TEST REPORT

REPORT NUMBER: 102761257SAT-001
ORIGINAL ISSUE DATE: October 28, 2016
REVISED DATE: None

EVALUATION CENTER
Intertek Testing Services NA Inc.
16015 Shady Falls Road
Elmendorf, TX 78112

RENDERED TO:

CarpetCycle, LLC
16 Herbert Street
Newark, NJ 07105

PRODUCTS EVALUATED: Insulation Batt

EVALUATION PROPERTY: ASTM C518: *Standard Test Method for Steady- State Thermal Transmission Properties by Means of the Heat Flow Apparatus*

Report of Testing of Quiet-Tech Acoustic Insulation Batt for compliance with the applicable requirements of the following criteria: ASTM C518, 2010, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Apparatus.

1 Table of Contents

2 Introduction

Intertek has conducted testing for CarpetCycle, LLC, on samples of Quiet-Tech Acoustic Insulation Batt to evaluate the thermal transmission properties. Testing was conducted in accordance with ASTM, following the standard methods of C518 (2010) Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus. This evaluation began on October 13, 2016 and was completed on October 14, 2016.

3 Test Samples

3.1. SAMPLE SELECTION

Intertek did not witness or sample the products submitted for testing. Samples were received at the Intertek Elmendorf Evaluation Center on October 4, 2016 in good condition and assigned Intertek Sample Tracking ID SAT1610041356-001.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The samples were provided by the client precut to 23.625 inch (600 mm) wide by 23.625 inch (600 mm) long by 2 inch (50.8 mm) nominal thicknesses required. Samples were conditioned for a minimum of 24 hours at 73 ± 2ºF (23 ± 1ºC) and 50 ± 5% relative humidity.

4 Testing and Evaluation Methods

4.1. Thermal Conductivity

The heat flow meter apparatus establishes steady state unidirectional heat flux through a test specimen between two parallel plates at constant but different temperatures. By appropriate calibration of the heat flux transducer(s) with calibration standards and by measurement of the plate temperatures and plate separation, Fourier's law of heat conduction is used to calculate thermal conductivity, thermal resistance, or resistivity.

The accurate use of the test method is limited by the capability of the apparatus to reproduce unidirectional constant heat flux density in the specimens, and by the precision in the measurement of temperature, thickness, EMF produced by the heat flux transducer, etc.

The apparatus shall not be used at temperatures, thickness or resistances, other than those within the range of the calibration, unless it can be shown that there is no difference in accuracy.

The apparatus must be capable of maintaining at least a 10°C temperature difference across the specimen for the duration of the test, unless a smaller LT is a requirement of a particular test. The specimens tested may also limit the use of the test method and these limitations are outlined in Practice C1045.

This evaluation was accomplished using a HFM 600 Heat Flow Meter Thermal Conductivity Instrument, manufactured by Linseis. The HFM 600 determines thermal conductivity in accordance with ASTM C518.

Heat flow through a solid, results from having a temperature gradient in the material. Thermal conductivity is a material property, which determines how much heat flows through a given thickness of the material when there is a temperature difference. The Fourier linear heat flow equation defines thermal conductivity under steady state conditions as:

$$\lambda = q \frac{\Delta T}{L}$$

where:

λ = thermal conductivity, $\frac{W}{m \cdot K}$

q = heat flux, $\frac{W}{m^2}$

ΔT = temperature difference across distance LX, K

L = distance between hot and cold plates, m

Prior to each series of tests, the HFM 600 was calibrated using a sample whose thermal conductivity is known and traceable to national standards.

To perform the test, the specimens are placed in the HFM 600 instrument, the top (hot) plate is brought downwards creating contact of both plates with the test specimen. The hot and cold plates were then allowed to equilibrate to the required temperatures and their exact temperatures were read from the instrument.

The mean temperature for testing is 75°F with a temperature difference between plates at 50°F. The hot plate is at 100°F and the cold plate is at 50°F.

The heat flow meter is oriented in a horizontal position with the hot plate on top and the cold plate on the bottom. The direction of heat flow is from the top plate through the specimen and then to the bottom plate. The HFM 600 uses a dual sensor system with a heat flux meter located on both sides of the sample. The equipment encloses the sample on all sides with three fixed insulated walls and an insulated door so that the sample is sealed from ambient on all edges.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

Test Results

Thermal Transmission	Thermal Conductivity K Value	Thermal Conductivity K Value	Thermal Resistance R Value	Thermal Resistance R Value	Thermal Resistance per inch R/in	Thermal Resistance per meter R/m	Reported R Value/in
Units:	Btu-in/hr · ft^2 · °F	W/(m · K)	Hr · ft^2 · °F/Btu	(m^2 · K)/W	Hr · ft^2 · °F/Btu/in	(m^2 · K)/W/m	Hr · ft^2 · °F/Btu
Test 1	0.3036	0.0438	6.57	1.1577	3.29	22.8	3.3
Test 2	0.2986	0.0431	6.70	1.1797	3.35	23.2	3.3
Test 3	0.2873	0.0414	6.9	1.2238	3.48	24.1	3.5

Test Information	Plate Separation	Plate Separation	Mean Temp.	Mean Temp.	Test Duration	Heat Flux	Temperature Gradient		
Units:	(in)	(m)	(°F)	(°C)	(min)	(W/m2)	(°F/in)	(°C/m)	(K/m)
Test 1	2.00	0.0507	75.0	23.89	142.0	22.7	37.6	471.2	5858.8
Test 2	2.00	0.0508	75.0	23.89	165.0	23.6	37.5	470.3	5847.2
Test 3	2.00	0.0507	75.0	23.89	1094.0	22.7	37.6	471.2	5858.8

1" (nom.) Specimen	**Density**	
	(kg/m^3)	(lbs/ft^3)
1	71.1	4.4
2	67.4	4.2
3	70.0	4.4
Mean:	69.5	4.3
Std Dev:	1.87	0.12
COV:	0.03	0.03

5.1.1. Statement of Measurement Uncertainty

The uncertainty of the Linseis Thermal Conductivity Instrument HFM 600 is estimated to be 1-3%.

6 Conclusion

Intertek has conducted testing for CarpetCycle, LLC, on samples of Quiet-Tech Acoustic Insulation Batt to evaluate the thermal transmission properties. Testing was conducted in accordance with ASTM, following the standard methods of C518 (2010) Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

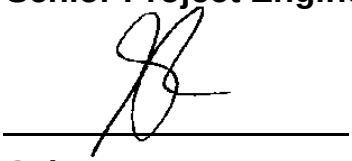
These results are listed as is and there are no pass fail criteria for this testing.

The conclusions of this test report may be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by: 

Jason De La Cruz
Senior Project Engineer

Reviewed by: 

Sal Romo
Project Engineer

REVISION SUMMARY

DATE	SUMMARY
October 28, 2016	Initial Release.