



Phius Window and Door Certification Program

Full Certification Protocol Summary

V1.2 – Updated 15 April 2026

Contents

Section 1: Program Overview	1
Section 2: Calculated Values and Paths to Certification.....	2
Section 3: General Certification Process by Path.....	3
Appendix I: Certification Criteria by Climate Zone	4
Appendix II: Standard Model Sizes.....	7
Appendix III: NFRC and Phius U-Factor Calculation Comparison.....	10
Appendix IV: Orange Path Boundary Conditions for LBNL WINDOW.....	14

Section 1: Program Overview

The Phius Window and Door Certification Program (“Program”) is a voluntary program that primarily rates the performance of fenestration products at the individual component level (glass, spacer, and frame) via LBNL THERM/WINDOW software. For best accuracy in building energy modeling, window performance data (e.g., U-values) are needed at the component-level (i.e., for the frame and glass separately) so that windows’ performance can be calculated for the exact sizes and configurations planned for the project. This component-level data is generally not otherwise readily available in the marketplace. The program also encompasses some other properties relevant to high-performance building, such as condensation resistance, airtightness, and frame material.

Manufacturers who pursue Phius product certification can better position their products in the passive and high-performance building markets. In turn, practitioners can more easily obtain the data they need to specify products for their projects. The plug-and-play, Phius-verified performance data on Phius product certificates saves time spent on modeling and documentation. Manufacturers who seek Phius product certification simply submit the requested product details to Phius after which performance values are calculated and published.

Phius Certified Products are listed publicly in the Phius Certified Window & Door Database. Manufacturers also receive digital certificates that can be printed and distributed to customers or posted to their respective websites. The subsequent sections outline the paths to certification, general certification process, and certification criteria by climate zone.

Section 2: Calculated Values and Paths to Certification

The program offers two paths to certification, each with their own protocol: the **Blue Path**, and the **Orange Path**. Regardless of which path is selected, the resulting Phius Certified performance data sheets have the same format and include the following information:

- Frame U-value (**U-Frame**)
- Linear bridge coefficient for the spacer/edge-of-glass effect (**Psi-Spacer**)
- Center-of-glass U-value (**U-COG**) – climate zone dependent (see Appendix IV)¹
- Center-of-glass solar heat gain coefficient (**SHGC-COG**)
- Whole-window or whole-door (“whole-product”) U-value for a standard size unit (see Appendix II for standard model sizes)
- Whole-product SHGC for a standard size unit
- Condensation resistance
- Availability of airtightness test data (*ASTM E283 and EN 1026 are acceptable test methods*)

The table below outlines the core differences between the two paths:

Blue Path (NFRC Method)	Orange Path (EN Method)
Based on NFRC standards, this protocol generates calculations based on ISO 15099 . • Full NFRC certification for each product combination and current NFRC Certified Product Directory Numbers (CPD Numbers) are required to utilize this path.	Based on EN standards, this protocol generates calculations based on: • Center-of-Glass U-value based on EN673 • Center-of-Glass Solar Heat Gain Coefficient based on EN 410 • Frame/Spacer performance based on EN 10077-2

The differences between the two calculation protocols are as follows:

- For the Blue Path, the data are taken from the Lawrence Berkley National Laboratory (LBNL) THERM and WINDOW simulation files that are minimally modified from NFRC standards instead of completely recalculated per CEN standards as with the Orange Path.
 - This slight modification entails converting the extra heat loss from NFRC’s 2.5-inch-wide edge-of-glass area into an equivalent linear coefficient.²
- By selecting the Orange Path, Manufacturers receive compatible/comparable ratings to the values typically assigned to imported European windows.
- For the Orange Path, the thermophysical properties of materials are obtained from appendices A, B, and C in NFRC 101. Supporting documentation may be provided to override these default values, subject to Phius approval.
- Both protocols support passive building practitioners with the component-level window data they need to perform building energy modeling, and Phius considers the certifications from each path to be functionally equivalent for Phius project (building) certification.

¹ Instructions for using LBNL WINDOW software to calculate the climate-dependent center-of-glass properties are available upon request.

² See Appendix III for a whitepaper with further details on this conversion.

Embellishments to the standard EN/ISO methods that bring the two paths closer to alignment:

- The same standard model sizes are used for both paths.
- The same outside temperature is used to calculate the climate-dependent center of glass U-value calculation for both paths.
 - Note: In the Phius Certified Window and Door Database hosted on Phius.org, the Zone 4 U-COG value is used for the Whole-Window U-value calculation for both paths. For other zone values, users are instructed to download the product certificates to obtain the full dataset.

Section 3: General Certification Process by Path

The following section outlines the core steps to certification for each path.

Blue Path

- The Manufacturer contacts an NFRC-accredited Simulation Laboratory with a Phius Blue Path Simulator on staff who has been trained to do the Phius conversion and is authorized to use the Phius Window Calculator to deliver Blue Path calculations and preliminary reports. A list of qualified simulators can be found on the Phius website at: <https://www.phius.org/contact-phius-blue-path-simulator>
- The Manufacturer must authorize the original lab to release the NFRC-authored simulation models to the Blue Path Simulator's laboratory (the original lab and Blue Path lab may be the same institution).
- The Manufacturer works with the Blue Path Simulator to determine the scope of work, after which the Blue Path Simulator quotes the cost for the conversion job. Phius works with the NFRC Simulator to determine the total number of products to be certified, and then calculates the Phius Certified Product Database listing fee. The calculation and inspection work proceeds per NFRC standard practice.
- The NFRC-accredited Simulation Laboratory sends converted THERM and WINDOW files and calculation files to Phius for a quality inspection.
- Phius contacts the manufacturer to identify which products are to be listed on the Phius website and bills the appropriate database listing fee.
- Upon payment of the database listing fee, the Phius Certified Product mark is awarded, and the values are published to the Phius Certified Window & Door Database.

Orange Path

- The Manufacturer works with the Phius Product Certification team to determine the scope of work, after which Phius quotes the job cost (not-to-exceed estimate). Current pricing information is available upon request. The Agreement is then executed and Phius provides the Manufacturer with an e-signature agreement that includes the total job cost.
- The Product Certification Manager selects a Phius-trained simulator (either in-house or licensed third party).
- A Phius-trained Reviewer (either a Phius staff member or a Phius-trained third party) performs a quality check on the calculations and informs the Simulator of any required corrections.
- Once confirmed by the Reviewer, Phius reviews the results a final time. Once approved, the results are shared with the Manufacturer, and Phius invoices the Manufacturer for final payment.
- The Phius Certified Product mark is awarded, and the values are published to the Phius database.

Appendix I: Certification Criteria by Climate Zone

The table below outlines the requirements to earn a climate zone recommendation check marks on Phius product certificates. These figures are calculated at standard model size in SI units (see Appendix II for a comprehensive list of standard model sizes). These recommendations are to be interpreted as a starting point for evaluating a window or door's suitability for use in a certain zone.

Important note on Phius Project Certification: For Phius Project Certification, more nuanced standards dictate products' suitability for any given project. Phius Project Certification rules and guidelines supersede the Phius product-certification-level climate zone recommendations. Product-level zone recommendations do not influence a product's eligibility for use in a Phius project. Products without climate zone recommendations are not outright prohibited from being used in a project; inversely, a zone recommendation award does not guarantee a product's suitability for a project.

All calculations for this program are in SI units and published in both SI and IP. Climate zone recommendations are awarded based on rounded SI values as shown in the table below.

Table 1: Phius Window & Door Climate Zone Recommendation Criteria for USA and Canada

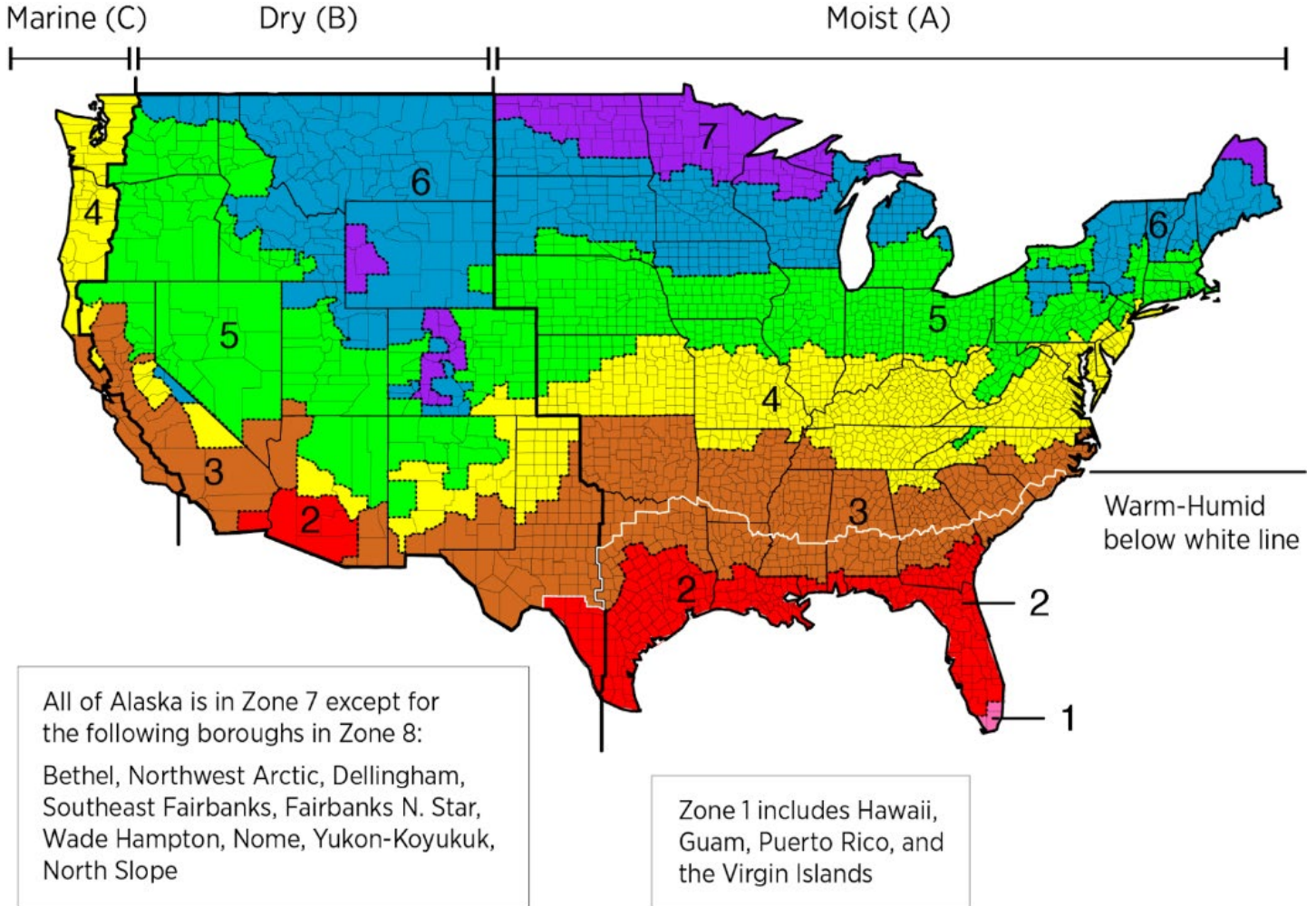
Climate Zone	Max Whole-Window U-Value (Btu/h·ft ² ·°F)	Max Whole-Window U-Value (W/mK)	Max Whole-Window SHGC
8	0.11	0.62	-
7	0.12	0.68	-
6	0.13	0.74	-
5A, 5B	0.16	0.91	-
4A, 4B	0.19	1.08	0.4
4C, 5C	0.24	1.36	-
3A	0.23	1.31	0.25
3B	0.29	1.65	0.25
3C	0.29	1.65	0.3
0, 1, 2	0.29	1.65	0.25

All values calculated at standard model size per Appendix II.

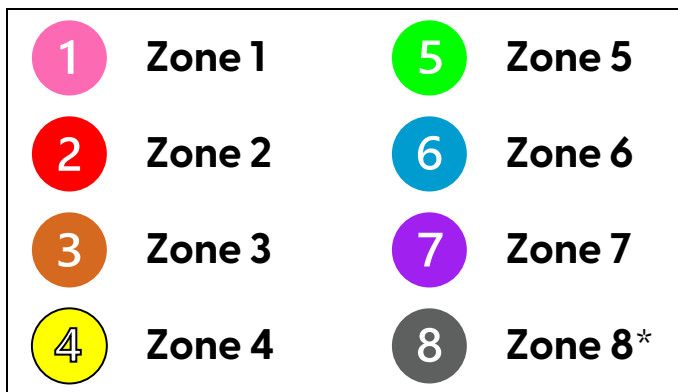
For maps of climate zones in the USA and Canada, refer to the following companion images. Note that the colors vary slightly between the Phius table and maps, however the climate zone numbers are consistent between the table and both reference images. For the purposes of this program, the climate zone numbers should be used as the primary reference point for Phius product certificate zone recommendations rather than the map/table color codes.

Companion Graphics to Table 1:

Corresponding IECC Climate Zones, USA³



Climate Zones, USA Map

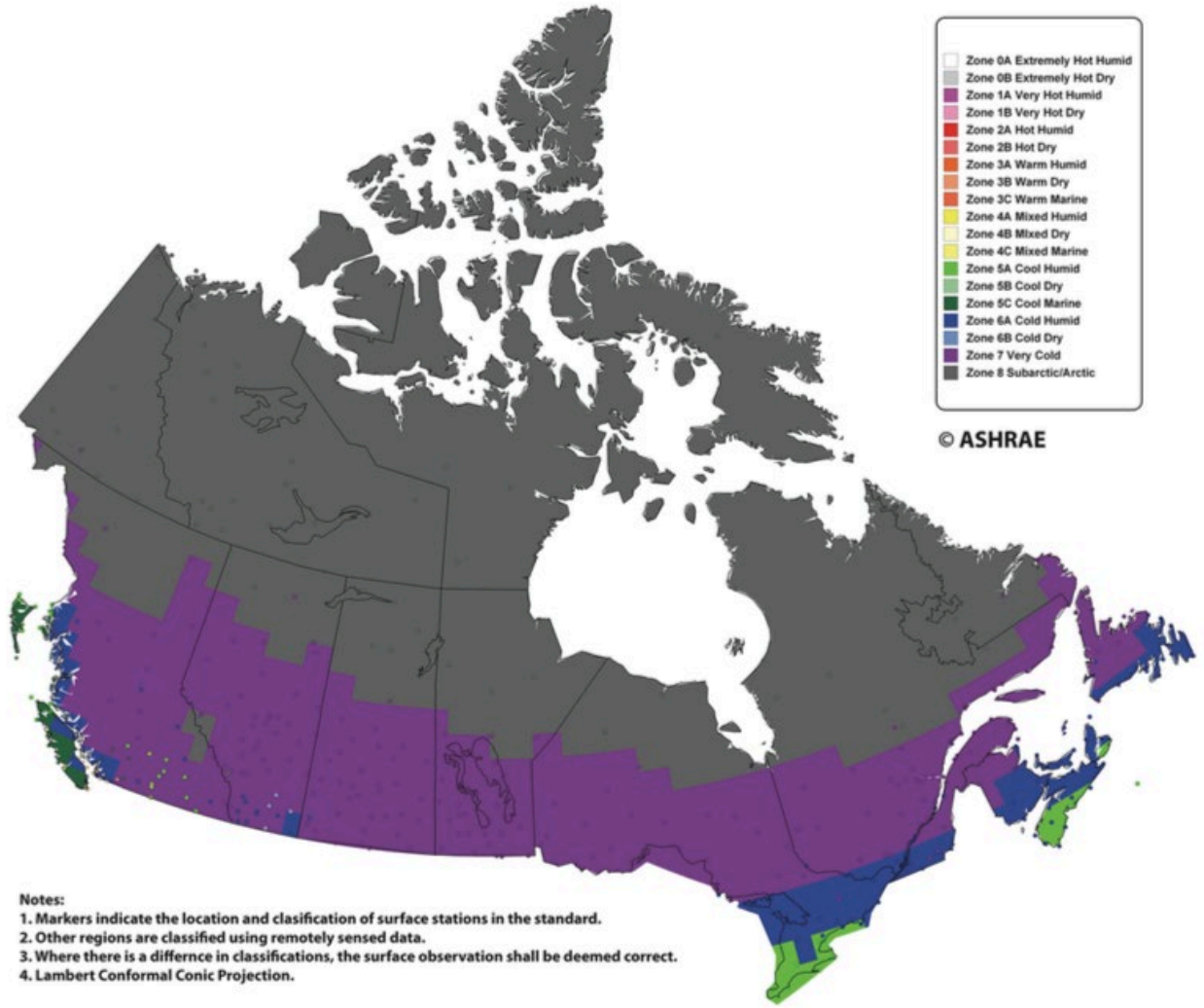


*Note: Zone 8 is not pictured and encompasses select boroughs in Alaska. See map text for details.

³ Graphic source: <https://bascc.pnnl.gov/images/iecc-climate-zone-map>

Corresponding ASHRAE Climate Zones, Canada⁴

ANSI/ASHRAE Standard 169-2013



- Notes:
1. Markers indicate the location and classification of surface stations in the standard.
 2. Other regions are classified using remotely sensed data.
 3. Where there is a difference in classifications, the surface observation shall be deemed correct.
 4. Lambert Conformal Conic Projection.

95 **FIGURE C-12** Canada climate zones map.

Climate Zones, Canada Map

5	Zone 5
6	Zone 6
7	Zone 7
8	Zone 8

⁴ Graphic source: ANSI/ASHRAE 169-2013

Appendix II: Standard Model Sizes

Tables 2 and 3 below outline the standard model sizes used for whole-product U-values and whole-product SHGC values. Standard model sizes mirror those used by the NFRC. Nomenclature differs slightly, but there are no deviations in assigned standard model sizes for product categories. Product types that are “grayed-out” in each table are not available in that table’s scope (e.g., curtain wall products are only modeled as two-lite products, therefore there is no one-lite standard size available for a curtain wall).

Table 2: Phius Window and Door Certification Standard Model Sizes, One-Lite Products

ONE LITE PRODUCTS, STANDARD MODEL SIZES			
Phius Classifications	NFRC Equivalent	One-Lite Standard Model Size (mm)	
WINDOWS		Width	Height
Awning	Projecting (Awning - Single)	1500	600
Casement	Casement - Single	600	1500
Single Hung	n/a	-	-
Double Hung	n/a	-	-
Dual Action Tilt Turn	Dual-Action	1200	1500
Fixed	Fixed	1200	1500
Horizontal Sliding	n/a	-	-
DOORS AND DOOR RELATED		Width	Height
Single Swinging Door	Side-Hinged Exterior Door	960	2090
Double Swinging Door	n/a	-	-
Sliding Door	n/a	-	-
Sidelite	Sidelite	960	2090
Transom	Transom	2000	600
Residential Roll Up Garage Door	Garage (Vehicular Access)/Rolling Door	2134	2134
Residential Swinging Garage Door	n/a	2134	2134
SKYLIGHTS		Width	Height
Skylight	Skylight/Roof Window	1200	1200
GLAZED WALL SYSTEMS		Width	Height
Curtain Wall	n/a	-	-
Window Wall	n/a	-	-
Sloped Glazing	n/a	-	-
Spandrel Panel System	n/a	-	-
Storefront	n/a	-	-

Table 3: Phius Window and Door Certification Standard Model Sizes, Two-Lite Products

TWO LITE			
Phius Classifications	NFRC Equivalent	Two-Lite Standard Model Size (mm)	
WINDOWS		Width	Height
Awning	n/a	1500	1200
Casement	Casement - Double	1200	1500
Single Hung	Vertical Slider	1200	1500
Double Hung	Vertical Slider	1200	1500
Dual Action Tilt Turn	n/a	2400	1500
Fixed	n/a	2400	1500
Horizontal Sliding	Horizontal Slider	1500	1200
DOORS AND DOOR RELATED		Width	Height
Single Swinging Door	n/a	-	-
Double Swinging Door	Side-Hinged Exterior Door (Double)	1920	2090
Sliding Door	Sliding Glass Door	2000	2000
Sidelite	n/a	-	-
Transom	n/a	-	-
Residential Roll Up Garage Door	n/a	-	-
Residential Swinging Garage Door	n/a	-	-
SKYLIGHTS		Width	Height
Skylight	n/a	2400	1200
GLAZED WALL SYSTEMS		Width	Height
Curtain Wall	Curtain Wall	2000	2000
Window Wall	Window Wall	2000	2000
Sloped Glazing	Sloped Glazing	2000	2000
Spandrel Panel System	Spandrel Panel System	2000	2000
Storefront	n/a	2000	2000

Combination units (e.g. two products mulled together) will receive a “Combination Unit” designation (rather than “One-Lite” or “Two-Lite”), and a model size that is a composite of the standard NFRC sizes in the table above according to the subsequent conditions:

Table 4: Two-Lite Combination Unit Standard Size Parameters

Two-Lite Combination Unit Orientation	Width	Height
Horizontal	Sum of applicable NFRC model sizes	Average of applicable NFRC model sizes
Vertical	Average of applicable NFRC model sizes	Sum of applicable NFRC model sizes

Below are two examples of this composite logic for combination units in practice:

Example, horizontal:

Fixed **Casement** (600 W x 1500 H)

beside an

Operable **Dual Action Tilt Turn** (1200 W x 1500 H)

Width: 600 + 1200 = 1800 mm

Height: (1500 + 1500) / 2 = 1500 mm

Combination unit model size: 1800 mm Wide x 1500 mm High.

Example, vertical:

Operable **Awning** (1500 W x 600 H)

above a

Fixed **Picture Window** (1200 W x 1500 H)

Width: (1500 + 1200) / 2 = 1350 mm

Height: 600 + 1500 = 2100 mm

Combination unit model size: 1350 mm Wide x 2100 mm High.

Note: Combination units are not present in the existing NFRC protocol. Therefore, any Blue Path products that aim to use their NFRC simulations as the basis for a Phius-certified Combination Unit must provide separate performance data and CPD numbers for each product that will comprise the Combination Unit. Phius Blue Path protocol allows for the creation of Combination Units from the data and simulations of each individual product that will be mulled together. Orange Path products that seek the Combination Unit designation will follow the same existing submission requirements as One-Lite and Two-Lite products.

Appendix III: NFRC and Phius U-Factor Calculation Comparison Whitepaper

By Jeff Baker, WESTLab, 06.26.2014

NFRC and Phius U-Factor Calculation Comparison

Prepared by Jeff Baker, WESTLab

June 26, 2014

There has been considerable interest in a method of extracting the input data for the Passive House Planning Package (PHPP) whole building energy modeling tool from the National Fenestration Rating Council (NFRC) window performance data. In order to determine if this input data can be exacted, the differences between the NFRC and Passive House Institute US (Phius) programs need to be understood.

The Phius window certification program follows the ISO 10077 procedure that determines a glass U-factor, frame U-factor, and lineal Psi (Ψ) value and total product U-factor. This program calculates the glass U-factor at ten different sets of temperature conditions (20°C interior and -18°C, -12°C, -10°C, -4°C, -2°C, 2°C, 5°C, 7°C, 10°C, 21°C exterior) with fixed surface heat transfer coefficients.⁵ The frame U-factor and Ψ value are determined at one set of temperatures (20°C interior and -10°C exterior) with fixed surface heat transfer coefficients. The ten total product U-factors are determined using the ten different center-of-glass U-factors with the frame and Ψ values for the single set of temperatures.

The NFRC certification program follows the ISO 15099 procedure that determines a center-of-glass, edge-of-glass, frame, and total product U-factor. This program calculated the U-factors at a single set of temperatures (21°C interior and -18°C exterior) with variable surface heat transfer coefficients.

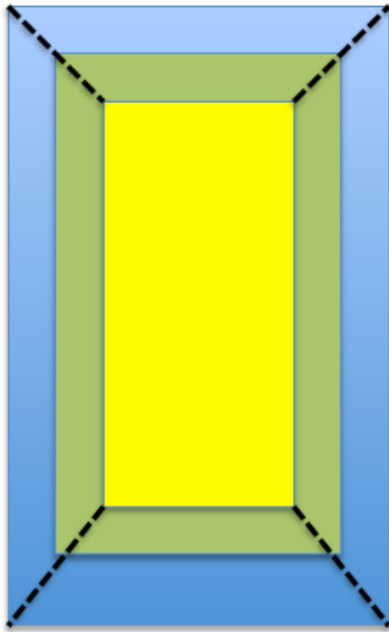
The two different ISO procedures, the temperature conditions, and surface heat transfer coefficient, will result in different total product U-factors. The procedures also area weight the component data differently. If the differences between the NFRC and Phius window programs can be ignored and that the NFRC results are acceptable for input into

the PHPP program several assumptions have to be made in order to derive the PHPP window input data. First, assume the NFRC center-of-glass U-factor is equal to the Phius glass U-factor. Second, that the NFRC frame U-factors are equal to the Phius frame U-factors. Third, the difference in the frame area weighting can be ignored. Finally, that the NFRC and Phius total product U-factors are equal at the NFRC rated product sizes. With these assumptions the Phius glass and frame U-factors are known, but the Ψ values still need to be determined from the available NFRC data.

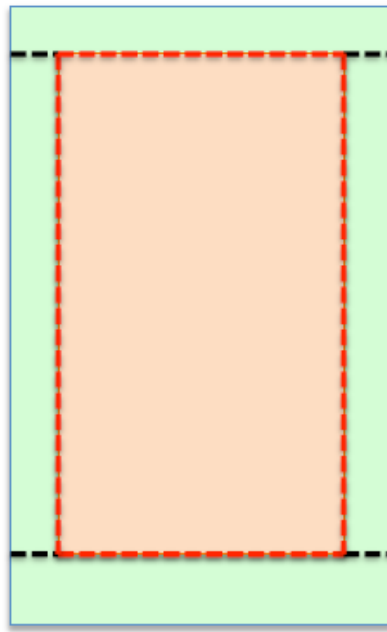
⁵ See Appendix IV for a table of these temperatures and their related climate zones.


Derivation of the PHIUS Ψ value from NFRC data


NFRC Area Weighted Method




PHIUS Area and Lineal Method



 NFRC Center-of-Glass Area - A_{cg}

 NFRC Edge-of-Glass Area - A_{eg}

 NFRC Frame Area - A_{fr}

 PHIUS Glass Area - A_g

 PHIUS Lineal Length - L

 PHIUS Frame Area - A_f

$$U_{NFRC} = \frac{U_{cg} * A_{cg} + \sum_1^n U_{eg}^i * A_{eg}^i + \sum_1^n U_{fr}^i * A_{fr}^i}{A_{total}}$$

$$U_{PHIUS} = \frac{U_g * A_g + \sum_1^n U_f^i * A_f^i + \sum_1^n \Psi^i * L^i}{A_{total}}$$

Where:

- U_{cg} = NFRC Center-of-Glass U-factor
- U_{eg} = NFRC Edge-of-Glass U-factor
- U_{fr} = NFRC Frame U-factor
- U_{NFRC} = NFRC Total Product U-factor
- U_g = Phius Glass U-factor, will assume equal to NFRC U_{cg}
- U_f = Phius Frame U-factor, will assume equal to NFRC U_{fr}
- Ψ = Phius Lineal Conductance, to be determined
- U_{Phius} = Phius Total Product U-factor, will assume equal to U_{NFRC}
- A_{total} = Total area of the product and assumed the same for NFRC and Phius

With $U_{NFRC} = U_{Phius}$ and the assumptions listed above Ψ can be solved:

$$U_{cg} * A_{cg} + \sum_1^n U_{eg}^i * A_{eg}^i = U_{cg} * A_g + \sum_1^n \Psi^i * L^i$$

$$A_g = A_{cg} + \sum_1^n A_{eg}^i$$

$$\sum_1^n U_{eg}^i * A_{eg}^i = \sum_1^n U_{cg} * A_{eg}^i + \sum_1^n \Psi^i * L^i$$

For each component i

$$U_{eg}^i * A_{eg}^i = U_{cg} * A_{eg}^i + \Psi^i * L^i$$

$$A_{eg}^i = (L^i - 0.0635/2) * 0.0635 \quad (L \text{ in meters})$$

$$\Psi^i = \frac{(U_{eg}^i - U_{cg}) * (L^i - 0.0635/2) * 0.0635}{L^i}$$

Where L^i is the component length at the product sightline using the NFRC model product size.

Now the input data for the PHPP program can be generated from the available NFRC product data calculations. The final question is how close do the Phius U-factors calculated from the NFRC data compare with actual Phius calculations.

This comparison has been done for a four-sided product. NFRC and Phius handle vertical and horizontal sliding products differently. NFRC treats these products as a single unit with two sashes, where Phius breaks them up into two separate units. If the NFRC results are used and the NFRC product is separated along the center of the meeting rail of the sliding product and half the meeting rail is used in each of the Phius equivalent products, the analysis presented above works as is and the input data for the PHPP program can be generated for the two products used to represent a sliding product.

A comparison of two products was done between U-factors generated using the Phius method and following the Phius method with NFRC input data. The results for all of the Phius temperatures and the NFRC inputs are included on the next page. The results indicate that the NFRC data is very comparable with the Phius data for -18°C. The NFRC results give U-factors lower than the Phius as a result of the differences in the ISO 10077 and 15099 procedures. For glass options with higher center-of-glass U-factors the NFRC results would be slightly higher than the Phius results.

The conclusion from this comparison is that the NFRC input data for the PHPP program provide results very comparable to the Phius data. Therefore, using NFRC input data for the PHPP program would be an accurate representation of the fenestration performance data.

Aluminum Clad Casement Window

PHIUS Exterior Temperature	Glass option 1			Glass option 2			Glass option 3			Glass option 4		
	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg
21	0.18	0.23	0.70	0.12	0.18	0.55	0.12	0.20	0.44	0.14	0.21	0.51
10	0.17	0.22	0.70	0.14	0.20	0.55	0.12	0.19	0.44	0.13	0.20	0.51
7	0.17	0.22	0.70	0.14	0.19	0.55	0.12	0.19	0.44	0.13	0.20	0.51
5	0.17	0.22	0.70	0.14	0.19	0.55	0.12	0.19	0.44	0.13	0.20	0.51
2	0.17	0.22	0.70	0.14	0.19	0.55	0.12	0.19	0.44	0.13	0.20	0.51
-2	0.16	0.22	0.70	0.14	0.19	0.55	0.11	0.19	0.44	0.13	0.20	0.51
-4	0.16	0.22	0.70	0.14	0.19	0.55	0.11	0.19	0.44	0.13	0.20	0.51
-10	0.16	0.22	0.70	0.14	0.19	0.55	0.11	0.19	0.44	0.13	0.20	0.51
-12	0.16	0.22	0.70	0.14	0.19	0.55	0.11	0.19	0.44	0.13	0.20	0.51
-18	0.159	0.218	0.697	0.136	0.190	0.548	0.111	0.185	0.445	0.126	0.200	0.507
NFRC (-18)	0.151	0.209	0.687	0.137	0.195	0.542	0.100	0.174	0.426	0.116	0.188	0.487

PHIUS Exterior Temperature	Glass option 5			Glass option 6			Glass option 7			Glass option 8		
	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg
21	0.15	0.21	0.57	0.10	0.17	0.38	0.10	0.16	0.26	0.13	0.20	0.26
10	0.15	0.21	0.57	0.12	0.18	0.38	0.11	0.18	0.26	0.13	0.20	0.26
7	0.15	0.21	0.57	0.12	0.18	0.38	0.11	0.18	0.26	0.13	0.20	0.26
5	0.15	0.21	0.57	0.12	0.18	0.38	0.11	0.18	0.26	0.13	0.19	0.26
2	0.15	0.21	0.57	0.12	0.18	0.38	0.11	0.18	0.26	0.13	0.19	0.26
-2	0.15	0.21	0.57	0.12	0.18	0.38	0.11	0.18	0.26	0.13	0.19	0.26
-4	0.15	0.21	0.57	0.12	0.18	0.38	0.11	0.18	0.26	0.13	0.19	0.26
-10	0.15	0.21	0.57	0.11	0.18	0.38	0.11	0.18	0.25	0.13	0.19	0.25
-12	0.15	0.21	0.57	0.11	0.18	0.38	0.11	0.18	0.26	0.13	0.19	0.26
-18	0.146	0.208	0.565	0.114	0.178	0.380	0.111	0.176	0.256	0.127	0.191	0.256
NFRC (-18)	0.140	0.200	0.560	0.113	0.175	0.357	0.111	0.173	0.236	0.118	0.182	0.237

Aluminum Clad Picture Window

PHIUS Exterior Temperature	Glass option 1			Glass option 2			Glass option 3			Glass option 4		
	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg
21	0.16	0.20	0.68	0.12	0.16	0.54	0.12	0.17	0.43	0.13	0.19	0.50
10	0.15	0.19	0.68	0.14	0.18	0.54	0.11	0.17	0.43	0.12	0.18	0.50
7	0.15	0.19	0.68	0.14	0.18	0.54	0.11	0.16	0.43	0.12	0.18	0.50
5	0.15	0.19	0.68	0.14	0.18	0.54	0.11	0.16	0.43	0.12	0.18	0.50
2	0.15	0.19	0.68	0.14	0.18	0.54	0.11	0.16	0.43	0.12	0.18	0.50
-2	0.15	0.19	0.68	0.14	0.18	0.54	0.11	0.16	0.43	0.12	0.18	0.50
-4	0.15	0.19	0.68	0.14	0.18	0.54	0.11	0.16	0.43	0.12	0.18	0.50
-10	0.15	0.19	0.68	0.14	0.18	0.54	0.10	0.16	0.43	0.12	0.18	0.50
-12	0.15	0.19	0.68	0.14	0.18	0.54	0.10	0.16	0.43	0.12	0.18	0.50
-18	0.152	0.195	0.682	0.136	0.179	0.538	0.103	0.161	0.432	0.116	0.175	0.505
NFRC (-18)	0.143	0.184	0.670	0.137	0.176	0.532	0.100	0.156	0.426	0.116	0.172	0.487

PHIUS Exterior Temperature	Glass option 5			Glass option 6			Glass option 7			Glass option 8		
	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg	Ucg	Uttotal	SHGCcg
21	0.13	0.18	0.54	0.11	0.15	0.37	0.10	0.15	0.25	0.12	0.16	0.25
10	0.13	0.18	0.54	0.13	0.17	0.37	0.12	0.17	0.25	0.12	0.16	0.25
7	0.13	0.18	0.54	0.13	0.17	0.37	0.12	0.17	0.25	0.12	0.16	0.25
5	0.13	0.18	0.54	0.13	0.17	0.37	0.12	0.17	0.25	0.11	0.16	0.25
2	0.13	0.18	0.54	0.13	0.17	0.37	0.12	0.17	0.25	0.11	0.16	0.25
-2	0.13	0.18	0.54	0.12	0.17	0.37	0.12	0.17	0.25	0.11	0.16	0.25
-4	0.13	0.18	0.54	0.12	0.17	0.37	0.12	0.17	0.25	0.11	0.16	0.25
-10	0.13	0.18	0.54	0.12	0.17	0.36	0.12	0.16	0.25	0.11	0.16	0.25
-12	0.13	0.18	0.54	0.12	0.17	0.37	0.12	0.16	0.25	0.11	0.16	0.25
-18	0.128	0.175	0.539	0.122	0.165	0.367	0.118	0.163	0.251	0.112	0.160	0.251
NFRC (-18)	0.126	0.167	0.533	0.118	0.159	0.345	0.115	0.157	0.233	0.106	0.151	0.233

Appendix IV: Orange Path Boundary Conditions for LBNL WINDOW

The table below outlines the interior and exterior temperatures used for the calculation of climate-specific Center-of-Glass U-Values in LBNL WINDOW for products certified on the Orange Path.

Phius Orange Path Boundary Conditions for U-COG Calculations in LBNL WINDOW

Climate Zone	Exterior Temperature	Interior Temperature
Zone 8	-18°C -0.4°F	20°C 68°F
Zone 7	-12°C 10.4°F	
Zone 6	-4°C 24.8°F	
Zones 5A, 5B	-2°C 28.4°F	
Zones 4A, 4B	2°C 35.6°F	
Zones 4C, 5C	5°C 41°F	
Zone 3C	10°C 50.0°F	
Zones 3A, 3B	7°C 44.6°F	
Zones 2, 1, 0	21°C 69.8°F	