

**NFRC U-FACTOR, SHGC, VT, &
CONDENSATION RESISTANCE
COMPUTER SIMULATION REPORT**

(Revised)

**Rendered to:
SPECIALTY WHOLESALE SUPPLY**

**SERIES/MODEL:
4000 / 4500 DuraGard XT Double Hung**

Report Number: E7526.11-116-45
Original Report Date: 01/18/17
Revised Report Date: 02/13/17



**NFRC U-FACTOR, SHGC, VT, & CONDENSATION RESISTANCE
COMPUTER SIMULATION REPORT**

(Revised)

Rendered to:
SPECIALTY WHOLESALE SUPPLY
101 Linus Allain Avenue
Gardner, Massachusetts 01440

Report Number: E7526.11-116-45
Simulation Date: 12/02/15
Original Report Date: 01/18/17
Revised Report Date: 02/13/17

Project Summary:

Architectural Testing, Inc., an Intertek Company (Intertek-ATI) was contracted to perform U-Factor, Solar Heat Gain Coefficient, Visible Transmittance, and Condensation Resistance* computer simulations in accordance with the National Fenestration Rating Council (NFRC). The products were evaluated in full compliance with NFRC requirements to the standards listed

**NFRC's Condensation Resistance rating is NOT equivalent to a Condensation Resistance Factor (CRF) determined in accordance with AAMA 1503.*

Standards:

ANSI/NFRC 100-2014: Procedure for Determining Fenestration Product U-Factors

ANSI/NFRC 200-2014: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

NFRC 500-2014: Procedure for Determining Fenestration Product Condensation Resistance Values

Software:

Frame and Edge Modeling: THERM 7.4.4
Center-of-Glass Modeling: WINDOW 7.4.14
Total Product Calculations: WINDOW 7.4.14
Spectral Data Library: IGDB 52.0

Simulations Specimen Description:

Series/Model: 4000 / 4500 DuraGard XT Double Hung
Type: Vertical Slider, Double Hung
Frame Material: VY Vinyl
Sash Material: VI Vinyl w/ Reinforcement - Interlock
Standard Size: 1200mm x 1500mm

Modeling Assumptions/Technical Interpretations:

- 1) To prevent air infiltration, tape was applied to all interior sash crack locations.
- 2) Grids did not require modeling in some options per the NFRC 3mm rule.

Specialty Products Table:

The specialty products method allow the manufacturer to determine the overall product SHGC and VT for any glazing option. The center of glass SHGC and/or VT must be determined using WINDOW 7.4.14. The method gives overall product SHGC and VT indexed on center of glass properties. All values used in the calculations are truncated to six decimal place precision.

	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.003449	0.006187	0.008765
SHGC1	0.760074	0.679648	0.603901
VT0	0.000000	0.000000	0.000000
VT1	0.756625	0.673461	0.595136

$$SHGC = SHGC0 + SHGCc (SHGC1 - SHGC0)$$

$$VT = VT0 + VTc (VT1 - VT0)$$

Validation Matrix:

The following products are part of a validation matrix. Only one is required for validation testing.

<i>Product Line</i>	<i>Report Number</i>
None	-

Spacer Option Description

<i>Spacer Type</i>	<i>Sealant</i>		<i>Code</i>
	<i>Primary</i>	<i>Secondary</i>	
Quanex Standard Super Spacer	Butyl Rubber	None	OF-S

Grid Option Description

<i>Grid Size</i>	<i>Grid Type</i>	<i>Grid Pattern</i>
5.5mm x 18mm	Aluminum Contour Grid (Painted)	NFRC Standard
0.220" x 0.875"	SDL Bar	NFRC Standard
0.111" x 0.875"	SDL Bar	NFRC Standard

Reinforcement Option Description

<i>Location</i>	<i>Material</i>
Interlocks	Composite

Gas Filling Technique Description

<i>Fill Type</i>	<i>Method</i>
92% Argon	Two-probe with concentration sensor

Edge-of-Glass Construction

<i>Interior Condition</i>	Vinyl glazing leg with Silicone
<i>Exterior Condition</i>	Vinyl glazing bead

Weatherstripping

<i>Type</i>	<i>Quantity</i>	<i>Location</i>
Finpile	1	Sill Frame, Sash Stiles, Top rail
Vinyl Bulb	1	Sill Rail, Head Frame

Frame/Sash Materials Finish

<i>Interior</i>	Vinyl
<i>Exterior</i>	Vinyl

**NFRC 100/200/500 Summary Sheet
4000 / 4500 DuraGard XT Double Hung**

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)			Condensation Resistance	
1	No Foam: Clear/Air/Clear (SS) 7/8"											
	0.090	0.688	0.090					AIR		CL	OF-S	N,G,S
	U-Factor 0.45			SHGC (N / <1) 0.61 / 0.54				VT (N / <1) 0.63 / 0.56			CR 45	
	No Foam: Clear/Air/Clear (DS) 7/8"											
	0.117	0.625	0.117					AIR		CL	OF-S	N,G,S
	U-Factor 0.45			SHGC (N / <1) 0.60 / 0.54				VT (N / <1) 0.62 / 0.55			CR 45	
2	No Foam: 7138/Air/Clear (SS) 7/8"											
	0.090	0.688	0.090					AIR	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.32			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR 54	
	No Foam: 7138/Air/Clear (DS) 7/8"											
	0.117	0.625	0.117					AIR	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.32			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR 54	
3	No Foam: 7138/Argon/Clear (SS) 7/8"											
	0.090	0.688	0.090					ARG92	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.29			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR 57	
	No Foam: 7138/Argon/Clear (DS) 7/8"											
	0.117	0.625	0.117					ARG92	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.29			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR 57	
4	No Foam: Clear/Air/7257 (SS) 7/8"											
	0.090	0.688	0.090					AIR	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.33			SHGC (N / <1) 0.44 / 0.40				VT (N / <1) 0.54 / 0.48			CR 54	
	No Foam: Clear/Air/7257 (DS) 7/8"											
	0.117	0.625	0.117					AIR	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.33			SHGC (N / <1) 0.44 / 0.39				VT (N / <1) 0.54 / 0.48			CR 54	
5	No Foam: Clear/Argon/7257 (SS) 7/8"											
	0.090	0.688	0.090					ARG92	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.29			SHGC (N / <1) 0.45 / 0.40				VT (N / <1) 0.54 / 0.48			CR 57	
	No Foam: Clear/Argon/7257 (DS) 7/8"											
	0.117	0.688	0.117					ARG92	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.29			SHGC (N / <1) 0.44 / 0.40				VT (N / <1) 0.54 / 0.48			CR 57	

**NFRC 100/200/500 Summary Sheet
4000 / 4500 DuraGard XT Double Hung**

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)			Condensation Resistance	
6	No Foam: 7138/Argon/Clear/Argon/Clear (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2)	CL	OF-S	N
	U-Factor 0.27			SHGC (N) 0.28				VT (N) 0.49			CR 63	
7	No Foam: 7138/Argon/Clear/Argon/Clear (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2)	CL	OF-S	G,S
	U-Factor 0.29			SHGC (<1) 0.25				VT (<1) 0.44			CR 63	
8	No Foam: Clear/Argon/Clear/Argon/7257 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.045(#5)	CL	OF-S	N
	U-Factor 0.24			SHGC (N) 0.40				VT (N) 0.49			CR 64	
9	No Foam: Clear/Argon/Clear/Argon/7257 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.045(#5)	CL	OF-S	G,S
	U-Factor 0.24			SHGC (<1) 0.36				VT (<1) 0.44			CR 64	
10	Foam(Sash Only): 7138/Argon/Clear (SS) 7/8"											
	0.090	0.688	0.090					ARG92	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.28			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR 58	
	Foam(Sash Only): 7138/Argon/Clear (DS) 7/8"											
	0.117	0.625	0.117					ARG92	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.28			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR 58	
11	Foam(Sash Only): Clear/Argon/7257 (SS) 7/8"											
	0.090	0.688	0.090					ARG92	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.29			SHGC (N / <1) 0.45 / 0.40				VT (N / <1) 0.54 / 0.48			CR 57	
	Foam(Sash Only): Clear/Argon/7257 (DS) 7/8"											
	0.117	0.688	0.117					ARG92	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.29			SHGC (N / <1) 0.44 / 0.40				VT (N / <1) 0.54 / 0.48			CR 57	
12	Foam(Sash Only): 7138/Argon/Clear/Argon/Clear (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2)	CL	OF-S	N
	U-Factor 0.27			SHGC (N) 0.28				VT (N) 0.49			CR 63	
13	Foam(Sash Only): 7138/Argon/Clear/Argon/Clear (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2)	CL	OF-S	G,S
	U-Factor 0.28			SHGC (<1) 0.25				VT (<1) 0.44			CR 63	

**NFRC 100/200/500 Summary Sheet
4000 / 4500 DuraGard XT Double Hung**

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)			Condensation Resistance	
14	Foam(Sash Only): Clear/Argon/Clear/Argon/7257 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.045(#5)	CL	OF-S	N
	U-Factor 0.24			SHGC (N) 0.40				VT (N) 0.49			CR 64	
15	Foam(Sash Only): Clear/Argon/Clear/Argon/7257 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.045(#5)	CL	OF-S	G,S
	U-Factor 0.24			SHGC (<1) 0.36				VT (<1) 0.44			CR 64	
16	Foam(Frame & Sash): 7138/Argon/Clear (SS) 7/8"											
	0.090	0.688	0.090					ARG92	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.27			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR 58	
	Foam(Frame & Sash): 7138/Argon/Clear (DS) 7/8"											
	0.117	0.625	0.117					ARG92	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.27			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR 58	
17	Foam(Frame & Sash): Clear/Argon/7257 (SS) 7/8"											
	0.090	0.688	0.090					ARG92	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.27			SHGC (N / <1) 0.45 / 0.40				VT (N / <1) 0.54 / 0.48			CR 57	
	Foam(Frame & Sash): Clear/Argon/7257 (DS) 7/8"											
	0.117	0.688	0.117					ARG92	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.27			SHGC (N / <1) 0.44 / 0.40				VT (N / <1) 0.54 / 0.48			CR 57	
18	Foam(Frame & Sash): 7138/Argon/Clear/Argon/Clear (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2)	CL	OF-S	N
	U-Factor 0.26			SHGC (N) 0.28				VT (N) 0.49			CR 63	
19	Foam(Frame & Sash): 7138/Argon/Clear/Argon/Clear (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2)	CL	OF-S	G,S
	U-Factor 0.27			SHGC (<1) 0.25				VT (<1) 0.44			CR 63	
20	Foam(Frame & Sash): Clear/Argon/Clear/Argon/7257 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.045(#5)	CL	OF-S	N
	U-Factor 0.22			SHGC (N) 0.40				VT (N) 0.49			CR 64	
21	Foam(Frame & Sash): Clear/Argon/Clear/Argon/7257 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.045(#5)	CL	OF-S	G,S
	U-Factor 0.23			SHGC (<1) 0.36				VT (<1) 0.44			CR 64	

**NFRC 100/200/500 Summary Sheet
4000 / 4500 DuraGard XT Double Hung**

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)			Condensation Resistance	
22	Foam(Partial Frame & Sash): 7138/Argon/Clear (SS) 7/8"											
	0.090	0.688	0.090					ARG92	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.28			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR	58
	Foam(Partial Frame & Sash): 7138/Argon/Clear (DS) 7/8"											
	0.117	0.625	0.117					ARG92	0.027(#2)	CL	OF-S	N,G,S
	U-Factor 0.28			SHGC (N / <1) 0.30 / 0.27				VT (N / <1) 0.54 / 0.48			CR	58
23	Foam(Partial Frame & Sash): Clear/Argon/7257 (SS) 7/8"											
	0.090	0.688	0.090					ARG92	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.28			SHGC (N / <1) 0.45 / 0.40				VT (N / <1) 0.54 / 0.48			CR	57
	Foam(Partial Frame & Sash): Clear/Argon/7257 (DS) 7/8"											
	0.117	0.688	0.117					ARG92	0.045(#3)	CL	OF-S	N,G,S
	U-Factor 0.28			SHGC (N / <1) 0.44 / 0.40				VT (N / <1) 0.54 / 0.48			CR	57
24	Foam(Partial Frame & Sash): 7138/Argon/Clear/Argon/Clear (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2)	CL	OF-S	N
	U-Factor 0.26			SHGC (N) 0.28				VT (N) 0.49			CR	63
25	Foam(Partial Frame & Sash): 7138/Argon/Clear/Argon/Clear (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2)	CL	OF-S	G,S
	U-Factor 0.28			SHGC (<1) 0.25				VT (<1) 0.44			CR	63
26	Foam(Partial Frame & Sash): Clear/Argon/Clear/Argon/7257 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.045(#5)	CL	OF-S	N
	U-Factor 0.23			SHGC (N) 0.40				VT (N) 0.49			CR	64
27	Foam(Partial Frame & Sash): Clear/Argon/Clear/Argon/7257 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.045(#5)	CL	OF-S	G,S
	U-Factor 0.23			SHGC (<1) 0.36				VT (<1) 0.44			CR	64
28	No Foam: 7138/Argon/Clear/Argon/7138 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2) / 0.027(#5)	CL	OF-S	N
	U-Factor 0.21			SHGC (N) 0.26				VT (N) 0.42			CR	68
29	No Foam: 7138/Argon/Clear/Argon/7138 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2) / 0.027(#5)	CL	OF-S	G
	U-Factor 0.22			SHGC (<1) 0.23				VT (<1) 0.38			CR	68

**NFRC 100/200/500 Summary Sheet
4000 / 4500 DuraGard XT Double Hung**

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)			Condensation Resistance	
30	Foam(Sash Only): 7138/Argon/Clear/Argon/7138 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2) / 0.027(#5)	CL	OF-S	N
	U-Factor 0.21			SHGC (N) 0.26				VT (N) 0.42			CR 68	
31	Foam(Sash Only): 7138/Argon/Clear/Argon/7138 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2) / 0.027(#5)	CL	OF-S	G
	U-Factor 0.21			SHGC (<1) 0.23				VT (<1) 0.38			CR 68	
32	Foam(Frame & Sash): 7138/Argon/Clear/Argon/7138 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2) / 0.027(#5)	CL	OF-S	N
	U-Factor 0.19			SHGC (N) 0.26				VT (N) 0.42			CR 68	
33	Foam(Frame & Sash): 7138/Argon/Clear/Argon/7138 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2) / 0.027(#5)	CL	OF-S	G
	U-Factor 0.20			SHGC (<1) 0.23				VT (<1) 0.38			CR 68	
34	Foam(Partial Frame & Sash): 7138/Argon/Clear/Argon/7138 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2) / 0.027(#5)	CL	OF-S	N
	U-Factor 0.20			SHGC (N) 0.26				VT (N) 0.42			CR 68	
35	Foam(Partial Frame & Sash): 7138/Argon/Clear/Argon/7138 (DS-SS-DS) 1"											
	0.117	0.250	0.090	0.438	0.117			ARG92	0.027(#2) / 0.027(#5)	CL	OF-S	G
	U-Factor 0.21			SHGC (<1) 0.23				VT (<1) 0.38			CR 68	

The Condensation Resistance results obtained from this procedure are for controlled laboratory conditions and do not include the effects of air movement through the specimen, solar radiation, and the thermal bridging that may occur due to the specific design and construction of the fenestration system opening.

Ratings values included in this report are for submittals to an NFRC-licensed IA and are 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. The ratings values were rounded in accordance to NFRC 601, NFRC Unit and Measurement Policy.

Intertek-ATI is an NFRC accredited simulation laboratory and all simulations were conducted in full compliance with NFRC approved procedures and specifications. The values included in this report are not considered in compliance with ANSI/NFRC 100, ANSI/NFRC 200, and/or NFRC 500 unless the associated validation test requirements have been satisfied, as applicable.

This report is reissued in the name of Specialty Wholesale Supply through written authorization of Chelsea Building Products, to whom the original report was rendered. The original Chelsea Building Products report number is E7526.01-116-45.

Intertek-ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI for the entire test record retention period. The test record retention end date for this report is August 11, 2020.

Results obtained are simulated values and were secured by using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the product simulated. This report may not be reproduced, except in full, without the written approval of Intertek-ATI

For INTERTEK-ATI:

SIMULATED BY:

REVIEWED BY:

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Senior Simulation Technician
Simulator-In-Responsible-Charge

DCW:dcw
E7526.11-116-45

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A: Drawings and Bills of Material(28)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
.01R0	12/02/15	All	Original report issued to Chelsea Building Products.
.09R0	01/18/17	All	Reissue report in the name of Specialty Wholesale Products.
.09R1	01/31/17	All	Revise report to add options 22-27.
.11R0	02/13/17	All	Revise report to add options 28-35

All drawings and Bills of Material used to simulate this product are enclosed in this Appendix
Some drawings may be omitted at the extruder's request.

