



MMM GROUP



ANSI/NFRC 100

Procedure for Determining Fenestration Product U-factors

ANSI/NFRC 200

Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

NFRC 500

Procedure for Determining Fenestration Product Condensation Resistance Values

Fenestration Simulation Report

300 Tilt & Turn

Report Number

GLW17M00444-d

Friday, May 26, 2017

Prepared For

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Manufacturer:	Great Land Windows
Report Number:	GLW17M00444-d
Product Line:	300 Tilt & Turn
Frame:	Fiberglass with Foam Fill
Sash:	Fiberglass with Foam Fill
Thermal Break:	N
Edge of Glass:	Exterior edges are held by foam glazing tape. Interior edges are held by silicone gasket or EPDM gasket.
Glazing:	Cardinal Glass Industries Float Glass 3mm (CCL), Cardinal Glass Industries LoE 180 on 3mm Clear (180), Cardinal Glass Industries LoE 270 on 3mm Clear (270), Cardinal Glass Industries LoE 272 on 3mm Clear (272), Cardinal Glass Industries LoE 340 on 3mm Clear (340), Cardinal Glass Industries LoE 366 on 3mm Clear (366), Cardinal Glass Industries i89 on 4mm Clear (i89).
Spacer:	Cardinal Endur with PiB Primary Sealant and Silicone Secondary Sealant (SS-D), Superspacer S-Class with integral primary sealant and Butyl Secondary Sealant (Validation Only)(ZF-D)
Weatherstripping	Silicone gasket on the frame and sash.
General:	This product line includes the 300 Tilt & Turn manufactured by Great Land Windows. Group leader calculations were performed for different center of glazing Low E coatings. They are groupable per ANSI/NFRC 100-2014 section 4.2.4.1. See group leader section for group leaders.



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Simulator

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WINDOW SIMULATION REPORT

The windows documented in this report were simulated in accordance with the ANSI/NFRC 100: Procedure for Determining Fenestration Product U-Factors (2014), ANSI/NFRC 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence (2014) and NFRC 500: Procedure for Determining Fenestration Product Condensation Resistance Values (2014).

The windows were simulated using WINDOW 7 and THERM 7 computer programs as specified in ANSI/NFRC 100 and ANSI/NFRC 200. The most currently approved spectral data files from NFRC were also used. The WINDOW program models the one-dimensional heat flow through the center-of-glass portion of the window. The THERM program models the two-dimensional heat flow through the frame, edge-of-glass, divider, and divider-edge portions of the window. The input data for both programs is based on manufacturer's specifications. Defaults for material thermal and optical properties are given in the computer programs. When values other than defaults were used, they are

Ratings values included in this report are for submittal 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 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.

DISCLAIMER:

This window simulation report was generated by MMM Group Ltd. of Kitchener, ON. The report relates only to the items specified.

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MMM Group Ltd. and its employees neither endorse nor warrant the suitability of the product simulated. Every effort was taken to accurately model the performance of the windows documented in this report. Because of the large amount of input data and analyses, it is possible that errors or omissions could occur.

Neither MMM Group Ltd. nor any of its employees shall be responsible for any loss or damage resulting directly or indirectly from any default, error, or omission.

SIMULATION NOTES

- 1 This is an "ANSI/NFRC 100: Procedure for Determining Fenestration Product U-Factors" Certification Report.
- 2 This is an "ANSI/NFRC 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence" Certification Report.
- 3 This is an "NFRC 500: Procedure for Determining Fenestration Product Condensation Resistance Values" Certification Report.
- 4 Unit conversions and rounding are performed according to NFRC 601.
- 5 All glazing surface emissivities are assumed to be 0.84 unless otherwise stated.
- 6 The gas fill method is single probe with 90% argon (arg90).
- 7 Unless otherwise stated. All non-continuous hardware that does not create a thermal bridge such as hinges, balances, locks etc. are not modeled.
- 8 Where applicable, the following materials are used (Conductivity in W/mK): ADCO PIB-8 HSNB Gray (0.155), Cardinal Stainless Steel (14.187), Superspacer Silicone Foam S1 (0.178), Superspacer S2 Premium (0.125), Superspacer S2 Premium Plus (0.127), Superspacer nXt (0.114), Superspacer Standard EPDM (0.179), Superspacer TriSeal (0.141), Superspacer T-Spacer (0.130), GED Intercept Ultra Stainless Steel (13.63), Quanex Butyl 761-71X (0.177), San Gobain SAN 35% Glass Fiber (0.142).

NFRC - U-Value Baseline Product

Manufacturer: Great Land Windows
Mfr contact: Chip Vaughan
Product line: 300 Tilt & Turn
Product Type: DATT
Frame: Fiberglass with Foam Fill
Report number: GLW17M00444-d
Date: 5/26/2017
Revised date:

Product Description	366-kry-Cl-kry-366 Validation, vss	
Glass Thick 1 (in)	0.153	
Glass Thick 2 (in)	0.154	
Glass Thick 3 (in)	0.153	
Glass Thick 4 (in)		
Glass Thick 5 (in)		
# of Glazing Layers	3	
Surface #2 Emissivity	0.02	
Surface #3 Emissivity		
Surface #4 Emissivity		
Surface #5 Emissivity	0.02	
Surface #6 Emissivity		
Surface #7 Emissivity		
Surface #8 Emissivity		
Gap 1	0.453	
Gap 2	0.453	
Gap 3		
Gap 4		
Validation Size	1200 x 1500 mm	
	47.244 x 59.055 in	
Spacer Type	ZF-D	
Grid	N	
Gap Fill	Air (10%) / krypton (90%) Mix	
U-Value	0.16	

ID	Name	No. of Layers	Mode	Tilt	Environmental Conditions	K_{eff} (Btu/h*ft**F)	Overall Thickness (in)	U_{val} (Btu/h*ft²F)	SHGC	Visible Transmittance
1	CCL-arg90-180	2	#	90	NFRC 100-2010	0.027	0.876	0.269	0.687	0.793
2	270-arg90-CCL	2	#	90	NFRC 100-2010	0.025	0.876	0.257	0.366	0.702
3	272-arg90-CCL	2	#	90	NFRC 100-2010	0.026	0.876	0.259	0.412	0.720
4	340-arg90-CCL	2	#	90	NFRC 100-2010	0.025	0.876	0.254	0.177	0.389
5	366-arg90-CCL	2	#	90	NFRC 100-2010	0.025	0.876	0.251	0.271	0.648
6	180-arg90-CCL-arg90-180	3	#	90	NFRC 100-2010	0.018	1.398	0.132	0.561	0.699
7	270-arg90-CCL-arg90-180	3	#	90	NFRC 100-2010	0.017	1.398	0.128	0.331	0.617
8	272-arg90-CCL-arg90-180	3	#	90	NFRC 100-2010	0.017	1.398	0.129	0.372	0.633
9	340-arg90-CCL-arg90-180	3	#	90	NFRC 100-2010	0.017	1.398	0.127	0.155	0.343
10	366-arg90-CCL-arg90-180	3	#	90	NFRC 100-2010	0.017	1.398	0.126	0.244	0.569
11	180-arg90-180-arg90-i89	3	#	90	NFRC 100-2010	0.017	1.398	0.116	0.533	0.683
12	270-arg90-180-arg90-i89	3	#	90	NFRC 100-2010	0.017	1.398	0.112	0.319	0.603
13	272-arg90-180-arg90-i89	3	#	90	NFRC 100-2010	0.017	1.398	0.113	0.357	0.619
14	340-arg90-180-arg90-i89	3	#	90	NFRC 100-2010	0.017	1.398	0.111	0.149	0.335
15	366-arg90-180-arg90-i89	3	#	90	NFRC 100-2010	0.016	1.398	0.111	0.236	0.556
16	366-kry-Cl-kry-366 Validation	3	#	90	NFRC 100-2010	0.010	1.378	0.104	0.234	0.460

NFRC Simulation Data – Summary

Manufacturer:	Great Land Windows		
Series/Model #:	300 Tilt & Turn		
Spacer:	Cardinal Endur with PiB Primary Sealant and Silicone Secondary Sealant (SS-D), Superspacer S-Class with integral primary sealant and Butyl Secondary Sealant (Validation Only)(ZF-D)		
Operator Type:	DATT	Sim Lab Code:	SEEL
Model Size:	1200 x 1500	Report number:	GLW17M00444-d
Thermal Break:	N	Date:	5/26/2017
		Revised Date:	
		Rating Procedure:	2014

Mfr. Product Code	Product Number	Gap 1 (in)	Gap 2 (in)	Gap Fill 1	Gap Fill 2	Emissivity Surface 2	Emissivity Surface 3	Emissivity Surface 4	Emissivity Surface 5	Tint	Spacer	Grid Type	Grid Size	U-Factor (Btu/h*ft²F)	SHGC	VT	*CR
CCL-arg90-180, en	0001	0.64		ARG			0.07			CL	SS-D	N		0.27	0.46	0.53	62
272-arg90-CCL, en	0002	0.64		ARG		0.04				CL	SS-D	N		0.26	0.28	0.48	62
270-arg90-CCL, en		0.64		ARG		0.04				CL	SS-D	N		0.26	0.25	0.47	62
340-arg90-CCL, en	0003	0.64		ARG		0.03				CL	SS-D	N		0.26	0.12	0.26	63
366-arg90-CCL, en		0.64		ARG		0.02				CL	SS-D	N		0.26	0.19	0.43	63
180-arg90-CCL-arg90-180, en	0004	0.52	0.52	ARG	ARG	0.07			0.07	CL	SS-D	N		0.18	0.38	0.47	73
272-arg90-CCL-arg90-180, en	0005	0.52	0.52	ARG	ARG	0.04			0.07	CL	SS-D	N		0.18	0.25	0.42	73
270-arg90-CCL-arg90-180, en		0.52	0.52	ARG	ARG	0.04			0.07	CL	SS-D	N		0.18	0.23	0.41	73
340-arg90-CCL-arg90-180, en	0006	0.52	0.52	ARG	ARG	0.03			0.07	CL	SS-D	N		0.18	0.11	0.23	73
366-arg90-CCL-arg90-180, en		0.52	0.52	ARG	ARG	0.02			0.07	CL	SS-D	N		0.18	0.17	0.38	73
180-arg90-180-arg90-i89, en	0007	0.52	0.52	ARG	ARG	0.07		0.07		CL	SS-D	N		0.17	0.36	0.45	66
272-arg90-180-arg90-i89, en	0008	0.52	0.52	ARG	ARG	0.04		0.07		CL	SS-D	N		0.17	0.24	0.41	67
270-arg90-180-arg90-i89, en		0.52	0.52	ARG	ARG	0.04		0.07		CL	SS-D	N		0.17	0.22	0.40	67
340-arg90-180-arg90-i89, en	0009	0.52	0.52	ARG	ARG	0.03		0.07		CL	SS-D	N		0.17	0.10	0.22	67
366-arg90-180-arg90-i89, en		0.52	0.52	ARG	ARG	0.02		0.07		CL	SS-D	N		0.17	0.16	0.37	67

*Note: 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.