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TEST REPORT

EVALUATION CENTER
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RENDERED TO

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Attn: Ms. Kelly McDermid

PRODUCT EVALUATED: SONOGLASS INSULATION
EVALUATION PROPERTY: STEADY-STATE THERMAL TRANSMISSION
PROPERTIES

Report of Testing Sonoglass Specimens for Steady-State Thermal Transmission Properties in accordance with ASTM C518-04, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for Monoglass Incorporated on Sonoglass insulation samples to evaluate Steady-State Thermal Transmission Properties. Testing was conducted in accordance with ASTM C518-04, "Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus". The evaluation of the samples was performed July 23, 2009.

3 Test Samples

3.1. SAMPLE SELECTION

Samples were submitted to Intertek directly from the client and were not independently selected for testing. Samples were received at the Evaluation Center on July 14, 2009.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

Each sample was nominally 3" – 3-½" x 12-½" x 12-½". The three samples were identified as "Sonoglass". Each sample was conditioned for a minimum of 48 hours at 23 ± 2° C and 50 ± 5% RH prior to testing.

4 Testing and Evaluation Methods

4.1. The specimens were conditioned for at least 48 hours at $23\pm 2^{\circ}\text{C}$ ($73\pm 5^{\circ}\text{F}$), and 50% relative humidity in the test lab area. The test specimens were weighed using an Ohaus Model GT4100 scale (inventory number 280 01 0075), and the volume of the container of each specimen was measured using a Mitutoyo vernier caliper S/N 1045609 (inventory number 280 01 0909). The apparent densities for the specimens were calculated. The specimens were then evaluated in accordance with ASTM C518-04 "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus" using a Netzsch Lambda 2000 Heat Flow Meter Model 436/3/1, Serial No. 183A-1204-606000390 (inventory number 280 01 0725).

4.1.1 TEST STANDARD 1

Thermal Resistance: ASTM C518-04 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

Specimen	Thermal Resistance at 25 mm (0.984 in.) $\text{K}\cdot\text{m}^2/\text{W}$ ($^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{h}/\text{Btu}$)	Thermal Resistance at 25.4 mm (1 in.) $\text{K}\cdot\text{m}^2/\text{W}$ ($^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{h}/\text{Btu}$)
Sonoglass	0.693 (3.937)	0.704 (4.000)

5.1.1. Statement of Measurement Uncertainty

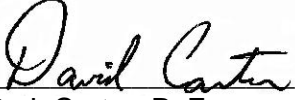
It was estimated that these results have an overall measurement uncertainty of 0.66% at the 95% confidence level.

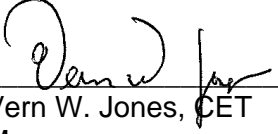
6 Conclusion

Intertek has performed testing in accordance with ASTM C518-04 "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus". Results of testing the "Sonoglass" samples are contained in this report.

Tested by: D. J. Carter

INTERTEK TESTING SERVICES NA LTD

Reported by: 
D. J. Carter, P. Eng.
Building Products Engineer
Physical Testing Services

Reviewed by: 
Vern W. Jones, CET
Manager
Physical Testing Services

DJC/VWJ/dc

APPENDIX A
Test Data

Test Data

Test: Steady-State Thermal Transmission

Date: July 23, 2009

Test Method(s): ASTM C518-04 "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus".

Conditioning: 48 hours at a temperature of $23 \pm 2^\circ\text{C}$ and relative humidity of $50 \pm 2\%$

Equipment: Scale (inventory number 280 01 0075), Calipers (inventory number 280 01 0909), Netzsch Heat Flow Meter (inventory number 280 01 0725).

Eng/Tech: Dave Carter

Thermal Transmission

Property	Sonoglass #1	Sonoglass #2	Sonoglass #3
<i>Density</i>	29.78 kg/m ³ (1.86 lb/ft ³)	36.69 kg/m ³ (2.29 lb/ft ³)	32.87 kg/m ³ (2.05 lb/ft ³)
<i>Thickness</i>	89.29 mm (3.52 in.)	90.10 mm (3.55 in.)	89.73 mm (3.53 in.)
<i>Upper Surface Temperature</i>	35.07° C (95.13° F)	35.03° C (95.05° F)	35.01° C (95.01° F)
<i>Lower Surface Temperature</i>	12.53° C (54.56° F)	12.47° C (54.44° F)	12.44° C (54.40° F)
<i>Temperature Differential</i>	22.54° C (40.57° F)	22.56° C (40.61° F)	22.56° C (40.61° F)
<i>Mean Temperature</i>	23.81° C (74.85° F)	23.74° C (74.74° F)	23.73° C (74.71° F)
<i>Rate of Heat Flux</i>	9.219 W/m ² (2.924 Btu/h·ft ²)	8.956 W/m ² (2.836 Btu/h·ft ²)	9.024 W/m ² (2.862 Btu/h·ft ²)
<i>Thermal Conductance</i>	0.409 W/m ² ·K (0.072 Btu/h·ft ² ·°F)	0.397 W/m ² ·K (0.070 Btu/h·ft ² ·°F)	0.400 W/m ² ·K (0.070 Btu/h·ft ² ·°F)
<i>Thermal Resistance</i>	2.444 K·m ² /W (13.877 °F·ft ² ·h/Btu)	2.522 K·m ² /W (14.317 °F·ft ² ·h/Btu)	2.499 K·m ² /W (14.187 °F·ft ² ·h/Btu)
<i>Thermal Conductivity</i>	0.037 W/m·K (0.253 Btu·in/h·ft ² ·°F)	0.036 W/m·K (0.248 Btu·in/h·ft ² ·°F)	0.036 W/m·K (0.249 Btu·in/h·ft ² ·°F)
<i>Thermal Resistivity</i>	27.371 K·m/W (3.948 °F·ft ² ·h/Btu·in)	27.985 K·m/W (4.036 °F·ft ² ·h/Btu·in)	27.847 K·m/W (4.017 °F·ft ² ·h/Btu·in)
<i>Thermal Resistance @ 25 mm (0.984 in)</i>	0.684 K·m ² /W (3.885 °F·ft ² ·h/Btu)	0.700 K·m ² /W (3.972 °F·ft ² ·h/Btu)	0.696 K·m ² /W (3.953 °F·ft ² ·h/Btu)
<i>Thermal Resistance @ 25.4 mm (1.00 in)</i>	0.695 K·m ² /W (3.947 °F·ft ² ·h/Btu)	0.711 K·m ² /W (4.036 °F·ft ² ·h/Btu)	0.707 K·m ² /W (4.016 °F·ft ² ·h/Btu)