High-Performance Measure Details

Measure Name
High Performance Fenestration

Use Category
BldgEnv – HP Envelope for Fenestration

Effective Date
April 13, 2026

End Date
Current

Version
2.2

Measure Code
LM446

Measure Stage
Early Adoption & High Priority Data Collection

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Technology Summary

High-performance fenestration systems—including thin triple-pane (TTP), vacuum insulated glass (VIG), and electrochromic (EC) glazing—are advanced window technologies designed to improve thermal performance and solar control compared to conventional double-pane systems. These technologies are typically applied in commercial and institutional buildings with significant façade area, where envelope performance strongly influences energy use and occupant comfort. Within the context of CEDA, high-performance fenestration represents a key envelope strategy that complements electrification by reducing building loads, improving system efficiency, and enhancing grid-responsive design.

Fenestration plays a critical role in California's decarbonization and electrification goals due to its direct impact on heating and cooling loads, peak demand, and occupant comfort. Improved thermal performance (lower U-factor) reduces heating and cooling energy, while optimized solar heat gain (SHGC) and dynamic control (in the case of EC glazing) can help manage peak loads and support grid resilience. These benefits are particularly important in perimeter zones, where poorly performing windows can drive HVAC sizing and increase reliance on mechanical systems, counteracting electrification and efficiency gains.

Despite their potential, real-world performance of high-performance fenestration systems often differs from modeled or rated values. Common gaps include: (1) reliance on center-of-glass metrics that do not reflect whole-window or installed performance; (2) unaccounted thermal bridging at the window-to-wall interface; (3) variability in electrochromic control strategies compared to modeled assumptions; (4) inconsistent installation practices affecting air leakage and insulation continuity; and (5) limited data on cost-performance relationships across building types and climates. This HPM is designed to better capture these effects and reduce uncertainty in both performance and cost assumptions.

Relevant industry standards and rating systems include NFRC 100, NFRC 200, NFRC 500, ASTM E1423, ASTM E1300, ASHRAE Standard 90.1, and California Title 24, Part 6.

Alignment with CEDA Program Goals

The CEDA program supports the implementation of energy efficiency measures that support Code Readiness' Long Term Tactical Plan (LTTP) to drive the goals of electrification, decarbonization, and load reduction.

Projects must meet the CEDA Inducement Requirements identified in the next section to receive an inducement on the equipment and will be evaluated for level of interest in metering to support Code Readiness Objectives.

This measure meets the CEDA program goals as follows:

- **Building partnerships with market stakeholders** by consulting on innovative technologies and best practices in energy efficiency which can lead to the development of more effective solutions and accelerate the adoption of new technologies. As teams adopt the measure, this increases the volume of engineers able to design the equipment, contractors capable of installing the equipment, and owners able to operate the equipment.
- **Increasing the supply of high-performance measures and all-electric buildings** by combining electrification with energy efficiency that can result in projects implementing measures to achieve greater energy savings, reduced emissions, and overall improved building performance. As more buildings specify and install high performance fenestration, this helps to increase the overall supply of this measure in the market for others to use, including beyond new construction.
- **Increasing the demand for high-performance measures and all-electric buildings** by pushing for electrification that drives the need for technological advancements, supporting economic growth opportunities through innovation, and raising awareness of the benefits of electrification to increase consumer adoption. As demand in the market increases for newer technologies, the long-term benefit is increased demand for manufacturers and suppliers to provide additional options available in the market.
- **Advancing new high-performance measure technology** by raising public awareness about new technologies and their benefits, helping build acceptance and demand through market support advocacy efforts that can influence stakeholder decisions that enables technological innovation.
- **Providing Codes & Standards with projects of interest** to collect metered data that will inform future California energy codes.

CEDA Inducement Requirements

The inducement requirements listed below are intended to support the adoption of high-performance fenestration technologies, including thin triple-pane (TTP), vacuum insulated glass (VIG), and electrochromic (EC) glazing. This measure addresses the current market gap where higher-performing window systems are not widely adopted due to higher upfront costs, design complexity, and uncertainty in real-world performance. The measure is also focused on gathering data on whole-assembly performance, including thermal bridging and dynamic glazing behavior, to improve future modeling assumptions and inform upcoming code cycles.

Projects receive inducements based on the incremental cost of high-performance fenestration relative to Title 24 code-minimum systems, along with projected energy savings and demand reduction impacts from NEO modeling. To be eligible, projects must apply high-performance fenestration to at least 20% of total building fenestration area and meet the applicable design and documentation requirements, including thermal bridging assessment and, where applicable, electrochromic control modeling. Inducements are provided as a percentage of incremental cost and are subject to program caps.

System Design Requirements

Eligible projects must install one or more qualifying fenestration types according to 1, 2, or 3, and complete item 4:

U-Factor: This measures the rate of heat transfer and indicates how well a window insulates. The lower the U-Factor, the better the window is at keeping heat inside. U-Factors can be calculated for the glass (Ucog, center of glass) or include the frame and/or spacer for a whole window assembly performance (Uw, window).

1. **Thin triple-pane (TTP)** windows, with a U-Factor of 0.22 Ucog or lower applied to at least 20% of the fenestration area.
2. **Vacuum Insulated Glass (VIG)** curtain walls of 0.11 Ucog U-Factor or lower applied to at least 20% of the fenestration area.
3. **Electrochromic** glazing with SHGC of <0.10 at darkest tint and 0.40> at clearest (pick references) applied to at least 20% of the fenestration area.
4. **Window installation thermal bridging assessment** and documentation of total window heat transfer (UA_w) and heat loss rate at peak conditions using one of the following four methods:
    a. **Method 0** Default Values Used in Thermal Bridging Assessment – use simple conservative heat loss values.
        i. For mid-wall mounting with frame over-insulation use φ = 0.015 Btu/h-ft-F
        ii. For mid-wall mounting without frame over-insulation, and in the plane of an insulation layer use φ = 0.02 Btu/h-ft-F
        iii. For other conditions use φ = 0.03 Btu/h-ft-F
    b. **Method 1** Calculated Value Used in Thermal Bridging Assessment – detailed 2D calculation with simplified spacer option according to Appendix B of ASHRAE STD 227P.
    c. **Method 2** Calculated Values Used in Thermal Bridging Assessment – 2D calculation with simplified frame according to Appendix B of ASHRAE STD 227P.
    d. **Method 3** Default Values Used in Thermal Bridging Assessment – According to ASHRAE RP 1365 catalog detail 07, 31, or 34 as applicable from Table 6.2 and Table 6.3 respectively, ASHRAE-D-RP-1365-20111006.pdf (morrisonhershfield.com):

***Table 6.2 Excerpt**, Summary of Linear Transmittances Dependent on Exterior Insulation Level (φ, Btu/h-ft-F)*

Detail: Wall Type, Transmittance Description	Linear Transmittance Btu/ft·hr·°F (W/m K)		
	R5	R15	R25
Glazing Transitions			
Detail 7: Ext Insulated Steel Stud Wall, Window Transition	0.044 (0.077)	0.062 (0.108)	0.069 (0.120)

***Table 6.3 Excerpt**, Summary of Linear Transmittances for Interior Insulated Assemblies (φ, Btu/h-ft-F)*

Detail: Wall Type, Transmittance Description	Linear Transmittance Btu/ft·hr·°F (W/m K)
Glazing Transitions	
Detail 31: Pre-cast sandwich panel w/out cavity insulation, Curtain Wall Transition	0.082 (0.142)
Detail 34: Pre-cast sandwich panel w/out cavity insulation, Window Transition	0.28 .048)

Supporting Documentation Requirements

1. Effective U_w U-Factors for installed window assemblies are documented based on one of the above calculation methods.
    a. For each different window assembly calculate the Uw U-Factor following:

$$U_w = \frac{\sum(\varphi \, . \, L) + \sum(X)}{A_{Total}} + U_{cog}$$

Where:

U_w	=	total effective assembly thermal transmittance (Btu/hr.ft2.F)
U_{cog}	=	center of glass clear field thermal transmittance (Btu/hr.ft2.F)
A_{Total}	=	the total area of the window and frame (ft2)
φ	=	heat flow from linear thermal bridge (Btu/hr.ft.F)
L	=	length of linear thermal bridge, i.e. glass edge/ frame length (ft)
X	=	heat flow from point thermal bridges (Btu/hr.F)

    b. Document the total area of each fenestration type.

Note: Point (X) thermal bridge transmittance values are not provided for Method 0 and Method 3. The above calculation would only use the length of the frame and the appropriate linear thermal transmittance values provided.

2. Total window heat transfer, UA_w, where UA_w represents the total area-weighted average Uw of all fenestration assemblies.
    a. For the overall performance of fenestration assemblies calculate:

$$UA_w = \frac{\sum_0^n (U_{wn} \cdot A_{wn})}{\sum_0^n (A_{wn})}$$

Where:

UA_w	=	total average effective assembly thermal transmittance (Btu/hr.ft2.F)
U_{wn}	=	the total effective assembly thermal transmittance of assembly, n (Btu/hr.ft2.F)
A_{wn}	=	the total area of the window and frame assembly, n (ft2)

    b. Document the overall window-to-wall area ratio and window-to-floor area ratio.
    c. We may also want to capture building level details such as predominant space type, floor area, location, etc.

Incremental Measure Cost

The Incremental Measure Cost (IMC) represents the additional cost of installing high-performance fenestration systems relative to code-minimum glazing. In new construction, costs are normalized on a per square foot ($/SF) of fenestration basis to reflect how envelope measures scale with building façade area. These normalized values are intended to represent typical market conditions and support program inducement calibration rather than project-specific cost reconciliation.

Base Case

The base case consists of Title 24 code-minimum fenestration systems, typically standard double-pane glazing assemblies with conventional framing systems. This includes standard material costs, fabrication, and installation practices consistent with current code-compliant construction.

Measure Case

The measure case includes installation of high-performance fenestration systems such as thin triple-pane (TTP), vacuum insulated glass (VIG), and electrochromic (EC) glazing. Incremental costs are driven by enhanced glazing technologies, additional manufacturing complexity, potential changes in framing systems, and, for electrochromic systems, integration of controls and low-voltage wiring. These systems are typically applied to portions of the building façade where improved thermal performance or solar control provides the greatest benefit.

Incremental Measure Cost

Incremental costs are expressed in dollars per square foot ($/SF) of fenestration and represent the additional cost relative to the base case.

- **Thin Triple-Pane (TTP):**
  $116/SF of fenestration
- **Vacuum Insulated Glass (VIG):**
  $200/SF of fenestration
- **Electrochromic (EC) Glazing:**
  $100/SF of fenestration

These values represent typical incremental costs under current market conditions and are intended for program-level analysis.

Sources

- Vitro Architectural Glass – Triple IGU Performance Data Sheets (2023)
- LuxWall – Vacuum Insulated Glass (VIG) Product Information
- Vitro Architectural Glass – VacuMax™ Vacuum Insulating Glass (VIG)
- Glass Forum – “Vacuum Insulated Glass (VIG) 101: A Comprehensive Guide”
- Lawrence Berkeley National Laboratory – Electrochromic Glazing Case Study

Note: References to specific products or manufacturers are provided solely for data and informational purposes and do not imply endorsement, recommendation, or preference by CEDA.

Code Readiness Objectives

This measure supports CEDA's Code Readiness efforts by generating real-world data on the performance, cost, and implementation of emerging high-performance fenestration technologies. The data collected will help reduce uncertainty in current modeling assumptions and inform future updates to Title 24 and related standards. The objectives include the following:

- Quantify the gap between modeled and as-installed fenestration performance
- Evaluate performance variability across climate zones and façade orientations
- Assess effectiveness of dynamic glazing control strategies (electrochromic systems)
- Characterize installation practices and thermal bridging impacts
- Develop a robust dataset of incremental costs and cost drivers

Code Readiness Site Monitoring

If selected for Code Readiness monitoring, equipment energy consumption and mechanical system performance may be monitored on-site for a period of up to 24 months. To support performance evaluation and data collection, projects shall provide reasonable access for the installation and operation of metering, sensors, and communication equipment.

Projects equipped with a Building Automation System (BAS), Energy Management System (EMS), or equivalent platform should enable integration of advanced metering devices through the existing system to facilitate data collection and remote access. For projects without a BAS or EMS, the Code Readiness team may install temporary stand-alone data loggers, sensors, and communication equipment as needed to monitor system performance for the duration of the monitoring period.

Instrumentation may be installed or supplemented, where necessary, to measure key system and equipment parameters sufficient to evaluate system performance and operational characteristics. All monitoring equipment will be temporary and installed in a manner that minimizes disruption to normal building operations.

Data Benefits

Collected data will help support the following:

- Inform future cost-effective opportunities for high-performance window systems in building energy codes
- Improve understanding of real-world performance vs. modeled performance

Sample Data Points

A sample set of data points that would ideally be collected is provided below for reference. This list will be re-developed for each project based on the infrastructure and need of the monitoring effort:

Data Points to Meter	Unit	Additional Specifications
Outdoor Temperature	°F	Measured at heat pump or site
Outdoor Air Dewpoint	°F	Measured at heat pump or site
Indoor Air Temperature	°F	Average
Building Mode (Occupied Unoccupied)	-	Flag indicating status

Code Reference

2025 CA Title 24, Part 6, Section 110.6 – Mandatory Requirements for Fenestration Products and Exterior Doors

110.6(a) Certification of fenestration products and exterior doors other than field-fabricated. *Any fenestration product and exterior door, other than field-fabricated fenestration products and field-fabricated exterior doors, may be installed only if the manufacturer has certified to the Commission, or if an independent certifying organization approved by the Commission has certified, that the product complies with all of the applicable requirements of this subsection.*

1. **Air leakage**. Manufactured fenestration products and exterior doors shall have air infiltration rates not exceeding 0.3 cfm/ft^2 of window area, 0.3 cfm/ft^2 of door area for residential doors, 0.3 cfm/ft^2 of door area for nonresidential single doors (swinging and sliding), and 1.0 cfm/ft^2 for nonresidential double doors (swinging), when tested according to NFRC-400 or ASTM E283 at a pressure differential of 75 pascals (or 1.57 pounds/ft^2), incorporated herein by reference.
   NOTES TO SECTION 110.6(a)1: Pet doors must meet 0.3 cfm/ft^2 when tested according to ASTM E283 at 75 pascals (or 1.57 pounds per square foot). AAMA/WDMA/CSA 101/I.S.2/A440-2011 specification is equivalent to ASTM E283 at a pressure differential of 75 pascals (or 1.57 pounds per square foot) and satisfies the air leakage certification requirements of this section.

   Exception to Section 110.6(a)1: *Field-fabricated fenestration and field-fabricated exterior doors.*

2. **U-factor**. The fenestration product and exterior door's U-factor shall be rated in accordance with NFRC 100, or use the applicable default U-factor set forth in Table 110.6-A.

   Exception 1 to Section 110.6(a)2: *If the fenestration product is a skylight in a building covered by the nonresidential standards with less than 200 square feet of skylight area, the default U-factor may be calculated as set forth in Reference Nonresidential Appendix NA6.*

   Exception 2 to Section 110.6(a)2: *If the fenestration product is an alternation consisting of any area replacement of glass in a skylight product in building covered by the nonresidential standards, the default U-factor may be calculated as set forth in Reference Nonresidential Appendix NA6.*

3. **Solar heat gain coefficient (SHGC).** The fenestration product's SHGC shall be rated in accordance with NFRC 200, or use the applicable default SHGC set forth in Table 110.6-B.

   Exception 1 to Section 110.6(a)3: *If the fenestration product is a skylight in a building covered by the nonresidential standards with less than 200 square feet of skylight area, the default SHGC may be calculated as set forth in Reference Nonresidential Appendix NA6.*

   Exception 2 to Section 110.6(a)3: *If the fenestration product is an alternation consisting of any area replacement of glass in a skylight product in building covered by the nonresidential standards, the default SHGC may be calculated as set forth in Reference Nonresidential Appendix NA6.*

4. **Visible transmittance (VT).** The fenestration product's VT shall be rated in accordance with NFRC 200 or ASTM E972, for tubular daylighting devices VT shall be rated using NFRC 203.

Exception 1 to Section 110.6(a)3: *If the fenestration product is a skylight in a building covered by the nonresidential standards with less than 200 square feet of skylight area, the default VT may be calculated as set forth in Reference Nonresidential Appendix NA6.*

Exception 2 to Section 110.6(a)3: *If the fenestration product is an alternation consisting of any area replacement of glass in a skylight product in building covered by the nonresidential standards, the default VT may be calculated as set forth in Reference Nonresidential Appendix NA6.*

5. **Labeling.** Fenestration products and exterior doors shall:
    a. Have a temporary label for manufactured fenestration products and exterior doors or a label certificate when the Component Modeling Approach (CMA) is used and for site-built fenestration meeting the requirements of Section 10-111(a)1. The temporary label shall not be removed before inspection by the enforcement agency; and
    b. Have a permanent label or label certificate when the Component Modeling Approach (CMA) is used and for site-built fenestration meeting the requirements of Section 10-111(a)2 if the product is rated using NFRC procedures.

6. **Fenestration acceptance requirements.** Before an occupancy permit is granted site-built fenestration products in other than single-family buildings shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified in the Reference Nonresidential Appendix NA7 to ensure that site-built fenestration meets Standards requirements, including a matching label certificate for product(s) installed and be readily accessible at the project location. A certificate of acceptance certifying that the fenestration product meets the acceptance requirements shall be completed, signed and submitted to the enforcement agency.

Exception to Section 110.6(a): *Fenestration products removed and reinstalled as part of a building alternation or addition.*

110.6(b) Installation of field-fabricated fenestration and exterior doors. *Field-fabricated fenestration and field-fabricated exterior doors may be installed only if the compliance documentation has demonstrated compliance for the installation using U-factors from Table 110.6-A and SHGC values from Table 110.6-B. Field-fabricated fenestration and field-fabricated exterior doors shall be caulked between the fenestration products or exterior door and the building, and shall be weather-stripped.*

Exception to Section 110.6(b): *Unframed glass doors and fire doors need not be weather-stripped or caulked.*

Table 110.6-A – Default Fenestration Product U-factors

Frame	Product Type	Single Pane[3,4] U-factor	Double Pane[1,3,4] U-factor	Glass Block[2,3] U-factor
Metal	Operable	1.28	0.79	0.87
Metal	Fixed	1.19	0.71	0.72
Metal	Greenhouse/Garden Window	2.26	1.40	N.A.
Metal	Glazed Doors	1.25	0.77	N.A.
Metal	Skylight	1.98	1.30	N.A.
Metal, Thermal Break	Operable	N.A.	0.66	N.A.
Metal, Thermal Break	Fixed	N.A.	0.55	N.A.
Metal, Thermal Break	Greenhouse/Garden Window	N.A.	1.12	N.A.
Metal, Thermal Break	Glazed Doors	N.A.	0.59	N.A.
Metal, Thermal Break	Skylight	N.A.	1.11	N.A.
Nonmetal	Operable	0.99	0.58	0.60

Frame	Product Type	Single Pane[3,4] U-factor	Double Pane[1,3,4] U-factor	Glass Block[2,3] U-factor
Nonmetal	Fixed	1.04	0.55	0.57
Nonmetal	Greenhouse/Garden Window	0.99	0.53	N.A.
Nonmetal	Glazed Doors	1.94	1.06	N.A.
Nonmetal	Skylight	1.47	0.84	N.A.

1. *For all dual-glazed fenestration products, adjust the listed U-factors as follows:*
    a. *Add 0.05 for products with dividers between panes if spacer is less than 7/16 inch wide.*
    b. *Add 0.05 to any product with true divided lite (dividers through the panes).*
2. *Translucent or transparent panels shall use glass block values when not rated by NFRC 100.*
3. *Visible Transmittance (VT) shall be calculated by using Reference Nonresidential Appendix NA6.*
4. *Windows with window film applied that is not rated by NFRC 100 shall use the default values from this Table.*

Table 210.6-B – Default Solar Heat Gain Coefficient (SHGC)

Frame	Product	Glazing	Single Pane[3,4] SHGC	Double Pane[2,3] SHGC	Glass Block[1,2] SHGC
Metal	Operable	Clear	0.80	0.70	0.70
Metal	Fixed	Clear	0.83	0.73	0.73
Metal	Operable	Tinted	0.67	0.59	N.A.
Metal	Fixed	Tinted	0.68	0.60	N.A.
Metal, Thermal Break	Operable	Clear	N.A.	0.63	N.A.
Metal, Thermal Break	Fixed	Clear	N.A.	0.69	N.A.
Metal, Thermal Break	Operable	Tinted	N.A.	0.53	N.A.
Metal, Thermal Break	Fixed	Tinted	N.A.	0.57	N.A.
Nonmetal	Operable	Clear	0.74	0.65	0.70
Nonmetal	Fixed	Clear	0.76	0.67	0.67
Nonmetal	Operable	Tinted	0.60	0.53	N.A.
Nonmetal	Fixed	Tinted	0.63	0.55	N.A.

1. *Translucent or transparent panels shall use glass block values when not rated by NFRC 200.*
2. *Visible Transmittance (VT) shall be calculated by using Reference Nonresidential Appendix NA6*
3. *Windows with window film applied that is not rated by NFRC 200 shall use the default values from this table.*

2025 CA Title 24, Part 6, Section 110.7 – Mandatory Requirements to Limit Air Leakage

All joints, penetrations and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weather-stripped or otherwise sealed to limit infiltration and exfiltration.

Note: Authority: Sections 25213, 25218, 25218.5, 25402 and 25402.1, Public Resources Code.

Reference: Sections 25007, 25008, 25218.5, 25310, 25402, 25402.1, 25402.4, 25402.8, and 25943, Public Resources Code.

National Fenestration Rating Council (NFRC) Standards

NRFC 100 *is the NFRC document titled "NFRC 100: Procedure for Determining Fenestration Product U-factors." (2017) NFRC 100 includes procedures for the Component Modeling Approach (CMA) and site-built fenestration formerly included in a separate document, NFRC 100-SB.*

NFRC 200 *is the NFRC document titled "NFRC 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence." (2017).*

NFRC 202 *is the NFRC document titled "NFRC 202: Procedures for Determining Translucent Fenestration Product Visible Transmittance at Normal Incidence." (2017).*

NFRC 203 *is the NFRC document titled "NFRC 203: Procedure for Determining Visible Transmittance of Tubular Daylighting Devices." (2017).*

NFRC 400 *is the NFRC document titled "NFRC 400: Procedure for Determining Fenestration Product Air Leakage." (2017).*

Eligible Climate Zones and Building Types

Eligible Climate Zones

This high-performance measure applies statewide in **California Climate Zones 1-16** (Title 24). Applicants must identify the project's climate zone in the submittal.

Eligible Building Types

This high-performance measure applies to:

- **High-Rise Multifamily**: Buildings with **four (4) or more habitable stories above grade**.
- **Nonresidential**: **Commercial, public, agricultural, and industrial** facilities (e.g., offices, retail, lodging, education, healthcare, food service, warehouses, manufacturing, civic buildings).

Eligible Project Scopes

This high-performance measure applies to:

- **New construction**, **additions**, and **major alterations/retrofits** to systems served by the measure.

This high-performance measure does not apply to (not in scope):

- **Low-rise residential** (single-family and multifamily ≤3 habitable stories above grade).

Measure Exclusions

This measure excludes the following:

- **Operable windows, glass doors, and non-fixed glazing assemblies** are excluded from this measure. Eligibility is limited to fixed windows and glazing systems only, consistent with current market availability and expected savings impact.
- **Fenestration systems that do not utilize qualifying technologies**—including thin triple-pane (TTP), vacuum insulated glass (VIG), or electrochromic (EC) glazing—are not eligible. Standard double-pane systems, conventional low-e glazing, or incremental improvements that do not meet the intent of high-performance fenestration are excluded.
- **Fenestration installations representing code-minimum or baseline compliance only** are not eligible. Projects must demonstrate performance improvements relative to Title 24 baseline conditions; systems installed solely to meet minimum code requirements do not qualify for inducement.
- **Projects with less than 20% of total building fenestration area utilizing high-performance glazing** are excluded from participation in this measure.

CEDA program administrators reserve the right to determine whether claimed measures constitute overlapping scope for the same equipment, controls integration, or monitoring infrastructure.

Reviewer Checklist

HPM Reviewer Checklist: LM446 – High Performance Fenestration – V2.2

Checklist Description: This checklist captures the elements that must be present in the project design to be eligible for the high-performance measure inducement or consideration for additional site metering.

Project Name: _____ **Review Date:** _____

Assessment:

- ☐ Approved
- ☐ Not approved

Notes:

Reviewer: _____ **Signature:** _____

High-Performance Measure Requirements	Comments

System Design & Supporting Documentation Requirements

- ☐ Project applies high-performance fenestration to at least 20% of total building fenestration area (sq. ft.)
- ☐ Fenestration technologies installed include one or more of the following: Thin triple-pane (TTP), Vacuum Insulated Glass (VIG), Electrochromic (EC) glazing
- ☐ Base case glazing defined as Title 24 code minimum for comparison in modeling
- ☐ NEO verification model includes updated fenestration inputs (U-factor, COG, SHGC, VT) reflecting installed technology
- ☐ Effective assembly U-factor (Uw) calculated using HPM Fenestration Thermal Bridge Assessment Workbook
- ☐ Thermal bridging assessment documented using one of the following methods:
  - ≤ Method 0 (default ρ-values applied)
  - ≤ Method 3 (ASHRAE RP 1365 catalog details)
- ☐ ≤ If Method 0 used, appropriate ρ-value selected based on installation condition:
  - ≤ ρ = 0.015 (mid-wall with frame over-insulation)
  - ≤ ρ = 0.020 (mid-wall without frame over-insulation / in insulation plane)
  - ≤ ρ = 0.030 (other conditions)
- ☐ Fenestration areas evaluated are broken out individually in modeling
- ☐ Energy savings calculated as difference between base case and verified case (electric and peak demand)
- ☐ Incremental Measure Cost (IMC) documented for selected technology (TTP, VIG, or EC)
- ☐ System design documentation and cost data provided
- ☐ Measure applies only to fixed windows and glazing assemblies (no operable windows or glass doors)

Version History Log

Version	Effective Date	End Date	Change Description
1	December 04, 2023	June 25, 2024	N/A
2	June 26, 2024	April 12, 2026	Addition of linear transmittance default values and inclusion of window thermal bridging assessment calculation procedure and documentation requirements
2.2	April 13, 2026	Current	Updated measure to the current CEDA HPM format, IMC, and added reviewer checklist