



UL 102

Standard for Sustainability for Door Leafs

Standard for Sustainability for Door Leafs, UL 102

First Edition, Dated March 22, 2012

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INTRODUCTION

1 General

1.1 This document contains requirements to serve as the basis for evaluating door leafs for sustainability.

1.2 For the majority of products going into buildings, no clear definition or requirements exist to assess the sustainability of these products. The environmental impact caused by the manufacture and use of building and construction materials creates an opportunity to address such sustainability issues in these requirements. These requirements will address these issues within the category of doors.

1.3 The impacts of extraction through production and ultimate disposal are often left to a broad sweeping statement of sustainability without a true definition of what that means. There are various alternative constructions, materials, manufacturing practices and even disposal options that can minimize environmental burdens.

1.4 These requirements provide a life cycle and human health-based approach to setting the criteria to be achieved. The requirements reflect the major areas of impact and provide a criteria structure that will allow manufacturers to demonstrate that any product meeting these requirements has made significant gains towards becoming sustainable.

1.5 This document contains items identified as “notes” that are provided as either explanatory material or to direct the reader to another related provision of these requirements. These notes shall not be considered as requirements of the criteria.

2 Scope

2.1 These requirements establish multiple attribute sustainability requirements for swinging door leafs as sold for a final product. These requirements do not include the hardware or frame for mounting the doors during use. However, when considering the thermal and mechanical performance of the door, it will be considered as a part of the larger system which might include the frame and hardware as appropriate for the test method.

2.2 The sustainability criteria in these requirements were developed based on the life cycle stages of doors. Sustainability factors considered in these requirements are: materials, energy, manufacturing and operations, health and environment, product performance, and product stewardship. Credit for innovations in these, or other factors not listed, is also addressed in these requirements.

3 Units of Measurement

3.1 For the purposes of these requirements, values shall be reported in accordance with the requirements of the specific criteria and shall be in metric units. If a manufacturer's choice of units deviates, that change shall be documented and justified as to the reason and relevance for that change.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the criteria of these requirements shall be interpreted as referring to the latest edition of that code or standard. The exception shall be in the case where the criterion explicitly states a certain version or date to be used.

5 Glossary

5.1 For the purpose of these requirements, the following definitions apply.

5.2 ACIDIFICATION – The process of becoming acid or being converted into an acid.

5.3 AIR LEAKAGE – The volume of air flowing per unit of time through the test chamber and test apparatus, exclusive of the air flowing through the test specimen, under a test pressure difference and test temperature difference, converted to standard conditions. (Reprinted from NFRC 400.)

5.4 ALTERNATIVE ENERGY – Fuel sources that are other than those derived from fossil fuels or nuclear power. Includes, but is not limited to, wind, solar, biomass, wave and tidal energy.

5.5 ALTERNATIVE RESOURCES – Resources other than raw or virgin material, including but not limited to bio-based materials, recycled/reclaimed content.

5.6 BIO-BASED CARBON – Carbon materials that are derived in whole or part from biomass resources. Biomass resources are organic materials that are available on a renewable or recurring basis such as crop residues, wood residues, grasses, and aquatic plants.

5.7 BIOACCUMULATE – The ability of a chemical to accumulate within an organism over time. [Note – See Appendix D for additional information]

5.8 BIOLOGICALLY ACTIVE – Substances that invoke a cellular response.

5.9 BIOPERSISTENT – A chemical or physical (fiber, particulate) toxicant that is not readily degraded in the environment or within the organism. [Note – See Appendix D for additional information]

5.10 CARCINOGEN – A chemical that can cause cancer in animals or humans. [Note – See Appendix D for additional information]

5.11 CHEMICAL ABSTRACT SERVICE (CAS) NUMBER – A unique numerical identifier assigned to every chemical by the CAS division of the American Chemistry Council.

5.12 CHRONIC REFERENCE EXPOSURE LEVEL – An airborne level of a substance that would pose no significant health risk to individuals indefinitely exposed to that level.

5.13 CO₂ EQUIVALENT – A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "million metric tons of carbon dioxide equivalents (MMTCO₂Eq)." The carbon dioxide

equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP. The use of carbon equivalents (MMTCE) is declining. (Reprinted from EPA Glossary of Climate Change Terms, <http://www.epa.gov/climatechange/glossary.html#5>)

5.14 DEMATERIALIZATION – Reduction in the mass of materials used during production of a product.

5.15 DOOR LEAF, SLAB – The pivoted or swinging portion of a door system; sometimes referred to as a door slab. (Reprinted from NFRC 600)

5.16 ELECTRICAL ENERGY – The ability of electric current to produce work, heat, light, or other forms of energy. It is measured in kilowatt hours. (Reprinted from Department of Energy <http://www.eia.doe.gov/glossary/index.cfm>).

5.17 ENDOCRINE DISRUPTOR – A chemical, such as environmental estrogen, that can interfere with the natural hormones found in an organism by mimicking an endogenous hormone.

5.18 ENVIRONMENTAL FATE – The processes by which chemicals move and are transformed in the environment. Environmental fate processes that should be addressed include: persistence in air, water, and soil; reactivity and degradation; migration in groundwater; removal from effluents by standard waste water treatment methods; and bioaccumulation in aquatic or terrestrial organisms. [Note – See Appendix D for additional information]

5.19 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) – Part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects. (Reprinted from Environmental management – Vocabulary, ISO 14050)

5.20 ESTROGENIC ACTIVITY – That which causes estrus in animals or has an action similar to that of an estrogen.

5.21 EUROPEAN UNION (EU) HAZARD CLASSIFICATION – The EU's system of classification, labeling and packaging chemical substances and mixtures. The Classification, Labeling and Packaging (CLP) Regulation incorporates the classification criteria and labeling rules agreed upon at the United Nations level in the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

5.22 EUTROPHICATION – The process whereby a body of water receives excess nutrients that stimulate excess plant growth, usually resulting in the depletion of dissolved oxygen.

5.23 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. (Reprinted from NFRC 600)

5.24 FOSSIL FUEL – Hydrocarbon deposit, such as petroleum, coal, or natural gas, derived from living matter of a previous geologic time that is used for fuel.

5.25 FREE MONOMER – A monomer that is not bound/complexed with other monomers or molecules.

5.26 GLAZING – An infill material such as glass or plastic; the process of installing an infill material into a prepared opening in windows, doors, Tubular Daylighting Devices, roof windows, or unit skylights.

5.27 GLOBAL WARMING – An average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common

usage, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities. (Reprinted from EPA Glossary of Climate Change Terms, <http://www.epa.gov/climatechange/glossary.html#5>)

5.28 GREENHOUSE GAS – Gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. (Reprinted from Environmental management – Vocabulary, ISO 14050)

5.29 GLOBAL REPORTING INITIATIVE (GRI) – A sustainability reporting framework that can be used to measure and report on the economic, environmental, and social performance of an organization.

5.30 HAZARDOUS MATERIAL IDENTIFICATION SYSTEM (HMIS) – A numerical hazard rating developed by the National Paint & Coatings Association (NPCA) as a compliance aid for the Occupational Safety & Health Administration (OSHA) Hazard Communication Standard.

5.31 HIGH CONSERVATION VALUE FORESTS (HCVF) – Forests of outstanding and critical importance due to their environmental, socio-economic, cultural, biodiversity and landscape value.

5.32 HOMOGENOUS – Uniform composition throughout. Examples include individual types of plastics, ceramics, glass, metals, alloys, paper, board, resins coatings. (Reprinted from UK RoHS Guidance –Producer Support Booklet)

5.33 HOMOGENOUS MATERIAL – A material that cannot be mechanically disjointed into different materials. (Reprinted from UK RoHS Guidance – Producer Support Booklet)

5.34 INHERENT TOXICITY – The hazard a substance presents to an organism. It is demonstrated by the concentration of a substance that produces a toxic effect in an organism, tested under laboratory conditions or in other studies.

5.35 LIFE CYCLE ASSESSMENT (LCA) – Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle. (Reprinted from Environmental management – Vocabulary, ISO 14050)

5.36 LIFE CYCLE IMPACT ASSESSMENT – Phase of life cycle assessment aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts for a product system throughout the life cycle of the product. (Reprinted from Environmental management – Vocabulary, ISO 14050)

5.37 LIFE CYCLE INVENTORY – Phase of life cycle assessment involving the compilation and quantification of inputs and output for a product throughout its life cycle. (Reprinted from Environmental management – Vocabulary, ISO 14050)

5.38 MANUFACTURER – A company which fabricates and/or assembles one or more parts, components, and/or accessories or supplies entire fenestration systems.

5.39 MICROBIAL RESISTANCE – The selection of anti-microbial resistant organisms (fungi, mold, bacteria) over time as a result of the use of biocides applied to doors and/or its component ingredients to reduce or inhibit mold growth.

5.40 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) HAZARD CLASSIFICATION – The hazardous materials marking system set by Standard System for the Identification of the Hazards of Materials for Emergency Response, NFPA 704.

5.41 **NATURAL DISTURBANCE** – Periodic natural events, such as the natural fire cycle, blowdown, or native pests, that disrupt ecosystem, community or population structure and change resources, substrate availability, or the physical environment.

5.42 **NATIVE SPECIES** – A species that occurs naturally with respect to a particular ecosystem, rather than as a result of an accidental or deliberate introduction into that ecosystem by humans.

5.43 **OZONE DEPLETION** – The destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life.

5.44 **PER UNIT** – Per door leaf/slab.

5.45 **PHOSPHOGYPSUM** – The primary byproduct of phosphate fertilizer production contains trace amounts of radioactivity and has been banned from most uses in the United States by EPA.

5.46 **PHOTOCHEMICAL SMOG FORMATION** – The process by which smog is formed during the chemical reaction of sunlight, nitrogen oxides and volatile organic compounds in the atmosphere, which leaves airborne particles (called particulate matter) and ground-level ozone.

5.47 **PLANTATION** – A large farm where crops or trees for lumber are cultivated for sale.

5.48 **POST-CONSUMER RECYCLED CONTENT** – Material used by an end-user which is no longer being used for its intended purpose.

5.49 **PRE-CONSUMER RECYCLED CONTENT** – Material diverted from the waste stream during a manufacturing process having never reached the end user. Excluded is the reutilization of materials generated in a manufacturing process and capable of being reused as a substitute for raw material without being modified in any way.

5.50 **PRIMARY ENERGY DEMAND** – The demand for energy found in nature that has not been subjected to any conversion or transformation process. It is energy contained in raw fuels as well as other forms of energy received as input to a system.

5.51 **PRODUCT STEWARDSHIP** – Manufacturer supported efforts to extend a product's life, or handling of the products at the end of life. End of life handling may include, but is not limited to, updating, refurbishing, or recycling of products through take-back programs.

5.52 **RAPIDLY RENEWABLE MATERIAL** – Natural, non-petroleum-based building materials, such as agrifibers, bamboo, or cork, that have harvest cycles under 10 years.

5.53 **RECYCLED CONTENT** – The proportion of pre-consumer and post-consumer recycled material, by mass, in a product or packaging.

5.54 **RENEWABLE ENERGY** – Energy derived from resources that are naturally replenished and can be sustained indefinitely. Potential sources include, but are not limited to, solar electric (photovoltaic), solar thermal, wind, geothermal, bio-gas, biomass, low-impact hydro and renewable cogeneration on-site or off-site, on- or off-grid. It is recommended that supporters of renewable energy, through the purchase of RECs and utility delivered products, seek third party certification, such as Green-e, EcoLogo or equivalent

5.55 **RENEWABLE ENERGY CERTIFICATE (REC)** – Is equivalent to 1000 kWh of Renewable Energy. A REC represents the property rights to the environmental, social, and other non-power qualities of renewable electricity generation. An REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source.

5.56 **REPRODUCTIVE/DEVELOPMENTAL HAZARD** – A chemical that can interfere with normal reproduction, mating through parturition (birth), of a species. A reproductive hazard may affect the reproductive organs of the male and/or female of a species. A developmental hazard is one that affects the developing organism and can cause a range of effects from fetal death to malformation of the offspring.

5.57 **RESIDUAL STAND** – The portion of the growing stock retained after an intermediate cutting.

5.58 **SOLAR ENERGY** – Radiant light and heat from the sun that can be harnessed and used as a source of renewable energy.

5.59 **SOLAR HEAT GAIN COEFFICIENT (SHGC)** – The ratio of the solar heat gain entering the space through the fenestration product to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and that portion of the absorbed solar radiation which is then reradiated, conducted, or convected into the space. (Reprinted from NFRC 200)

5.60 **SPECIES DIVERSITY** – A measure of the diversity within an ecological community that incorporates both species richness (the number of species in a community) and the evenness of species' abundances. Evenness measures the variation in the abundance of individuals per species within a community.

5.61 **SUCCESSIONAL PHASES** – Predictable and orderly changes in the composition or structure of an ecological community. Succession may be initiated either by formation of new, unoccupied habitat or by some form of disturbance of an existing community.

5.62 **SUSTAINABLE AGRICULTURE** – Agricultural production that integrates three main goals: environmental health, economic profitability, and social and economic equity.

5.63 **THERMAL ENERGY** – Energy generated and measured by heat of any kind. The sun, ocean, and geothermal sources can all be sources of thermal energy.

5.64 **THERMALLY INSULATING** – A coating that, when applied, reduces heat transfer.

5.65 **TOTAL VOLATILE SULFUR COMPOUNDS (TVSC)** – Concentration of all sulfur containing Volatile Organic Compounds. See Volatile Organic Compounds.

5.66 **TOXICOLOGICAL ASSESSMENT** – A review of existing data and/or use of structure-activity evaluations to estimate hazards of a chemical.

5.67 **U-FACTOR, THERMAL TRANSMITTANCE** – Heat transmission in unit time through unit area of a material or construction and the boundary air films, induced by unit temperature difference between the environments on each side. (Reprinted from ASHRAE 90.1)

5.68 **VOLATILE ORGANIC COMPOUNDS (VOC)** – Carbon-containing compounds that evaporate easily at room temperature.

5.69 WASTE – Material from the generator or holder that does not possess characteristics or meet technical specifications for use in the marketplace without further processing and will be discarded or released to the environment.

5.70 WASTE MINIMIZATION – The practice and processes by which a manufacturer reduces the amount of waste generated during the production of their product.

COMPLIANCE, EVALUATION AND ASSESSMENT CRITERIA

6 Compliance Documentation

6.1 To comply with these requirements, a manufacturer shall provide to the assessing body the necessary documentation of the specific achievement level and necessary supporting documentation for the candidate product. As an example, documentation can be in the form of, but not limited to, invoices, energy bills, test reports, certificates, calculations with supporting basis for information, etc. Manufacturers shall also provide to the assessing body a declaration of the scoring of the product to these requirements and the desired level of achievement.

6.2 The methodology for assessing whether a product conforms to the requirements shall be documented and be of sufficient detail to provide confidence that the product has correctly conformed to these requirements. The product manufacturer shall document the specific criteria to which conformance are being claimed in accordance with the Achievement Matrix, Appendix B. Manufacturers that self-declare to these requirements shall follow the guidelines in ISO 14021, Environmental labels and declarations - Self-declared environmental claims (Type II environmental labeling). Documentation and detailed results of any verification shall not be made publicly available without manufacturer consent.

6.3 Door manufacturers shall declare in writing that their communications regarding the use of these requirements and applicable sections comply with the Federal Trade Commission Guides for the Use of Environmental Marketing Claims at 16 C.F.R. 260 for accurate, reliable, and documented communications. This declaration shall also state that “both the express and implied meaning of the certification about the data, responses to information, and provisions of the requirements, is reasonable and based on competent and reliable scientific evidence prepared by qualified professionals in the relevant area, using procedures to produce accurate and reliable results.”

6.4 Products shall be reevaluated at least every three years or when changes to materials, processes or the manufacturing facilities occur that may impact compliance results to these requirements, following a product's assessment to these requirements.

7 Evaluation and Assessment Criteria

7.1 General

7.1.1 The requirements in Evaluation and Assessment Criteria, Section 7, describe how the categories and point levels are associated. For each criterion within each category, the total number of possible points is specified. Overall, a maximum of 119 points are available for exterior doors and 108 for interior doors, not including innovation points. No more than ten innovation points, as described in these requirements, are permitted to be assigned to a candidate product.

7.1.2 When evaluation for a credit results in a fractional point value, the point value recorded in the Achievement Matrix for that credit shall be the fractional value rounded down to the nearest whole number. Fractional points from one credit shall not be combined with fractional points from other credits.

7.1.3 Beyond the prerequisites, no minimum number of points is required from within each category specifically in order to demonstrate compliance with these requirements. The total number of points required may be obtained by any combination of total points available.

7.2 Levels of achievement

7.2.1 Three levels of achievement are available within these requirements: Silver, Gold, and Platinum. Table 7.1 below identifies the levels, with the associated points needed to achieve each level. The interior door achievement levels reflect that 12.2 and section 25 do not apply to interior doors.

Table 7.1
Achievement level requirements

Level of Achievement	Exterior Points Required	Interior Points Required
Silver	45	38
Gold	59	50
Platinum	73	62

7.3 Categories

7.3.1 The requirements are divided into seven categories utilizing a combination of prerequisites and optional points that are available to applicants seeking compliance with these requirements. The maximum number of points for each category is shown in Table 7.2.