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Therm 7.8 and Window 7.8 Simulation Report

Zero•Net UCW3500 Captured w/ Triple IGU and Fiberglass Thermal Break and Pressure Plate

*Thermal modeling analysis was performed on FreMarq's UCW3500 framing system with a fiberglass pressure plate (exterior) and thermal break (interior). Analysis of the system was performed using the Therm 7.8 and Window 7.8 computer software developed by Lawrence Berkeley Laboratory.

	U-Factor Center of Glass (Btu/h-ft^2-F)	U-Factor Assembled (Btu/h-ft^2-F)	SHGC	VT	CR
NFRC Size	0.133	0.181	0.221	0.346	77
5' x 10' Job Size	0.133	0.165	0.231	0.367	78

THERM 7.8 calculates heat loss through frame and edge-of-glazing components using finite element analysis. The program solves for temperature and heat flow distribution throughout the cross section. The temperature distribution can then be used to determine overall heat loss, total and component U-factors, and local temperatures at points of interest.

WINDOW 7.8 calculates U-factor and temperatures for the center-of-glazing using a two-dimensional heat flow analysis.

Standards:

NFRC 100-2014: *Procedure for Determining Fenestration Product U-Factors.*

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.*

Standard NFRC environmental conditions were used to analyze the system, which are -0.4°F exterior ambient temperature with a 12.3 mph wind acting perpendicular to the wall. An exterior film coefficient of 4.579 BTU/hr*ft^2*°F was used to represent the exterior wind. Interior conditions were modeled as 69.8°F ambient temperature with natural convection only.

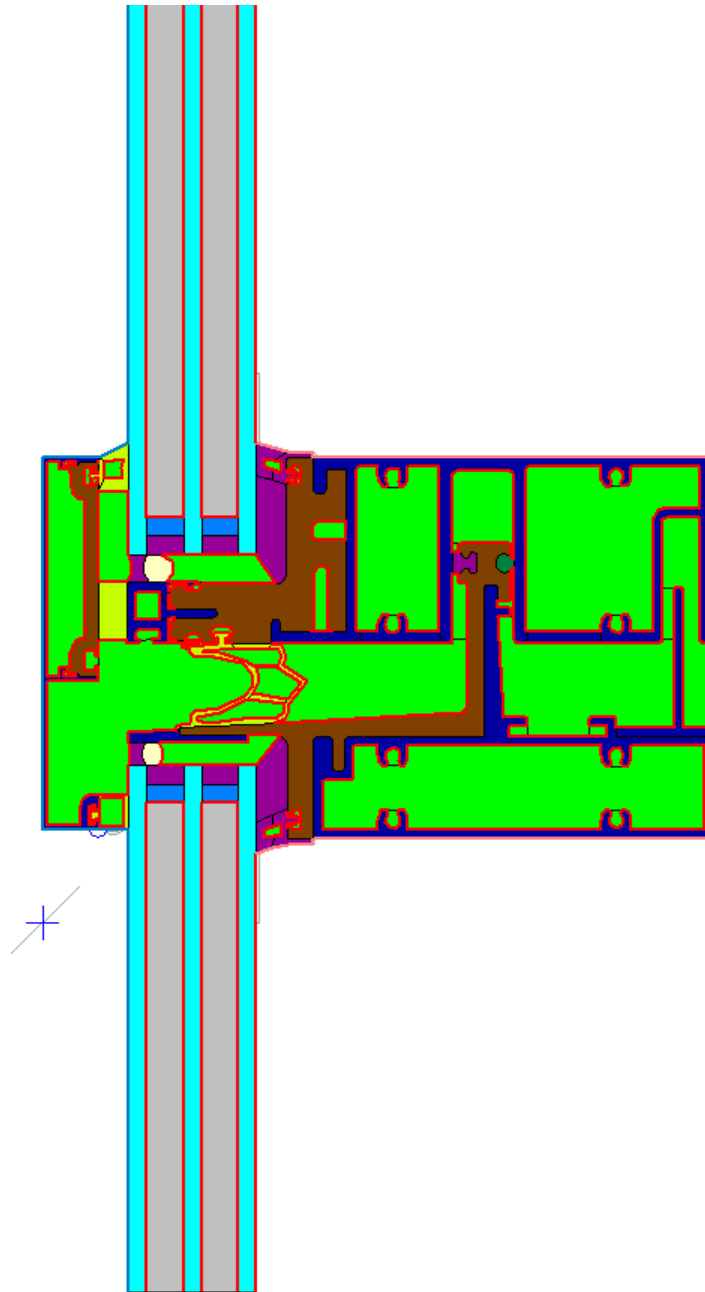One insulating glass system was used in this analysis. The system consisted of:

RD013 Glass:

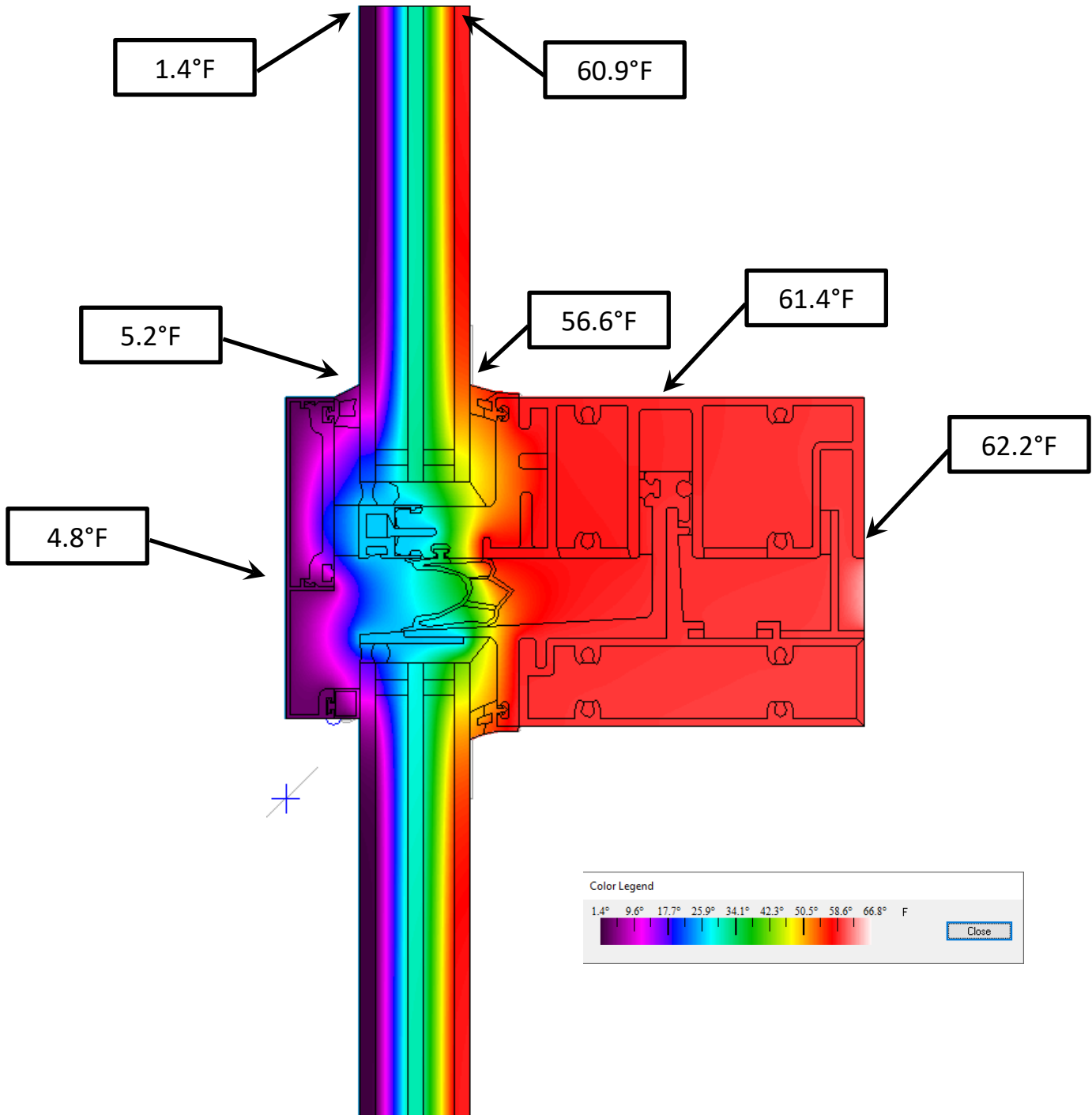|	
1/4" VRE154 on Clear (#2)	(IGDB # 6206)
1/2" VTS Spacer with 90% Argon - 10% Air	(IGDB # 0009)
1/4" VE185 on Clear (#4)	(IGDB # 6050)
1/2" VTS Spacer with 90% Argon - 10% Air	(IGDB # 0009)
1/2" Clear	(IGDB # 2004)

U-factor calculations were performed on standard NFRC rating size consisting of a two lite wide glazed wall system specimen with an overall size of 79" X 79". Job size model was also done at 5' x 8' on a custom single vision.

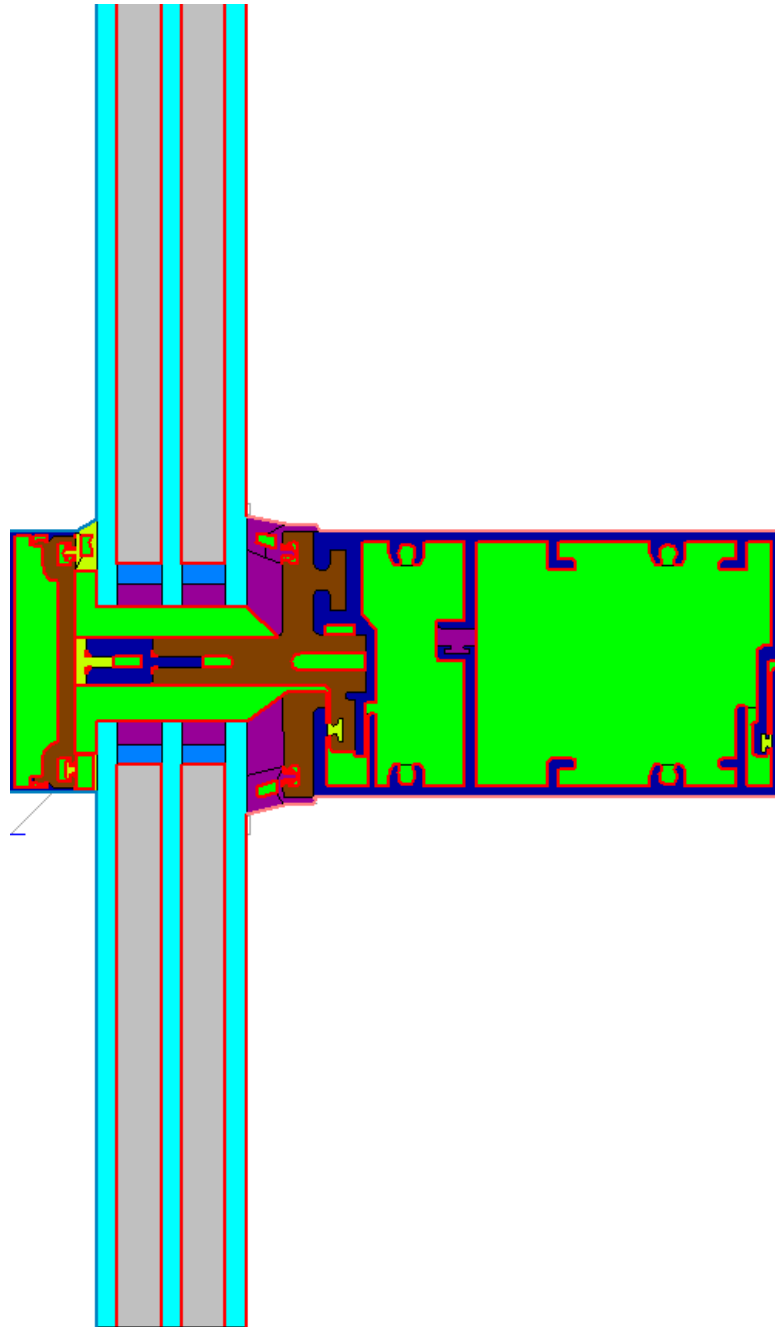Thermal model graphical outputs with frame surface temperature identification can be found below.
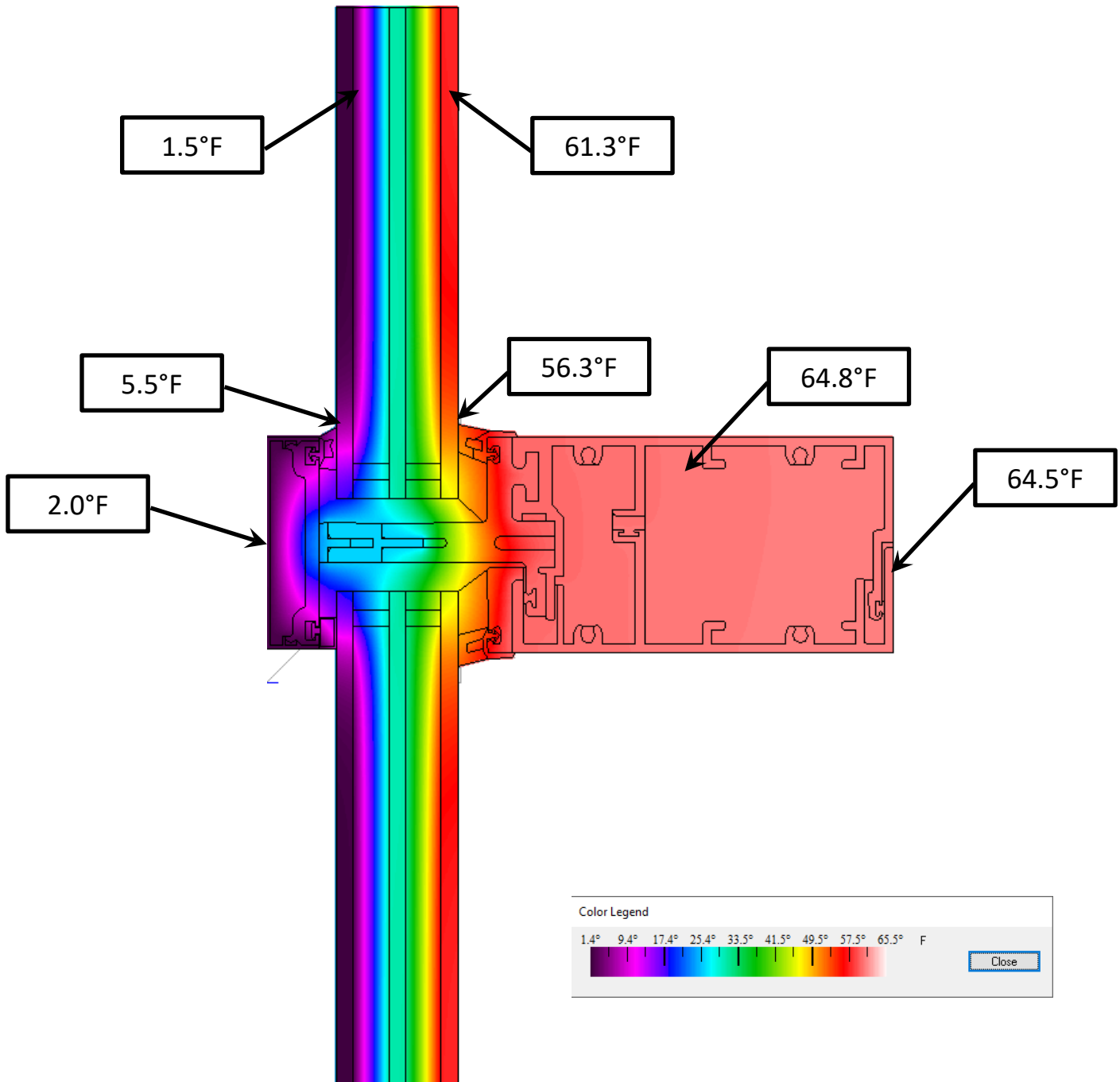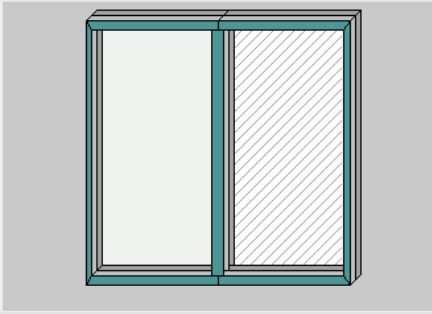
Typical Horizontal

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Typical Horizontal

1.4°F

60.9°F

5.2°F

56.6°F

61.4°F

4.8°F

62.2°F

Color Legend

1.4° 9.6° 17.7° 25.9° 34.1° 42.3° 50.5° 58.6° 66.8°   F

Close

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Typical Vertical

Typical Vertical

1.5°F

61.3°F

5.5°F

56.3°F

64.8°F

2.0°F

64.5°F

Color Legend

1.4°   9.4°   17.4°   25.4°   33.5°   41.5°   49.5°   57.5°   65.5°   F

Close

Window Data

![FreMarq Innovations — THE END OF COMPROMISE®]

		ID	Name	Mode	Thick	Flip	Tsol	Rsol1	Rsol2	Tvis	Rvis1	Rvis2	Tir	E1	E2	Cond	Comment
▾	Glass 1 ▶▶	6206	VRE154.VIR	#	0.236	☐	0.301	0.363	0.411	0.528	0.295	0.101	0.000	0.840	0.057	0.578	
	Gap 1 ▶▶	9	Air (10%) / Argon (90%) N		0.500												
▾	Glass 2 ▶▶	6050	VE185.VIR	#	0.236	☐	0.574	0.177	0.258	0.852	0.065	0.061	0.000	0.840	0.088	0.578	
	Gap 2 ▶▶	9	Air (10%) / Argon (90%) N		0.500												
▾	Glass 3 ▶▶	2004	Clr-6.CIG	#	0.236	☐	0.793	0.073	0.073	0.889	0.080	0.080	0.000	0.840	0.840	0.578	

ID #: 102 **Name:** RD013 Glass
3 **Tilt:** 90 ° **IG Height:** 39.37 inches
Environmental Conditions: NFRC 100-2010 **IG Width:** 39.37 inches
Comment: Triple Viracon Glass
Overall thickness: 1.709 inches **Mode:** #

Center of Glass Results | Temperature Data | Optical Data | Angular Data | Color Properties | Radiance Results

Ufactor	SC	SHGC	Rel. Ht. Gain	Tvis	Keff	Layer 1 Keff	Gap 1 Keff	Layer 2 Keff	Gap 2 Keff	Layer 3 Keff
Btu/h-ft2-F			Btu/h-ft2		Btu/h-ft-F	Btu/h-ft-F	Btu/h-ft-F	Btu/h-ft-F	Btu/h-ft-F	Btu/h-ft-F
0.134	0.291	0.253	60.1	0.408	0.0221	0.5778	0.0125	0.5778	0.0139	0.5778

Glass Data