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**NFRC 102-2004 THERMAL TEST REPORT**

**Rendered To:**

**Door & Access Systems Manufacturers Association**  
**1300 Sumner Avenue**  
**Cleveland, OH 44115**

**Productline**  
**Insulated 4-Panel Garage Door (1-3/4 Thick)**

**Report Number**  
**ETC-06-1005-18496.0**

**Product Tested**  
**Insulated 4-Panel Garage Door (1-3/4 Thick)**

**Accreditations**

AAMA  
Dade County  
IGCC  
NFRC  
SGCC

**Certifications**

**Recognitions**

ALI  
KEYSTONE  
NAMI  
NYCSCA  
TDI  
WDMA

Report Number:	ETC-06-1005-18496.0
Job Number:	ETC-06-1005-18496-2
Test Start Date:	08/16/06
Test Finish Date:	08/17/06
Report Date:	11/30/06
Expiration Date:	08/17/10

## NFRC 102 - 2004 THERMAL TEST REPORT

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Door & Access Systems Manufacturers Association  
1300 Sumner Avenue  
Cleveland, OH 44115

### Product Tested

Insulated 4-Panel Garage Door (1-3/4  
Thick)

### NFRC Operating Type

Garage Door, X

### Generic Size (in.)

84 x 84

### Product Description

Item	Unit	Value
Production / prototype model	-	-
Overall width	in.	84.000
Overall height	in.	84.000
Panel thickness	in.	1.750
Skin Material	-	Painted Steel
Core Material	-	Polyurethane Foam
Number of Panels	-	4
Panel Dimension	in.	24.0" x 79.5"
* The Garage Door sample was bucked in a wood frame made up of 1.5"x4" studs on top and sides, and 1.5"x8" on the bottom.		
* Top Panel Dimension: 24.0 x 9.25"		
* Bottom Three Panel Dimension: 24.0"x79.5"		

### Summary of Results

Item	Unit	Value
Measured U-factor $U_S$	Btu/hr·ft <sup>2</sup> ·°F	0.21
Measured $U_S$ Uncertainty $\Delta U_S$	Btu/hr·ft <sup>2</sup> ·°F	0.003
<b>Standardized U-factor <math>U_{ST}</math></b>	<b>Btu/hr·ft<sup>2</sup>·°F</b>	<b>0.21</b>
Standardization method **	-	<b>CTS Method</b>

\*\* CTS method is used in accordance with NFRC 102 - 2004 requirement section 8.2(A).

**NFRC 102 - 2004 Thermal Transmittance (U-Factor) Measurement Data**

Item	Symbol	IP Unit	SI Unit
<b><u>Measured Test Data</u></b>			
<b><u>Heat Flows</u></b>			
1. Total measured input into the metering room	$Q_{TOTAL}$	791.34 Btu/hr	231.93 W
2. Surround panel heat flow	$Q_{SP}$	53.28 Btu/hr	15.61 W
Surround panel thickness	$L_{SP}$	0.33 ft	0.10 m
Surround panel conductance	$C_{SP}$	0.05 Btu/hr·ft <sup>2</sup> ·°F	0.31 W/m <sup>2</sup> ·K
3. Metering room extraneous heat flow	$Q_{EX}$	9.88 Btu/hr	2.90 W
4. Net specimen heat flow	$Q_S$	728.18 Btu/hr	213.42 W
<b><u>Areas</u></b>			
1. Specimen projected area	$A_S$	49.00 ft <sup>2</sup>	4.55 m <sup>2</sup>
2. Metering room opening area	$A_{MR}$	64.00 ft <sup>2</sup>	5.95 m <sup>2</sup>
3. Metering room baffle area	$A_{B1}$	64.00 ft <sup>2</sup>	5.95 m <sup>2</sup>
4. Surround panel exposed interior area	$A_{SP}$	15.00 ft <sup>2</sup>	1.39 m <sup>2</sup>
5. Specimen warm side heat transfer area	$A_H$	4.60 ft <sup>2</sup>	0.43 m <sup>2</sup>
6. Specimen cold side heat transfer area	$A_C$	3.50 ft <sup>2</sup>	0.32 m <sup>2</sup>
<b><u>Test Conditions</u></b>			
1. Average metering room air temperature	$t_h$	69.41 °F	20.78 °C
2. Average cold side air temperature	$t_c$	-0.34 °F	-17.96 °C
3. Average guard room air temperature	$t_g$	72.15 °F	22.31 °C
4. Average warm side baffle temperature	$t_{b1}$	68.72 °F	20.40 °C
5. Average cold side baffle temperature	$t_{b2}$	-0.36 °F	-17.98 °C
6. Average warm side surround panel temperature	$t_{SP1}$	65.76 °F	18.76 °C
7. Average cold side surround panel temperature	$t_{SP2}$	1.07 °F	-17.18 °C
8. Average metering room relative humidity	$RH_{MR}$	14.7 %	14.7 %
9. Warm side air velocity	$V_h$	0.5 mph	0.2 m/s
10. Cold side air velocity	$V_c$	11.2 mph	5.0 m/s
11. Maximum specimen air leakage before test	-	0.00 cfm/ft <sup>2</sup>	0.00 m <sup>3</sup> /(h·m <sup>2</sup> )
<b><u>U-Factor Results</u></b>			
1. Measured specimen U-factor	$U_S$	0.21 Btu/hr·ft <sup>2</sup> ·°F	1.21 W/m <sup>2</sup> ·K
2. CTS method standardized U-factor	$U_{S[CTS]}$	0.21 Btu/hr·ft <sup>2</sup> ·°F	1.19 W/m <sup>2</sup> ·K

**NFRC 102 - 2004 Thermal Transmittance (U-Factor) Standardization Calculation**

Item	Symbol	IP Unit	SI Unit
<b>Calculated Test Data</b>			
<b>Equivalent "CTS" Method</b>			
1. Emittance of glass	$e_1$	0.84	0.84
2. Metering room baffle emittance	$e_{b1}$	0.93	0.93
3. Equivalent warm side surface temperature	$t_1$	57.80 °F	14.34 °C
4. Equivalent cold side surface temperature	$t_2$	2.56 °F	-16.35 °C
5. Metering room baffle surface temperature	$t_{b1}$	68.72 °F	20.40 °C
6. Measured warm side surface conductance	$h_I$	1.28 Btu/hr-ft <sup>2</sup> ·°F	7.27 W/m <sup>2</sup> ·K
7. Calibrated CTS cold side surface conductance	$h_{II,CTS}$	5.13 Btu/hr-ft <sup>2</sup> ·°F	29.13 W/m <sup>2</sup> ·K
8. Specimen surface conductance	$C_S$	0.27 Btu/hr-ft <sup>2</sup> ·°F	1.53 W/m <sup>2</sup> ·K
9. CTS calibrated convection constant	$K$	0.30 Btu/hr-ft <sup>2</sup> ·°F <sup>1.25</sup>	1.97 W/m <sup>2</sup> ·K <sup>1.25</sup>
10. Specimen radiative heat flow	$Q_{R1}$	413.81 Btu/hr	121.28 W
11. Specimen convective heat flow	$Q_{C1}$	314.37 Btu/hr	92.14 W
12. Specimen radiative heat flux	$q_{R1}$	8.45 Btu/hr-ft <sup>2</sup>	26.64 W/m <sup>2</sup>
13. Specimen convective heat flux	$q_{C1}$	6.42 Btu/hr-ft <sup>2</sup>	20.24 W/m <sup>2</sup>
14. Standardized warm side surface conductance	$h_{STI}$	1.16 Btu/hr-ft <sup>2</sup> ·°F	6.61 W/m <sup>2</sup> ·K
15. Standardized cold side surface conductance	$h_{STII}$	5.10 Btu/hr-ft <sup>2</sup> ·°F	28.96 W/m <sup>2</sup> ·K
16. Standardized thermal transmittance (U-factor)	$U_{ST[CTS]}$	0.21 Btu/hr-ft <sup>2</sup> ·°F	1.19 W/m <sup>2</sup> ·K

**NFRC 102 - 2004 Thermal Transmittance (U-Factor) Test Duration**

- The ETC guarded hot box was started at 10:29 PM hrs. on 08/16/06.
- The test parameters were considered stable for two consecutive two-hour test periods from 2:34 AM hrs., to 4:29 AM hrs.; from 4:29 AM hrs. to 6:32 AM hrs.
- The thermal test results were derived from 4:29 AM hrs. to 6:32 AM hrs.
- The steady state was determined in accordance with section 5.2.3.2(A) of NFRC 102 - 2004.

**Additional Results and Records**

Item	Result	
<b>I.G. glazing deflection measurement</b>	Upon arrival	
	Upper lite	- in.
	Lower lite	- in.
	Before test	
	Upper lite	- in.
	Lower lite	- in.
After test	Upper lite	- in.
	Lower lite	- in.
<b>Condensation observation</b>	No condensation was observed after test.	
<b>Calibration date</b>	07/03/06	
<b>Location of the ETC guarded hot box</b>	Thermal testing area at ETC Laboratories, Inc.	
<b>Note 1:</b> The specimen was sealed on the interior with tape to minimize air leakage during test.		
<b>Note 2:</b> The airflow is perpendicular to the exterior side of the specimen during test.		

### **Conditions, Terms, and General Notes Regarding The Test**

**This test was conducted in full accordance with the procedures established in "NFRC 102 - 2004: Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems".**

***The rating values included in this report are for submittal to an NFRC-licensed IA and not meant to be used directly for labeling purposes. Only those values identified on a valid Certification Authorization Report (CAR) by an NFRC accredited Inspection Agency (IA) are to be used for labeling purposes.***

This test method does not include procedures to determine heat flow due to either air movement through the specimen or solar radiation effects. As a consequence, the thermal transmittance results obtained do not reflect performances which may be expected from field installations due to not accounting for solar radiation, air leakage effects, and thermal bridge effects that may occur due to the specific design and construction of the fenestration system opening. The latter can only be determined by in-situ measurements. Therefore, it should be recognized that the thermal transmittance results obtained from this test method are for ideal laboratory conditions and should only be used for fenestration product comparisons and as input for thermal performance analysis which also includes solar, air leakage, and thermal bridge effects.

This report relates only to the fenestration products tested.

The product tested has been compared to the detailed drawings, bill of materials and fabrication information supplied by the client so named herein. Our analysis, which includes dimensional and component description comparisons, indicate the tested product and engineering information supplied by the client "Are Equivalent". The report will be retained for four years from the date of initial test.

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**FOR ETC LABORATORIES**

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Gurjinder Singh, Director of NFRC Services  
Person in Responsible Charge

