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THERMAL PERFORMANCE TEST REPORT

Rendered to

ALL SEASONS WINDOW, INC.
28 Edgeboro Road
East Brunswick, New Jersey 08816

Report No: 02-31109.03
Test Date: 12/15/1998
Original Report Date: 12/16/1998
Current Report Date: 01/14/1999
Expiration Date: 12/15/2002

Test Sample Identification:

Series/Model: V 500 PW

Type: Vinyl Fixed Window

Overall Size: 4’ 0” wide by 4’ 0” high

Representative Size: Residential
Validation Test Unit

Test Procedures:

U-Factor tests were performed in a Guarded Hot Box in accordance with the following:

NFRC 100-97 “Procedure for Determining Fenestration Product Thermal Properties.”

Test Results Summary:

Standardized U-Factor (U_{st}) 0.29 Btu/hr·ft^{2}F (CTS Equivalent Procedure)

Test Sample Description:

Construction:

		Frame	Interior Panel	
	Size:	48” x 48”	45” x 45”	
CORNERS		Coped & butted	Mitered	
	Fasteners	Screwed	Welded	
	Sealant	Gasket	None	
MATERIAL		VY	VY	
	Color Ext.	White	White	
	Finish Ext.	Extruded vinyl	Extruded vinyl	
	Color Int.	White	White	
	Finish Int .	Extruded vinyl	Extruded vinyl	
GLAZING METHOD		NA	Tape glazed	

Glazing: (Sheet #1 is Exterior Sheet)

	Sheet #1	Gap #1	Sheet #2
THICKNESS	0.12”	0.63”	0.12”
LOW-E COATING*	NA	NA	0.043
COATING SURFACE*	NA	NA	#3
SPACER / SEALANT	NA	S4 (Intercept)	NA
MUNTIN PATTERN	NA	NA	NA
MATERIAL*	Annealed glass	90% Argon 10% Air Single probe-timed	NA

Components:

TYPE	QUANTITY	LOCATION
WEATHERSTRIPPING		
Wool pile with fin	2 Rows	Sash stiles and top rail
Vinyl bulb	1 Row	Sash bottom rail and sill

* Stated per Client/ Manufacturer NA- Non Applicable See Appendix A for Description Codes

TYPE	QUANTITY	LOCATION
HARDWARE: None		
DRAINAGE: None		

Test Conditions:

t_l = Average temperature of room side air 70.25 F

t_{ll} = Average temperature of weather side air -0.09 F

Metering room average relative humidity 6.83 %

Nominal 15 mph dynamic wind applied perpendicular to the test specimen exterior.

Specimen was sealed from the interior during testing using clear tape.

The positive pressure created by the 15 mph dynamic wind was offset to create a pressure difference across specimen to ± .21 psf, using made-up air.

Test Data:

A_s = Projected specimen area	16.00	Ft^2
A_{int} = Total exposed interior area	18.66	Ft^2
A_{ext} = Total exposed exterior area	16.18	Ft^2
A_{sp} = Area of surround panel	20.26	Ft^2
A_{mb} = Metering box area	36.26	Ft^2
A_{bl} = Area of room side baffle	32.13	Ft^2
Q = Total measured input to metering box	403.13	Btu/hr
Q_{sp} = Surround panel heat loss	- 63.34	Btu/hr
Q_{mb} = Metering box heat loss	- 5.83	Btu/hr
Q_{fl} = Flanking loss	- 11.41	Btu/hr
Q_s = Net specimen heat loss	322.55	Btu/hr
U_s = Thermal Transmittance (U_s) of test specimen	0.29	$Btu/hr{\cdot}ft^{2}{\cdot}F$
R_s = Thermal Resistance (R_u) of the test specimen	3.49	$ft^{2}{\cdot}hr{\cdot}F/Btu$
t_1 = Specimen area-weighted room side surface temperature	53.35	F
t_2 = Specimen area-weighted weather side surface temperature	2.94	F
t_{bl} = Area weighted baffle surface temperature	70.30	F
t_{sp1} = Surround panel room side temperature	67.46	F
t_{sp2} = Surround panel weather side temperature	0.37	F
Area weighted exterior frame surface temperature	2.62	F
Area weighted interior frame surface temperature	56.81	F

Area weighted exterior edge of glass temperature	3.76	F

Test Data (cont.):

Area weighted interior edge of glass temperature	46.19	F
Area weighted exterior center glass temperature	2.46	F
Area weighted interior center glass temperature	56.47	F
Equivalent room side surface temperature	55.53	F
Equivalent weather side surface temperature	3.76	F
h_l = Room side surface conductance	1.37	Btu/hr·ft^2·F
h_{ll} = Weather side surface conductance	5.24	Btu/hr·ft^2·F
C_s = Thermal conductance of specimen	0.39	Btu/hr·ft^2·F
R_c = Surface to surface thermal resistance of specimen	2.57	ft^2·hr·F/Btu
R_l = Room side surface resistance	0.73	ft^2·hr·F/Btu
R_{ll} = Weather side surface resistance	0.19	ft^2·hr·F/Btu
R_u = Overall thermal resistance of specimen	3.50	ft^2·hr·F/Btu
h_{stl} = Room side standardized surface conductance	1.35	Btu/hr·ft^2·F
h_{stll} = Weather side standardized surface conductance	5.10	Btu/hr·ft^2·F
U_{st} = Standardized thermal transmittance of test specimen	0.29	Btu/hr·ft^2·F

$$R_{st} = (1/h_{stl}) + (1/C_s) + (1/h_{stll})$$

$$U_{st} = (1/R_{st})$$

The reported standardized thermal transmittance (U_{st}) was determined using the equivalent calculation procedure.

Glazing Deflection:

Primary Glazing

Glazing thickness at edge	0.87”

Center glazing thickness upon receipt of specimen in laboratory (after stabilization)	0.81”
Center glazing thickness at laboratory ambient conditions on day of testing	0.81”
Center glazing thickness at test conditions	0.80”

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 attached drawing.

The following documentation is attached to this report:

1. An isometric drawing indicating thermocouple attachment locations and average surface temperature measurements.

2. A drawing indicating location and type of condensation/frost evidenced on the exposed surfaces of the test specimen.

A calibration of the New Brighton, Minnesota, ATI “Thermal Test Chamber” was conducted in September 1998.

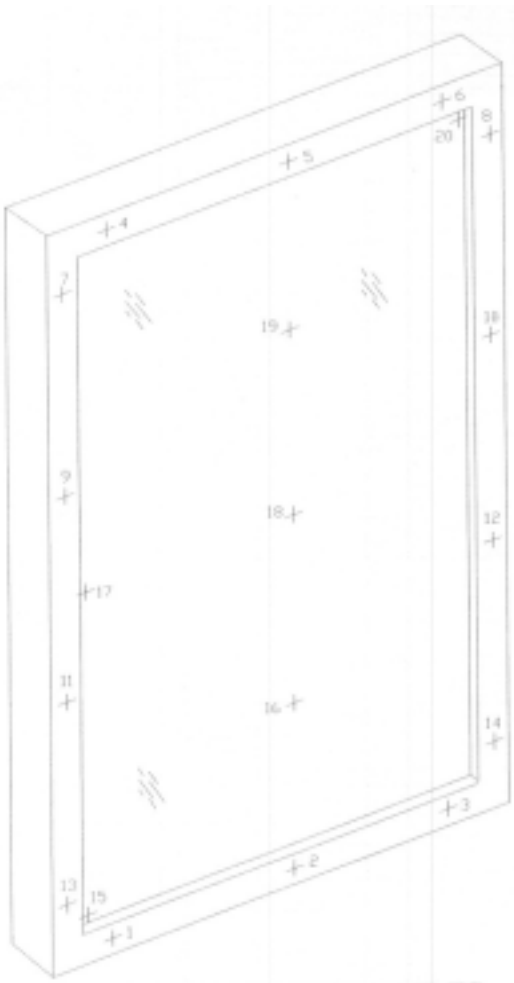
“This test method does not include procedures to determine the heat flow due to either air movement through the specimen or solar radiation effects. As a consequence, the thermal transmittance results obtained do not reflect performances which may be expected from field installations due to not accounting for solar radiation, air leakage efforts, and the 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 the 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 to thermal performance analyses which also include solar, air leakage and thermal bridge effects.”

This report is reissued in the name All Seasons Window through written authorization from Chelsea Building Products for whom testing was originally performed.

Detailed drawings, 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 is applicable to the sample tested. ATI is an NFRC accredited test laboratory and all tests were conducted in compliance with NFRC approved procedures. Results obtained are tested values and do not constitute an opinion or endorsement by this laboratory. This report

does not constitute certification of this product which may only be granted by an NFRC approved Independent Administrator.

For **ARCHITECTURAL TESTING, INC.**



SURFACE TEMPERATURES

	Interior	Exterior
1.	55.85	0.24
2.	55.50	2.06
3.	54.43	1.82
4.	61.41	3.27
5.	60.25	4.08
6.	57.07	2.88
7.	61.96	2.91
8.	60.56	3.29
9.	58.05	2.65
10.	59.19	3.51
11.	57.07	2.17
12.	55.88	1.61
13.	49.00	2.35
14.	49.65	3.12
15.	34.69	3.47
16.	56.53	2.18
17.	56.66	4.61
18.	46.85	2.23
19.	56.42	2.75
20.	44.95	7.88

02-31109

Appendix A

Description Table Abbreviations

CODE	FRAME/PANEL MATERIAL	DEFINITION
A1	Aluminum w/ vinyl inserts	Vinyl inserts employed in aluminum frame sash members
AL	Aluminum	No thermally broken frame / sash composite
AP	Aluminum w/ thermal breaks – partial	Some frame / panel members thermally broken
AT	Aluminum w/ thermal breaks - all members	All members contain thermal breaks
AW	Aluminum clad wood	Aluminum classing covering primary wood members
FG	Fiberglass	Fiber reinforced frame / panel members
OT	Other	Material not described in this lookup table
ST	Steel	Steel alloy members
VA	Vinyl w/ reinforcing - all members	Some frame / panel members contain reinforcing
VC	Vinyl clad aluminum	Vinyl cladding covering primary aluminum members
VH	Vinyl w/ reinforcing - horizontal members only	Only horizontal panel members contain reinforcing
VI	Vinyl w/ reinforcing - interlock only	Only panel interlock members contain reinforcing
VP	Vinyl w/ reinforcing - partial	Only specific members contain reinforcing
VV	Vinyl w/ reinforcing – vertical members only	Only vertical panel members contain reinforcing
VW	Vinyl clad wood	Vinyl cladding covering primary wood members
VY	Vinyl	Vinyl members with no reinforcing
WA	Aluminum / wood composite	Aluminum members combined with wood members
WD	Wood	All members are solid wood
WV	Vinyl / wood composite	Aluminum members combined with wood members

CODE	INTERSPACE GAS FILL
AIR	Air
AR2	Argon / Krypton mixture
AR3	Argon / Krypton / Air mixture
ARG	Argon
CO2	Carbon Dioxide
KRY	Krypton
OT	Other
ST6	Sulphur Hexafluouride

CODE	THERMAL BREAK MATERIAL
F	Foam
O	Other
U	Urethane
V	Vinyl

CODE	SPACER TYPE	DEFINITION
A1	Aluminum	Aluminum spacer system
A2	Aluminum – thermally broken	Aluminum spacer with urethane thermal break
A3	Aluminum – reinforced polymer	Polymer spacer with aluminum substance
A4	Aluminum / wood	Aluminum / wood composite
A5	Aluminum reinforced butyl	Butyl spacer with aluminum substrate
A6	Aluminum / foam / aluminum	Two aluminum spacers separated by foam
A7	Aluminum U-shaped	U-shaped aluminum spacer embedded in sealant
FG	Fiberglass	Fiberglass spacer system
GL	Glass	Glass spacer system
PU	Polyurethane foam	Polyurethane foam
S1	Steel	Stainless steel spacer system
S2	Steel – thermally broken	Stainless steel spacer with urethane thermal break
S3	Steel / foam / steel	Two steel spacers separated by foam
S4	Steel U-shaped	U-shaped stainless steel spacer system
S5	Steel reinforced butyl	Butyl spacer with steel substrate
S6	Steel reinforced butyl	Butyl spacer with steel substrate

V1	Vinyl U-shaped	U-shaped spacer system embedded in sealant
WD	Wood	Wood spacer system
ZF	Silicone Foam	Silicone foam spacer system