

GREEN SEAL™ PROPOSED REVISED ENVIRONMENTAL STANDARD FOR PAINTS AND COATINGS (GS-11)

1.0 SCOPE

This standard establishes environmental requirements for paints and coatings. The standard includes wall, floor and reflective coatings, primers and undercoats and rust preventative coatings. The standard does not include stains¹, clear finishes, recycled (consolidated or reprocessed) latex paint, specialty paints (industrial, marine and automotive coatings), or paint sold in aerosol cans.

2.0 DEFINITIONS

2.1. Carcinogen: A chemical listed as a known, probable, or possible human carcinogen by the International Agency for Research on Cancer (IARC) (Groups 1, 2A, and 2B), the National Toxicology Program (NTP) (Groups 1 and 2), the U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) (weight-of-evidence classifications A, B1, B2, and C), or the Occupational Safety and Health Administration (OSHA).

2.2. Colorant: Concentrated color (dyes or pigments) that can be added to paints or coatings to make specific colors. Unless specified otherwise, it is the maximum amount of colorant recommended for use by the manufacturer.

2.3. Flat: Paints or coatings whose specular gloss level at 60° registers less than 5 as measured by ASTM D523-89(1999), *Standard Test Method for Specular Gloss*.

2.4. Hazardous Air Pollutant (HAP): Any compound listed by the U.S. Environmental Protection Agency in the Clean Air Act Section 112(b) (1) as a hazardous air pollutant.

2.5. Ingredient: Any constituent of a product that is intentionally added or known to be a contaminant that comprises at least 0.01% by weight.

2.6. Intentional Introduction: The act of deliberately utilizing a material prohibited in the standard in the formation of a package or packaging component where its continued presence is desired in the final package or packaging component to provide a specific characteristic, appearance, or quality.

2.7. Mutagen: A chemical that meets the criteria for category 1, chemicals known to induce heritable mutations or to be regarded as if they induce heritable

¹ Under ASTM D16-03, *Standard Terminology for Paint, Related Coatings, Materials, and Applications* STAIN is defined as “a penetrating composition that changes the color of a surface, usually transparent and leaving practically no surface film”.

mutations in the germ cells of humans, under the Harmonized System for the Classification Of Chemicals Which Cause Mutations in Germ Cells (UN, 2003)².

2.8. Non-Flat: Paints or coatings whose specular gloss level at 60° registers 5 or greater as measured by ASTM D523-89(1999), *Standard Test Method for Specular Gloss*.

2.9. Ozone-Depleting Compounds: Any compound with an ozone-depletion potential greater than 0.01 (CFC 11=1).

2.10. Paints: Liquid, liquefiable, or mastic composition that is converted to a solid adherent film after application to a substrate as a thin layer and is used for decorating, protecting, identifying or to serve some functional purpose such as the filling or concealing of surface irregularities or the modification of light and heat radiation characteristics and is intended for on-site application to interior or exterior surfaces of residential, commercial, institutional or industrial buildings.

2.11. Primer: The first coating applied to a substrate for surface preparation or to provide adhesion for subsequent coatings.

2.12. Post-Consumer Material: Finished products, packages or materials generated by a business or consumer that have served their intended end uses, and that have been recovered from or otherwise diverted from the waste stream for the purpose of recycling.

2.13. Recovered Material: Material that has been recovered from or otherwise diverted from the waste generated after a material manufacturing process. Recovered material may include post-consumer material, cuttings, trimmings, obsolete inventories, and rejected unused stock, but does not include material capable of being re-used within the process that generated it.

2.14. Recyclable Package: The package can be collected in a substantial majority of communities, separated or recovered from the solid waste stream and used again, or reused in the manufacture or assembly of another package or product through an established recycling program.

2.15. Reflective Coating: Coatings designed and intended for the modification of light and heat radiation characteristics.

2.16. Reproductive Toxin: A chemical listed as a reproductive toxin (including developmental, female, and male toxins) by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Code of Regulations, Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, et. Seq.).

² United Nations Economic Commission for Europe, *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*. First Edition 2003.

2.17. Rust Preventative Coatings: Coatings formulated and recommended for use in preventing the corrosion of ferrous metal substrates.

2.18. Topcoat: The outermost layer of a paint or coating.

2.19. Undercoat: The first of two or more coats of a paint or coating.

2.20. Volatile Aromatic Compound: Any hydrocarbon compound containing one or more 6-carbon benzene rings in the molecular structure with an initial boiling point lower than or equal to 250°C measured at standard conditions of pressure.

2.21. Volatile Organic Compound (VOC): Any organic compound which participates in atmospheric photochemical reactions as defined by U.S. Environmental Protection Agency in 40 CFR §51.100 (s), (s) (1) and/or has an initial boiling point lower than or equal to 250°C measured at standard conditions of pressure.

3.0 PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS

3.1. All paints and coatings under GS-11 shall meet the following performance requirements unless specified otherwise. All applicable performance requirements shall include the paint or coating with colorant.

3.1.1. Adhesion. The product shall demonstrate a minimum of 50% or better rating for wet and dry adhesion over wood, masonry, aged alkyd and vinyl as determined by ASTM D3359-2 *Standard Test Methods for Measuring Adhesion by Tape Test*.

3.1.2. Applicability (Flow and Leveling). The product shall demonstrate a minimum 6 rating for foaming, leveling, and spatter resistance as determined by ASTM D7073-05 *Standard Guide for Application and Evaluation of Brush and Roller Applied Paint Films*.

3.1.3. Flexibility. The product shall show no signs of cracking, peeling or loss of adhesion as determined by ASTM D522-93a (2001) *Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings*.

3.1.4. Temperature Stability. The product shall not thicken, skin, or show any coarse particles as determined by ASTM D1849-95(2003) *Standard Test Method for Package Stability of Paint*.

3.2. In addition to requirements in 3.1, primers and undercoats shall meet the following requirements:

3.2.1. Hiding Power (Opacity). The product shall demonstrate a minimum 0.98 contrast ratio at 400 square feet per gallon as determined

by ASTM D2805-96a (2003), *Standard Test Method for Hiding Power of Paints by Reflectometry*. Compliance will be determined on dried film of the un-tinted white paint having a minimum 80% reflectance.

3.3. In addition to the requirements listed in 3.1, floor coatings shall meet the following requirements:

3.3.1. Alkali Resistance. The product shall show no signs of lifting, wrinkling, disintegration or more than a slight color change as determined by ASTM D7072-04 *Standard Practice for Evaluating Accelerated Efflorescence of Latex Coatings*.

3.3.2. Bond Strength. The product shall demonstrate minimum 300 psi pull-off strength as determined by ASTM D4541-02 *Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers*.

3.3.3. Impact Resistance. The product shall demonstrate a minimum 6 in-lb as the impact failure end point as determined by ASTM D2794-93(2004) *Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)*.

3.3.4. Scrubbability (Abrasion Resistance). The product shall demonstrate a wear index of 200 or less as determined by ASTM D4060-07, *Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser*.

3.4. In addition to the requirements listed in 3.1, reflective coatings shall meet the following requirements:

3.4.1. Solar Reflectance. Solar Reflectance shall meet the requirements as listed below as determined by ASTM E1918-06 *Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field*.

Characteristic	Performance Specification³	
	Low-Slope Roofs	Steep-Slope Roofs
Initial Solar Reflectance	Greater than or equal to 0.65	Greater than or equal to 0.25

³ Low-slope roofs are defined as surfaces with a slope of 2:12 inches or less and Steep-slope roofs are surfaces with a slope of greater than 2:12 inches as determined by ASTM E1918-06 *Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field*.

Characteristic	Performance Specification ³	
Maintenance of Solar Reflectance (three years after installation under normal conditions)	Greater than or equal to 0.50	Greater than or equal to 0.15

3.4.2. Thermal Emittance. The product shall have a thermal emittance of 80% or more as determined by ASTM C1371-04a *Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emisimeters*.

3.4.3. Fade Resistance. The product shall demonstrate a minimum durability (lack of color change) of 1000 hours using a Xenon Arc or QUV-A bulbs with a moisture and/or condensation cycle following the guidelines in ASTM G151-06 *Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Source* or ASTM G155-05a *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*.

3.4.4. Water Resistance. The product shall show no signs of washing off, lifting or wrinkling as tested by ASTM D1735-04 *Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus*.

3.5. In addition to the requirements listed in 3.1 and 3.2, rust preventative coatings shall meet the following requirements:

3.5.1. Corrosion Resistance. The product shall have a minimum rust rating of 9 per SSPC-VIS 2 after 300 hours of exposure as determined by ASTM D5894-05 *Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)*.

3.6. In addition to requirements in 3.1 and 3.2, interior topcoats shall meet the following requirements:

3.6.1. Scrubbability (Abrasion Resistance). The product shall demonstrate the following minimum requirements for scrub cycles before failure as determined by ASTM D2486-06 *Standard Test Method for Scrub Resistance of Interior Latex Flat Wall Paints*.

Flat	1000 scrub cycles before failure
Non-Flat	1500 scrub cycles before failure

3.6.2. Washability (Stain Removal). The product shall demonstrate the following minimum requirements for stain removal as determined by

ASTM 4828-91 *Mechanical Method, Standard Test Method for Practical Washability of Organic Coatings.*

Flat	5 minimum rating
Non-Flat	7 minimum rating

3.7. In addition to the requirements listed in 3.1 and 3.2, exterior topcoats shall meet the following requirements:

3.7.1. Biological Growth. The product shall attain a surface disfigurement rating of 8 or greater when exposed to a biological test chamber following the requirements of ASTM D3273, *Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber* and evaluated according to the requirements of ASTM D 3274, *Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation.*

3.7.2. Alkali Resistance. The product shall show no signs of lifting, wrinkling, disintegration or more than a slight color change as described in 3.3.1.

3.7.3. Fade Resistance. The product shall demonstrate a minimum durability (lack of color change) of 1000 hours as described in 3.4.3.

3.7.4. Water Resistance. The product shall show no signs of washing off, lifting or wrinkling as described in 3.4.4.

3.7.5. Scrubbability (Abrasion Resistance). The product shall demonstrate the minimum 2500 scrub cycles before failure as described in Section 3.6.1.

3.7.6. Washability (Stain Removal). The product shall demonstrate the minimum requirements as described in 3.6.2.

3.8. Alternative Performance Requirements. Alternatively, a manufacturer can demonstrate that its product meets the performance requirements using alternate standard test methods if accompanied by documented rationale for the method modification.

4.0 PRODUCT-SPECIFIC HEALTH AND ENVIRONMENTAL REQUIREMENTS

4.1. Compound Prohibitions. The product, including colorant, shall not contain any ingredients that are carcinogens, mutagens, reproductive toxins,

hazardous air pollutants or ozone-depleting compounds. An exception shall be made for titanium dioxide.⁴

Naturally occurring elements and chlorinated organics, which may be present as a result of chlorination of the water supply, are not considered ingredients if the concentrations are below the applicable maximum contaminant levels in the National Primary Drinking Water Standards found in 40 CFR, Part 141.

4.2. Specific Compound Prohibitions. The product, including colorant, shall not contain the following ingredients:

- 1,2-dichlorobenzene
- Aqueous ammonia
- Alkyphenol ethoxylates (APEs)
- Formaldehyde-donors
- Phthalates
- Methyl ethyl ketone (MEK)
- Triphenyl tins (TPT) and tributyl tins (TBT)

4.3. Volatile Aromatic Compound Content Limit. The product, including colorant, shall contain no more than 0.5% by weight of sum total of volatile aromatic compounds.

4.4. Volatile Organic Compound Content Limit. The VOC concentration of the product shall not exceed those listed below in grams of VOC per liter of product as determined by ASTM D6886-03 *Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography*. U.S. EPA Reference Method 24 should be used for VOC levels greater than 15%.⁵

The calculation of VOC shall exclude water, but will include colorants.

<i>Product Type</i>	<i>VOC level (in g/L)</i>
Flat Topcoats	50
Non-Flat Topcoats	100
Primers/Undercoats	50
Floor and Reflective Coatings	100
Rust Preventative Coatings	250

⁴ Titanium Dioxide: EC Number 236-675-5, CAS Number 13463-67-7

⁵ Alternatively, International Organization for Standardization (ISO) 11890 *Paints and varnishes -- Determination of volatile organic compound (VOC) content* may also be used, using *Part 1: Difference method* if the VOC level is greater than 15%.

4.5 Volatile Organic Compound Emission Limit. Any product, including colorant, *intended for interior use* shall not emit volatile organic compounds in concentrations that exceed those listed below at 168 hours in environmental chambers as measured using ASTM D 5116-06 *Standard Guide for Small Scale Environmental Chamber Determinations of Organic Emissions for Indoor Materials/Products*; ASTM D 5197-03 *Test Method for Determination of Formaldehyde and other Carbonyl Compounds in Air (Active Sampler Methodology)* and ASTM D 6169-03 *Practice for the Selection of Sorbents and Pumped Sampling/Thermal Desorption Analysis Procedures for Volatile Organic Compounds in Air*.

Individual VOCs	<0.1 TLV*
Formaldehyde	0.05 ppm
4-phenylcyclohexene	0.0065 mg/m ³
Styrene	0.07 mg/m ³
Total VOCs	0.5 mg/m ³
Total aldehydes	0.1 ppm
Any pollutant regulated as a primary or secondary outdoor air pollutant must meet a concentration that will not generate an air concentration greater than that promulgated by the National Ambient Air Quality Standard (U.S. EPA, code of Federal Regulations, Title 40, Part 50).	
* Any pollutant not listed must produce an air concentration level no greater than 1/10 the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, Cincinnati, Ohio 45211-4438).	

5.0 PACKAGING REQUIREMENTS

5.1. Recyclable Package. The product's package shall be recyclable.

5.2. Heavy Metal Restrictions. Heavy metals, including lead, mercury, cadmium, and hexavalent chromium, shall not be intentionally introduced. Further, the sum of the concentration levels of these metals present shall not exceed 100 parts per million by weight (0.01%); an exception is allowed for packages that would not exceed this maximum level but for the addition of recovered materials. Further, intentional introduction does not include the use of one of the metals as a processing aid or intermediate to impart certain chemical or physical changes during manufacturing, where the incidental retention of a

residual of that metal in the final package or packaging component is not desired or deliberate, if the final package or packaging component complies with the incidental concentration restrictions of 100 ppm.

5.3. Other Restrictions. Phthalates are prohibited from being intentionally introduced; an exception is allowed for packages that would not have added phthalates but for the addition of recovered material.

5.4. Recovered Material Content. The packaging shall contain state-of-the-art amount of recovered and post-consumer content. Where a product's packaging is below these levels, the manufacturer must demonstrate that efforts have been made to use the maximum available post-consumer material in packaging.

6.0 END-OF-LIFE MANAGEMENT

6.1. Consumer Education. The manufacturer shall provide information to the consumer through print, online or other accessible media regarding:

- Purchasing the amount of product needed for a specified job.
- Discouraging improper disposal of the product and packaging.
- Consulting with local authorities for proper disposal or recycling opportunities for leftover product and packaging.
- If a manufacturer provides a take-back program, how the product and/or container can be returned.

6.2. The manufacturer shall demonstrate that paint not salable from the manufacturing process is utilized locally and/or domestically where there are existing markets.

7.0 LABELING REQUIREMENTS

7.1. The manufacturer's label shall include a statement discouraging improper disposal of product and encouraging consulting with local authorities regarding proper disposal or recycling opportunities for leftover product and container. The label shall also list instructions or references to resources regarding proper use of the product and, if applicable, information about the manufacturer take-back program.

7.2. The Green Seal Certification Mark may appear on the product's packaging.

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

7.4. Whenever the certification mark appears on a package, the package shall contain a description of the basis for certification. The description shall be in a location, style, and typeface that are easily readable. Unless otherwise approved in writing by Green Seal, the description shall, as applicable, read:

“This product meets the Green Seal™ environmental standard for paints and coatings based on performance requirements, reduced volatile organic compounds (VOCs) and prohibited toxic ingredients.”

ADDENDUM

GREEN SEAL CRITERIA FOR VERIFICATION OF OPTIONAL CLAIMS FOR GS-11 CERTIFIED PAINTS AND COATINGS

A. SCOPE

This criteria document establishes environmental requirements for OPTIONAL verified claims on GS-11 certified products. Verification applications may be reviewed during the initial application for GS-11 certification.

There is emphasis on demonstrated leadership in the following environmental impact areas: energy reduction, waste reduction, resource minimization (including water), and emissions reduction.

B. DEFINITIONS

B.1. Alternative fueled vehicles: The vehicle(s) runs predominantly on compressed natural gas or electrically-generated power. The vehicle(s) complies with this requirement if it is demonstrated through fuel purchase records and miles driven records for the vehicle(s) that gasoline purchases for the vehicle(s) do not exceed the amount required to drive the vehicle(s) 15% of the miles driven.

B.2. Carbon offsets: Mitigation of greenhouse gas emissions generated during the product manufacturing and distribution using reduction measures that may be purchased from a third-party carbon offset provider.

B.3. Greenhouse gas (GHG): Components of the atmosphere that contribute to the greenhouse effect including water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

B.4. Manufacturing facility(ies): Location(s) where the final certified product is manufactured or produced. If there are multiple locations, all locations where the certified product is manufactured or produced shall be considered.

B.5. Renewable Energy: Energy from non-depleting sources and derived from natural processes that are replenished including wind, solar, water, geothermal, and biofuels.

B.6. Volatile Organic Compound (VOC): Any organic compound which participates in atmospheric photochemical reactions as defined by U.S. Environmental Protection Agency in 40 CFR §51.100 (s), (s) (1) and/or has an initial boiling point lower than or equal to 250°C measured at standard conditions of pressure.

B.7. Waste: By-products from the manufacturing of the product not included in the finished product that are not salable and are disposed, including wastewater.

C. VERIFIED CLAIM CRITERIA:

C.1. Zero VOC: A product shall be verified to have zero VOC if it contains zero VOC as determined by the methods described in section 4.4 of GS-11 and, if intended for interior use, the VOCs from emission testing as listed in section 4.5 are below detectable limits.

C.2. Manufactured with Green Energy: A product shall be verified to be manufactured with green energy if the manufacture of the product is fueled by at least 75% renewable energy, not including any carbon offsets.

C.3. Shipped using Alternative Fuels: A product shall be verified to be shipped using alternative fueled vehicles if the manufacturer demonstrates that 100% of the product distribution uses alternative fueled vehicles.

C.4. Manufactured with Zero Waste: A product shall be verified to be manufactured with zero waste when the manufacturing facility(ies) demonstrate they do not dispose of waste (solid and water). Utilization of such materials must be demonstrated to be either within the company or with proven partnerships.

C.5. Manufactured with Zero GHG Emissions: A product shall be verified to be manufactured with zero greenhouse gas emissions if the manufacturing facility(ies) demonstrate zero net greenhouse gas emissions during production. This can be achieved within the company, with proven partnerships, or through emission data accompanied by supplementary carbon offset records.

D. LABELING REQUIREMENTS:

D.1. The verification mark may only appear on packaging, literature or marketing materials for GS-11 certified products.

D.2. The verification mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the verification.

D.3. Whenever the verification mark appears on a package, the package shall contain a description of the basis for the claim verified. The description shall be in a location, style, and typeface that are easily readable and shall not detract from the Green Seal certification mark. Unless otherwise approved in writing by Green Seal, the description shall, as applicable, read as follows:

Zero VOC: This product was verified by Green Seal™ to have zero volatile organic compounds (VOCs).

Manufactured with Green Energy: This product was verified by Green Seal™ to have been manufactured with at least 75% renewable energy.

Shipped using Alternative Fuel: This product was verified by Green Seal™ to have been distributed by alternatively fueled vehicles.

Manufactured with Zero Waste: This product was verified by Green Seal™ to have been manufactured in a process that produced zero net waste.

Manufactured with Zero GHG Emissions: This product was verified by Green Seal™ to have been manufactured with zero net greenhouse gas emissions.