



# National Fenestration Rating Council Incorporated

NFRC-600-2009: Glossary and Terminology

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## Foreword

The National Fenestration Rating Council has developed a uniform national rating system for fenestration products energy performance characteristics.

The rating system is reinforced by a product certification program where ratings determined by NFRC accredited laboratories are reviewed and authorized by NFRC licensed independent certification and inspection agencies (IA's) as conforming to NFRC requirements. Under the certification program, fenestration manufacturers shall label products using an NFRC certification mark to indicate these ratings.

This document is a uniform glossary and terminology of key terms used in NFRC documents.

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# 1. Introduction

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The National Fenestration Rating Council has developed a uniform national rating system for energy performance characteristics of fenestration products.

The rating system is reinforced by a product certification program where ratings are determined by NFRC accredited laboratories, and then reviewed and authorized by NFRC licensed independent certification and inspection agencies (IA's) as conforming to NFRC requirements.

This document is a uniform glossary and terminology of key terms used in NFRC documents.

The values stated in metric (SI) units shall be regarded as the standard. The inch-pound (IP) units shown in parenthesis shall be for reference only.

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## 2. Purpose and Scope

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This document includes all of the terms that appear in various NFRC documents (standards, certification, etc.). In the event of a conflict between a definition in this document and a definition in another NFRC document, the definition in this document shall prevail.

Any terms not explicitly defined shall have ordinarily accepted meanings such as the context implies.

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## 3. Terms and Definitions

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**Absorptance,  $\alpha$ :** The ratio of the absorbed radiant energy to the total incident radiant energy.

**Accreditation:** Official authorization, approval, or recognition accorded by NFRC to a laboratory based upon specific NFRC qualifications.

**Accreditation Inspection:** A technical assessment of an NFRC-accredited laboratory, either by submitting required documentation, or an on-site inspection of the facility, or both, that is conducted by an NFRC Inspector(s).

**Accreditation Policy Committee, APC:** A standing committee whose members are appointed by the NFRC Board of Directors to manage the NFRC Laboratory Accreditation Program (LAP). See the NFRC Operating Policies Manual for further details.

**Accreditation Program:** The NFRC program administering the LAP as set forth in NFRC 701.

**Accredited Laboratory:** A computer simulation or testing laboratory that has met NFRC Laboratory Accreditation Program (LAP) requirements, has entered into a NFRC laboratory License Agreement, and received a NFRC Certificate of Accreditation, none of which has been revoked.

**Administrator-in-responsible-charge:** The individual responsible for assuring that the quality of services offered and provided by an NFRC-Licensed Independent Certification and Inspection Agency (IA) that provides NFRC certification services in connection with the NFRC Product Certification Program (PCP) complies with the requirements of the Certification Agency Program (CAP) and other applicable NFRC requirements.

**Affiliate:** A person that directly, or indirectly, through one or more intermediaries, controls or is controlled by, or is under common control with another person or organization. The meaning of "affiliation" shall be derived from the definition of "affiliate."

**Air Leakage, AL:** 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.

**Air Mass, AM:** The ratio of the mass of atmosphere along the actual observer-to-sun line to the mass that would exist if the observer was at sea level, at standard barometric pressure and if the sun was directly overhead (at the zenith).

**Ambient Temperature:** Temperature at a given set of environmental conditions.

**Anchor:** Any device used to secure the fenestration product to the building frame.

**Angle of Incidence:** The angle between the solar beam and the normal (perpendicular) to the plane on which it is incident. (The plane of incidence may be the aperture plane, the glazing plane or any other plane of interest)

**Angular Selectivity:** A glazed fenestration product or component thereof whose optical properties vary with the angles of incidence (or direction of incidence.)

**Approved Component:** Glazing, spacer, or frame cross-section of a fenestration product/system for which NFRC component approval has been granted and remains current, in accordance with the requirements of the NFRC.

**Approved Component Library Database:** An electronic database owned and maintained by NFRC which contains peer-reviewed and approved glazing, spacer, and frame component information.

**Application Assessment Report:** An applicant's initial inspection report for licensing and technical competence evaluation results prepared by the NFRC inspector for initial licensing.

#### **Areas, A:**

**Center-of-glazing Area,  $A_c$ :** all glazing areas except those within 63.5 mm (2.5 in.) of any part of a primary sash and/or frame and/or divider; or any part of a primary door and/or frame and/or divider.

**Divider Area,  $A_d$ :** the projected area in the plane(s) parallel to the fenestration product's glazing of all interior or exterior applied non-removable dividers, true dividers, and simulated dividers or between glazing dividers.

**Door Core Area,  $A_{dc}$ :** the projected area of the door less the frame, edge-of-frame, lite glazing frame, edge-of-glazing, center-of-glazing, edge-of-divider, divider, edge-of-panel and panel areas.

**Edge-of-divider Area,  $A_{de}$ :** all glazed vision areas within 63.5 mm (2.5 in.) of any part of a divider area. The edge-of-divider area shall exclude any edge-of-glazing area.

**Edge-of-glazing Area,  $A_{eg}$ :** all glazed vision areas within 63.5 mm (2.5 in.) of any part of the frame and sash or of the door lite frame sight line, excluding any divider or edge of divider.

**Edge-of-panel Area,  $A_{ep}$ :** the projected area extending from the point 25 mm (1 in.) of uniform thickness on the panel, to the point which includes 25 mm (1 in.) of door core material from the interface of any decorative bead or from the interface of the panel cutout and the door core.

**Frame Area,  $A_f$ :** the projected area of frame and sash in the plane(s) parallel to the glazing surface, except for doors, which shall include the projected areas of the door jambs, header, threshold, door bottom sweep and the peripheral structural elements of the door leaf, in a plane parallel to the door core surface.

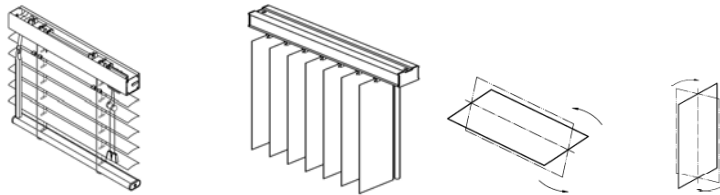
**Lite Frame Area,  $A_{lf}$ :** specific to doors, the projected area extending from the sight line of the lite frame into the surrounding homogeneous door core surface for a distance of 25 mm (1 in.) beyond the outer edge of the lite frame and parallel to the door core surface.

**Panel Area,  $A_p$ :** the projected area of all decorative panels of uniform thickness and extending from a point 25 mm (1 in.) of uniform thickness, in a plane parallel to the door core surface.

**Projected Fenestration Product Area,  $A_{pf}$ :** the area of the rough opening in the wall, for the fenestration product, less installation clearance.

**Total Fenestration Product Area,  $A$ :** the area of the total fenestration product that includes all frame, divider, edge-of-glazing, edge-of-divider and center-of-glazing areas.

**Articulating Fenestration Attachment Products:** Fenestration Attachment Products that can deploy/retract as well as articulate. (Several examples shown below, but not all inclusive.)



**Assembler:** Any person who completes the final assembly of a product authorized for certification from fabricated parts, components, and accessories as supplied by a manufacturer/responsible party in accordance with the product certification, and is authorized by that manufacturer/responsible party to attach the appropriate temporary labels when necessary. An assembler retains the right to become an NFRC-certified manufacturer/responsible party at a future date.

**Attachment:** See Dynamic Attachment or Fenestration Attachment.

**Awning Window:** A window with one or more sash that rotate about its top hinge and projects outward.

**Azimuth:** The angle subtended between two planes, one being the plane passing through the position of the sun and normal to the earth's surface and the other being the plane aligned to true north and normal to earth's surface.

**Baffle:** A shielding surface in a test apparatus located to separate the specimen from the heating or cooling equipment.

**Base Profile:** primary structural member of a fenestration product line, which forms the basis for comparison, such as groupings.

**Baseline Product:** Within a product line, the individual product selected for validation testing.

**Bead:** (1) A strip used around the periphery of the glazing to secure it in a frame or sash (also referred to as a "stop."); (2) A strip of sealant, such as caulking or glazing compound.

**Blackbody:** A perfect emitter and absorber of thermal radiation. A blackbody emits radiant energy at each wavelength at the maximum rate possible as a consequence of its temperature and absorbs all incident radiant flux.

**Blind Competence Evaluation:** An evaluation of an Accredited Laboratory or an IA by NFRC, conducted with no advance notification, in situations where substantial negligence and/or incompetence of the laboratory or the IA is suspected by the APC or the CPC.

**Breather/Capillary Tube:** A tube providing an intentional breach of the IG seals to allow for pressure equalization.

**Calibration Transfer Standard, CTS:** An insulation board that is faced with glazing, instrumented with temperature sensors between the glazing and the insulation board core, which is used to calibrate the surface heat transfer coefficients and the surround panel.

**Caming:** Material that divides and holds pieces of glazing together to form a single decorative glazing panel.

**Casement Window:** A window containing one or more sash hinged to open from the side, that project outward or inward from the plane of the window in a vertical plane. A conventional casement window has a sash that projects outward.

**Cellular shades** – A fenestration attachment product that has a cellular structure. This attachment can be horizontal or vertical.

**Cellular Structure** - Two or more layers joined at the pleats to form compartments or cells that trap air. Cellular construction can be single cell, multiple cell or cell-in-cell.

**Center-of-Glazing:** Referring to thermal or optical properties of a glazing system in that area of the system which is not influenced by the frame, glazing bars, mullions, or other opaque or conducting members of the fenestration product.

**Certificate of Licensing:** Certificate that is issued by NFRC authorizing licensure as an NFRC-licensed entity.

**Certification:** The affixing by a licensed Responsible Party of an NFRC label on a fenestration product, or on a box/packaging containing an attachment product, or the distribution of an NFRC Label Certificate, for which Certification Authorization has been granted.

**Certification Agency Program, CAP:** Set of rules and procedures by which an independent certification and inspection agency becomes licensed and operates.

**Certification Authorization Report, CAR:** Certificate listing performance values of NFRC-rated products that is issued by an NFRC-Licensed IA granting the licensee the authority to affix NFRC Labels on a fenestration product or on the box/packaging containing an attachment product, or to obtain an NFRC Label Certificate, upon PCP compliance by the licensee.

**Certification Examination:** A written or oral test conducted to determine whether IA's are competent to evaluate NFRC tests and simulations and to be designated as Individual-in-responsible-charge.

**Certification Mark:** The distinctive logotype "sun flake" incorporating the initials NFRC in the center and the word "CERTIFIED" appearing at the base that has been registered with the United States Trademark Office and is intended to appear as a component of an NFRC Label or Label Certificate indicating the fenestration product has met the PCP or CMA PCP requirements as applicable.

**Certification Policy Committee, CPC:** A standing committee whose members are appointed by the NFRC Board of Directors to manage the NFRC Certification Agency Program (CAP and to provide interpretations for the NFRC Product Certification Program (PCP). See the NFRC Operating Policies Manual for further details.

**Certification Program:** A term often used for the Product Certification Program (PCP or CMA PCP).

**Certified Fenestration System:** A fenestration system for which an NFRC label certificate is generated or label is affixed, in accordance with the NFRC License Agreement.

**Certified Product:** A fenestration product for which product certification authorization has been granted by a licensed IA, and which is properly labeled in accordance with the requirements of the certification program.

**Certified Products Database:** A database of information for products for which certification authorization has been granted by a licensed IA, for each participant in the Certification Program.

**Certified Products Directory (CPD) Number:** A unique identification number assigned by NFRC to an authorized product.

**Certified Products Directory, CPD:** A directory of fenestration products in electronic form, listing fenestration products and their performance ratings, for which product certification authorization has been granted by a licensed IA, and can be searched by the public.

**Certified Simulator:** Any individual that has attended at least one NFRC-sanctioned Simulation Training Workshop, completed and satisfactorily passed all necessary examinations, participated in NFRC simulation round robins, and is approved by NFRC to use at least one NFRC-approved simulation software tool.

**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.).

**Cladding:** An applied rigid or semi-rigid roll-formed or extruded covering that is placed over or is attached to and follows the contour of the interior or exterior framing member for the primary purpose of protection from environmental elements and/or aesthetics. Cladding adds no structural integrity to the framing member.

**Combination Assembly:** A window, door, or skylight assembly formed by a combination of two or more separate units whose frames are mull together.

**Commercial Building:** All buildings other than detached one and two-family houses, multi-family residential structures not more than four stories above-grade in height, and manufactured houses (mobile or modular homes). Note: This includes, but is not limited to, offices, hotels, restaurants, retail, high-rise residential and entertainment facilities, museums, libraries, schools, hospitals, laboratories, and manufacturing and warehouse facilities.

**Commercial Fenestration:** Fenestration installed in commercial buildings.

**Compliance and Monitoring Program:** A program that establishes activities that are prohibited by law and/or contract, and fines associated with such activities.

**Component:** any glazing, spacer, or frame cross-section, which has been granted approval by NFRC and entered into the component library.

**Component Library:** see Approved Component Library Database.

**Component Manufacturer/Supplier:** Any person or entity who manufactures NFRC approved glazing, spacers, or frame cross-sections which have been granted approval by NFRC procedures and have been entered into the component library.

**Component Modeling Approach Product Certification Program (CMA-PCP):** The program defined by **NFRC 705**.

**Computer Simulation:** The process by which a product is analyzed for energy performance characteristics utilizing NFRC-approved computer software and manufacturer supplied product specifications and drawings, in accordance with the requirements of the NFRC Rating System.

**Condensation Resistance, CR:** A relative indicator of a fenestration product's ability to resist the formation of condensation at a specific set of environmental conditions. The higher the Condensation Resistance value the greater the resistance to the formation of condensation.

**Center-of-glazing Condensation Resistance, CR<sub>c</sub>:** The Condensation Resistance for the central portion of the glazing (i.e., portion of the glazing where 1-D heat transfer effects dominate). CR<sub>c</sub> also includes divider and edge-of-divider portions of the product

**Edge-of-glazing Condensation Resistance,  $CR_e$ :** The Condensation Resistance for the edge portion of the glazing (i.e., portion of the glazing where 2-D heat transfer effects dominate).

**Frame Condensation Resistance,  $CR_f$ :** The Condensation Resistance for the frame portion of the fenestration product.

**Product Condensation Resistance,  $CR$ :** The lower of  $CR_f$ ,  $CR_c$ , and  $CR_e$ .

**Conductance, Thermal,  $k$ :** The time rate of steady state heat flow through a unit area of a material or construction induced by a unit temperature gradient in a direction perpendicular to that unit area.

**Conduction Heat Transfer:** Heat transfer through a solid material by contact of one molecule to the next.

**Control Boundary:** In a fenestration thermal test system, the system boundary, which comprises all thermodynamic systems. It is an imaginary surface which divides the system volume and the surroundings. For an example, a calorimeter system boundary consists of an imaginary surface defined by the exterior surfaces of the surround panel and calorimeter walls.

**Convection Heat Transfer:** A heat transfer process involving motion of a fluid (such as air) caused by either the difference in density of the fluid and the action of gravity (natural convection), or by mechanical forces such as blowers, fans, etc. (forced convection).

**Convective Film Coefficient,  $h$ :** The time rate of convection heat transfer from a unit area of a surface to its surroundings, induced by a unit temperature difference between the surface and the environment.

**Curb:** A wall or frame used to raise roof windows, skylights, or sloped glazing above the surface of the roof.

**Curtain Wall, Curtain Wall System:** An external non-load bearing wall that consists of any combination of framing materials, fixed glazing, opaque glazing, operable windows, or other in-fill materials. See Storefront, Window Wall.

**Debridge:** The process of cutting away the metal on the bottom of a thermal break cavity once the low conductivity polymer has fully cured thereby creating a thermally broken metal extrusion.

**Decorative Panel:** A decorative raised molding on a door leaf.

Deploy (v.) – When a fenestration attachment product is extended to cover the fenestration product

**Dew Point Temperature,  $t_{dp}$ :** The temperature at which water vapor in air will condense at a given state of humidity and pressure.

**Diffuse (adj.):** Referring to radiometric quantities: indicates that flux propagates in many directions, as opposed to a direct beam, which refers to quasi-collimated flux from the sun, whose angular diameter is approximately 0.5 degree. When referring to reflectance, it is the directional hemispherical reflectance less the specular reflectance. Diffuse has been used in the past to refer to hemispherical collection (including the specular component). This use is deprecated in favor of the more precise term hemispherical.

**Diffuser:** A translucent glazing layer or fenestration product accessory designed to transmit direct-beam radiation diffusely, i.e. many directions.

Directional Selectivity: A fenestration product or component thereof whose optical properties vary with the direction of incidence.

**Divider:** Any bar used to separate glazing into multiple lites or placed in the gap between sheets of glazing. Dividers may be external or internal, may be removable or non-removable and may be real (true) or simulated. Dividers may also be called grids, grilles or muntins.

**Door Leaf, Slab:** The pivoted or swinging portion of a door system. Sometimes referred to as a door slab.

**Door, Exterior:** Building component whose primary function is to allow human egress from/to the building.

**Dual Action Window:** A window that operates into two different ways. Typically, the window consists of a sash that tilts from the top and swings inward from the side.

**Dynamic Attachment:** Any Fenestration Attachment that incorporates Dynamic Glazing.

**Dynamic Glazing:** Any Glazing System/Glazing In-fill that has the fully reversible ability to change its performance properties, including U-factor, SHGC, or VT. This includes, but is not limited to, shading systems between the glazing layers and chromogenic glazing.

**Dynamic Glazing Product:** Any Fenestration Product that incorporated Dynamic Glazing.

Edge seal – Any system that eliminates or mitigates the flow of air around the edges of a fenestration attachment product.

**Emissivity,  $\epsilon$ :** The relative ability of a surface to reflect or emit heat by radiation. Emissivity ranges from 0.00 to 1.00. (Blackbody emissivity is 1.0)

**Hemispherical Emissivity,  $\epsilon_h$ :** Emissivity of a surface averaged over all the radial directions of the overspreading hemisphere.

**Normal Emissivity,  $\epsilon_n$ :** Emissivity of a surface into the direction normal to its surface.

**Spectral Emissivity,  $\epsilon_{\lambda}$ ,  $\epsilon_{\lambda, \theta}$ :** Emissivity based on the radiant energy per unit wavelength band.

**Emittance,  $\epsilon$ :** The ratio of the radiant flux emitted by a body to that of a perfect blackbody at the same temperature. Similar to emissivity but applies to a specific object rather than to the inherent material property.

**Emissometer:** Device for measuring the emissivity of a surface over an assigned wavelength interval and over a specified solid angular range (usually confined to the far infrared portion of the electromagnetic spectrum.)

**End Stile Area,  $A_{es}$ :** the projected area of the end stile in the plane(s) parallel to the garage door surface.

**Energy Panel:** A glazed Fenestration Attachment designed to be mounted to the interior or exterior of a primary fenestration product such that a gap is created between the glazing systems of the attachment and the primary fenestration product. This includes, but it not limited to, storm windows, storm doors, and storm panels. Also, see Fenestration Attachment.

Exterior Attachments – Fenestration attachment products located on the outside of the building envelope.

**Fabricated Parts:** pre-machined components assembled to make an NFRC certified fenestration product or component assembly.

**Fabricator:** Any entity (may include a site-built manufacturer or glazing contractor) that receives reissued simulation and validation test reports that are authorized by a lineal supplier to be reissued for certification authorization.

**Family:** Any child, parent, spouse, and/or sibling, including adoptive, grand, in-law, and step relationships.

**Fenestration:** Products that fill openings in a building envelope, such as windows, doors, skylights, curtain walls, etc., designed to permit or limit the passage of air, light, vehicles, or people.

**Fenestration Attachment:** A device (such as, but not limited to, shades, films, or blinds) designed to be physically attached to, incorporated with or covering a fenestration product.

**Film:** Fenestration attachment products which consist of a flexible adhesive-backed polymer film which may be applied to the interior or exterior surface of an existing glazing system. See Fenestration Attachment.

**Financial Interest:** Ownership, whether direct or indirect, of an equity or partnership interest in, a holding of debt or lease to or other similar relationship of a financial nature, but does not include ownership of less than five percent of the outstanding equity securities of a publicly traded corporation or partnership.

**Finish:** The final treatment or coating of a surface.

**Fixed Window:** A window designed to be non-operable.

**Frame:** The enclosing structure of a window, door or skylight which fits into the wall or roof opening and receives either, glazing, sash or vents.

**Frame Cross-Section:** 2-D cross-section of a frame member, which is part of the framing system (also known as frame) of a fenestration product. Frame cross-section may consist of one or more individual pieces, including but not limited to a fixed part of the frame, sash, glazing stop, etc. Note: In a typical window there are several unique frame cross-sections, such as sill, head, jambs, etc.

**Framing Product Line** – A collection of framing sections whose cross-sections can be grouped using the applicable grouping rules for non-residential products. This may include standard sections (head, jamb, sill, etc.) as well as non-standard sections (inside corner, outside corners, etc.) which are used in conjunction with the primary systems to build a complete system on a building.

**Framing System:** Structural component of a fenestration system that retains the fenestration system within the wall or roof opening.

**Free Stream Condition:** A location in an air stream where the effect of the wall is negligible.

**Fritted Glass:** Glass on which a pattern has been created by application of a ceramic material to the glass surface, which is subsequently fused at high temperature.

**Fully CLOSED Position:** The orientation or condition of a Dynamic Glazing Product with a shading system, or a shade/blind fenestration attachment product, that allows the minimum Visible Transmittance (VT) within the design limitations of the product.

**Fully OFF Position:** The orientation or condition of a Dynamic Glazing Product, such as chromogenic glazing, where the glazing is de-energized, de-activated, or otherwise “OFF.”

**Fully ON Position:** The orientation or condition of a Dynamic Glazing Product, such as chromogenic glazing, where the glazing is energized, activated, or otherwise “ON.”

**Fully OPEN Position:** The orientation or condition of a Dynamic Glazing Product with a shading system, or a shade/blind fenestration attachment product, that allows the maximum Visible Transmittance (VT) within the design limitations of the product.

**Gap Width:** The distance between two adjacent glazing surfaces.

**Garage (Vehicular Access) Door:** A door that is used for vehicular traffic at entrances of buildings, such as garages, loading docks, parking lots, factories and industrial plants, that is not generally used for pedestrian traffic, which includes vertical jamb tracks, all divider, edge-of-divider, edge-of-glazing, center-of-glazing, door panel core, edge-of-panel and stile (end cap) areas.

**Gas-fill:** The process of adding a gas between glazing panes. Term typically used to indicate gases other than air, such as argon and krypton.

**Gasket:** Pre-formed shapes, such as strips, grommets, etc., of elastomeric composition, providing continuous sealing of the glazing or frame members.

**Glass:** An inorganic, amorphous substance, usually transparent, composed of silica (sand), soda (sodium carbonate) and lime (calcium carbonate) with small quantities of other materials.

**Glazed wall:** A general term for an assemblage of multiple units of glazing and/or opaque materials connected by a framing system, including curtain wall and window wall systems. See Curtain Wall, Window Wall.

**Glazing Bite:** The dimension by which the framing system overlaps the edge of the glazing infill.

**Glazing Contractor:** An entity that performs and completes the final assembly of a component system authorized for certification from fabricated parts, components, glazing, and accessories as supplied by a manufacturer, lineal supplier or fabricator in accordance with approved assembly instructions.

**Glazing system/Glazing In-fill:** A generic term used to describe an infill material, such as glass, plastic or other transparent or translucent material, or assembly of glazing material, spacer and desiccant, used to enclose openings in a building created by a specific framing system.

**Glazing:** The act of installing the glazing system/glazing in-fill. n, The transparent or semi-transparent infill material in a glazing system.

**Greenhouse/Garden Window:** A window unit that consists of a three-dimensional, five-sided structure generally protruding from the wall in which it is installed. Operating sash may or may not be included.

**Grid(s):** See Divider.

**Group Leader:** The single option defined as representing all other options in that group for purposes of grouping.

**Grouping:** The process of reducing the number of individual options by selecting the worst performing option, as representative.

**Head:** The horizontal member forming the top of the fenestration product frame.

**Heat Flux,  $q$ :** The heat flow rate through a surface of unit area perpendicular to the direction of heat flow in units of energy per unit time and per unit area.

**Hinged Escape Window, Rescue Window:** Any primary window that is mounted into a stationary perimeter frame and is permanently hinged at one jamb.

**Holographic Glazing:** Glazing with a thin-film microstructure or coating which diffracts incident light.

**Homogeneous Material:** A material in which relevant properties are not a function of the position within the material.

**Horizontal Sliding Window:** A window that contains one or more manually operated sash that slide horizontally within a common frame.

**Hung Window:** Vertically sliding window with one or more balanced sashes.

**Hybrid Tubular Daylighting Device, HTDD:** A TDD whose light transmitting tube consists of more than one material and/or has more than one geometry throughout its length. Typically used with suspended ceilings or to illuminate spaces without ceilings.

**IA Program:** A term often used for the Certification Agency Program (CAP).

**Independence Criteria:** The requirements set forth in the certification program to ensure independence of participating entities.

**Independent Certification and Inspection Agency, IA:** An organization or person authorized by license to conduct specified services for the Certification Program.

**Individual Product:** Any one specific fenestration product within a product line, specific to weather seals, glazing method, hardware, opening/non-opening configurations, ventilators, weep systems, and sills.

**Individual-in-responsible-charge:** The individual who is responsible for ensuring that the quality of services offered and provided in connection with the Certification Program comply with the listed requirements.

**Inset Mount:** An installation type where a skylight is mounted directly into the roof deck (as opposed to a curb mount.)

**Inside Reveal Mount** – Method of attaching fenestration attachment products so they can be deployed or retracted inside the window reveal of the building.

**Inspector:** One or more individuals authorized to act on behalf of NFRC in connection with certain activities, including but not limited to, conducting laboratory inspections, IA inspections, or other inspections.

**Insulating Glass (IG) Fabricator:** An entity that assembles the components to form an insulating glass unit (IGU).

**Insulating Glass Unit (IGU), Sealed Insulating Glass Unit:** a preassembled unit, comprising lites of glass, which are sealed at the edges and separated by dehydrated space(s). The unit is normally used for windows, window walls, picture windows, sliding doors, patio doors, or other types of fenestration.

**Insulative flat panels** – A fenestration attachment product made from any combination of material with a rigid flat panel frame.

**Integrating Sphere:** An optical device used to either collect flux reflected or transmitted from a sample into a hemispherical solid angle or to provide isotropic irradiation of a sample from a complete hemispherical solid angle. It consists of a cavity that is approximately spherical in shape with apertures for admitting and detecting flux and usually having additional apertures over which the sample and reference specimens are placed.

**Inter-Agency Comparison, IAC:** Organization, performance, and evaluation of certification authorization processes by two or more certification agencies in accordance with predetermined results and/or submissions.

**Inter-Laboratory Comparison, ILC:** Organization, performance, and evaluation of the same test sample or simulation by two or more laboratories in accordance with predetermined conditions.

**Interlayer:** A layer of material acting as an adhesive between layers of glazing.

**Irradiance:** A radiometric term for the radiant flux in any or all directions in a hemispherical solid angle that is incident upon, passing through, or leaving a surface.

**Interior Attachments** – Fenestration attachment products located on the inside of the building envelope.

**Jal-Awning Window:** A window consisting of a multiplicity of top-hinged sashes arranged in a vertical series within a common frame, each operated by its own control device that swings the bottom edges of the sash outward.

**Jamb:** The vertical members of a fenestration product frame.

**Knocked Down Product, KD :** A fenestration product supplied by a licensed manufacturer/responsible party in an unassembled or partially assembled state, which requires further assembly at the jobsite.

**Label Certificate:** A document used in lieu of an NFRC Temporary Label specific to certain products that have received certification authorization. See NFRC 705.

**Label:** permanent and/or temporary marker or device applied to a fenestration product, listing rating information and indicating compliance with certification requirements.

**Laboratory Accreditation Program, LAP:** Set of rules and procedures by which a laboratory becomes accredited and operates.

**Laboratory Quality Control Manual:** A document, internal to a testing or simulation laboratory, that clearly describes and mandates rules and procedures of a laboratory seeking to become or remain an Accredited Laboratory to ensure that services performed or to be performed are accurate, repeatable and generally of a high quality.

**Laminated Glass:** Two or more sheets of glass bonded together with one or more interlayers of transparent plastic to which the glass adheres if broken, conforming to ASTM C1172.

**License Agreement:** A written agreement entered into between licensing parties where they agree to comply with all applicable program requirements (e.g., CAP, LAP, and PCP).

**Licensee:** Any entity entering into an NFRC License Agreement and meeting the NFRC PCP requirements.

**Lineal Supplier:** A company/responsible party that manufactures lineals (i.e., frame/sash profile components made from vinyl, aluminum, wood, fiberglass, or other materials), and supplies those lineals to a fabricator.

**Lite:** Another term for glazing used in a fenestration product. Frequently spelled “lite” in industry literature to avoid confusion with “light,” as in “visible light.”

**Low-E Coating:** Microscopically thin metal, metal oxide or multilayer coating, deposited on a glazing surface to reduce its thermal infrared emittance.

**Manufacturer Code:** A unique alpha code assigned to the licensee by NFRC.

**Manufacturer Identification number:** A unique numeric code assigned to the licensee by NFRC.

**Manufacturer:** Any entity that manufactures fenestration components, whole fenestration products, or fenestration attachments. A manufacturer may be a single plant/fabricator or a single company with multiple plants/fabricators or a combination thereof.

**May:** Action referred to is permitted but not required.

**Monolithic (adj.):** Glazing consisting of a single pane of transparent material (glass or plastic).

**Mullion:** A structural member connecting two or more products. Mullions may be of the following types:

**Integral Mullion:** A member bounded at both ends by crossing frame members.

**Combination Mullion:** A member formed by joining two or more individual fenestration products together with or without an additional reinforcing member (mullion stiffener).

**Nail Flange, Nailing Fin:** An extension of a fenestration product frame that generally laps over the conventional stud construction and through which fasteners are used to secure the frame in place.

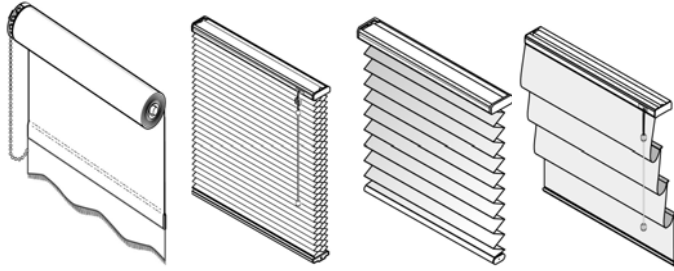
**Near-normal/Hemispherical (adj.):** Indicates nearly normal irradiance impinging upon the specimen surface and leaving the surface into an entire hemispherical solid angle.

**New products:** Products not in production that may be submitted for validation testing in support of initial certification authorization.

**NFRC Inspector:** One or more individuals authorized to act on NFRC’s behalf in connection with certain activities, including but not limited to, conducting inspections under the NFRC programs.

**NFRC Upload Spreadsheet:** A Microsoft Excel® spreadsheet formatted for transferring NFRC calculated values and data to an NFRC certification database.

**Non articulating fenestration attachment product:** Fenestration attachment product that can only deploy or retract and does not articulate. (Below are several examples, but not all inclusive)



**Non-residential Building** – See Commercial Building.

**Non-residential Fenestration System** – See Commercial Fenestration System.

**Non-thermally broken members:** System members with less than 1.6 mm (1/16 in.) or no separation between metal or system members to provide a resistance heat transfer path from exterior to interior.

**Normal (adj.):** Referring to the direction perpendicular to a surface.

**Notice of Probation:** A written notice issued by NFRC allowing for continued licensing but requiring the fulfillment of specific conditions, e.g., monitoring, education, supervision, reporting, etc.

**Notice of Revocation:** A written notice issued by NFRC withdrawing the grant to an NFRC-licensed entity of its NFRC License and its rights under its License Agreement, including but not limited to, the rights to participate in the Licensing Program, to issue test or simulation reports, to issue product certification authorization, and utilize NFRC's name, trade names and certification marks. Issuance of a notice of revocation requires immediate cessation of all NFRC-related activities by the recipient.

**Notice of Suspension:** A written notice issued by NFRC advising an NFRC licensee that its license has been suspended by NFRC for a certain duration until remedial action is taken. If remedial action is not taken within the timeframe required, a Notice of Revocation may be issued.

**Obscure Glazing:** Glazing having an image, pattern, or texture that distorts the vision through the glazing.

**Opaque (adj.):** Not allowing visible light to pass through.

**Opaque In-fill Systems:** Fenestration systems that include opaque elements. See Spandrel.

**Operating Policies:** The policies and procedures by which NFRC conducts its operations as set forth in the Operating Policies Manual.

**Operator Type, Product Type :** a designation used to distinguish among fenestration products based on mode of operation, and the intended use of the installed product as defined by the manufacturer.

**Outdoor Air Ventilator Assembly, OAVA:** An apparatus independent from, but installed into a fenestration product, for controlling the transfer of air through the product.

**Outdoor Wetted Length (OWL):** measured from the interface between frame and glazing to the first adiabatic boundary on the outdoor side

**Outside Reveal Mount** - Method of attaching fenestration attachment products so they can be deployed over and outside of the window reveal of the building.

**Parent Company:** A licensee meeting PCP requirements who has signed an NFRC License Agreement to participate in the Certification Program. The licensee lists on its Schedule I more than one plant (or fabricator) for which the licensee is responsible.

**Patterned Glazing:** Glazing in which a design has been incorporated onto one or both surfaces.

**Permeance:** A measure of the transmission of a fluid through a material.

**Pivoted Window:** A window consisting of a sash which pivots about an axis within the frame.

**Pleated shade** – A fenestration attachment products made from a single layer of pleated flexible material.

**Polarization:** The condition of electromagnetic waves in which the transverse motion or field of the wave is confined to a plane or ellipse.

**Prismatic Glazing:** A daylighting device; a light-redirecting glazing with a fine-structure saw tooth cross-section, designed to refract incident sunlight and skylight in a preferential direction.

**Private Labeler:** An entity that contracts with a fenestration product manufacturer to have a product manufactured under the private labeler's brand name for distribution in the market place. A private labeler may or may not participate as an NFRC licensee.

**Product Certification Authorization:** The authority granted by an NFRC-Licensed IA to an NFRC Licensee to affix NFRC Labels, or obtain an NFRC Label Certificate, evidenced by a Certification Authorization Report (CAR) or Label Certificate issued by the IA.

**Product Certification Program (PCP):** The NFRC program for granting of authorization to licensees to label products under the NFRC energy rating system.

**Product Line:** A series of individual fenestration products of the same operator type, manufactured from the same profiles. Individual variations such as glazing, spacer, or small variations in frame profiles are considered individual products within product lines.

**Production Line Unit:** A fenestration product produced on the licensee's production line.

**Profile angle:** The angular difference between a horizontal plane and a plane tilted about a horizontal axis in the plane of the fenestration product until it intersects the sun.

**Profile:** Referring to the cross-sectional geometry or property of a frame, sash, or its component.

**Projected Frame Depth (PFD):** representing projection in the plane of glazing measured from the sightline to the end of the frame as viewed from the indoor side.

**Projecting Products:** A non-planar fenestration product where the glazing projects outward past its frame (i.e., skylights, tubular daylighting devices, garden windows).

**Pyranometer:** a device used to measure the total solar radiant energy incident upon a surface per unit time per unit area.

**Pyrheliometer:** A radiometer used to measure the direct or beam solar irradiance incident on a surface normal to the sun's rays.

**Quality Control Auditor:** A manufacturer's representative(s) who is (are) responsible for implementing and maintaining all provisions of the Quality Control Manual.

**Quality Control Manual:** An internal document that clearly describes and mandates quality control rules and procedures a manufacturer shall follow in order to obtain product certification authorization.

**Radiant Flux:** The time rate of flow of energy in the form of electromagnetic waves or photons.

**Radiation:** The transfer of heat in the form of electromagnetic waves or photons from one body to another.

**Radiometer:** Instrument for measuring irradiance in energy or power units.

**Rail:** A horizontal member of a fenestration product sash or panel.

**Rating Procedure:** An NFRC approved document describing all the necessary steps to obtain a rating (i.e., NFRC 100, NFRC 200, etc).

**Rating System:** A system that consists of NFRC simulation and test procedures for determining comparative fenestration product energy performance characteristics, as supported by the Certification Program.

**Rating:** Performance values obtained using NFRC-approved procedures used for comparative purposes only (i.e., U-factor, SHGC, VT, etc.).

**Reference Fenestration Product:** The fenestration product that an attachment is combined with for the purposes of rating. A reference fenestration product comprises a reference glazing system and a reference frame with a specified construction.

**Reference Frame:** The frame of the reference fenestration product. This may or may not correspond to an actual frame type available commercially.

**Reference Glazing System:** The glazing system in the reference fenestration product.

**Reflectance:** The ratio of the reflected radiant flux to the incident radiant flux.

**Registered Mark:** The distinctive NFRC logo, which has been registered with the United States Trademark Office and is intended to appear as a component of the label to indicate that the fenestration product to which the label is affixed, has met the requirements of the NFRC Product Certification Program.

**Reissued Report:** A simulation or test report originally issued to an NFRC-licensed Lineal Supplier that is reissued by an NFRC-accredited simulation or testing laboratory to a Fabricator identified on the Lineal Supplier's Schedule III.

**Relative Humidity, RH:** the ratio of the amount of water vapor in the air compared to the maximum amount of water vapor that the air could hold at a particular temperature and pressure.

**Representative Size:** The actual size of a specimen used for validation testing.

**Resistance, Thermal, R:** A property of a substance or construction which retards the flow of heat.

**Responsible Party:** The entity (manufacturer, fabricator, lineal supplier, building owner, architect, door distributor, or other party) that signs an NFRC License Agreement. The responsible party agrees to comply with all applicable program requirements.

**Retract (v.)** - When a fenestration attachment product is manipulated to uncover the fenestration product

**Roller shades, Solar shades, Roller Shutters** - A fenestration attachment product that can be retracted and rolled onto the shaft.

**Rolling Door**-A door used for vehicular traffic at entrances of buildings, such as garages, loading docks, parking lots, factories and industrial plants, generally not used for pedestrian traffic, and includes door core (vertically connecting horizontal slats), side edge-of-door (including vertical guides), top edge-of-door and bottom edge-of-door.

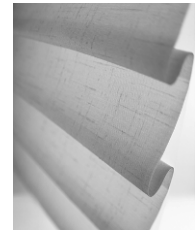
**Roof Window:** See Skylight/Roof Window.

**Rough Opening:** The framed opening in a wall or roof where a fenestration product is to be installed.

**Sash:** The portion of a fenestration assembly that is installed in a frame and includes the glazing, stiles, and rails. A sash may be operable or fixed.

**Sealant:** A flexible material placed between two or more parts of a structure, with adhesion to the joining surfaces, to prevent the passage of certain elements such as air, moisture, water, dust, and other matter.

**Shade** – A fenestration attachment product with horizontal panels that has one of several styles including, but not limited to: flat roman (figure 1), hobbled, and soft fold, and can be made with or without backing. (See *non articulating fenestration attachment product* for image)



**Figure 1-Roman Shade**

**Shall:** Action referred to is mandatory.

**Sheer shade** – A fenestration attachment product made from a woven/knit material with or without soft or semi-rigid louvers. This product can have following construction: a) A single layer of sheer material without louvers; b) A single layer of sheer material with louvers on the back; c) Two parallel layers of sheer material with a horizontal vane in between the two layers of fabric. This product can be horizontal or vertical.

**Shutter** – A fenestration attachment product that is rigid and usually consisting of a frame of vertical stiles and horizontal rails (top, center and bottom). Set within this frame can be louvers (both operable and inoperable) and/or solid panels that can be mounted within a frame.

**Sidelite:** A fenestration product that is used as a companion product installed on one or both sides of a door. Sidelites may consist of a glazed frame or a non-operable sash within a frame.

**Sight Line:** The perimeter of the daylight opening where the opaque member (frame, sash or divider) intersects the glazing.

**Sill:** The bottom horizontal member in a fenestration product frame.

**Simulation Software:** Any computer software used for Computer Simulation.

**Simulator-In-Responsible-Charge, SIRC:** The individual(s) responsible for assuring that the quality of services offered and provided by an Accredited Simulation Laboratory are in full compliance with the LAP. An SIRC shall have successfully completed an NFRC Simulation Accreditation Workshop, passed an NFRC Simulation Accreditation Examination, attended an NFRC Annual Accreditation Workshop, and participate in any ILC evaluations in accordance with the LAP.

**Single Glazed, Single Glazing:** Glazing that is just one layer of glass or other glazing material (as opposed to sealed insulating glass or glazing).

**Site-Built Products:** Fenestration products that are designed to be field glazed or field assembled and are comprised of specified framing and glazing components.

**Skylight/Roof Window:** A window designed for sloped or horizontal application, the primary purpose of which is to provide daylighting and/or ventilation. Typically, the term roof window is not used for horizontal applications.

**Slab:** Part of a hinged door system, glazed or unglazed, surrounded by a frame. Slabs may be fixed or operable.

**Sliding Door:** A door that contains one or more manually operated panels that slide horizontally within a common frame.

**Sloped Glazing:** A glazed system that is mounted at a slope greater than 15° from the vertical plane.

**Solar (adj):** (1) Referring to radiometric quantities, indicating that the radiant flux involved has the sun as its source or has the relative spectral distribution of solar flux; (2) referring to an optical property, having as its weighting function a standard solar spectral irradiance distribution.

**Solar Calorimeter:** An insulated enclosure with an aperture into which a fenestration system is inserted for measuring solar heat gain.

**Solar Heat Gain Coefficient, SHGC:** The ratio of the solar heat gain entering the space through the fenestration product to the incident solar radiation. NFRC rates SHGC at normal incidence.

**Solar Heat Gain, SHG:** The quantity of incident solar energy passing through a fenestration system. Included are both directly transmitted solar radiation as well as solar energy absorbed by the fenestration system and re-transmitted into the inside space.

**Solar Irradiance, Average:** The time average of solar irradiance.

**Solar Irradiance, Global:** The solar irradiance incident upon an upward-facing horizontal surface, including direct beam and diffuse sky radiation.

**Solar Intensity, I:** The quantity of radiant flux per unit solid angle in a specified direction.

**Solar Irradiance, E:** The quantity of radiant flux incident upon a surface from all directions and over all wavelengths per unit area.

**Solar Radiation:** Electromagnetic radiation covering the spectral range from 300 to 4000 nm coming from either natural direct beam solar radiation or from an artificial radiation source having a similar spectral distribution.

**Solar-Air Heat Transfer Coefficient Meter:** An insulated flat black plate in the same plane and solar exposure as the test specimen, used to measure the instantaneous exterior surface heat transfer coefficient.

**Spacer System:** The assembly consisting of the spacer and primary and/or secondary sealant(s).

**Spacer:** The component that separates and maintains the space between the glazing surfaces of an insulating glass unit (IGU), excluding any sealants.

**Spacer Manufacturer:** The entity that produces a spacer, which has been granted approval in accordance with the NFRC 705 and is entered into the component library.

**Spandrel:** The opaque areas of a building envelope which typically occur at locations of the floor slabs, columns, and immediately below roof areas.

**Spandrel Area:** The area of the spandrel infill between the primary sash or frame members.

**Specifying Authority:** The entity that specifies the fenestration products/ systems on a commercial or non residential project to meet design and performance requirements. The Specifying Authority enters into a license agreement with NFRC and obtains an NFRC label certificate for a project. This entity may be, but is not limited to, an architect, engineer, or supplier.

**Spectral (adj):** Indicating that the property or quantity was evaluated at a specific wavelength,  $\lambda$ , within a small wavelength interval,  $\Delta\lambda$  about  $\lambda$ . Usually indicated by placing the wavelength symbol  $\lambda$ , as a subscript following the symbol for the quantity, as with  $E_{\lambda}$ , thereby indicating that the flux-related quantity is a concentration of flux at the indicated wavelength, or it may be placed inside parentheses following the symbol for the material property, as with  $\alpha(\lambda)$ . It is permissible to indicate the wavelength dependence of a flux quantity as follows:  $E_{\lambda}(\lambda)$ .

**Specular (adj.):** Indicating that the flux leaves a surface or medium at an angle of reflection or transmission numerically equal to the angle of incidence.

**Standard Framing System Product** – The framing sections (head, jamb, sill, etc.) within a Framing Product Line which is required to fabricate a standard size and configuration fenestration product per NFRC 100, Table 4-3.

**Steady-state Conditions:** Conditions that do not change appreciably over time.

**Storefront:** A non-residential system of doors and windows mullered as a composite structure; typically designed for high use/abuse and strength. The storefront system is usually installed between the floor and ceiling of the building.

**Storm Window** – A glazed fenestration attachment product designed to be mounted to the interior or exterior of a primary fenestration product such that a gap is created between the glazing systems of the attachment and the primary fenestration product. This is sometimes called an energy panel.

**Structurally glazed framing:** A method of glazing where framing members are generally not exposed to the exterior (i.e., 2-sided or 4-sided structural glazed).

**Sunroom/Solarium:** A multi sided structure comprised of a high percentage of glazed area vs. framing area, usually attached to the exterior of a building.

**Surface Heat Transfer Coefficient, Surface Conductance, Film Coefficient, h:** The time rate of heat flow between a surface and its surroundings per unit area, and per unit temperature difference.

**Surround Panel:** A homogeneous material of known low conductivity that supports the test specimen.

**Swinging Door With Frame:** A door system having, at a minimum, 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.

**Thermal Break, Thermal Barrier:** A component made of material of relatively low thermal conductivity, which is inserted between two components having high thermal conductivity, in order to reduce heat transfer.

**Thermal Bridge:** A path of high thermal conductance from the exterior to interior surfaces of a system that has lower thermal conductance in all other areas. An example would be metal fasteners penetrating an insulating wall or thermally broken frame.

**Thermal Conductivity, k:** Heat transfer property of materials expressed in units of energy per time per length per degree temperature difference.

**Thermal Transmittance, U-Factor, U:** See U-factor.

**Thermally Broken Members, TB:** System members with a minimum of 5.30 mm (0.210 in.) separation provided by a thermal break.

**Thermally Improved Members, TI:** System members with a separation  $\geq 1.60$  mm (0.062 in.) provided by either a thermal break or open air space that may be interrupted by short thermal bridges between the interior and exterior surfaces.

**Threshold:** See Sill.

**Tilt Angle:** The angle from horizontal at which the fenestration is positioned.

**Time Constant:** The time required to come to within  $1/e$  (37%) of the final value of the applicable parameter following a step disturbance of the measurement system.

**Tinted Glazing:** Glazing colored by incorporation of additives or surface coatings.

**Translucent (adj.):** Permitting light to pass through but with differing degrees of obscuration and diffusion.

**Transmittance:** the ratio of the transmitted radiant flux to the incident radiant flux.

**Transom:** A non-operable fenestration product that is used as a companion product installed above another fenestration product. Transoms may consist of a glazed frame or a non-operable sash within a frame. For purposes of complying with NFRC procedures, transoms shall not exceed 800 mm (30 in.) in height. [Note: Products that exceed 700 mm (27 in.) in height are rated as fixed windows.]

**Transparent (adj.):** Permitting light to pass through with clear vision.

**Tropical Awning Window:** A window consisting of one or more top hinged or pivoted sash, operated by one control device, which swings the bottom edge of the sash outward. A single control or operating device operates all sash, securely closing them at both jambs without the use of any additional manually controlled locking devices.

**Tubular Daylighting Device, TDD:** A non-operable device primarily designed to transmit daylight from a roof surface 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. See also Hybrid Tubular Daylighting Device.

**U-Factor, Thermal Transmittance, U:** 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.

**Validation Matrix:** Two or more product lines whose U-Factor can be validated by a single test.

**Vertical Sliding Window:** A window that contains at least one manually operated sash that slides vertically within a common frame.

**Visible Transmittance, VT:** The ratio of visible radiation entering the space through the fenestration product to the incident visible radiation, determined as the spectral transmittance of the total fenestration system, weighted by the photopic response of the eye and integrated into a single dimensionless value. Weighted by a standard solar spectrum.

**Weather strip:** A flexible component used to reduce air leakage or water penetration or both between the sash or panels and/or sash or panels and frame.

**Wetted Area, Wetting Surface:** The entire exposed surface area.

**Window Wall:** A type of wall or window system installed between floors or between floor and roof. Also referred to as a strip window or horizontal ribbon window system. See Curtain Wall, Storefront.

**Window:** An assembled unit consisting of a frame/sash component holding one or more pieces of glazing functioning to admit light and/or air to an enclosure.

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## 4. Referenced Documents

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1. **NFRC 100-2004:** Procedure for Determining Fenestration Product U-factors.
2. **NFRC 101-2004:** Procedure for Determining Thermo-Physical Properties of Materials for Use in NFRC-Approved Software Programs.
3. **NFRC 102-2004:** Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.
4. **NFRC 200-2004:** Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
5. **NFRC 201-2004:** Procedure for Interim Standard Test Method for Measuring the Solar Heat Gain Coefficient of Fenestration Systems Using Calorimetry Hot Box Methods.
6. **NFRC 300-2004:** Test Method for Determining Solar Optical Properties of Glazing Materials and Systems.
7. **NFRC 301-2004:** Standard Test Method for Emittance of Specular Surfaces Using Spectrometric Measurements.
8. **NFRC 400-2004:** Procedure for Determining Fenestration Product Air Leakage.
9. **NFRC 500-2004:** Procedure for Determining Fenestration Product Condensation Resistance Values.
10. **NFRC 500UG-2004:** User Guide to NFRC 500: Procedure for Determining Fenestration Product Condensation Resistance Rating Values.
11. **NFRC 702:** Certification Accreditation Program Manual
12. **NFRC 701:** Laboratory Accreditation Program Manual
13. **NFRC 700:** Product Certification Program Manual
14. **NFRC 705-Component Modeling Approach Product Certification Program Manual (CMA-PCP)**
15. **University of Massachusetts-2004.** Fenestration Glossary and Terminology
16. **ASHRAE Terminology of HVAC&R, ASHRAE, Inc., Atlanta, 1991**