

THERMAL SIMULATION IN ACCORDANCE WITH CSA A440.2-19

UL Laboratory Canada Inc.

Submitted to:

Report No.:
AT-01227 R1

Skyreach Group Inc.
112A Snidercroft Road
Concord ON, Canada
L4K 2K1

Report Summary

Operation Type: DDSG
Series/Model: 8100 Sliding Glass Door
Report Date: 2025-01-10
Revision Date: 2025-03-05
Simulation Date : 2025-01-10
Number of Pages: 6

Note: Reference must be made to UL Laboratory Canada Inc. complete report for specimen description and detailed simulation results.

Simulated by:



Jihane Rata
Simulator
UL Laboratory Canada Inc.

Approved by:



Mélanie Comtois
NFRC Certified Simulator, SIRC
UL Laboratory Canada Inc.

LABORATORY, FIELD TESTING AND ADVISORY SERVICES FOR THE BUILDING ENVELOPE.

TORONTO
7 Underwriters Road
Toronto
ON M1R 3A9
Canada
T: +1.866.937.3852
E: BuildingEnvelope@ul.com

MONTREAL
1320 Lionel-Boulet Blvd
Varenes
QC J3X 1P7
Canada
T: +1.855.353.2532
E: BuildingEnvelope@ul.com

TELFORD
Halesfield 2
Telford
TF7 4QH
United Kingdom
T: +44.1952.586.580
E: BuildingEnvelopeEurope@ul.com

W: ul.com/buildingenvelope

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THERMAL SIMULATION IN ACCORDANCE WITH CSA A440.2-19

1 INTRODUCTION

UL Laboratory Canada Inc. has been retained by Skyreach Group Inc. to evaluate a *sliding glass door* in accordance with ANSI/NFRC 100 Procedure for Determining Fenestration Product U-Factors, ANSI/NFRC 200 Solar Heat Gain Coefficient and Visible Transmittance and NFRC 500 Procedure for Determining Fenestration Product Condensation Resistance Values. The product components and manufacturing details are documented in section 4 of this report. Rounding is per NFRC 601 NFRC Unit and Measurement Policy. All imperial values are for reference only. Appendix A of this report includes drawings and information of the product.

Simulations were conducted in full compliance with CSA requirements. Air infiltration test results were taken from report number TF-00369-B1 from UL Laboratory Toronto

2 SPECIFICATION

CSA A440.2-19:	Fenestration energy performance
ANSI/NFRC 100-2023:	Procedure for Determining Fenestration Product U-Factors
ANSI/NFRC 200-2023:	Solar Heat Gain Coefficient and Visible Transmittance
NFRC 101-2023:	Procedure for Determining Thermophysical Properties of Materials for Use in NFRC-Approved Software
NFRC 500-2017:	Procedure for Determining Fenestration Product Condensation Resistance Values
NFRC 601-2020:	NFRC Unit and Measurement Policy
WINDOW 7:	Software by Lawrence Berkeley National Laboratory
THERM 7:	Software by Lawrence Berkeley National Laboratory
IGDB v.103.0:	International Glazing Database by Lawrence Berkeley National Laboratory

3 DISCLAIMER

Data required for this evaluation were taken from the best available sources and every effort was taken to accurately perform the simulation documented in this report. Because of the large amount of input data and analysis it is possible that errors or omissions could occur. Neither UL Laboratory Canada Inc. nor any of its employees shall be held responsible for any loss or damage resulting directly or indirectly from any default, error or omission.

4 PRODUCT DESCRIPTION

4.1 OPERATOR TYPE:

DDSG, Sliding Glass Door

4.2 SERIES/MODEL:

8100 Sliding Glass Door

4.3 FRAME:

4.3.1	Material:	AT, Aluminum w/ Thermal breaks - All members
4.3.2	Finish:	Painted Aluminum
4.3.3	Reinforcement:	None
4.3.4	Weatherstripping:	None
4.3.5	Continuous Hardware:	No hardware was required to be modeled
4.3.6	Overall dimensions:	2000 mm W. x 2000 mm H. (78.74" x 78.74")

4.4 SASH(ES)

4.4.1	Material:	AT, Aluminum w/ Thermal breaks - All members
4.4.2	Sash 1:	
4.4.2.1.	Finish:	Painted Aluminum
4.4.2.2.	Reinforcement(s):	None
4.4.2.3.	Weatherstripping(s):	Compression weatherstripping at all perimeter
4.4.2.4.	Continuous Hardware:	No hardware was required to be modeled
4.4.3	Sash 2:	
4.4.3.1.	Finish:	Painted Aluminum
4.4.3.2.	Reinforcement(s):	None
4.4.3.3.	Weatherstripping(s):	Compression weatherstripping at all perimeter
4.4.3.4.	Continuous Hardware:	No hardware was required to be modeled
4.4.4	Sash 3:	N/A
4.4.5	Sash 4:	N/A

4.5 GLAZING METHOD:

- 4.5.1 Exterior face: EPDM gasket
- 4.5.2 Interior face: EPDM gasket

4.6 SPACER:

Spacer type:	Material:	Primary sealant:	Secondary sealant:
Chromatech Ultra (TS-D)	Vinyl and Stainless Steel	Polysulphide	Hot-Melt Butyl
Endur IG (SS-D)	Stainless Steel	Polyisobutylene	Silicone
Super Spacer Premium Enhanced (ZF-S)	Silicone Foam	N/A	Hot-Melt Butyl

4.7 GRID:

- 4.7.1 Grid: None
- 4.7.2 Material and finish: N/A
- 4.7.3 Standard NFRC Grid Pattern: N/A

4.8 GLAZING:

- 4.8.1 Filling Techniques: Single probe
Evacuated chamber
- 4.8.2 Capillary tube: No
- 4.8.3 Gas fill percentages: 90% Argon, 10% Air
97% Argon, 3% Air
- 4.8.4 Comment: None

5 SIMULATION RESULTS

Table 1: Center of glazing results

ID	Name	Insulating Glass Unit												U factor		SHGC	VT
		Emissivities	Glass 1		Gap 1		Glass 2		Gap 2		Glass 3		Tint				
			Type	mm	mm	gas	Type	mm	mm	gas	Type	mm		W/m2-K	Btu/hr-ft2-F		
1	6mm-ClrCGI-Arg90-180#3	0.068 (#3)	Clear	6.0	16.05	Arg90	Cardinal180	6.0					CL	1.51	0.27	0.65	0.77
2	6mm-ClrCGI-Arg90-180#3	0.068 (#3)	Clear	6.0	16.00	Arg90	Cardinal180	6.0					CL	1.51	0.27	0.65	0.77
3	6mm-ClrXYG-Arg90-S1.16#3	0.072 (#3)	Clear	5.9	16.00	Arg90	Optilite S1.16	5.9					CL	1.52	0.27	0.59	0.80
4	6mm-ClrCGI-Arg90-ClrCGI-Arg90-180#5	0.068 (#5)	Clear	6.0	11.73	Arg90	Clear	6.0	11.73	Arg90	Cardinal180	6.0	CL	1.05	0.19	0.56	0.69
5	6mm-ClrCGI-Arg90-ClrCGI-Arg90-180#5	0.068 (#5)	Clear	6.0	12.00	Arg90	Clear	6.0	12.00	Arg90	Cardinal180	6.0	CL	1.05	0.18	0.56	0.69
6	6mm-ClrXYG-Arg90-ClrCGI-Arg90-S1.16#5	0.072 (#5)	Clear	5.9	12.00	Arg90	Clear	6.0	12.00	Arg90	Optilite S1.16	5.9	CL	1.05	0.19	0.53	0.72
7	6mm-180ESC#2-Arg97-PV-Arg97-180ESC#5	0.080 (#2), 0.080 (#5)	LoE 180ESC	5.7	12.70	Arg97	PureVision	5.7	12.70	Arg97	LoE 180ESC	5.7	CL	0.76	0.13	0.55	0.68

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Table 2: Overall fenestration products results

ID	Option Name	Insulating Glass Unit					Overall Product				
		W7 COG ID	Spacer	Grid	Grid Size	Tint	U Factor		SHGC	VT	ER CSA
							W/m2-K	Btu/hr-ft2-F			
1	CH_6mm-ClrCGI-Arg90-180#3	2	TS-D	N		CL	2.20	0.39	0.44	0.52	16
2	CH_6mm-ClrXYG-Arg90-S1.16#3	3	TS-D	N		CL	2.21	0.39	0.41	0.54	14
3	CH_6mm-ClrCGI-Arg90-ClrCGI-Arg90-180#5	5	TS-D	N		CL	1.88	0.33	0.39	0.46	20
4	CH_6mm-ClrXYG-Arg90-ClrCGI-Arg90-S1.16#5	6	TS-D	N		CL	1.89	0.33	0.37	0.49	19
5	ED_6mm-ClrCGI-Arg90-180#3	1	SS-D	N		CL	2.18	0.38	0.44	0.52	17
6	ED_6mm-ClrCGI-Arg90-ClrCGI-Arg90-180#5	4	SS-D	N		CL	1.87	0.33	0.39	0.46	21
7	SP_6mm-180ESC#2-Arg97-PV-Arg97-180ESC#5	7	ZF-S	N		CL	1.64	0.29	0.38	0.46	25

*** Air tightness values from TF-00369-B1**

Infiltration: 0.44 l/s.m²

Exfiltration: 0.48 l/s.m²

**** ER calculated using metric U Factor.**

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6 REVISION LOG

Revision Number	Revision Date	Description
NS-01227 R1	2025-03-05	Glazing option ID#7 added to the original report as per client request.

APPENDIX A: DRAWINGS AND PRODUCT INFORMATION


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8100 Sliding Glass Door

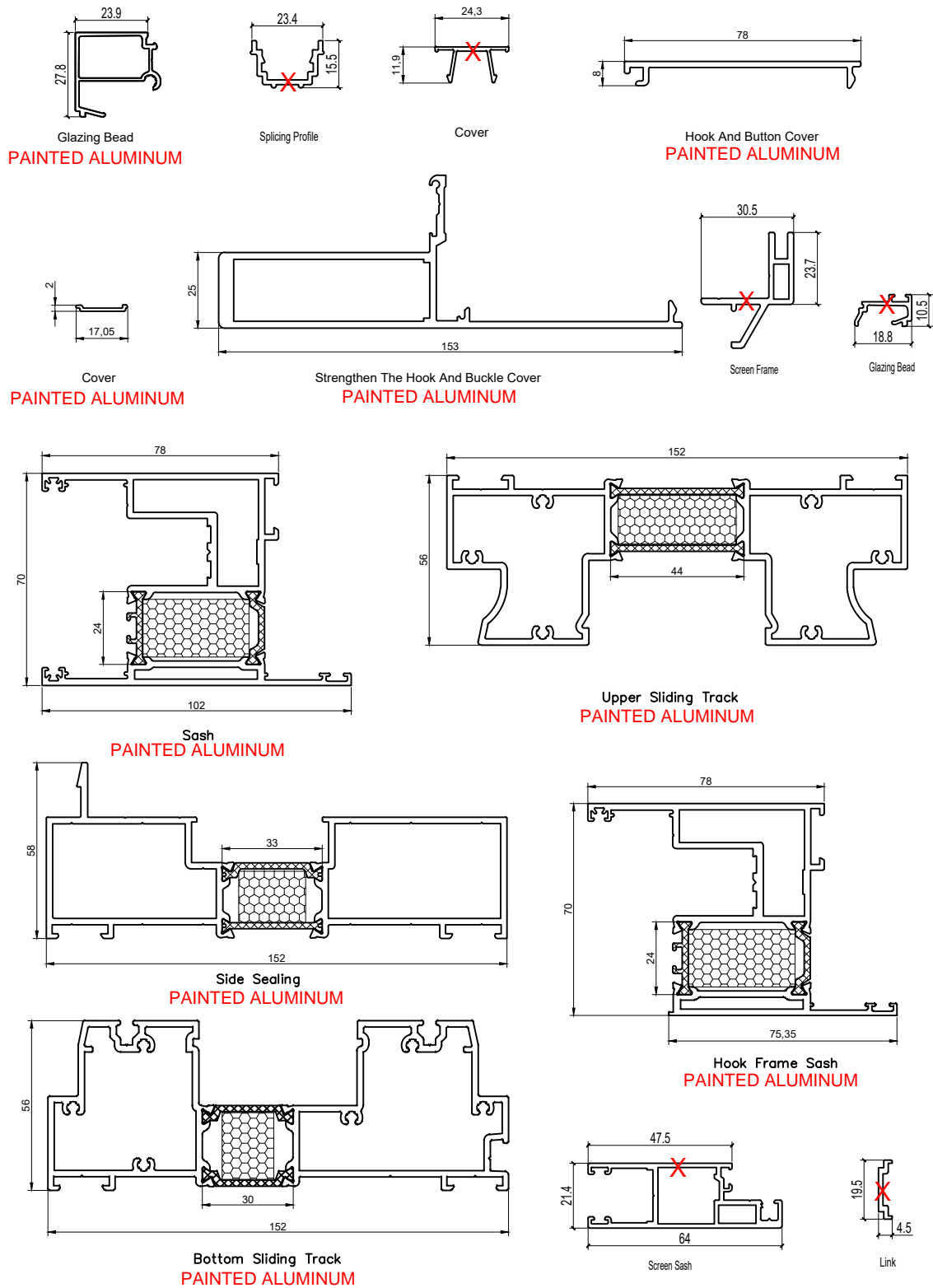
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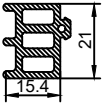
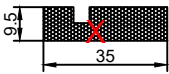


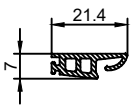


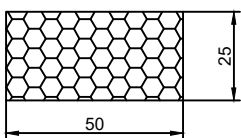
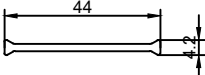
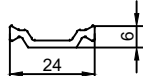
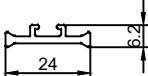
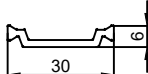
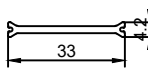
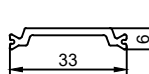
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	REVISION	00	DATE	May 2024
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8100 Aluminum Lift-sliding Door Profile



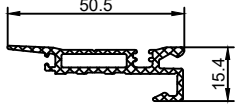
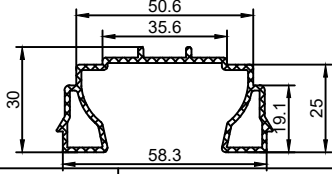
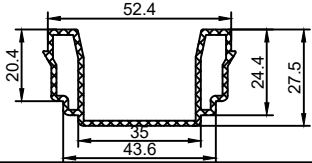
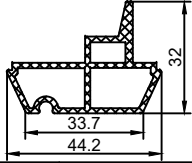

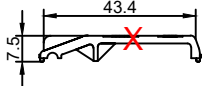






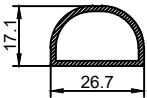
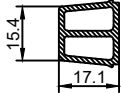
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8100 Aluminum Lift-Sliding Door Accessories Profile

0808592	Gasket	0808602	ES70 Foam
	EPDM		PE
0808700	Glazing Gasket	0808751	Glazing Gasket
	EPDM		EPDM
0808761	Glazing Gasket	0809000	Glazing Gasket
	EPDM		EPDM
0900505	5 H=5mm Silicified wool top	0972550	PE foam
			PE
0965744	Heat-insulating strip	0962690	Heat-insulating strip
	PA66GF25		PA66GF25
0962519	Heat-insulating strip	0964980	Heat-insulating strip
	PA66GF25		PA66GF25
0964762	Heat-insulating strip	0964760	Heat-insulating strip
	PA66GF25		PA66GF25

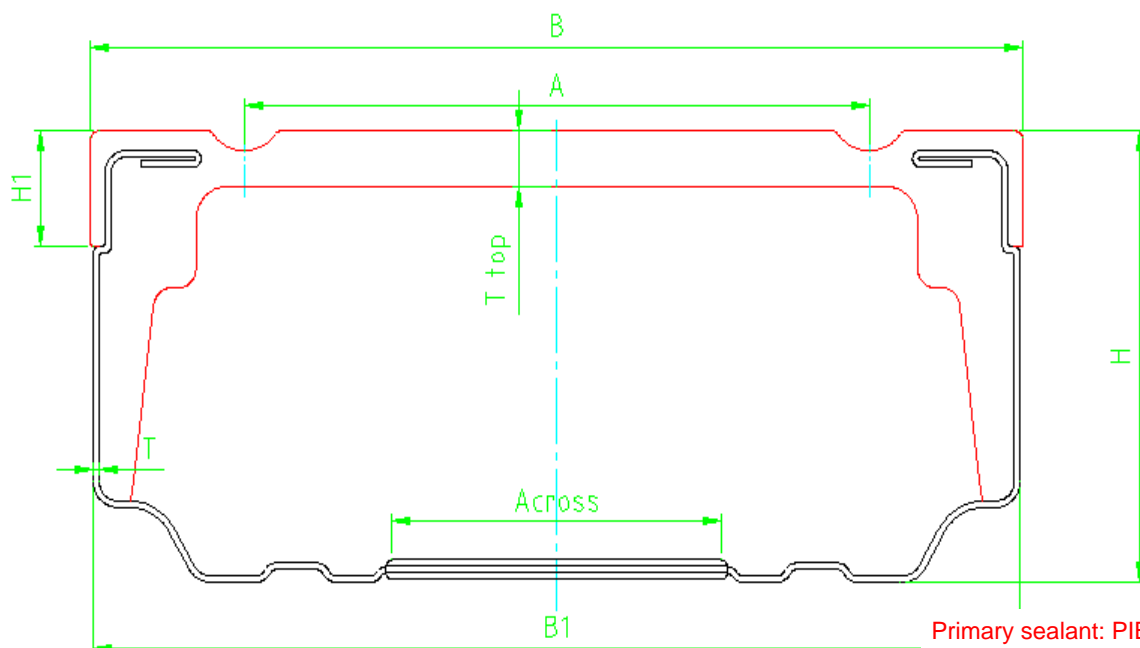
X : NOT SIMULATED

8100 Aluminum Lift-Sliding Door Accessories Profile

0100104	Sealant strip	0111304	U Groove
	PVC		PVC
0131304	U Insulation	0131314	Plastic Material
	PVC		PVC
0110019	Stainless steel slide	0550743	Glass Pallet
	Stainless steel		PA66
0808204	Exterior Glazing Gasket	0808305	Interior Glazing Gasket
	EPDM		EPDM
0808301	3.2mm Interior Glazing Gasket	0808502	Round bar adhesive strip
	EPDM		EPDM
0808504	Round bar adhesive strip	0808586	Screen window tape
	EPDM		EPDM
0808590	Adhesive strip with back	0808591	Adhesive strip with back
	EPDM		EPDM

X : NOT SIMULATED

1. Spacer properties



Primary sealant: PIB
 Second sealant: Polysulfide
 Second sealant height: 5mm

1.1 Cross section and tolerances

Spacer bar / cavity available	H - 0.05 +0.15 [mm]	H1 +/- 0.3 [mm]	Back Corrugation Across	B -0.30 +0.10 [mm]	B1 -0.05 +0.25 [mm]	A +/- 0.1 [mm]	Volume Desiccant Grace 551 g/m	T top -0.05 +0.15 [mm]
CUS 8	6.85	1.8	NO	7.6	7.5	2.45	22,4	0.85
CUS 10	6.85	1.8	NO	9.6	9.5	4,45	31,0	0.85
CUS 12	6.85	1.8	YES	11.6	11.5	6,45	39,5	0.85
CUS 13	6.85	1.8	YES	12.6	12.5	7,45	43,8	0.85
CUS 14	6.85	1.8	YES	13.6	13.5	8,45	48,1	0.85
CUS 15	6.85	1.8	YES	14.6	14.5	9,45	52,4	0.85
CUS 16	6.85	1.8	YES	15.6	15.5	10,45	56,6	0.85
CUS 18	6.85	1.8	YES	17.6	17.5	12,45	65,2	0.85
CUS 20	6.85	1.8	YES	19.6	19.5	14,45	73,7	0.85
CUS 22	6.85	1.8	YES	21.6	21.5	16,45	82,3	0.85
CUS 24	6.85	1.8	YES	23.6	23.5	18,45	90,8	0.85
CUS 26	6.85	1.8	YES	25.6	25.5	20,45	99,4	0.85

T steel is 0,104 mm for all sizes.

EN 1279-6 reference to table A.2 & A.5 – Note. Present list is valid until old norm expire 31.01.2019.

Ref. No.	EN Ref.	Description/specification	Internal test method
Further Spacer properties			
1.2	2.3 2.4	Geometry/shape The spacer geometry is shown in the cross section picture above. On enquiry a specific drawing can be delivered. Tolerances above.	Slide gauge and inspection drift
1.3	2.2	Length and straightness Standard length is 6,000 mm +/- 10 mm. Straightness deviation up to 15 mm/m at room temperature.	Steel ruler. Visual.

1.4	2.7	Undesired openings The spacer is tight as the backside is one uninterrupted piece of material. Plastic and steel are extruded together.	Process validation.
1.5	2.6	Perforation. See comments below ** Controlled perforation hole size, measured with airflow for optimal performance.	Air flow meter.
2.0 Spacer material			
2.1		Material for calculations Steel material used according to DIN EN 10088 type 1.4372 (AISI 201) or similar grades. Thermal conductance $\lambda_s = 15 \text{ W/mK}$ at 20 °C. These values are to be used for calculations.	<i>Documented by supplier.</i>
2.2	2.5	Surface The surface is clean and do not undergo any treatment with chemicals. Colours similar to RAL 9004, 9016, 7035, 7040, 8003 and 8016.	Visual test & Adhesion test.
2.3		Tolerances of the steel material The wall thickness of the spacer "S" is standard 0.104 mm.	Micro meter.
2.4		Lubrication During the forming of the spacer lubrication is used. The lubrication will evaporate fully leaving no volatile elements.	Adhesion test.
2.5	2.8	Volatile elements Volatile elements are tested according to EN 1279-6 annex G.	Weight loss test. M_v measured

** 1.5.1 Level of perforation

The ROLLTECH standard perforation will reduce the absorption of aqueous vapour to be no less than 1.0 weight % over a period of 24 hours (16 mm cavity tested by Grace Davidson Europe) - relative to the spacer size. The perforation is targeted EN 1279 - 6 annex A – specified maximum preload $H_2O \leq 3 \%$.

** 1.5.2 Function of the perforation

The perforation holes are until a certain particle size able to detain dust from the desiccant. This point is particular related to the performance of the bending machine and to the desiccant quality. An incorrect adjustment of the bending tool can cause damage to the perforation.

3.0 Quality aspects

3.1 Quality management

ROLLTECH A/S is certified according to DS EN ISO 9001.

3.2 Tests of the product

Processes and routines are established to secure the quality of the delivered material. During production the spacers are continuously monitored through systematic and random checks. Data will be available for a period of 5 years.

3.3 Quality agreement

ROLLTECH A/S fulfil the requirements of EN 1279 - 6 annex A. Specific quality agreement can be made to reduce inspection and test of the incoming material according to EN1279-6 part 5.2.6.



COMPLIES TO FILE
AT-01227 R1
CONFORME DOSSIER

4.0 Customer focus and warranty

On all spacers ROLLTECH offers a 5 years' product warranty. The warranty covers free exchange of spacers in case of a defect. The spacers must have been stored, installed and used according to present norms and technical standards. Special solutions and **usage that are not standardized** will need prior approval in writing from ROLLTECH in order to be covered. Related to temperature standardized condition for IG is -30° to 80°C.

4.1 Storage and use

To secure the performance of the spacers, the stock conditions must be acceptable. Broken packaging, humidity and variation in temperature will have an effect on the spacer in general. Make sure the spacer is conditioned at room temperature before use.

Preferred conditions will be a room temperature over 15°C and humidity RH of minimum 45%
Avoid having an environment with a high concentration of dust.

General handling and attention according to safety data sheet for the spacer. Use gloves when handling the spacer/frames and make sure there is exhausting when cutting the spacer.

It is recommended to check out and control all the specific points above.

4.2 Adhesion check

When preparing samples for adhesion test according to EN1279-6 F3.2.2 make sure the spacer backside is covered and in full contact with the sealant (no air bubbles). When pulling the samples make sure to support the spacer fully inside to avoid deformation. If the spacer deforms the adhesion test will be affected. Written procedure can be delivered up on request. Curing time according to instruction from sealant manufacturer.

4.3 Pressure

Deformation by pressure such as wind load and weight load by horizontal installation can be provided.

4.4 System performance

The user (here the IG producer) must secure the whole system consisting of spacer, connector/corner key, bending machine, desiccant, butyl and sealant works well together in the chosen setup. Focus on compatibility, adhesion, dust and corner quality.

After handling and transport of the frames, it's important to check if the connector/corner keys are still in the correct position, if not there is a significant risk for desiccant dust inside the IG unit. Foam behind the connector/corner can be used to avoid such problems.

4.5. Cleaning the plastic surface

If for some reason the plastic surface is defiled by dust from other materials it can be cleaned again by the use of water or air. Dust can easily be removed with antistatic loaded compressed air or a moist cloth. Chemicals are not recommended. In case of specific cleaning needs make sure to test compatibility between materials.

4.6 UV stability

The plastic used is an organic material with UV stabilizer in order to minimize the ageing effect caused by sun light.

The material is tested for 3.000 hours according to EN ISO 4892-1 & EN 4892-2 method A, cycle 1. Evaluation is done according to grey scale index.

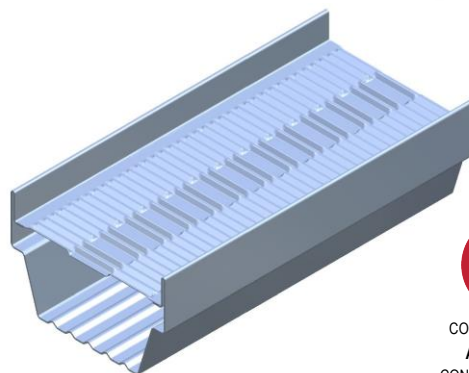


COMPLIES TO FILE
AT-01227 R1
CONFORME DOSSIER

Endur IG™ Simulation Model



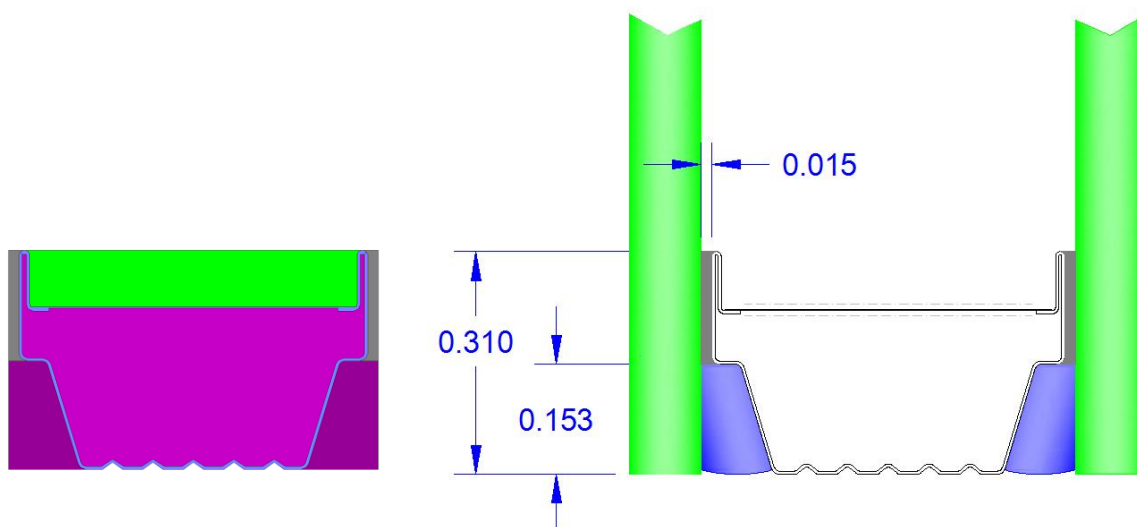
The purpose of this guide is to help properly model the Endur IG™ seal system when performing Therm window simulations.



COMPLIES TO FILE
AT-01227 R1
CONFORME DOSSIER

Endur IG™ Edge geometry.

Shown here is the simplified Endur IG™ geometry that should be used for thermal models. This geometry is also included within the attached Therm file: “Cardinal Endur IG Spacer 2016 Therm7_Rev00.thm”.



Some important items are:

- PIB thickness is 0.015”.
- Spacer back even with glass edge.
- Stainless steel thickness is 0.0045” along the sides and back of the spacer and 0.002” across the middle of the spacer for most airspaces.

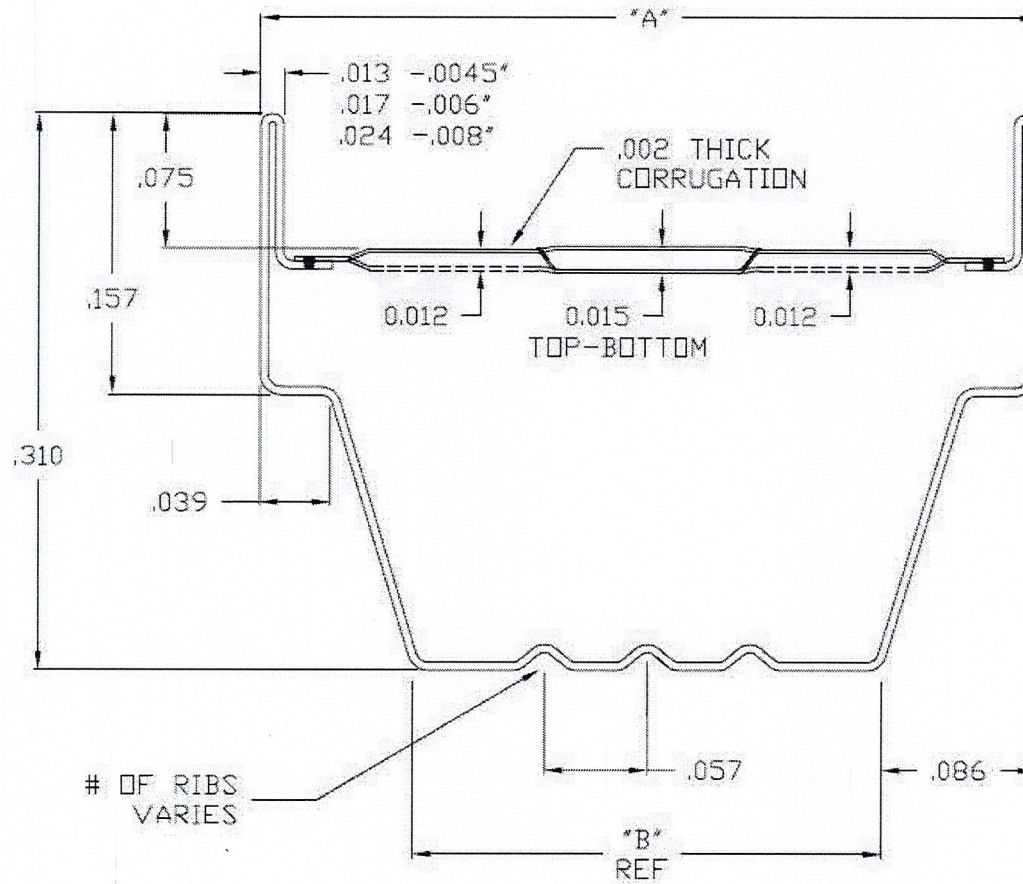
Thermal conductivity

The following thermal conductivity values should be used when modeling Endur IG™.

- Silicone: 0.202 BTU/hr-ft-F (0.350 W/m-K)
- PIB [ROYAL/KOMMERLING PIB-8 HSNB Gray]: 0.096 BTU/hr-ft-F (0.167 W/m-K)
- Desiccant [Molecular Sieve]: 0.058 BTU/hr-ft-F (0.100 W/m-K)
- Spacer [Cardinal Stainless Steel]: 8.197 BTU/hr-ft-F (14.187 W/m-K)



SPACER GEOMETRY FOR ENDUR IG SHOWN.
PROPER THERM GEOMETRIES PROVIDED.



P/N	NAME	A	B	BACK WALL	# RIBS
63-065	6.5	.236	.064	.0045	1
63-070	7.0	.256	.084	.0045	1
63-075	7.5	.276	.104	.0045	1
63-080	8.0	.295	.123	.0045	2
63-085	8.5	.315	.143	.0045	2
63-098	9.8	.366	.194	.0045	3
63-105	10.5	.394	.222	.0045	3
63-115	11.5	.432	.260	.0045	3
63-122	12.2	.460	.288	.0045	3
63-130	13.0	.492	.320	.0045	5
64-130	13.0	.492	.320	.006	5
64-145	14.5	.550	.378	.006	5
64-158	15.8	.602	.430	.006	5
64-160	16.0	.610	.438	.006	7
64-165	16.5	.630	.458	.006	7
64-175	17.5	.669	.497	.006	7
64-195	19.5	.748	.576	.006	9
64-210	21.0	.807	.635	.006	9
65-098	9.8	.366	.194	.008	3
65-115	11.5	.432	.260	.008	3
65-130	13.0	.492	.320	.008	5
65-145	14.5	.550	.378	.008	5
65-160	16.0	.610	.438	.008	7

REV.	DATE	DESCRIPTION	BY
CARDINAL IG			
TITLE			
ALL RIGHTS ARE EXPRESSLY RESERVED BY CARDINAL IG			
SCALE	DATE	DRAWN BY	APPROV
TOLERANCES	PARTS		

Super Spacer® Premium Enhanced

Super Spacer® Premium is a flexible, silicone foam spacer product that provides the maximum in perimeter insulation for sealed glazing units. Desiccant-filled with pre-applied side adhesive, the structural foam spacer significantly simplifies insulating glass (IG) production.



Basic Use

Super Spacer is a dual seal insulating glass spacer system that uses a high-performance acrylic adhesive for its structural seal and is backed with a proprietary multi-layer moisture vapor seal.

Featuring a vapor barrier backing, the spacer must be used in combination with conventional IG sealants.

Colors

Super Spacer Premium is available in Black, Aluminum, Grey and Almond.

Composition

Silicone foam base with desiccant pre-fill.

Desiccant Fill

Molecular-sieve.

Continuous Packaged Length

For regular insulating glass production, Super Spacer Premium is supplied on reels with the continuous packaged length varying depending on the spacer width.

Protective Packaging

To provide desiccant protection, the reels are vacuum-sealed in moisture-proof foil bags. The reels are then shipped in recyclable cardboard boxes.

Performance	Norm
Thermal conductivity 0.115 W/m°K	ASTM C 518
Gas / Moisture vapor barrier WVTR < 0.020 gm/m ² /day Oxygen < 0.009 cc/m ² /day	ASTM F 1249 ASTM D 3985
Primary structural seal Acrylic adhesive	
Fogging No fog in visual area.	ASTM E 2190 EN 1279 - 6 CAN/CGSB 12.8
Gas Retention Pass with hot-melt butyl or curative butyl	EN 1279 - 3
I.G. Durability Pass with hot-melt butyl or curative butyl	ASTM E 2190 EN 1279 - 2

Warm-Edge Silicone Foam Features & Benefits

- Superior silicone foam insulation
- Low thermal conductivity
- Substantially reduced perimeter condensation
- Typical overall 0.2 W/m²K (0.04 BTU/h-ft²-°F) U-factor window improvement (vs. aluminum)
- Excellent UV resistance
- Extreme temperature performance
- Fast dew-point drop
- Superior compression-set resistance
- Excellent color stability
- Enhanced sound dampening

Edge-Seal Durability

- Continuous vapor barrier at corners
- No chemical fogging
- High desiccant content
- Same spacer material and edge-seal technology as the proven Premium Plus product.

Unique Dual-Seal Design

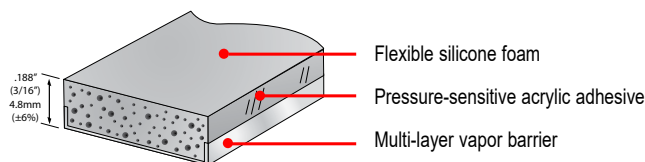
- Outer hot-melt butyl sealant for enhanced gas retention
- Inner structural acrylic side adhesive
- Immediate unit handling
- No cold flow or spacer/seal migration problems

Improved Productivity

- Fast application
- Elimination of desiccant filling
- No corner key assembly
- Simplified production of shaped units
- Limited equipment investment
- High-volume production with reduced labor force

Pleasing Aesthetic Appearance

- Black, Aluminum, Grey or Almond colors
- Smooth matte surface finish
- No surface blistering or bubbling
- Straight-line application with sharp 90° corners



Reel Sizes

Width mm	Width inches	Meter/ Reel	Feet/ Reel	Meter/ Auto Reel	Feet/ Auto Reel
4.8 mm	0.188"	610	2000	N/A	N/A
6.4 mm	0.250"	457	1500	1372	4500
7.9 mm	0.313"	335	1100	1006	3300
9.5 mm	0.375"	305	1000	914	3000
11.1 mm	0.438"	274	900	823	2700
11.9 mm	0.469"	244	800	731	2400
12.7 mm	0.500"	244	800	731	2400
14.3 mm	0.563"	213	700	640	2100
15.9 mm	0.625"	206	675	617	2025
17.5 mm	0.688"	183	600	549	1800
19.1 mm	0.750"	175	575	526	1725
20 mm*	0.787"	152	500	457	1500

* All even metric sizes are not available in North American market.

Note: Nominal sizes larger than 0.375" (3/8") have a tolerance of +/- 3% for the width (airspace) and +/- 6% for the height (thickness).

For nominal sizes 0.375" (3/8") and lower the tolerance is +/- 0.010" on the width (airspace) and +/- 6% for the height (thickness).

Note: All metric dimension equivalent sizes are for reference only.

Quanex's Quality Management System is certified to ISO 9001:2015 by Smithers Quality Assessments

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