

NFRC SIMULATION REPORT

Project Name: 3000 Series Curtainwall - Triple
Glazed Thermal Analysis

Project Number: 1510-17827

Simulation Date: December 20th, 2024

Report Date: December 20th, 2024

Revision #: R0

Product Model:

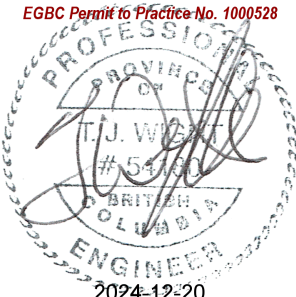
Name/Number	Type
CB3000	Curtain Wall

**Fenestration
Product Supplier:**

Acro Aluminum Inc.
5430 275 St,
Langley, BC,
V4W 3X7

Attn: Brent Friesen

Simulation by:

Layton Consulting Employee Name	Signature
Taylor Wight, P.Eng., NFRC Certified Simulator	 EGBC Permit to Practice No. 1000528 PROFESSIONAL ENGINEER T.J. WIGHT #54100 BRITISH COLUMBIA 2024-12-20
Tyler Loewen, NFRC Certified Simulator	

 <small>GLAZING, CLADDING, & SPECIALTY STRUCTURAL ENGINEERING Suite 233 - 18525 53rd Ave., Surrey, BC, Canada, V3S 7A4</small>	Project: 3000 Series CW – Triple Glazed Thermal Analysis				Project No: 1510-17827	
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GENERAL NOTES

Disclaimers

- This report shall not be reproduced, neither in part nor in full, without the approval of Layton Consulting Ltd.
- This report relates only to the fenestration products simulated and are based on the CAD files and information provided by the client. Layton Consulting Ltd. does not verify that all the provided information is current and accurate to what is installed.
- Ratings values included in this report are for submittals to an NFRC-licensed IA and are not meant to be used directly for labelling purposes. Only those options identified on a valid Certificate of Authorization (CA) by an NFRC accredited Inspection Agency (IA) are to be used for labelling purposes”.

Simulation Notes

- Thermal simulations were conducted in full compliance with NFRC test methods (as per ANSI/NFRC 100-2020^[E0A0] Procedure for Determining Fenestration Product U-factors).
- The Solar Heat Gain Coefficient (SHGC) and Visible Transmittance (VT) were determined following ANSI/NFRC 200-2020^[E0A0].
- Glass layers were taken from the latest International Glazing Database (IGDB).
- The IGU gas fill was assumed to be filled with Argon using the single-probe timed filling technique, to fill the air gap with 90% Argon, and 10% Air.
- Simulation was completed using NFRC approved software – THERM 7.8 and WINDOW 7.8.
- Thermal simulation models may require some minor modifications made by the simulator, relative to the provided drawings, to account for software limitations.
- Rounding is per NFRC 601, NFRC Unit and Measurement Policy.
- Unless otherwise stated, only continuous hardware was modelled.

STANDARD FRAME SIZE

The standard NFRC sizes for curtainwall windows was used, the standard size is 2000 x 2000 mm (78.74 x 78.74 in). That standard size consists of half frames used around the perimeter, as well as a full vertical frame in the centre as shown in the figure below (taken from the NFRC 2017 Simulation manual Section 8.9.2).

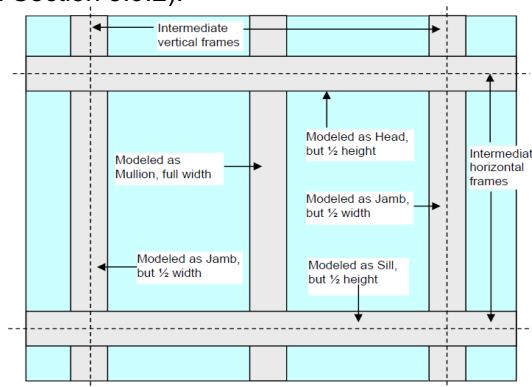


Figure 8-88. Curtain wall simulation model (represented by dotted lines) for rating, where the framing members are modeled at half their width.

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PRODUCT LINE DESCRIPTION AND MATERIAL PROPERTIES

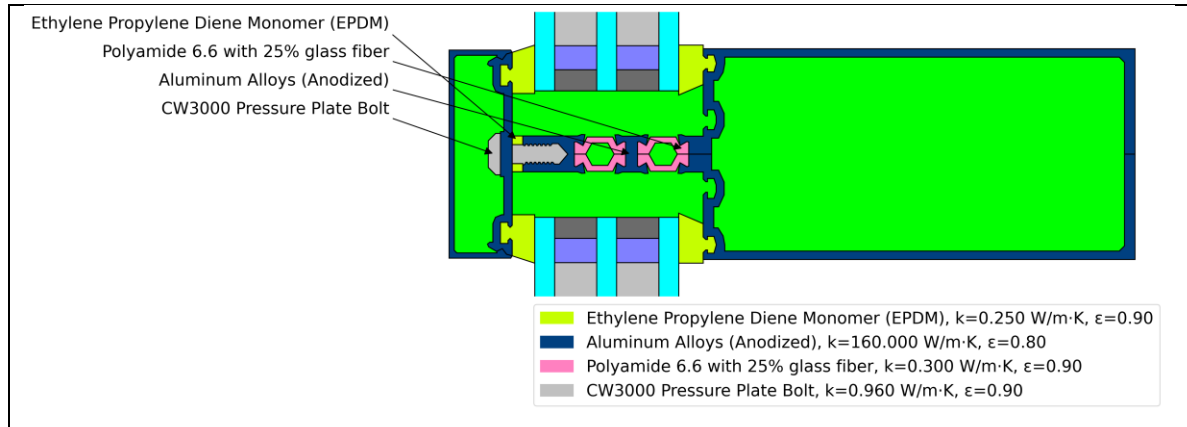


Figure 1: Model of the CW Jamb to Show the Materials of Components Modelled

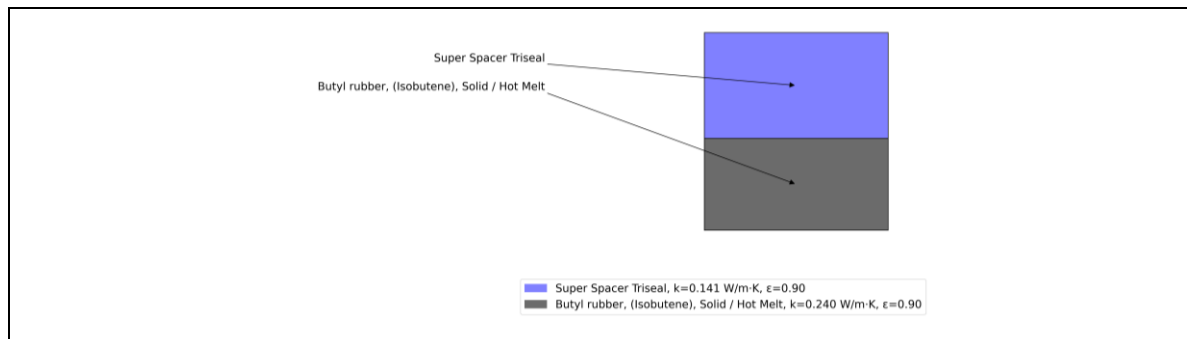


Figure 2: Spacer Material Details

Insulated Glazing Unit (IGU) Details:

G1: LoE² 272 on 6 mm Clear (Surface #2, $\epsilon = 0.042$) / 12.7mm Air (10%) - Argon (90%) Mix / LoE² 272 on 6 mm Clear (Surface #4, $\epsilon = 0.042$) / 12.7mm Air (10%) - Argon (90%) Mix / i89 on 6mm Clear (Surface #6, $\epsilon = 0.149$) (Total Thickness = 42.5mm)

G2: SunGuard® SuperNeutral 68 on Clear (Surface #2, $\epsilon = 0.039$) / 12.7mm Air (10%) - Argon (90%) Mix / SunGuard® SuperNeutral 68 on Clear (Surface #4, $\epsilon = 0.039$) / 12.7mm Air (10%) - Argon (90%) Mix / ClimaGuard IS-20, Interior Surface LE on 6mm Clr (Surface #6, $\epsilon = 0.198$) (Total Thickness = 42.2mm)

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RESULTS

Table 1: Thermal Modelling Result

Product Name	Glazing Type	Low-E Coating	Overall U-Factor (W/m²·K)	Overall U-Factor (Btu/h·ft²·°F)	SHGC	VT
3000 Series CW	GL1	LoE272 + LoE272 + i89	0.986	0.174	0.28	0.48
3000 Series CW	GL2	SN68 + SN68 + IS20	0.991	0.174	0.26	0.45

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APPENDIX



Figure 3: NFRC Certification of Laboratory and Simulator – Taylor Wight

IGU Name: G1								
	ID	Name	Thick	Surf	Tsol	Tvis	E	Source
Glass 1	2014	LoE272-6.CIG	5.7	2	0.411298	0.411298	0.411298	IGDB v97.0
Gap 1	9	Air (10%) - Argon (90%) Mix	12.7					
Glass 2	2014	LoE272-6.CIG	5.7	4	0.411298	0.411298	0.411298	IGDB v97.0
Gap 2	9	Air (10%) - Argon (90%) Mix	12.7					
Glass 3	2162	i89-6.CIG	5.7	6	0.689242	0.689242	0.689242	IGDB v97.0
Overall Thickness (mm):			42.5					

IGU Name: G2								
	ID	Name	Thick	Surf	Tsol	Tvis	E	Source
Glass 1	3110	SGSN68C6.grd	5.6134	2	0.380872	0.380872	0.380872	IGDB v15.4
Gap 1	9	Air (10%) - Argon (90%) Mix	12.7					
Glass 2	3110	SGSN68C6.grd	5.6134	4	0.380872	0.380872	0.380872	IGDB v15.4
Gap 2	9	Air (10%) - Argon (90%) Mix	12.7					
Glass 3	3293	CGIS-20c6.0.grd	5.6134	6	0.725481	0.725481	0.725481	IGDB v18.1
Overall Thickness (mm):			42.2402					

Centre of Glass Results (Frame not included):						
Name	# of Layers	Mode	Overall Thickness	Uval	SHGC	Tvis
			inches	Btu/h-ft ² -F		
G1	3	#	1.709	0.110	0.307	0.533
G2	3	#	1.709	0.111	0.282	0.501

Figure 4: Additional IGU Details

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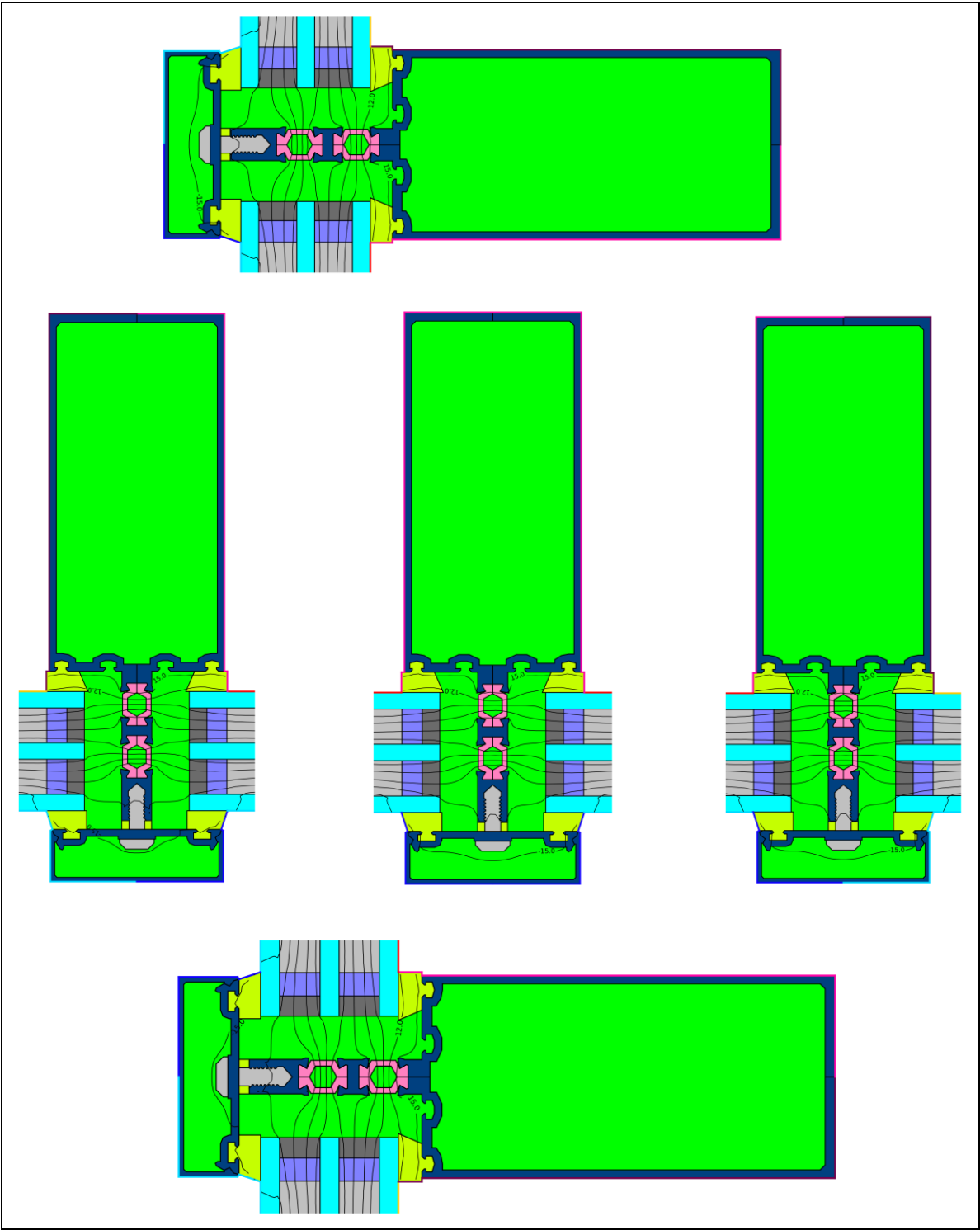


Figure 5: Thermal Modelling Result – Isothermal Visual Representation



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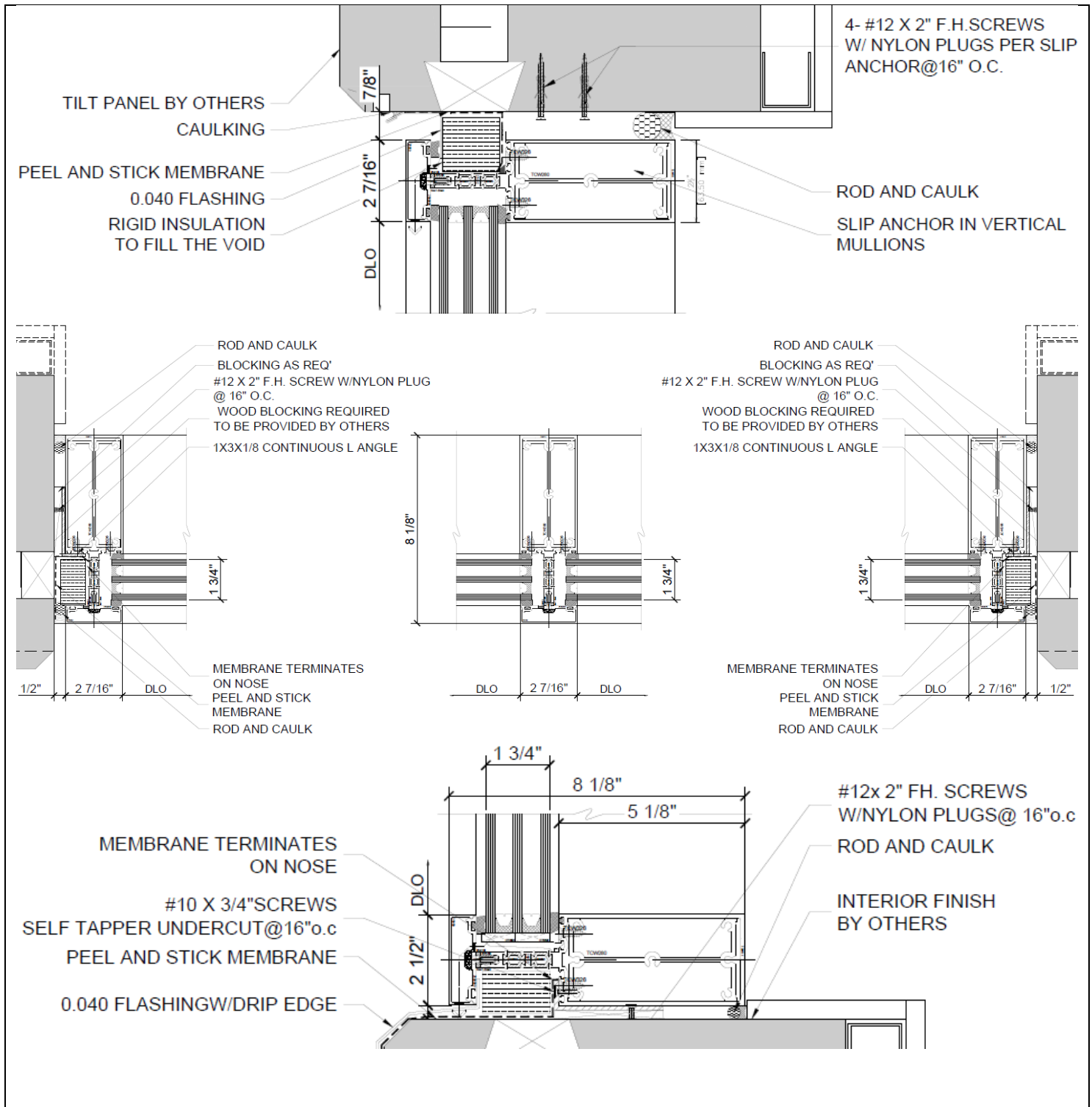
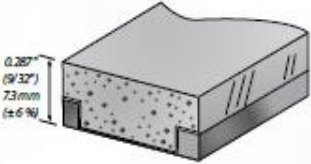


Figure 6: Assembled product drawings

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ARCHITECTURAL STRUCTURAL AND CAPTURED GLAZING UNITS



TRISEAL™

Available Sizes: 0.323" (8.2mm) to 0.874" (22.2mm) airspace

Standard Colors: Black and Grey

Optional Colors: Are Available (Minimum Order Required)

Custom Options: As defined by Specifier (Minimum Order Required)

Figure 10: Spacer Details

UPDATE GREEN CELLS FOR MEASUREMENTS				UPDATE ORANGE CELLS AS NEEDED FOR CONDUCTIVITY			
Cross Section	Material	Conductivity (W/mK)	Depth (m)	Conductivity (Btu-in/h-ft ² -F)	Depth (in)	R (m ² K/W)	R (h-ft ² -F/Btu-in)
1	Air Cavity - Default is 0.024 W/mK	0.024	0.0036576	0.168	0.144	0.1510	0.8571
2	Aluminum	160.003	0.003556	1109.380	0.14	0.0000	0.0001
3	EPDM	0.250	0.00320	1.733	0.1259	0.0128	0.0726
4	Air Cavity - Default is 0.024 W/mK	0.024	0.01355	0.168	0.5336	0.5594	3.1762
5		0.000	0	0.000	0	0.0000	0.0000
6		0.000	0	0.000	0	0.0000	0.0000
7		0.000	0	0.000	0	0.0000	0.0000
			0.02396		0.9435	0.7231	4.1061
			Dt		Dt	Rt	Rt
Calculated conductivity			Metric		Inch-Pounds		
			Kn = Dt/Rt		Kn = Dt/Rt		
			Kn= 0.0331		0.23		
Other conductivities required			SI Units		IP Units		
Stainless steel:							
Kb= 17.00					117.869		
Calculate the fraction of bolt to no bolt:							
Bolt head width:							
Wb= 12.5					0.492		
Bolt spacing:							
Sb= 228.6					9		
Fraction of thermal bridging:							
Fb= 0.055					0.055		
			5.5 %		5.5 %		
Fraction of non thermal bridging:							
Fn= 0.945					0.945		
			94.5 %		94.5 %		
New keff in Therm: (Fb*Kb+Fn*Kn)							
keff= 0.96					6.66		
			(W/mK)		(Btu-in/h-ft ² -F)		

Figure 11: Thermal Bridge Calculation – (when used for CW bolt conductivity calc)