



*NSF International Standard /
American National Standard*

NSF/ANSI 347 - 2012a

Sustainability Assessment for Single Ply Roofing Membranes



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Chair, Joint Committee on Roofing Membranes
c/o NSF International
789 North Dixboro Road, P.O. Box 130140
Ann Arbor, Michigan 48113-0140 USA
Phone: (734) 769-8010 Telex: 753215 NSF INTL
FAX: (734) 769-0109
E-mail: info@nsf.org
Web: <http://www.nsf.org>

NSF International Standard/
American National Standard
for Sustainability –

Sustainability assessment for single ply roofing membranes

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Foreword²

This American National Standard, NSF/ANSI 347 Sustainability Assessment for Single Ply Roofing Membranes Standard, has been developed as part of the ongoing efforts of a number of interested parties to document and improve the sustainability profile of roofing membranes using established and/or advanced scientific principles, practices, materials, and standards. Stakeholders involved in developing the Standard included membrane manufacturers, industry consultants, architects and engineers that specify roofing materials, trade associations, national regulatory agencies that regulate either environmental practices or roofing specifications, and non-governmental organizations. The scope of this standard includes, but is not limited to, Ethylene Propylene Diene Terpolymer (EPDM), Ketone Ethylene Ester (KEE), Poly Vinyl Chloride (PVC), Thermoplastic Polyolefin (TPO), and Polyisobutylene (PIB) products. The standard is applicable to products manufactured in one or multiple facilities, and in one or multiple countries.

The purpose of the Sustainability Assessment for Single Ply Roofing Membranes Standard is to establish consistent requirements for sustainable roofing membrane products. These requirements are intended to form the basis of conformity assessment programs, such as third-party certification or registration.

The Sustainability Assessment for Single Ply Roofing Membranes Standard has been designed, in part, to meet the following goals:

- Facilitate communication of information that is verifiable and accurate about the environmental and social impacts associated with the production and use of Single Ply Roofing Membranes.
- Provide transparency and offer credibility for manufacturers in making claims of environmental preferability and sustainability, and to harmonize the principles and procedures used to support such claims.
- Provide framework for assessing the sustainability attributes of Single Ply Roofing Membranes that allows the tracking of incremental changes in the product over time and the comparison of different products that perform similar functions.

These requirements are intended to form the basis of conformity assessment programs, such as third-party certification or registration.

This version of the Standard incorporates the following revisions:

Issue 2

Normative references have been updated. Sections 5.7, 5.8 and 6.5, and 7.3.2.1, 7.3.2.3 and 7.4.1 have been modified to improve clarity.

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

² The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

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NSF International Standard for Sustainability –

Sustainability assessment for single ply roofing membranes

1 General

The overall purpose of this Standard is to facilitate communication of information that is verifiable and accurate, about the environmental and social impacts associated with the production and use of single ply roofing membranes. Such communication is expected to encourage the demand for and supply of products that cause less stress on the environment and society, thereby stimulating the potential for continuous market-driven improvement.

This Standard is intended to provide transparency, and offer credibility for manufacturers in making claims of environmental preferability and sustainability, and to harmonize the principles and procedures used to support such claims.

This Standard provides a framework for assessing the sustainability of single ply roofing membranes. Sustainability related information should be used to guide a manufacturer's decisions about supply chain modifications, product content changes, manufacturing adjustments, performance improvements, end-of-life options, and corporate governance, with the goal of producing more sustainable products.

This Standard addresses environmental performance and sustainability attributes of single ply roofing membranes, and provides a means to track incremental changes to the products' sustainability profile. This Standard is intended to provide a framework to compare and assess the sustainable nature of different products performing similar functions.

This Standard is intended to be used by product manufacturers, suppliers, and others interested in understanding the sustainability performance of single ply roofing membranes. Independent auditors, certification bodies and environmental labeling organizations are also potential users of this Standard for its use in supporting market based environmental and sustainability claims. This Standard should also be used by purchasers and consumers, including building owners and designers who wish to ensure the accuracy of manufacturer claims relative to the sustainable nature of their products.

1.1 Scope

This Standard establishes an approach to the evaluation of the sustainability of single ply roofing membranes. The Standard includes criteria across the product life cycle from raw material extraction through manufacturing, use, and end-of-life management.

As used in this Standard, "Single Ply Roofing Membrane" includes, but is not limited to, EPDM (Ethylene Propylene Diene Terpolymer), KEE (Ketone Ethylene Ester), PVC (Poly (Vinyl Chloride), TPO (Thermoplastic Polyolefin), and PIB (Polyisobutylene) products. The Standard is applicable to products manufactured in one facility or multiple facilities, one country or multiple countries.

1.2 Principles

This standard practice was developed based on the following important principles.

1.2.1 Life cycle consideration

The life cycle of a product considers activities associated with the sourcing or extracting of natural resources, production and delivery of raw materials and finished product, use and maintenance of the product, and the final disposal at the end of its service life. This Standard was developed with consideration of the life cycle stages of Single Ply Roofing Membrane to help identify the appropriate and relevant characteristics and criteria to be used in evaluating a product's environmental preferability and sustainability.

1.2.2 Relationship with legislation

A precondition for claiming conformance with this Standard shall be compliance with environmental and other relevant regulations promulgated by authorities having jurisdiction.

1.2.3 International trade aspects

The procedures and requirements included within this Standard are not intended to create unnecessary barriers to international trade.

1.2.4 Scientific basis

The measurable criteria contained in this Standard were developed and selected based on sound scientific and engineering principles intended to produce accurate, reproducible results.

1.2.5 Product innovation

Use of this Standard is intended to support innovation that maintains or has the potential to improve environmental and social accountability performance.

2 References

The following documents contain provisions that, through reference, constitute provisions of this Standard. At the time this Standard was balloted, the editions listed below were valid. All documents are subject to revision, and parties are encouraged to investigate the possibility of applying the recent editions of the documents indicated below.

2.1 Normative references

ANSI/ASHRAE/IESNA 90.1-2010 – Energy Standard for Buildings Except Low-Rise Residential Buildings³

ASTM D4434 / D4434M, Standard Specification for Poly(Vinyl Chloride) Sheet Roofing⁴

ASTM D4637 / D4637M, Standard Specification for EPDM Sheet Used In Single-Ply Roof Membrane⁴

³ American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, N.E. Atlanta, GA 30329. <www.ashrae.org>.

⁴ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. <<http://www.astm.org>>.

ASTM D6754, Standard Specification for Ketone Ethylene Ester Based Sheet Roofing⁴

ASTM D6878, Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing⁴

ASTM D7067, Standard Specification for Reinforced White PIB Sheet Used in Roofing Membrane⁴

ASTM E108, Standard Test Methods for Fire Tests of Roof Coverings⁴

NOTE – For ASTM references, the standard referenced in the normative references will be the most current version of the standard.

District Rule 1113 – 2001, *Architectural Coatings*⁵

District Rule 1168 – 2005, *Adhesive and Sealant Applications*⁶

Environment Canada, National Pollutant Release Inventory (NPRI)⁷

Canadian Construction Material Center (CCMC) Technical Guidance⁸

Global Reporting Initiative (GRI) Sustainability Reporting Framework, G3 Guidelines⁹

International Code Council Evaluation Service (ICCES)¹⁰

International Labour Organization (IARC), Monographs on the Evaluation of Carcinogenic Risks to Humans, International Agency on the Research of Cancer¹¹

International Labour Organization (ILO), Convention 29, Forced Labour Convention, 1930¹²

International Labour Organization (ILO), Convention 105, Abolition of Forced Labour Convention, 1957¹²

International Labour Organization (ILO), Convention 182, Worst Forms of Child Labour Convention, 1999¹²

International Organization for Standardization, (ISO), ISO 14001: 2004, Environmental management systems – Requirements with guidance for use¹³

⁵ South Coast Air Quality Management District, 21865 Copley Dr, Diamond Bar, CA 91765. <<http://www.arb.ca.gov/drdb/sc/cur.htm>>.

⁶ Cool Roof Rating Council, 1610 Harrison Street, Oakland, CA 94612. <<http://www.coolroofs.org>>.

⁷ Environment Canada, 200 Sacre-Coeur Blvd., Gatineau, Quebec K1A 0H3 Canada. <<http://www.ec.gc.ca/inrp-npri>>.

⁸ National Research Council of Canada, 1200 Montreal Road, Bldg. M-58, Ottawa, Ontario Canada. <www.nrc-cnrc.gc.ca/ccmc>.

⁹ Global Reporting Initiative, PO Box 10039, 1001 EA, Amsterdam, The Netherlands. <<http://www.globalreporting.org>>.

¹⁰ International Code Council Evaluation Service (ICCES) 5360 Workman Mill Road, Whittier, CA 90601. <<http://www.icc-es.org>>.

¹¹ International Agency for Research on Cancer (IARC), 150 Cours Albert Thomas, 69372 Lyon CEDEX 08, France. <<http://monographs.iarc.fr/index.php>>.

¹² International Labour Organization, 4 route des Morillons, CH-122 Genève 22, Switzerland. <<http://www.ilo.org>>.

¹³ ..International Organization for Standardization (ISO), 1 ch. de la Voie-Creuse, Case postale 56, CH-1211 Geneva, Switzerland. <<http://www.iso.org>>.

International Organization for Standardization, (ISO), ISO 14020: 2000, Environmental labels and declarations – General principles¹³

International Organization for Standardization, (ISO), ISO 14025: 2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures¹³

International Organization for Standardization, (ISO), ISO 14040: 2006, Environmental management – Life cycle assessment – Principles and framework¹³

International Organization for Standardization, (ISO), ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines¹³

International Organization for Standardization, (ISO), ISO 14064-1: 2006, Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals¹³

International Organization for Standardization, (ISO), ISO 14064-2: 2006, Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements¹³

International Organization for Standardization, (ISO), ISO 14064-3: 2006, Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions¹³

International Organization for Standardization, (ISO), ISO 9000, Quality Management¹³

International Responsible Care Initiative, Responsible Care Management System® (RCMS®)¹⁴

Maplecroft, Map of Human Rights Risk¹⁵

National Institute of Standards and Technology (NIST), Building for Environmental and Economic Sustainability (BEES) software¹⁶

Organisation for Economic Co-operation and Development, Measuring Capital: OECD Manual¹⁷

State of California Environmental Protection Agency, Proposition 65, Safe Drinking Water and Toxic Enforcement Act of 1986 – Chemicals Known to the State to Cause Cancer or Reproductive Toxicity¹⁸

Social Accountability International, SA8000:2008, *Social Accountability*¹⁹

Stockholm Convention on Persistent Organic Pollutants (POPs) – Annex A, B, and C²⁰

Underwriters Laboratory, UL-790.8 - 2004, Standard Test Methods for Fire Tests of Roof Coverings²¹

¹⁴ International Responsible Care Initiative. <<http://responsiblecare.org>>.

¹⁵ Maplecroft, The Towers, St Stephen's Road, Bath, BA1 5JZ, United Kingdom. <<http://www.maplecroft.com>>.

¹⁶ National Institute of Standards and Technology (NIST), Building and Fire Research, 100 Bureau Drive, Stop 8600, Gaithersburg, MD 20899-8600. <<http://www.nist.gov/bfrl>>.

¹⁷ OECD, 2, rue Andre' Pascal, 75775 Paris Cedex 16, France. <<http://oecd.org>>.

¹⁸ OEHHA (Office of Environmental Health Hazard Assessment), 1001 Street, P.O. Box 2815, Sacramento, CA 95812-2815. <<http://www.oehha.org/prop65>>.

¹⁹ Social Accountability International, 15 West 44th Street, 6th Floor, New York, NY 10036. <<http://www.sa-intl.org>>.

²⁰ United Nations Environment Programme, Stockholm Convention. 11-13, Chemin des Anémones – 1219 Châtelaine, Switzerland. <<http://chm.pops.int>>.

US Department of Energy, National Renewable Energy Laboratory (NREL), U.S. Life Cycle Inventory Database²²

US Department of Health and Human Services, National Toxicology Program (NTP), Report on Carcinogens²³

US Environmental Protection Agency (USEPA), ENERGY STAR Roof Products Key Product Criteria²⁴

US Environmental Protection Agency (USEPA), Great Lakes Binational Toxics Strategy (Level I and II Substances)²⁵

US Environmental Protection Agency (USEPA), Integrated Risk Information System (IRIS) database²⁶

US Environmental Protection Agency (USEPA), National Waste Minimization Program, Priority Chemicals²⁷

US Environmental Protection Agency (USEPA), Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)²⁸

US Environmental Protection Agency (USEPA), Toxics Release Inventory (TRI) Program²⁹

US Environmental Protection Agency (USEPA), Toxics Release Inventory (TRI) Program – Persistent, Bioaccumulative, and Toxic (PBT) Chemicals Rules³⁰

US Occupational Safety and Health Administration (OSHA) – Regulated Toxic Metal or Carcinogen³¹

2.2 Informational references

ASTM C1549, Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer⁴

²¹ Underwriters Laboratories, 2600 N.W. Lake Rd. Camas, WA 98607-8542. <<http://www.ul.com>>.

²² U.S. Department of Energy's National Renewable Energy Laboratory (NREL), 1617 Cole Blvd., Golden, CO 80401. <<http://www.nrel.gov/lci/>>.

²³ National Toxicology Program (NTP): U.S. Department of Health and Human Services, Public Health Service, Research Triangle Park, NC 27709. <<http://ntp.niehs.nih.gov/>>.

²⁴ US EPA, ENERGY STAR Hotline (6202J), 1200 Pennsylvania Ave NW, Washington, DC 20460 <<http://www.energystar.gov>>.

²⁵ US EPA, Great Lakes Binational Toxics Strategy, 1200 Pennsylvania Ave NW, Washington, DC 20460 <<http://www.epa.gov/greatlakes/p2/bns.html#Appendix I>>.

²⁶ US EPA, Integrated Risk Information System (IRIS), 1200 Pennsylvania Ave NW, Washington, DC 20460 <<http://www.epa.gov/IRIS>>.

²⁷ US EPA - Office of Resource Conservation and Recovery, 1200 Pennsylvania Avenue, NW, Washington, DC 20460. <<http://www.epa.gov/epawaste/hazard/wastemin/index.htm>>.

²⁸ US EPA - Office of Research and Development, National Risk Management Research Laboratory, Sustainable Technology Division – Systems Analysis Branch (MS-466), 26 West Martin Luther King Drive, Cincinnati, OH 45268 <<http://www.epa.gov/nrmrl/std/sab/traci>>.

²⁹ US EPA - TRI Reporting Center, PO Box 10163, Fairfax, VA 22038. <<http://www.epa.gov/tri/index.htm>>.

³⁰ US EPA - TRI Reporting Center, PO Box 10163, Fairfax, VA 22038. <<http://www.epa.gov/triinter/lawsandregs/pbt/pbtrule.htm>>.

³¹ US Occupational Safety and Health Administration (OSHA), 200 Constitution Ave., NW, Washington, DC 20210. <www.osha.gov>.