods

4.1. SAMPLE PREPARATION

The client prepared all specimens to the required dimensions.

4.2. CONDITIONING

Before testing, all specimens were held in standard laboratory conditions for at least 24 hours at a temperature of $23 \pm 2^{\circ}\text{C}$ and relative humidity of $50 \pm 5\%$.

4.3. DENSITY

The density was determined in accordance with ASTM D 1622-03 on three specimens measuring 100 mm (4 in.) long x 75 mm (3 in.) wide by 25 mm (1 in.) thick. The specimens were weighed, and then measured for length, width, and thickness at three points for each dimension. The density was calculated as follows:

$$D = W_s / V$$

Where D	=	Density, kg/m ³ (lbs/ft ³)
W _s	=	weight of specimen, kg (lbs)
V	=	volume of specimen, m ³ (ft ³)

4.4. COHESION / ADHESION STRENGTH

The cohesion/adhesion strength was determined in accordance with ASTM E 736-06. The samples were sprayed onto 305 mm (12 in.) x 100 mm (4 in.) galvanized 16 ga. steel sheets to a thickness of ½ inch. Using a single component epoxy, a plastic cap with a 51 mm (2 in.) diameter was bonded to the insulation. After curing for 24 hours the bottle cap was pulled from the insulation at a rate of 5 kg (11 lb)/min. The cohesion/adhesion strength was calculated based on the area of the plastic cap and the maximum load attained.

4.5. COMPRESSIVE STRENGTH

The compressive strength was evaluated using ASTM E 761-05. Three specimens measuring 151 mm (6 in.) long x 151 mm (6 in.) wide x 25 mm (1 in.) thick were prepared by spraying the insulation onto 16 ga. galvanized steel sheets. A plot of load versus deflection was recorded for each specimen and these results were used to calculate values for compressive strength based on a 10 % core deformation as follows:

$$S_c = W / A$$

Where

S_c	=	Compressive Strength, kPa (psi)
W	=	Load at 10% core deformation, N (lbf)
A	=	Initial horizontal cross-sectional area, mm ² (in ²)

4.6. AIR EROSION

Sonoglass insulation was sprayed to a thickness ranging from 1 to 2 cm onto a piece of plywood measuring 24 in. x 24 in. x ¾ in. thick. Air erosion testing was conducted in accordance with ASTM E 859-06. The cross sectional area of the ducting measured 8 in. x 24 in. with the 24 in. dimension parallel to the ground. A 15.25 in. x 20 in. rectangular opening was located mid-section of the ducting to accommodate the test panel. A blower located at the inlet of the test assembly provided an air speed of 20 ft/s (6 m/s). Air velocity was measured using a VelociCalc Hot Wire anemometer positioned 4 in. ahead of and 2 in. below the test specimen, inline with air flow direction. Filters used on the inlet and outlet air were made of 30-denier nylon. The test specimen was placed over the opening on top of the duct prior to testing. Air was blown through the duct at test velocity with the collecting filter in place at the outlet end. The collection filter was weighed at elapsed times of 1, 6 and 24 hours.

4.6.1. Deviation from Standard

The sample size requirement in the standard was 24 in. x 24 in. Due to the width of the ducting available and the sample size used for this test, the opening used was 15 ¼ in. x 20 in. Calibrated VelociCalc Hot Wire Anemometer used instead of a pitot tube.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

The test results for the fiberglass insulation product are shown in Table 1 below. A full set of test data is included in Appendix A.

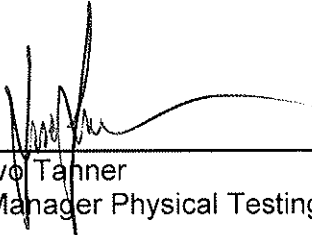
Table 1. Test Results of Sonoglass Acoustic Treatment	
Property	Test Result
Density, lbs/ft ³	8
Cohesion/Adhesion Strength, psf	293
Compressive Strength, psi	1.3
Air Erosion, g (total weight gain)	0.11

6 Conclusion

The Sonoglass Acoustic Treatment fiberglass insulation product identified and evaluated in this report has shown the physical properties as outlined in Section 5 of this report.

INTERTEK TESTING SERVICES NA LTD.

Reported by: 
Baldeep Sandhu
Technologist, Construction Products

Reviewed by: 
Ivo Tanner
Manager Physical Testing, Construction Products

BSS/ah

APPENDIX A: Test Data (6 pages)



Density
 Test: 8-May-08 Project: 3151049 Eng/Tech: A. Chang
 Client: Monglass Inc
 Product: **Sonoglass Acoustic Treatment**
 Method: ASTM D 1622-03 Test Method for Apparent Density of Rigid Cellular Plastics
 Specimen Size: 4 x 3 x 1 in
 Conditioning: 23 ± 2°C and relative humidity of 50 ± 5%
 Equipment: Mitutoyo Digital Calipers (ID 52650 ; Calibration due May 2009)
 Digital Balance (ID 52606; Calibration Due April 2009)

Specimen	Length (in)			Width (in)			Depth (in)				Weight		Density			
	L1	L2	L3	Avg.	W1	W2	W3	Avg.	D1	D2	D3	D4	Avg.	(g)	(kg/m ³)	(lbs/ft ³)
1	3.865	3.877	3.879	3.874	3.065	3.066	3.062	3.064	1.364	1.369	1.380	1.381	1.373	33.40	128.1	7.995
2	3.880	3.859	3.842	3.860	3.060	3.034	2.997	3.030	1.354	1.349	1.346	1.346	1.349	31.96	126.6	7.905
3	3.854	3.863	3.871	3.863	3.054	3.048	3.052	3.051	1.375	1.388	1.375	1.379	1.379	34.30	131.9	8.235
														Mean:	128.9	8.045
														StdDev:	2.73	0.17
														COV:	2%	2%



Cohesion/Adhesion

Test: **16-May-08** Project No: 3151049
 Date: **Monoglass Inc.** Eng/Tech: G. Nishio
 Client: **Sonoglass Acoustic Treatment**
 Product: **ASTM E 736-06 Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Membranes**
 Test Methods: **12 x 4 x 1/2 inch**
 Specimen Size: **48 hours at a temperature of 23 ± 2°C and 50 ± 5 % relative humidity**
 Conditioning: **11 lbs/minute (5 kg/min.)**
 Speed of Test: **Instron 8516 loading apparatus (Intertek ID 000568; Cal. Due July 2008)**
 Equipment: **Artech 50 lb Load Cell (Intertek ID D2742; Cal. Due June 2008)**

Specimen	Cap Area (in ²)	Max Load (lbs)	Load (psf)	Load (Pa)	Mode of Failure
1	3.4	3.8	163.5	7826	cohesive failure
2	3.4	4.4	187.4	8974	cohesive failure
3	3.4	12.3	526.7	25220	cohesive failure
	Mean:	6.8	292.5	14007	
	StdDev:	4.7	203.2	9728.1	
	COV:	69.5%	69.5%	69.5%	



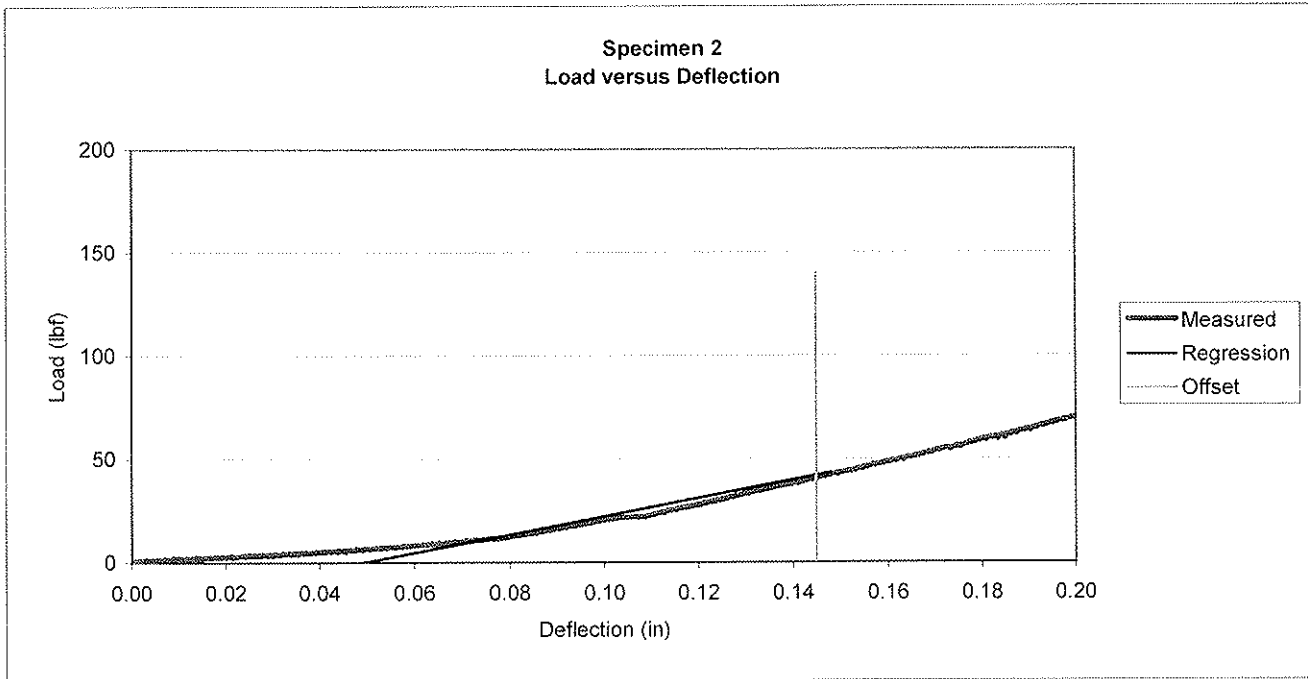
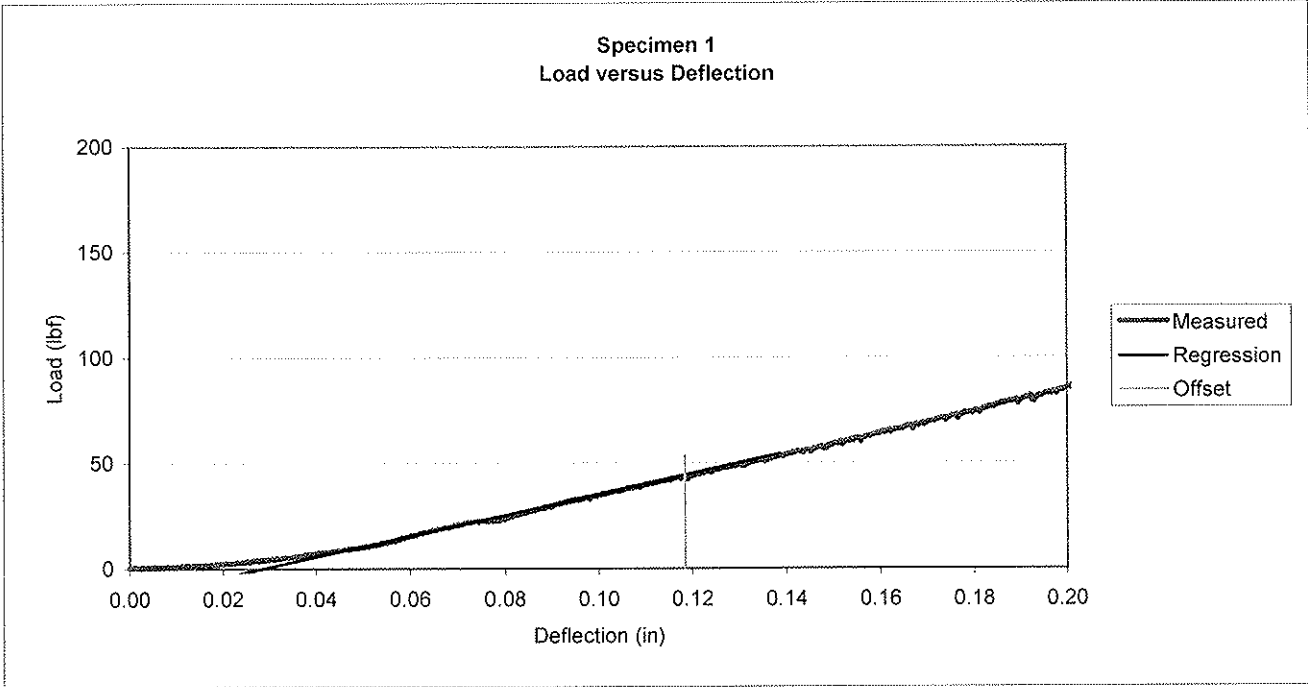
Test: Compressive Strength
Date: 9-May-08 **Project:** 3151049 **Eng/Tech:** A. Chang
Client: Monglass Inc.
Product: Sonoglass Acoustic Treatment
Method: ASTM E761-05 Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
Conditioning: 72 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%
Specimen Size: 151 x 151 x 25 mm
Sp. Thickness: 25.4 mm 1.00 in
Crosshead Speed: 1.3 mm/min 0.05 in/min
Equipment: Instron (Intertek ID 000568; Cal. Due July 2008)
 Instron 25 kN load cell (Intertek ID 000567; Cal. Due July 2008)
 Mitutoyo Digital Calipers (ID 1019 ; Calibration due May 22, 2008)

Specimen	Length (mm)			Width (mm)			Depth (mm)			Load at 10% Deformation		Compressive Strength		
	L1	L2	L3	W1	W2	W3	D1	D2	D3	D4	(lbf)	(N)	(kPa)	(psi)
1	148.37	150.10	147.90	151.98	153.53	152.53	22.00	28.33	22.52	18.51	43.6	194	8.5	1.2
2	151.16	150.88	150.05	151.84	152.78	152.97	21.63	28.48	20.03	26.83	40.8	181	7.9	1.1
3	147.13	146.53	151.44	149.79	149.44	149.61	20.36	25.17	25.08	25.96	54.6	243	10.9	1.6
4	146.33	148.71	149.30	145.92	149.63	152.60	27.16	29.16	28.09	25.21	41.2	184	8.3	1.2
											Mean:	8.9		1.3
											StdDev:	1.4		0.2
											COV:	15.4%		15.4%

Test: **Compressive Strength**
Date: 9-May-08
Client: Monglass Inc.
Product: **Sonoglass Acoustic Treatment**

Project: 3151049

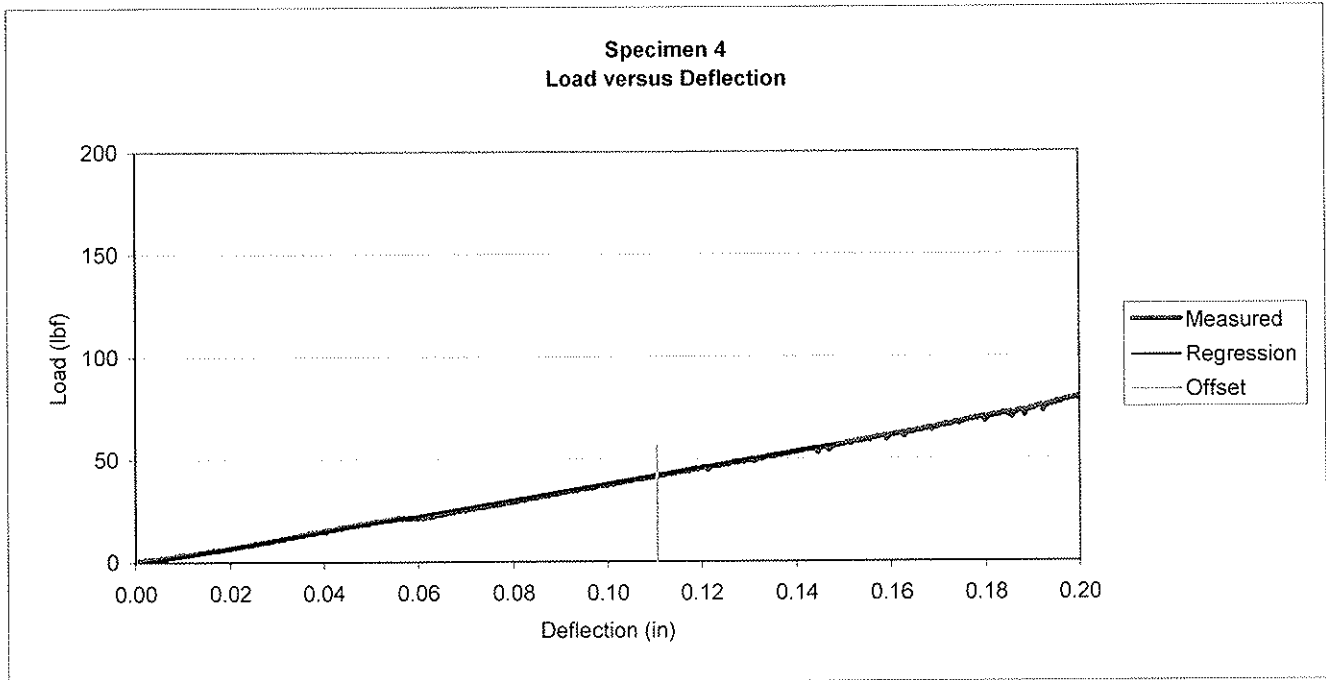
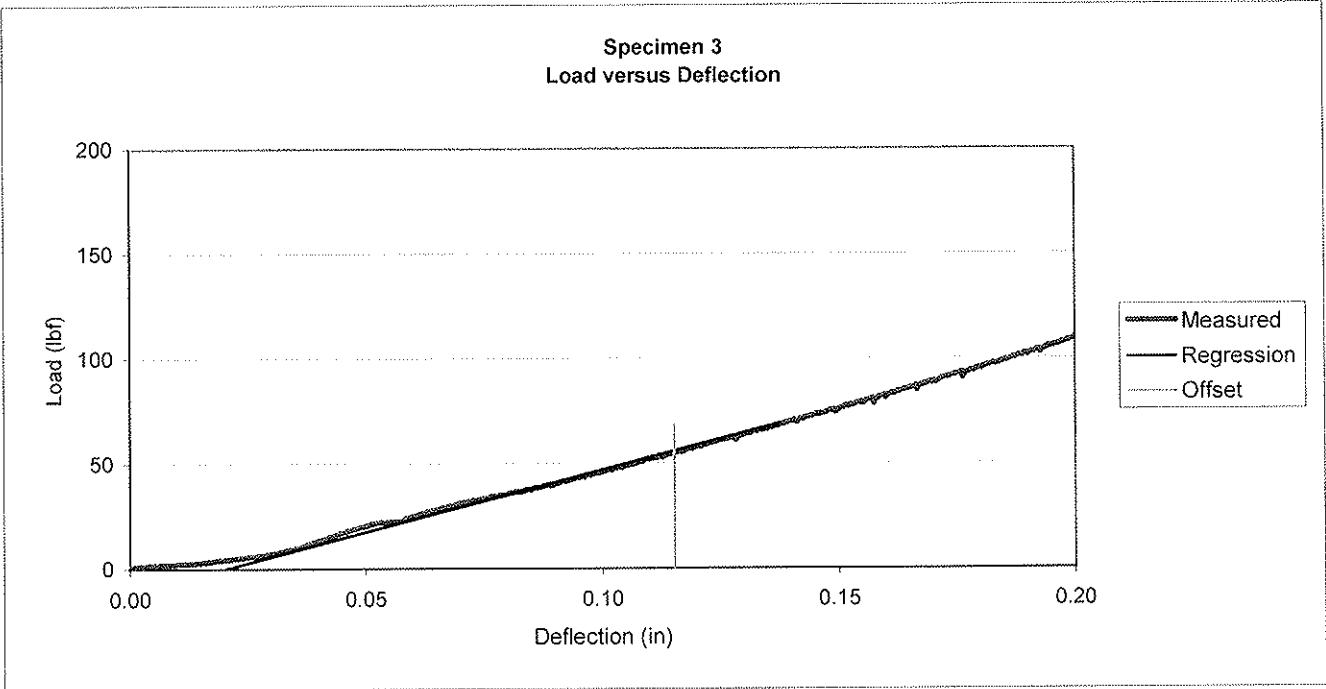
Eng/Tech: A. Chang





Test: **Compressive Strength**
Date: 9-May-08 Project: 3151049
Client: Monglass Inc.
Product: **Sonoglass Acoustic Treatment**

Eng/Tech: A. Chang





Test: Air Erosion
Date: 12-May-08
Client: Monoglass Inc.
Project: 3151049
Tech: Geri Nishio
Product Tested: Sonoglass Acoustic Treatment
Sample Size: 24" x 24" x 3/4" thick plywood with 6.4 to 12.7mm(0.25 to .05 in) layer of Sonoglass insulation sprayed onto plywood.
Method: ASTM 859-06, Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials(SFRMs)
Equipment: VelociCalc Model 8347 Anemometer(ITS ID# P 60000-calibration due July-08)
 Fluke II digital thermometer(ITS ID D2679-calibration due May-09)
 Dayton model 4C330 Blower with electric motor

Notes: An air duct was constructed from two 12 ft(3.66m) long sections.
 Cross sectional dimensions of the duct: 8 x 24 inches (20 x 61 cm)
 The 20 inch dimension was parallel to the floor. A 15.25 x 20 inch rectangular opening was cut out of the top of the second section from the blower at the inlet assembly, with the 20 inch dimension parallel to the length of the duct.
 A 30 denier filter screen placed at the blower intake.
 A 30 denier collection screen was placed at the discharge end of the assembly.
 The 15 1/4 in. x 20 in. test section with insulation side down was centered over the opening and a 3 kg dead weight placed on top of the sample to prevent movement.
 Wind speed was verified to meet the E 859 requirement of 20 ft/s, with the VelociCalc located 4 inches ahead of and 2 inches below the sample surface, inside the duct.
 The screen at the discharge end was dried at 50°C(120°F) for one hour before testing, to confirm constant weight.
 The discharge end screen was removed and re-weighed at intervals of 1, 6 and 24 hours to measure any material coming off the sample.
 Test Area: 15.25 x 20 inches = 305 sq. inches

Time (hrs)	Observations/Comments	Material collected (g)
0	Start blower.	0
1	Blower stopped to check for any particle accumulation in collection screen.	0
6	Blower stopped to check for any particle accumulation in collection screen.	0.11
24	Blower stopped to check for any particle accumulation in collection screen.	0.11
	Test stopped. Total accumulated weight:	0.11

No evidence of delamination, cracking, peeling or flaking