

**ROLLING DOOR THERMAL PERFORMANCE
TEST REPORT**

Rendered to:

DOOR & ACCESS SYSTEMS MANUFACTURERS ASSOCIATION INTERNATIONAL

**PROJECT: Rolling Door Research Project
TYPE: Rolling Door Assembly**

Reference should be made to ATI Report No. 60770.05-116-46 for complete test specimen description and data.

ROLLING DOOR THERMAL PERFORMANCE TEST REPORT

Rendered to:

DOOR & ACCESS SYSTEMS MANUFACTURERS ASSOCIATION
INTERNATIONAL
1300 Sumner Avenue
Cleveland, Ohio 44115

Report No: 60770.05-116-46
Test Dates: 11/1/05 - 11/15/05
Report Date: 02/07/06
Expiration Date: 11/15/09

Test Sample Identification:

Project: Rolling Door Research Project
Type: Non-Insulated Rolling Steel Door Assembly

Test Procedure:

The thermal transmittance (U) was determined in accordance with ANSI/DASMA 105-98, Test Method for Thermal Transmittance and Air Infiltration of Garage Doors under the standard conditions.

Additional testing was performed for thermal transmittance (U) in general accordance with NFRC 102-2004, Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems under the standard conditions. Certain deviations from the NFRC standard were necessary due to garage door construction details and sample size. These deviations include the following:

- 1) Due to the sample size exceeding 8' x 8' and the nature of the garage doors extension into the metering area, the standard NFRC metering chamber could not be used.
- 2) No baffle was in place on the warm side and baffle temperature for calculations was assumed to be equal to air temperature.

Test Sample Description:

Test Specimen: Non-Insulated Rolling Steel Door

Overall Size (Test Sample): 120" wide by 120" high

Overall Size (Test Opening): 120" wide by 103-3/4" high

Individual Panel Size: 120" wide by 2-5/8" high slats

Individual Panel Thickness: 5/8" total thickness

Finish: Gray painted galvanized steel

Panel Construction: The slats were constructed from 22 gage galvanized steel. The slats were connected to one another with cast metal brackets on each end of every other slat. The bottom of the curtain contained an aluminum extrusion with a 1" diameter flexible leaf gasket. A 4" high brush gasket was fastened to the head of the test opening. A 1 1/4" high vinyl gasket was fastened to both jamb guide tracks.

Installation: The jamb guide tracks were installed onto a wood test frame. Because of the limit of the height of the test chamber, the header was mounted to the top of the wood test frame. A 16-1/4" high, 12" deep, and 120" long piece of calibrated foam was installed on the top exterior to cover the exposed aluminum header. This reduced the test opening height to 103-3/4".

COMPONENTS			
	Type	Quantity	Location
WEATHERSTRIP			
	Brush Gasket, 4"	1 row	Head of test opening
	Vinyl Gasket, 1 1/4"	1 row	Jamb guide tracks
	Flexible leaf gasket, 1"	1 row	Bottom of curtain
HARDWARE			
	Metal Chain Hoist	1	Mounted to the interior right end cap through a rolled formed steel chain
	V-shaped chain lock	1	Mounted to the interior right jamb
	Spring-tensioned roll bar with mounting plates	1	Mounted from jamb to jamb across the header

Test and Calculations per DASMA 105

Test Duration:

1. The environmental systems were started at 10:30 hrs., 11/08/05
2. The thermal performance test results were derived from 06:19 hrs., 11/9/05 to 08:19 hrs., 11/9/05.

Thermal Transmittance (U):

Standard DASMA conditions

T_h	= Average warm side ambient temperature	67.98 F
T_c	= Average cold side ambient temperature	18.01 F
P	= Static pressure difference across test specimen 15 mph dynamic perpendicular wind at exterior	0.00 psf
Nominal sample area		86.46 ft ²
Total measured input to calorimeter		5894.81 Btu/hr
Calorimeter correction		151.44 Btu/hr
Net specimen heat loss		5743.37 Btu/hr
U	= Thermal Transmittance	1.329 Btu/hr-ft ² -F

Air Infiltration: The sample was tested for air infiltration in accordance with ASTM E 283-91 (reapproved 1999)

1. Static pressure = 0.11 inches H₂O; equivalent to a wind velocity of 15 mph.
2. Static pressure = 0.30 inches H₂O; equivalent to a wind velocity of 25 mph.

The air infiltration rate was greater than the measuring equipments tolerance range and corresponded to an open condition. Therefore the air infiltration could not be determined for this product.

Surface Temperature Report - ANSI/DASMA 105

Time: 06:19 06:49 07:19 07:49 08:19 AVERAGE

Thermocouples - Warm Side Surface of Sample

1	31.34	31.34	31.34	31.34	31.34	31.34
2	29.95	29.95	29.95	29.95	29.95	29.95
3	30.66	30.66	30.66	30.66	30.66	30.66
4	31.19	31.19	31.19	31.19	31.19	31.19
5	31.69	31.69	31.69	31.69	31.69	31.69
6	45.42	45.42	45.42	45.42	45.42	45.42
7	46.53	46.53	46.53	46.53	46.53	46.53
8	44.73	44.73	44.73	44.73	44.73	44.73
9	44.16	44.16	44.16	44.16	44.16	44.16
10	47.19	47.19	47.19	47.19	47.19	47.19
11	50.02	50.02	50.02	50.02	50.02	50.02
12	44.82	44.82	44.82	44.82	44.82	44.82
13	48.41	48.41	48.41	48.41	48.41	48.41
14	36.87	36.87	36.87	36.87	36.87	36.87
15	34.98	34.98	34.98	34.98	34.98	34.98
16	34.87	34.87	34.87	34.87	34.87	34.87
17	33.54	33.54	33.54	33.54	33.54	33.54
18	31.46	31.46	31.46	31.46	31.46	31.46
19	33.39	33.39	33.39	33.39	33.39	33.39
20	31.36	31.36	31.36	31.36	31.36	31.36
21	29.86	29.86	29.86	29.86	29.86	29.86
22	30.11	30.11	30.11	30.11	30.11	30.11
23	30.96	30.96	30.96	30.96	30.96	30.96
24	30.98	30.98	30.98	30.98	30.98	30.98
Avg.	36.85	36.85	36.85	36.85	36.85	36.85

Warm Side - Room Ambient Air Temperature

67.98 67.98 67.98 67.98 67.98 67.98

Cold Side - Room Ambient Air Temperature

18.01 18.01 18.01 18.01 18.01 18.01

Test and Calculations per NFRC 102

Test Duration:

1. The environmental systems were started at 08:17 hrs., 11/09/05
2. The thermal performance test results were derived from 05:26 hrs., 11/10/05 to 07:26 hrs., 11/10/05.

Standard NFRC conditions - CTS Method

T_h	= Average warm side ambient temperature	69.39 F
T_c	= Average cold side ambient temperature	-0.40 F
P	= Static pressure difference across test specimen 15 mph dynamic perpendicular wind at exterior	0.00 psf
	Nominal sample area	86.46 ft ²
	Total measured input to calorimeter	8803.29 Btu/hr
	Calorimeter Correction	248.78 Btu/hr
	Net specimen heat loss	8554.51 Btu/hr
U_s	= Thermal Transmittance	1.418 Btu/hr-ft ² -F
t_1	= Equivalent Interior Specimen Surface Temperature, CTS	6.06 Btu/hr-ft ² -F
t_2	= Equivalent Exterior Specimen Surface Temperature, CTS	12.95 Btu/hr-ft ² -F
h_h	= Interior Surface Heat Transfer Coefficient, CTS	1.56 Btu/hr-ft ² -F
h_c	= Exterior Surface Heat Transfer Coefficient, CTS	7.41 Btu/hr-ft ² -F
U_{st}	= Standardized U-Value	1.053 Btu/hr-ft ² -F

Standard NFRC conditions - Area Weighted Method

U_s	= Thermal Transmittance	1.418 Btu/hr-ft ² -F
t_1	= Equivalent Interior Specimen Surface Temperature, AW	21.45 Btu/hr-ft ² -F
t_2	= Equivalent Exterior Specimen Surface Temperature, AW	18.26 Btu/hr-ft ² -F
h_h	= Interior Surface Heat Transfer Coefficient, AW	2.06 Btu/hr-ft ² -F
h_c	= Exterior Surface Heat Transfer Coefficient, AW	5.30 Btu/hr-ft ² -F
U_{st}	= Standardized U-Value (calculated in accordance with ASTM C 1199-00)	1.038 Btu/hr-ft ² -F

Surface Temperature Report - NERC 102

Time: 05:26 05:56 06:26 06:56 07:26 AVERAGE

Thermocouples - Warm Side Surface of Sample

1	18.55	18.55	18.55	18.55	18.55	18.55
2	16.66	16.66	16.66	16.66	16.66	16.66
3	18.24	18.24	18.24	18.24	18.24	18.24
4	19.33	19.33	19.33	19.33	19.33	19.33
5	19.41	19.41	19.41	19.41	19.41	19.41
6	39.28	39.28	39.28	39.28	39.28	39.28
7	40.80	40.80	40.80	40.80	40.80	40.80
8	39.04	39.04	39.04	39.04	39.04	39.04
9	38.31	38.31	38.31	38.31	38.31	38.31
10	41.70	41.70	41.70	41.70	41.70	41.70
11	45.58	45.58	45.58	45.58	45.58	45.58
12	39.11	39.11	39.11	39.11	39.11	39.11
13	44.00	44.00	44.00	44.00	44.00	44.00
14	27.14	27.14	27.14	27.14	27.14	27.14
15	25.41	25.41	25.41	25.41	25.41	25.41
16	24.69	24.69	24.69	24.69	24.69	24.69
17	22.61	22.61	22.61	22.61	22.61	22.61
18	20.81	20.81	20.81	20.81	20.81	20.81
19	23.30	23.30	23.30	23.30	23.30	23.30
20	19.06	19.06	19.06	19.06	19.06	19.06
21	16.59	16.59	16.59	16.59	16.59	16.59
22	16.91	16.91	16.91	16.91	16.91	16.91
23	18.99	18.99	18.99	18.99	18.99	18.99
24	19.00	19.00	19.00	19.00	19.00	19.00
Avg.	27.27	27.27	27.27	27.27	27.27	27.27

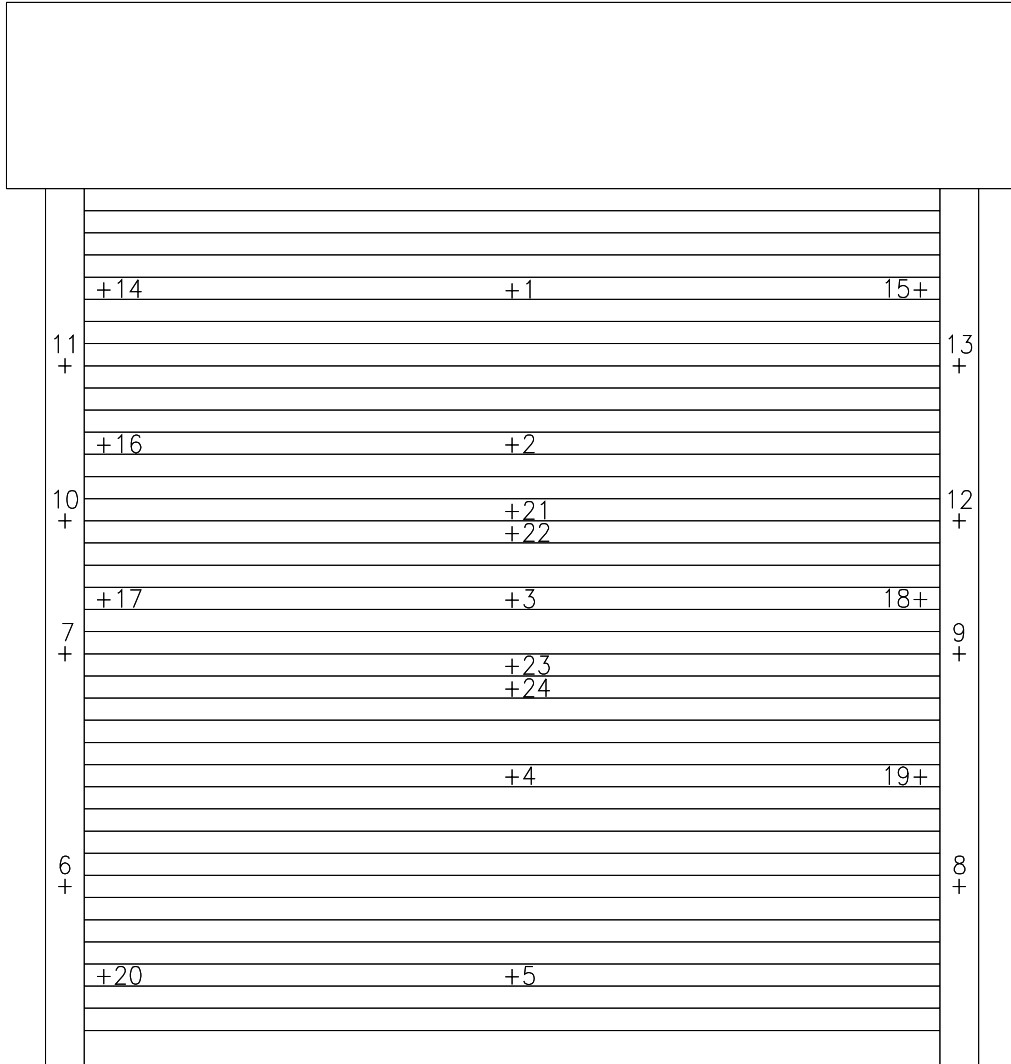
Warm Side - Room Ambient Air Temperature

69.39 69.39 69.39 69.39 69.39 69.39

Cold Side - Room Ambient Air Temperature

-0.40 -0.40 -0.40 -0.40 -0.40 -0.40

Thermocouple Location Diagram



The test sample was inspected for the formation of frost or condensation which may influence the surface temperature measurements. Any observed condensation/frost is indicated on the 'Thermocouple Location Diagram.'

A calibration of the ATI 'thermal test chamber' in York, Pennsylvania was conducted in May 2004.

Representative samples of the test specimen and a copy of this report will be retained by ATI for a period of four years. This report is the exclusive property of the client so named herein and relates only to the fenestration product tested. This report may not be reproduced, except in full, without the approval of the laboratory. Results obtained are tested values and do not constitute an opinion or endorsement by this laboratory.

For ARCHITECTURAL TESTING, INC.

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KSL:kmm
60770.05-116-46

Attachments:

- Appendix A: Report Summary (1)
- Appendix B: Additional Calculations (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
.01R0	02/07/06	All	Original Report Issue. Work requested by Joseph Hetzel of Door & Access Systems Manufacturers Association International.
.03R0	3/22/2006	All	Rolling steel door product only included in the report
.05R0	3/24/2006	All	Editorial Changes to the .03R0 Report
.05R1	4/28/2006	2 4,6 5 Appendix A Appendix B	Edited Panel Construction Description Edited Page Title Edited Calculation Values Edited U-Factor results Added Entire Appendix
.05R2	6/1/2006	2	Edited Measurements of the Vinyl Gasket

Report Summary

Appendix A

Report Summary:

Thermocouple Measurements

Thermocouple ID	Test #2	Test #2
	DASMA	NFRC
1	31.34	18.55
2	29.95	16.66
3	30.66	18.24
4	31.19	19.33
5	31.69	19.41
6	45.42	39.28
7	46.53	40.80
8	44.73	39.04
9	44.16	38.31
10	47.19	41.70
11	50.02	45.58
12	44.82	39.11
13	48.41	44.00
14	36.87	27.14
15	34.98	25.41
16	34.87	24.69
17	33.54	22.61
18	31.46	20.81
19	33.39	23.30
20	31.36	19.06
21	29.86	16.59
22	30.11	16.91
23	30.96	18.99
24	30.98	19.00
Average	36.85	27.27
Warm Side - Air Temp.	67.98	69.39
Cold Side - Air Temp.	18.01	-0.40

Thermal Transmittance and Standardized U-Value

Test Specification	Test	Test
	DASMA	NFRC
DASMA U_s	1.329	1.418
NFRC U_{st} - CTS Method	1.017	1.053
NFRC U_{st} - AW Method	1.025	1.038

Additional Calculations

Appendix B

Additional Calculations:

The following calculations are in addition to those calculations which are reported. They include calculations for NFRC Ust (AW or CTS) on the ANSI/DASMA 105 test results. The DASMA U and NFRC Us results are calculated identically, therefore DASMA calculations on the NFRC tests are already included earlier in the report. These results are not strictly in compliance with the test method, as the test was performed under different temperature conditions.

Test Specimen: Non-Insulated Rolling Steel Door

DASMA 105 Test Conditions - NFRC Calculations

NFRC Calculation - CTS Method

T_h	= Average warm side ambient temperature	67.98 F
T_c	= Average cold side ambient temperature	18.01 F
P	= Static pressure difference across test specimen 15 mph dynamic perpendicular wind at exterior	0.00 psf
	Nominal sample area	86.46 ft ²
	Total measured input to calorimeter	5894.81 Btu/hr
	Calorimeter Correction	151.44 Btu/hr
	Net specimen heat loss	5743.37 Btu/hr
U_s	= Thermal Transmittance	1.329 Btu/hr-ft ² -F
t_1	= Equivalent Interior Specimen Surface Temperature, CTS	24.15 Btu/hr-ft ² -F
t_2	= Equivalent Exterior Specimen Surface Temperature, CTS	26.97 Btu/hr-ft ² -F
h_h	= Interior Surface Heat Transfer Coefficient, CTS	1.52 Btu/hr-ft ² -F
h_c	= Exterior Surface Heat Transfer Coefficient, CTS	7.41 Btu/hr-ft ² -F
U_{st}	= Standardized U-Value	1.017 Btu/hr-ft ² -F

NFRC Calculation - Area Weighted Method

U_s	= Thermal Transmittance	1.329 Btu/hr-ft ² -F
t_1	= Equivalent Interior Specimen Surface Temperature, AW	34.26 Btu/hr-ft ² -F
t_2	= Equivalent Exterior Specimen Surface Temperature, AW	31.33 Btu/hr-ft ² -F
h_h	= Interior Surface Heat Transfer Coefficient, AW	1.97 Btu/hr-ft ² -F
h_c	= Exterior Surface Heat Transfer Coefficient, AW	4.99 Btu/hr-ft ² -F
U_{st}	= Standardized U-Value (calculated in accordance with ASTM C 1199-00)	1.025 Btu/hr-ft ² -F