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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

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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 ² ·°F	0.21
Measured U_S Uncertainty ΔU_S	Btu/hr·ft ² ·°F	0.003
Standardized U-factor U_{ST}	Btu/hr·ft²·°F	0.21
Standardization method **	-	CTS Method

** 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
<u>Measured Test Data</u>			
<u>Heat Flows</u>			
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 ² ·°F	0.31 W/m ² ·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
<u>Areas</u>			
1. Specimen projected area	A_S	49.00 ft ²	4.55 m ²
2. Metering room opening area	A_{MR}	64.00 ft ²	5.95 m ²
3. Metering room baffle area	A_{B1}	64.00 ft ²	5.95 m ²
4. Surround panel exposed interior area	A_{SP}	15.00 ft ²	1.39 m ²
5. Specimen warm side heat transfer area	A_H	4.60 ft ²	0.43 m ²
6. Specimen cold side heat transfer area	A_C	3.50 ft ²	0.32 m ²
<u>Test Conditions</u>			
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 ²	0.00 m ³ /(h·m ²)
<u>U-Factor Results</u>			
1. Measured specimen U-factor	U_S	0.21 Btu/hr·ft ² ·°F	1.21 W/m ² ·K
2. CTS method standardized U-factor	$U_{S[CTS]}$	0.21 Btu/hr·ft ² ·°F	1.19 W/m ² ·K

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

Item	Symbol	IP Unit	SI Unit
Calculated Test Data			
Equivalent "CTS" Method			
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 ² ·°F	7.27 W/m ² ·K
7. Calibrated CTS cold side surface conductance	$h_{II,CTS}$	5.13 Btu/hr-ft ² ·°F	29.13 W/m ² ·K
8. Specimen surface conductance	C_S	0.27 Btu/hr-ft ² ·°F	1.53 W/m ² ·K
9. CTS calibrated convection constant	K	0.30 Btu/hr-ft ² ·°F ^{1.25}	1.97 W/m ² ·K ^{1.25}
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 ²	26.64 W/m ²
13. Specimen convective heat flux	q_{C1}	6.42 Btu/hr-ft ²	20.24 W/m ²
14. Standardized warm side surface conductance	h_{STI}	1.16 Btu/hr-ft ² ·°F	6.61 W/m ² ·K
15. Standardized cold side surface conductance	h_{STII}	5.10 Btu/hr-ft ² ·°F	28.96 W/m ² ·K
16. Standardized thermal transmittance (U-factor)	$U_{ST[CTS]}$	0.21 Btu/hr-ft ² ·°F	1.19 W/m ² ·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	
I.G. glazing deflection measurement	Upon arrival	
	Upper lite	- in.
	Lower lite	- in.
	Before test	
	Upper lite	- in.
	Lower lite	- in.
After test	Upper lite	- in.
	Lower lite	- in.
Condensation observation	No condensation was observed after test.	
Calibration date	07/03/06	
Location of the ETC guarded hot box	Thermal testing area at ETC Laboratories, Inc.	
Note 1: The specimen was sealed on the interior with tape to minimize air leakage during test.		
Note 2: 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.

ETC Laboratories makes no opinions or endorsements regarding this product and its performance. This report may not be reproduced or quoted in partial form without the expressed written approval of ETC Laboratories.

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FOR ETC LABORATORIES

Gurjinder Singh, Director of NFRC Services
Person in Responsible Charge

