



*NSF International Standard /
American National Standard*

NSF/ANSI 457 - 2017

**Sustainability Leadership
Standard for Photovoltaic
Modules**



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Foreword²

This American National Standard, NSF/ANSI 457 Sustainability Leadership Standard for Photovoltaic Modules, has been developed as part of the ongoing efforts of a number of interested parties to document and improve the sustainability performance profile of photovoltaic modules using established and advanced scientific principles, practices, materials, and standards.

The purpose of this Standard for Photovoltaic modules is to establish product sustainability performance criteria and corporate performance metrics that exemplify sustainability leadership in the market. These performance criteria are intended to form the basis of conformity assessment programs, such as third-party certification or registration.

Suggestions for improvement of this Standard are welcome. This Standard is maintained on a Continuous Maintenance schedule and can be opened for comment at any time. Comments should be sent to Chair, Joint Committee on Sustainability Leadership Standard for Photovoltaic Modules at standards@nsf.org, or NSF International, Standards Department, P.O. Box 130140, Ann Arbor, Michigan 48113-0140, USA.

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NSF/ANSI Standard
for Sustainability—

Sustainability Leadership Standard for Photovoltaic Modules

1 General

1.1 Purpose

The purpose of this Standard for Photovoltaic (PV) modules is to establish product sustainability performance criteria and corporate performance metrics that exemplify sustainability leadership in the market.

The Standard provides a framework and standardized set of performance objectives for manufacturers and the supply chain in the design and manufacture of PV module components. For purchasers, this Standard provides a consensus-based definition of key sustainability attributes and performance metrics, alleviating individual purchasers from the arduous and complex task of defining sustainability performance for PV modules. This Standard can be used within an established system for the identification of sustainability/environmentally preferable products by purchasers and to provide market recognition for conforming products and brand manufacturers.

This Standard was developed based on the principle that only sustainability leadership products, those in the top third of the market, are expected to qualify to the Standard at the Bronze level at the date of publication of the Standard. Only a few products are expected to meet the highest performance level (Gold) at the date of publication of the Standard.

This Standard will be continually maintained and periodically reviewed to ensure that the definition of sustainability leadership, as reflected in the performance criteria, progresses with the evolution of technology and services and sustainability/environmental improvements in the product sector.

1.2 Scope

This is a sustainability leadership Standard for PV modules. The scope of this Standard includes PV modules for installation on, or integral with buildings, or to be primarily used as components of free-standing power-generation systems, including but not necessarily limited to:

- photovoltaic cells that generate electric power using solar energy
- interconnects (materials that conduct electricity between cells)
- encapsulant (insulating material enclosing the cells and cell interconnects)
- superstrate (material forming primary light-facing outer surface) and substrate (material forming back outer surface) (e.g., glass, plastic films)
- wires used to interconnect photovoltaic modules and connect junction boxes to the balance of system equipment
- frame or integrated mounting mechanism, if present

The following are not included:

- balance of system equipment, such as cabling and mounting structures, equipment intended to accept the electrical output from the array, such as power conditioning units (inverters) and batteries, unless they are contained in the photovoltaic module
- a photovoltaic cell that is a part of another device for which it produces the electricity, such as consumer or industrial electronic products (e.g. calculators, lights, textile) where the photovoltaic cell primarily provides the energy needed to make the electronic product function
- mobile photovoltaic cell where the inverter is so integrated with the photovoltaic cell that the solar cell requires disassembly before recovery

This Standard establishes measurable criteria for multiple levels of sustainability/environmental leadership achievement and performance throughout the lifecycle of the product. This Standard addresses multiple attributes and environmental performance categories including management of substances, preferable materials use, life cycle assessments, energy efficiency and water use, responsible end-of-life management and design for recycling, product packaging, and corporate responsibility.

2 References

2.1 Normative references

The following referenced documents are required for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies. European Union Directives, which contain the adoption date in their title, shall not be treated as “dated standards or regulations”. Unless explicitly indicated otherwise, when a European Union Directive is referenced in this Standard, a new or updated European Union Directive shall apply as the referenced Directive upon its enforcement date.

ANSI/AIHA/ASSE Z10, Occupational Health and Safety Management System³

ANSI 50021 – Superior Energy Performance®— Additional Requirements for Energy Management Systems

ANSI 50028 - Superior Energy Performance® – Requirements for verification bodies for use in accreditation or other forms of recognition

California Safer Products Alternatives Analysis –CA Code of Regulations Title 22, Division 4.5, Chapter 55, Article 5, Sections 69505.5-69505.7⁴

Candidate List of Substances of Very High Concern (SVHC)⁵

Conflict Free Sourcing Initiative (CFSI)⁶

DIN 6120-1 - Marking of packaging and packaging materials for recycling purposes - Plastics packaging and packaging materials - Part 1: Graphical symbols⁷

³ ASSE International Office, 901 Canterbury, Suite A, Westlake, OH 44145 <www.asse.org>

⁴ DTSC Headquarters 1001 I Street Sacramento, CA 95814-2828 <www.dtsc.ca.gov>

⁵ European Chemicals Agency P.O.Box 400 00121 Helsinki, Finland <www.echa.europa.eu>

⁶ CFSI 1737 King Street Suite 330 Alexandria, VA 22314 <www.conflictreesourcing.org>

⁷European Standards Krimicka 134 318 13 Pilsen < Czech Republic VAT: CZ7908212026 <www.en-standard.eu>