



ENERGY STAR® Product Specification Residential Windows, Doors, and Skylights

Eligibility Criteria Draft 1 Version 7.0

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Following is the **Draft 1** Version 7.0 ENERGY STAR product specification for Windows, Doors, and Skylights. A product shall meet all the identified criteria if it is to earn the ENERGY STAR.

- 1) **DEFINITIONS:** Below are the definitions of the relevant terms in this document. Most definitions are based on or pulled directly from the National Fenestration Rating Council (NFRC) 600 except where otherwise noted.

Product Types

- A. Window: An assembled unit consisting of a frame/sash component holding one or more pieces of glazing functioning to admit light and/or air into an enclosure and designed for a vertical installation in an external wall of a Residential Building. Includes Transoms.
- B. Door: A sliding or swinging entry system designed for and installed in a vertical wall separating conditioned and unconditioned space in a Residential Building. Includes Sidelites. ENERGY STAR recognizes three categories of Doors and Sidelites:
- i) Opaque: A Door or Sidelite with no glazing (per NFRC 100).
 - ii) ≤ 1/2-Lite: A Door with ≤ 900 in² (0.581 m²) of glazing or a Sidelite ≤ 281 in² (0.181m²) of glazing (per NFRC 100). Includes 1/4- and 1/2-lite Doors and Sidelites.
 - iii) > 1/2-Lite: A Door with > 900 in² (0.581 m²) of glazing or a Sidelite with > 281 in² (0.181m²) of glazing (per NFRC 100). Includes 3/4-lite and fully glazed Doors and Sidelites.
- C. Skylight: A Window designed for sloped or horizontal application in the roof of a Residential Building, the primary purpose of which is to provide daylighting and/or ventilation.

Product Subcategories

- D. Sliding Glass Door: A Door that contains one or more manually operated glass panels that slide horizontally within a common frame, categorized with the NFRC product code DDSG.

Note: The definition for the subcategory “sliding door” has been revised to specify “sliding glass door” and the NFRC product code “DDSG.” This change aligns with the terminology used by NFRC and provides clarity on which products are included in this subcategory.

- E. Swinging Door: A Door system having a hinge attachment of any type between a leaf and jamb, mullion, or edge of another leaf or having a single, fixed vertical axis about which the leaf rotates between open and closed positions. Swinging Doors include NFRC codes EDSL and DDFR.

Note: The definition for the subcategory “swinging door” has been revised to specify the NFRC product codes “EDSL” and “DDFR.” This change clarifies that French double doors are included in this category.

- F. Sidelite: A fenestration product with the NFRC product code FXSL.
- G. Transom: A fenestration product with the NFRC product code FXTR.
- H. Tubular Daylighting Device (TDD) or Tubular Skylight: A non-operable device primarily designed to transmit daylight from a roof surface of a Residential Building to an interior ceiling surface via a tubular conduit. The device consists of an exterior glazed weathering surface, a light transmitting tube with a reflective inside surface and an interior sealing device, such as a translucent ceiling panel. TDDs are considered Skylights.

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- I. Dynamic Glazing Product: Any fenestration product that has the fully reversible ability to change its performance properties, including U-Factor, Solar Heat Gain Coefficient (SHGC), or Visual Transmittance. This includes, but is not limited to, shading systems between the glazing layers and Chromogenic Glazing.
 - i) Chromogenic Glazing: A broad class of changeable glazings that have means to reversibly vary their optical properties, including active materials (e.g., electrochromic and Suspended Particle Device/SPD) and passive materials (e.g., photochromic, thermochromic, etc.).
 - ii) Internal Shading System: Operable blinds or shades positioned between glass panes in a Window, Door, or Skylight.

Performance Metrics

- J. U-Factor: The heat transfer per time per area and per degree of temperature difference (Btu/h ft²·°F). The U-Factor multiplied by the interior-exterior temperature difference and by the projected fenestration product area yields the total heat transfer through the fenestration product due to conduction, convection, and long-wave infra-red radiation.
- K. Solar Heat Gain Coefficient (SHGC): The ratio of the solar heat gain entering the space through the fenestration product to the incident solar radiation.
- L. Air Leakage: The volume of air flowing per unit time per unit area (cfm/ft²) through a fenestration system due to air pressure or temperature difference between the outdoor and indoor environment.

Other

- M. Residential Building: A structure used primarily for living and sleeping that is zoned as residential and/or subject to Residential Building codes. For the purposes of ENERGY STAR, Residential Building refers to buildings that are three stories or less in height.
- N. Insulating Glass Unit (IGU): A preassembled unit, comprising lites of glass, which are sealed at the edges and separated by dehydrated space(s).
- O. North American Fenestration Standard (NAFS): The common name for the American Architectural Manufacturers Association (AAMA)/Window & Door Manufacturers Association (WDMA)/Canadian Standards Association (CSA) 101/I.S.2/A440 testing standard.

2) SCOPE:

- A. Included Products: Products that meet the definition of a residential Window, Door, or Skylight as specified herein are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.B. Products that are covered under other ENERGY STAR product specifications are not eligible for certification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/specifications.
- B. Excluded Products: Products that are assembled onsite, including but not limited to sash packs or sash kits; Windows, Doors, or Skylights that are intended for installation in non-Residential Buildings; Window, Door, or Skylight attachments that are not included in a product's NFRC-certified rating.

3) CERTIFICATION CRITERIA:

- A. Energy Efficiency Requirements: Products shall have NFRC-certified U-Factor and, where applicable, SHGC ratings at levels which meet or exceed the minimum criteria specified in Tables 1 through 4. Windows, sliding glass doors, and skylights shall meet the criteria for a given ENERGY STAR Climate Zone. Swinging doors shall meet the criteria for a given glazing level. Dynamic Glazing Products shall meet the criteria while in the minimum tinted state for Chromogenic Glazing products or the "fully open" position for Internal Shading Systems.

119 **Table 1: Energy Efficiency Requirements for Windows**
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Climate Zone	U-Factor	SHGC
Northern	≤ 0.22	≥ 0.17
North-Central	≤ 0.24	≤ 0.40
South-Central	≤ 0.28	≤ 0.23
Southern	≤ 0.32	≤ 0.23

121 **Note:** Table 1 shows the V7 requirements for windows. The U-factor requirements were lowered for all
122 climate zones and the SHGC requirements were lowered in the South-Central and Southern Zones. A
123 minimum SHGC was established for the Northern Zone. EPA concluded that the proposed windows criteria
124 can provide meaningful savings for consumers, paying back incremental price premiums in a reasonable
125 period of time. Payback periods can vary based on location, energy prices, and household characteristics.
126 EPA calculated a population weighted average payback for each climate zone, with the following results:
127 11.3 years in the Northern Zone, 8.6 years in the North-Central Zone, 9.0 years in the South-Central Zone,
128 and 8.9 years in the Southern Zone.

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130 The criteria can be met through multiple technical pathways, do not require proprietary technology, and do
131 not negatively impact the non-energy performance of the product. Products meeting the criteria are
132 available for sale today and provide a clear differentiation over standard products in the market. Please see
133 the Version 7.0 Criteria Analysis Report for more information and analysis.

134 **Table 2: Energy Efficiency Requirements for Sliding Glass Doors**
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Climate Zone	U-Factor	SHGC
Northern	≤ 0.22	≥ 0.17
North-Central	≤ 0.24	≤ 0.40
South-Central	≤ 0.28	≤ 0.23
Southern	≤ 0.32	≤ 0.23

137 **Note:** Table 2 shows the requirement for sliding glass doors, which EPA proposed to split into a new
138 category and align the requirements with those for windows. Please see the Version 7.0 Criteria Analysis
139 Report for more information.

140 **Table 3: Energy Efficiency Requirements for Swinging Doors**
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Glazing Level	U-Factor	SHGC	
Opaque	≤ 0.17	No Rating	
≤ ½-Lite	≤ 0.23	≤ 0.25	
> ½-Lite	≤ 0.28	Northern and North-Central	≤ 0.40
		South-Central and Southern	≤ 0.23

142 **Note:** Table 3 shows the V7 requirements for swinging doors. The U-factor requirements were lowered for
143 ≤½-Lite and >½-Lite doors, and the SHGC requirements were lowered for >1/2-Lite doors in the South-
144 Central and Southern Zones. Please see the Version 7.0 Criteria Analysis Report for more information and
145 analysis.

146 **Table 4: Energy Efficiency Requirements for Skylights**
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Climate Zone	U-Factor	SHGC
Northern	≤ 0.45	Any
North-Central South-Central Southern	≤ 0.50	≤ 0.25

Note: Table 4 shows the V7 requirements for skylights. The U-factor requirements were lowered for all climate zones, and the requirements were aligned for the North-Central, South-Central, and Southern Zones with a new maximum SHGC of 0.25 for those zones. Please see the Version 7.0 Criteria Analysis Report for more information and analysis.

- B. **Equivalent Energy Performance:** Windows may also have NFRC-certified U-Factor and SHGC ratings at levels which meet or exceed the equivalent energy performance criteria specified in Table 4. These criteria allow Windows with energy performance equivalent to the prescriptive criteria to be certified for the Northern Zone. Equivalent performance criteria are not applicable to the North-Central, South-Central, or Southern Zones or to Doors or Skylights.

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Table 5: Equivalent Energy Performance for Windows

Climate Zone	U-Factor ¹	SHGC ²
Northern	= 0.23	≥ 0.35
	= 0.24	≥ 0.40
	= 0.25	≥ 0.45
	= 0.26	≥ 0.50

Note: Table 5 shows the tradeoffs for the Northern zone which have equivalent energy performance to the prescriptive requirement. The tradeoffs allow flexibility in achieving the ENERGY STAR levels through different technology pathways. Please see the Version 7.0 Criteria Analysis Report for more information and analysis.

- D. **Air Leakage Requirements:** Products shall have Air Leakage ratings at levels which meet or exceed the minimum criteria specified in Table 5 and adhere to the labeling requirements laid out below.

Table 6: Air Leakage Requirements

Product	Air Leakage Rating
Window, Sliding Door, or Skylight	≤ 0.3 cfm/ft ²
Swinging Door	≤ 0.5 cfm/ft ²

- i) Windows, Sliding Doors, and Skylights shall demonstrate adherence to this requirement by either
- (1) Displaying “≤ 0.3” in the Air Leakage portion of the NFRC temporary label.
 - OR
 - (2) Placing one of the following labels on the product:
 - (a) AAMA Gold Label
 - (b) Keystone Certifications, Inc. NAFS Structural Certification Label
 - (c) National Accreditation & Management Institute, Inc. (NAMI) NAFS Structural Certification Label
 - (d) WDMA Hallmark Certification Label

NOTE: The U.S. Environmental Protection Agency (EPA) may consider similar labels offered by other Certification Bodies on a case by case basis.

- ii) Swinging Doors shall demonstrate adherence to this requirement by either:
- (1) Displaying “≤ 0.5” in the Air Leakage portion of the NFRC temporary label.
 - OR
 - (2) Placing one of the following labels on the product:
 - (a) AAMA Gold Label
 - (b) Keystone Certifications, Inc. NAFS Structural Certification Label
 - (c) NAMI NAFS Structural Certification Label
 - (d) WDMA Hallmark Certification Label

NOTE: EPA may consider similar labels offered by other Certification Bodies on a case by case basis.

- iii) Manufacturers shall test and/or add the necessary labeling as their products come up for NFRC re-certification.

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E. **Installation Instructions:** Products shall have installation instructions readily available online or packaged with the product. This information does not need to be included on product labels. Electronic versions of instructions may be provided on the website of a retailer, manufacturer, and/or industry association. Retailers, manufacturers, and industry associations may include in these instructions whatever disclaimers they feel are necessary to limit their liability. EPA understands that the manufacturer cannot write installation instructions for every situation and that generic instructions covering the most common situations are acceptable to fulfill this requirement. The installation instructions shall include:

- i) A list of hardware and tools required for installation, including those provided by the manufacturer and those not provided by the manufacturer.
- ii) Diagrams/pictures and descriptions of the product or a typical product of similar type and parts provided by the manufacturer.
- iii) General guidance on safely removing old products and preparing the frame for installation. Guidance should direct consumers to relevant content on proper management of lead paint, such as www.epa.gov/lead. (Inclusion of diagrams/pictures is preferred, but optional.)
- iv) General information on proper disposal or recycling of products being removed.
- v) Detailed flashing instructions including diagrams/pictures or reference to the applicable flashing manufacturer's instructions, as applicable to the product.
- vi) Instructions on properly shimming the product to achieve an installation that is flush, level, and plumb. (Inclusion of diagrams/pictures is preferred, but optional.)
- vii) Guidance on sealing and weatherproofing to prevent air and water infiltration at the product-wall interface. (Inclusion of diagrams/pictures is preferred, but optional.)
- viii) Variations of the above based on whether the job is a pocket installation, rough opening installation with exterior sheathing intact, and/or rough opening installation with exterior sheathing removed, as applicable to the product.

Disclaimer: EPA makes no warranties, expressed or implied, nor assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of the contents of installation instructions, or any portion thereof. Further, EPA cannot be held liable for defects or deficiencies resulting from the proper or improper application of installation instructions.

4) **TESTING:**

A. When testing residential Windows, Doors, and Skylights, the test methods shown in Table 6 shall be used to determine ENERGY STAR certification:

Table 6: Test Methods for ENERGY STAR Certification

ENERGY STAR Requirement	Test Method Reference
U-Factor	NFRC 100
SHGC	NFRC 200
Air Leakage	ASTM E283 in accordance with NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440-11

B. All products containing IGUs shall have them certified according to NFRC procedures.

5) **EFFECTIVE DATE:** The ENERGY STAR Version 7.0 Residential Windows, Doors, and Skylights specification shall take effect on a to-be-determined date. To meet the ENERGY STAR criteria, a product model shall meet the ENERGY STAR specification in effect on the model's date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

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Note: EPA plans to complete this revision process by January 2022. EPA recognizes stakeholder' interest in a specification transition at the end or beginning of a calendar year and will aim to accommodate this.

- 6) **CONSIDERATIONS FOR FUTURE REVISIONS:** ENERGY STAR reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that the ENERGY STAR certification is not automatically granted for the life of a product model.

ENERGY STAR Certification Criteria for Residential Windows, Doors, and Skylights

Windows and Sliding Glass Doors

Climate Zone	U-Factor ¹	SHGC ²	
Northern	≤ 0.22	≥ 0.17	Prescriptive
	= 0.23	≥ 0.35	Equivalent Energy Performance
	= 0.24	≥ 0.40	
	= 0.25	≥ 0.45	
	= 0.26	≥ 0.50	
North-Central	≤ 0.24	≤ 0.40	
South-Central	≤ 0.28	≤ 0.23	
Southern	≤ 0.32	≤ 0.23	

Swinging Doors

Glazing Level	U-Factor ¹	SHGC ²	
Opaque	≤ 0.17	No Rating	
≤ ½-Lite	≤ 0.23	≤ 0.25	
> ½-Lite	≤ 0.28	Northern & North-Central	≤ 0.40
		Southern & South-Central	≤ 0.23

276 Air Leakage for other Sliding Doors ≤ 0.3 cfm/ft²
 277 Air Leakage for Swinging Doors ≤ 0.5 cfm/ft²
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Skylights

Climate Zone	U-Factor ¹	SHGC ²
Northern	≤ 0.45	Any
North-Central		
South-Central	≤ 0.50	≤ 0.25
Southern		

270 Air Leakage for windows and sliding glass doors ≤ 0.3 cfm/ft²

271 1 Btu/h ft²·°F

272 2 Solar Heat Gain Coefficient

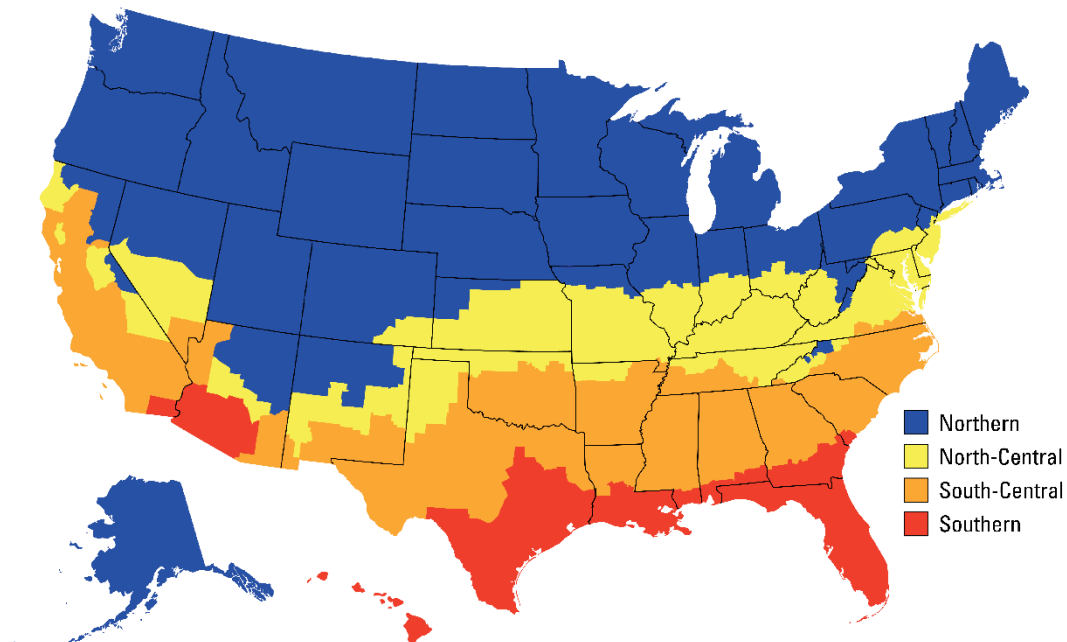
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Air Leakage ≤ 0.3 cfm/ft²



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284 **Note:** A complete list of ENERGY STAR Climate Zones by state and county or, where applicable, zip code is available at
285 https://www.energystar.gov/index.cfm?fuseaction=windows_doors.search_climate.

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Note: The ENERGY STAR Climate Zone map has changed to reflect various counties across the U.S. moving into a different International Energy Conservation Code (IECC) zones as a result of changing climate patterns. Please see the Criteria Analysis Report for more information.

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