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ENERGY STAR® Program Requirements Product Specification for Residential Windows, Doors, and Skylights

Eligibility Criteria Draft 1 Version 6.0

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9 Following is the **Draft 1** Version 6.0 product specification for ENERGY STAR qualified windows, doors, and
10 skylights. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

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12 1) **Definitions:** Below are the definitions of the relevant terms in this document. Most definitions are based on
13 or pulled directly from the National Fenestration Rating Council (NFRC) 600-2010 except where otherwise
14 noted.

15 16 **Product Types**

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18 A. **Window:** An assembled unit consisting of a frame/sash component holding one or more pieces of
19 glazing functioning to admit light and/or air into an enclosure and designed for a vertical installation in an
20 external wall of a residential building. Includes sidelites and transoms greater than 700 mm (27 in) in
21 width, operable transoms, and operable glazed sidelites (per NFRC 100-2010).
22
23 B. **Door:** A sliding or swinging entry system (including sidelites and transoms) designed for and installed in
24 a vertical wall separating conditioned and unconditioned space in a residential building. ENERGY STAR
25 recognizes three categories of doors:
26
27 i) **Opaque:** A door with no glazing or a slab sidelite greater than 700 mm (27 in) in width (per NFRC
28 100-2010).
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30 ii) **≤ ½-lite:** A door with ≤ 29.8 percent glazing (based on NFRC 100-2010). Includes ¼- and ½-lite
31 doors.
32
33 iii) **> ½-lite:** A door with > 29.8 percent glazing (based on NFRC 100-2010). Includes ¾-lite and fully
34 glazed doors.
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36 C. **Skylight:** A window designed for sloped or horizontal application in the roof of a residential building, the
37 primary purpose of which is to provide daylighting and/or ventilation.

38 39 **Product Subcategories**

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41 D. **Sliding Door:** A door that contains one or more manually operated panels that slide horizontally within a
42 common frame.
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44 E. **Swinging Door:** A door system having, at a minimum, a hinge attachment of any type between a leaf and
45 jamb, mullion, or edge of another leaf or having a single, fixed vertical axis about which the leaf rotates
46 between open and closed positions.
47
48 F. **Sidelite:** A fenestration product 700 mm (27 in) in width or less consisting of a glazed frame or a non-
49 operable sash within a frame that is used as a companion product installed on one or both sides of a
50 door (per NFRC 100-2010).
51
52 G. **Transom:** A fenestration product 700 mm (27 in) in width or less consisting of a glazed frame or a non-
53 operable sash within a frame that is used as a companion product installed above a door (per NFRC
54 100-2010).
55

56 **Note:** When the Version 5.0 specification went into effect in January 2010, doors had separate qualification
57 criteria for the first time in the program's history. As a result, the program received many requests for clarification
58 as to how sidelites and transoms were to be treated under the program. As is done with most technical issues,

ENERGY STAR deferred to NFRC procedure. If the product is tested as a door, it qualifies under the door criteria. If the product is tested as a window, it qualifies under the window criteria. For clarification purposes, EPA has specifically called out sidelites and transoms in the definitions section of the specification so that manufacturers are clear on NFRC procedure and, consequently, ENERGY STAR policy.

- 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.
- I. Dynamic Glazing Product: Any fenestration product that has the fully reversible ability to change its performance properties, including U-factor, 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.

Note: EPA has made only minor changes to the dynamic glazing definitions to bring them more in line with NFRC documents. While stakeholders asked that EPA consider how the ENERGY STAR specification handles dynamic glazing products, no changes have been made in this policy. EPA cannot consider making special allowances for these products until energy savings is documented and consumer use is better understood.

Performance Metrics

- J. U-Factor: The heat transfer per time per area and per degree of temperature difference. 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 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).

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 qualification, with the exception of products listed in Section 2.B.
- 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.

Note: The “Excluded Products” section is included in all other program specifications, so EPA has included this section and used it to clarify those products that are ineligible for ENERGY STAR qualification. Per the e-mail notification sent on August 16, 2010, sash packs or sash kits are not eligible for ENERGY STAR qualification. Also excluded are site-built products, products intended for installation in non-residential buildings, and window, door, or skylight attachments that are not included in a product’s NFRC-certified rating.

3) **Qualification Criteria:**

Note: The *Version 6.0 Draft 1 Criteria and Analysis Report* contains the research, analyses, and rationale used for selection of the qualification criteria.

- A. **Energy Efficiency Requirements:** To qualify for ENERGY STAR, products shall have NFRC-certified U-factor and, where applicable, SHGC ratings at levels which meet or exceed the minimum qualification criteria specified in Tables 1-3. Windows and skylights shall meet the criteria for a given ENERGY STAR Climate Zone. 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.

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Table 1. Energy Efficiency Requirements for Windows

Climate Zone	U-Factor	SHGC
Northern	≤ 0.27	Any
North-Central	≤ 0.29	≤ 0.40
South-Central	≤ 0.31	≤ 0.25
Southern	≤ 0.40	≤ 0.25

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Table 3. Energy Efficiency Requirements for Skylights

Climate Zone	U-Factor	SHGC
Northern	≤ 0.45	≤ 0.35
North-Central	≤ 0.47	≤ 0.30
South-Central	≤ 0.50	≤ 0.25
Southern	≤ 0.60	≤ 0.25

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Table 2. Energy Efficiency Requirements for Doors

Glazing Level	U-Factor	SHGC
Opaque	≤ 0.17	No Rating
≤ ½-Lite	≤ 0.23	≤ 0.25
> ½-Lite	≤ 0.30	≤ 0.25

- B. **Equivalent Energy Performance:** To qualify for ENERGY STAR, windows may also have NFRC-certified U-factor and, where applicable, 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 qualify in 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 4. Equivalent Energy Performance for Windows

Climate Zone	U-Factor	SHGC
Northern	= 0.28	≥ 0.32

- C. **Air Leakage Requirements:** To qualify for ENERGY STAR, products shall have air leakage ratings at levels which meet or exceed the minimum qualification criteria specified in Table 5. Windows, sliding doors, and skylights shall demonstrate adherence to this requirement by displaying “≤ 0.3” in the air leakage portion of the NFRC temporary label. Swinging doors shall demonstrate adherence to this requirement by displaying “≤ 0.5” in the air leakage portion of the NFRC temporary label. Manufacturers may test and/or add the necessary labeling as their products come up for NFRC re-certification.

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Table 5. Air Leakage Requirements

Product	Air Leakage Rating
Window, sliding door, or skylight	≤ 0.3
Swinging door	≤ 0.5

- D. **Installation Instructions:** To qualify for ENERGY STAR, products shall have installation instructions readily available online or packaged with the product. Electronic versions of instructions may be provided on the website of a retailer, manufacturer, and/or industry association. These 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 and parts provided by the manufacturer.
- iii) General guidance on safely removing old products and preparing the frame for installation, including proper management of lead paint when applicable. (Inclusion of diagrams/pictures is preferred, but optional.)
- iv) Detailed flashing instructions including diagrams/pictures or reference to the applicable flashing manufacturer's instructions.
- v) Instructions on properly shimming the product to achieve an installation that is flush, level, and plumb. (Inclusion of diagrams/pictures is preferred, but optional.)
- vi) Guidance on sealing and weatherproofing to prevent air and water infiltration. (Inclusion of diagrams/pictures is preferred, but optional.)
- vii) 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 (e.g. new construction installation), 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) **Test Requirements:**

A. Representative Models shall be selected for testing per the following requirements:

- i. For qualification of an individual product model, the representative model shall be equivalent to that which is intended to be marketed and labeled as ENERGY STAR.
- ii. Qualification of a product family is not permitted under this specification.

B. When testing residential windows, doors, and skylights, the test methods shown in Table 6 shall be used to determine ENERGY STAR qualification:

Table 6. Test Methods for ENERGY STAR Qualification	
ENERGY STAR Requirement	Test Method Reference
U-Factor	NFRC 100
SHGC	NFRC 200
Air Leakage	NFRC 400 or ASTM E283

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

5) **Effective Date:** The ENERGY STAR Residential Windows, Doors, and Skylights specification shall take effect on January 1, 2014. To qualify for ENERGY STAR, 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.

6) **Future Criteria 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 industry discussions. In the event of a specification revision, please note that the ENERGY STAR qualification is not automatically granted for the life of a product model.

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

218 Windows 225

Climate Zone	U-Factor ¹	SHGC ²	
Northern	≤ 0.27	Any	Prescriptive
	= 0.28	≥ 0.32	Equivalent Energy Performance
North-Central	≤ 0.29	≤ 0.40	226 227 228
South-Central	≤ 0.31	≤ 0.25	229
Southern	≤ 0.40	≤ 0.25	

Doors

Glazing Level	U-Factor ¹	SHGC ²
Opaque	≤ 0.17	No Rating
≤ ½-Lite	≤ 0.23	≤ 0.25
> ½-Lite	≤ 0.30	≤ 0.25

Air Leakage for sliding doors ≤ 0.3 cfm/ft²
 Air Leakage for swinging doors ≤ 0.5 cfm/ft²

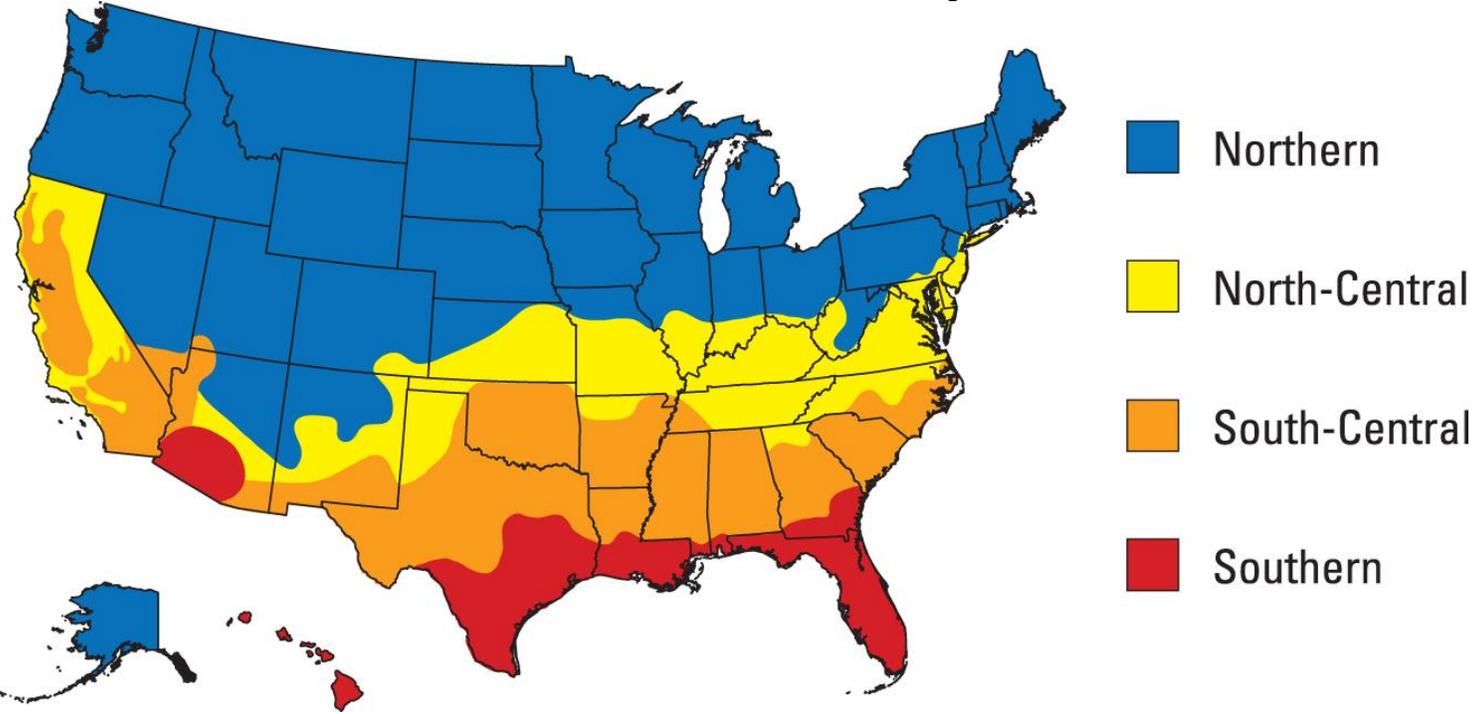
Skylights

Climate Zone	U-Factor ¹	SHGC ²
Northern	≤ 0.45	≤ 0.35
North-Central	≤ 0.47	≤ 0.30
South-Central	≤ 0.50	≤ 0.25
Southern	≤ 0.60	≤ 0.25

Air Leakage ≤ 0.3 cfm/ft²

219 Air Leakage ≤ 0.3 cfm/ft²
 220
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 222 ¹ Btu/h.ft².°F
 223 ² Solar Heat Gain Coefficient
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Note: A complete list of ENERGY STAR Climate Zones by state and county or, where applicable, zip code is available at https://www.energystar.gov/index.cfm?fuseaction=windows_doors.search_climate.