



GS-13

**GREEN SEAL™ STANDARD FOR
WINDOWS**

**SECOND EDITION
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THE MARK OF ENVIRONMENTAL RESPONSIBILITY

GREEN SEAL™

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Green Seal offers certification of products, services, and companies in conformance with its standards. For additional information on Green Seal or any of its programs, contact:

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FOREWORD

General. The final issued standard was developed in an open and transparent process with stakeholder input that included producers, users, and general interests.

The requirements in the standard are based on an assessment of the environmental, health, or social impacts associated with the products, services, or organizations covered in the scope of the standard. The requirements included in the standard are subject to revision. Provisions for safety have not been included in this standard. This standard neither modifies nor supersedes laws and regulations. Compliance with this Standard is not a substitute for, and does not assure, compliance with any applicable law or regulations. Compliance with all applicable laws and regulations is a required prerequisite for the manufacturing and marketing of the products. This standard (and any corresponding conformity assessment) presumes compliance with all applicable laws and regulations.

Products, services, or organizations that are substantially similar to those covered by this standard in terms of function and life cycle considerations may be evaluated against the intent of the requirements of this standard, accounting for relevant differences between the intended scope of the Standard and the actual product, service, or organization to be evaluated.

This standard may not anticipate features of the product that may significantly, and undesirably, increase its impact on the environment, health, or society. In such a situation, Green Seal will ordinarily amend its standards to account for the unanticipated environmental, health, and societal impacts.

Normative references (e.g., other standards) in this standard intend to refer to the most recent edition of the normative reference.

Edition. This version is the Second Edition from March 21, 1995 (with editorial changes made on October 1, 2011) and replaces the First Edition from June 1, 1994, including substantive revisions.

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Tests may be required by the standard that involve safety considerations. Adequate safeguards for personnel and property should be employed in conducting such tests.

ACRONYMS AND ABBREVIATIONS

ALR. Air Leakage Rate

ASTM. ASTM International, a standard setting organization formerly known as the American Society for Testing and Materials

NFRC. National Fenestration Rating Council

SHGC. Solar Heat Gain Coefficient

VLTC. Visible Light Transmission Coefficient

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1.0 SCOPE

This standard establishes requirements for the following residential fenestration *products* including *windows, skylights, glazed exterior doors, and storm doors*. *Products* specifically excluded from this standard include curtain walls, *glazing* cast into precast concrete, greenhouse *windows*, and glass blocks. See Appendix 1 for an example list of products included in this standard.

Words and phrases described in the standard that appear in italics have a corresponding definition located in the definition section of the standard, Annex A.

2.0 PRODUCT CHARACTERIZATION

2.1 Heat Transfer. The overall *heat transfer coefficient*, or *U-value*, representative of an entire *product* shall be determined according to the provisions of National Fenestration Rating Council (NFRC) Standard No. 100-91: Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to *U-values*). NFRC Attachment A: Interim standard test method for measuring the steady state thermal transmittance of fenestration systems using hot box methods.

2.2 Solar Heat Gain. The *Solar Heat Gain Coefficient (SHGC)* representative of an entire *product* shall be determined according to the provisions of NFRC Standard No. 200-93: Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence.

2.3 Visible Light Transmission. The *Visible Light Transmission Coefficient (VLTC)* representative of an entire *product* shall be determined according to the provisions of NFRC Standard No. 300-93: Procedure for Determining Fenestration Product Optical Properties.

2.4 Air Leakage. The *Air Leakage Rate (ALR)* representative of an entire *product* shall be measured at a wind speed of 25 MPH according to Test Procedure ASTM International (ASTM) Standard No. E283-89 (04.07): Rate of Air Leakage Through Exterior Windows/Curtain Walls/Doors-Test, ASTM. When final, NFRC 400 may be used.

2.5 *Products* with adjustable components, including but not limited to mechanical, electronic, or thermal integrated shades, shall be tested at fixed settings of these adjustable components designated by the *product's* manufacturer as most favorable for the *product's* performance in its designated class.

3.0 PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS

The ratio of the *product's* VLTC over its SHGC shall be greater than 1.

4.0 PRODUCT-SPECIFIC ENVIRONMENTAL REQUIREMENTS

4.1 U-Value. *Glazed exterior doors and windows* shall have *U-values* for NFRC Model Size AA no greater than 0.36. *Skylights* shall have a *U-value* for NFRC Model Size AA no greater than 0.44. Exception: *storm doors* are exempt from the *U-value* requirement.

4.2 Air Leakage. *Fixed products* shall have an *ALR* no greater than 0.10 scfm/ft.² *Operable products* shall have an *ALR* no greater than 0.30 scfm/lfc.

4.3 Product Frame and Sash Material. The *product* manufacturer shall demonstrate that the *product frame* and *sash* materials have not been formulated with the heavy metals lead, cadmium, arsenic, mercury, or hexavalent chromium. Exception: *Products* with aluminum parts treated for anti-corrosivity with organic conversion coatings containing chromate are exempted from this requirement.

5.0 PRODUCT PACKAGING REQUIREMENTS

5.1 The corrugated box used to package the *product* must contain at least 25% post-consumer material. The percentage of post-consumer material is to be based on fiber weight and calculated according to the following formula:

$$\% \text{ post-consumer material} = \frac{[\text{PCFil}(\text{FWil}) + \text{PCFol}(\text{FWol}) + \text{PCFm}(\text{FWm})]}{[\text{FWil} + \text{FWol} + \text{FWm}]}$$

Where:

PCFil = % Post-consumer fiber in the inner liner

PCFol = % Post-consumer fiber in the outer liner

PCFm = % Post-consumer fiber in the medium

FWil = Fiber weight of inner liner

FWol = Fiber weight of outer liner

FWm = Fiber weight of medium

5.2 The sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in the corrugated shipping box or other packaging directly in contact with the *product* shall not exceed 100 parts per million by weight.

6.0 CONSUMER EDUCATION REQUIREMENTS

6.1 Pre-sales education materials meeting the following requirements must be made available to the consumer:

6.1.1 Materials to recommend to the consumer the manufacturer's most appropriate *product* for a variety of U.S. climate zones and all cardinal orientations within each climate zone. This recommendation shall be based upon annual energy performance and/or annual energy cost optimization as predicted by *window* simulation software like RESFEN - A Prototype PC Program for Calculating Residential Fenestration Heating and Cooling Energy Use and Cost, Lawrence Berkeley Laboratory.

6.1.2 Materials must clearly state the *U-value* and the *SHGC* of all recommended *products*.

6.2 In order to minimize long-term *product air infiltration*, proper installation instructions must be provided with the *product*.

7.0 LABELING REQUIREMENTS

7.1 The Green Seal Certification Mark shall appear on the *product* packaging.

7.2 The Green Seal Mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the certification.

7.3 Whenever the Certification Mark appears on a package or *product*, the *product* or package must contain a description of the basis for certification. The description shall be in a location, style, and typeface that are easily readable by the consumer. Unless otherwise approved in writing by Green Seal, the description shall read as follows:

This product meets the Green Seal™ Standard for Windows, GS-13, for governing energy efficiency, heavy metals in the *frame* and *sash* materials, packaging, and consumer education materials.

ANNEX A – Normative

Definitions of Terms

(note that the defined terms are italicized throughout the standard)

Air Infiltration. The exchange of indoor air and outdoor air through *product* components.

Air Leakage Rate (ALR). The volume of air flowing per unit time through leakage paths in the closed *product* under specified temperature and pressure conditions on the indoor and outdoor sides of the *product*.

Fixed Product. Any non-*operable product*.

Frame. The associated head, jamb, sill, and where applicable, mullion and muntin which, when assembled, house the *sash* or fixed *glazing*.

Glazed Exterior Door. Any glazed exterior partition having movable parts, installed on a building wall, capable of admitting solar radiation into the building area, and intended for human entrance and exit from the building with glazed areas greater than 144 square inches per panel.

Glazing. *Product* components which are transparent or semi-transparent to solar radiation.

Heat Transfer Coefficient (U-value). Overall heat transferred, on average in units of time per unit area (ft^2) of the entire *product* when the temperature differential between the indoor and outdoor sides of the *product* is one degree Fahrenheit. The U-value is expressed in $\text{Btu}/\text{hr}/\text{ft}^2/^\circ\text{F}$. The U-value multiplied by the indoor-outdoor temperature difference and the projected area of the entire *product* yields the rate of heat transfer through the entire *product* in Btu/hr .

Operable Product. Any *product* that can be opened for ventilation.

Product. A *window*, *skylight*, *glazed exterior door*, or *storm door*.

Sash. Structural *product* component which provides peripheral support for the *window glazing*.

Skylight. Any glazed partition having fixed or movable parts, installed on a building roof, and capable of admitting solar radiation into the building.

Solar Heat Gain Coefficient (SHGC). The ration of solar energy transmitted through a *product*, from the *products* outdoor side to the indoor side, to the solar energy striking the outdoor side of the *product*, for a given angle of incidence and for a given set of

environmental conditions (indoor/outdoor temperatures, outdoor wind speed, insulation). Included are directly transmitted solar radiation as well as solar energy absorbed and then re-radiated/conducted toward the indoor side.

Storm Door. Any glazed partition having movable parts, installed on a building wall, capable of admitting solar radiation into the building area, and intended for human entrance and exit from the building.

Window. Any glazed partition having fixed or movable parts, installed on a building wall, and capable of admitting solar radiation into the building.

Visible Light Transmission Coefficient (VLTC). The ration of intensity of visible light (wavelength range of 0.38 to 0.78 μm) transmitted through a *product glazing* from the *product's* outdoor side to the indoor side, to the intensity of the visible light striking the outdoor side of the *product*, for a given angle of incidence, a given set of environmental conditions (indoor temperature and outdoor temperature), and a given visible light source.

APPENDIX 1 – Informative

Examples of products included and excluded in the scope of GS-13:

Products Included in GS-13

- *Awning windows*
- *Casement windows*
- *Double-hung windows*
- *Fiberglass doors*
- *Fiberglass windows*
- *Glazed exterior doors (residential)*
- *Patio doors*
- *Skylights*
- *Sliding doors*
- *Sliding windows*
- *Storm doors*
- *Vinyl doors*
- *Vinyl windows*
- *Windows*
- *Wood-framed doors*
- *Wood-framed windows*
- *Residential fenestration products*

Products Excluded from GS-13

- *Commercial doors*
- *Commercial fenestration products*
- *Commercial skylights*
- *Commercial storm doors*
- *Commercial windows*