GS-11

GREEN SEAL® STANDARD FOR

PAINTS, COATINGS, STAINS, AND SEALERS

EDITION 4.0

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GREEN SEAL

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Green Seal offers certification of products, services, and companies in conformance with its standards. For additional information on Green Seal or any of its programs, contact:

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FOREWORD

Edition. Edition 4.0 was issued on September 7, 2021. It replaces Edition 3.2 from October 26, 2015. Corrections and/or clarifications were last made to this standard on January 27, 2023. Information on changes made to this standard are available on Green Seal's website.[1]

General. The final issued standard was developed in an open and transparent process involving a balanced group of stakeholders including producers, users, and general interests.

The requirements in the standard are based on an assessment of the environmental, health, or social impacts associated with the products covered in the scope of the standard. These requirements are subject to revision and generally cover aspects above and beyond regulatory compliance. This standard neither modifies nor supersedes laws and regulations. Any conformity assessment to this standard requires compliance with all applicable laws and regulations for the manufacturing and marketing of the products.

Provisions for safety have not been included in this standard, since they are overseen by regulatory agencies. Adequate safeguards for personnel and property should be employed for all stages of production and for all tests that involve safety considerations.

Products that are substantially similar to those covered by this standard in terms of function and life cycle considerations may be evaluated against the intent of the requirements of this standard, accounting for relevant differences between the intended scope of the standard and the actual product to be evaluated.

This standard may not anticipate a feature of the product that may significantly, and undesirably, increase its impact on the environment, health, or society. In such a situation, Green Seal will ordinarily amend a standard to account for the unanticipated environmental, health, or societal impacts.

Normative references (e.g., other standards) in this standard intend to refer to the most recent edition of the normative reference unless explicitly stated otherwise. Test methods may be required for product evaluation. Unless explicitly stated that a specified method is the only acceptable one, the intent of the standard is that an equivalent test method may be accepted at Green Seal's sole discretion. Certification to this standard shall be awarded only by Green Seal or, with Green Seal's explicit written permission, by a third-party certification program conducting on-site audits.

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[1] https://greenseal.org/green-seal-standards/library#section5

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ACRONYMS AND ABBREVIATIONS

ANSI. American National Standards Institute
ASTM. ASTM International (formerly American Society for Testing and Materials)
BHMA. Builders Hardware Manufacturers Association
CARB. California Air Resources Board
CDPH. California Department of Public Health
CFR. Code of Federal Regulations
CREL. Chronic Reference Exposure Levels
CRRC. Cool Roof Rating Council
EPA United States Environmental Protection Agency
GHS Globally Harmonized System of Classification and Labeling of Chemicals
NFPA. National Fire Protection Association
ISO. International Organization for Standardization
ppm. Parts Per Million
SCAQMD. South Coast Air Quality Management District
SCM 2007 Suggested Control Measures (set by CARB in 2007)
SSPC Society for Protective Coatings (formerly Steel Structures Painting Council)
UN. United Nations
UV. Ultra Violet
VOC. Volatile Organic Compound

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GREEN SEAL STANDARD FOR PAINTS, COATINGS, STAINS, AND SEALERS, GS-11

1.0 SCOPE

This standard establishes environmental, health, and performance requirements for certain *architectural coatings* that are intended to be applied on-site, and for *stains, finishes,* and *sealers*.

The standard covers the following product categories for *interior* and *exterior* architectural use: wall and ceiling *coatings*, including *paints* and *reflective wall coatings; anticorrosive coatings*, including rust-preventive *coatings*; *floor paints; primers* (undercoats); *stains*; *finishes*; and *sealers*, including *concrete and masonry sealers* (both *penetrating* and *film-forming* products) for *interior* and *exterior* use and *basement specialty coatings* for *interior* use. The standard also covers *floor coatings* intended for general purposes in commercial and residential settings,[2] as well as *fire-resistive coatings*, including *intumescent coatings* for *interior* architectural use and *reflective roof coatings* for *exterior* architectural use.

The standard includes products intended to be applied to wallboard, tile, metal, wood, composite wood, concrete, stone, masonry, and terrazzo substrates, as well as other architectural substrates. Also included are *stains*, *finishes*, and *sealers* generally applied to non-architectural metal and wood substrates.

All product categories may be clear, *transparent*, or opaque.

The standard does not include recycled (consolidated or reprocessed) latex *paint*, floor *finishes*/polishes intended to be stripped and reapplied periodically, specialty non-architectural *coatings* (e.g., coatings for industrial equipment, marine or automotive use), products sold in aerosol cans, or anti-graffiti coatings.[3] The standard is not intended to define leadership criteria for *industrial maintenance coatings*, intended for resistance in challenging environments, such as acid/base/corrosive surroundings or extreme temperatures. However, products that are labeled as *industrial maintenance coatings* may be certified to this standard if they meet all the criteria for the product category whose function most closely aligns with them.

See Appendix 1 for a sample list of products that are or are not included in this standard.

Words and phrases that appear in *italics* are defined in Annex A.

[2] *floor coatings* that are not intended for resistance in challenging environments, such as acid/base/corrosive surroundings or extreme temperatures. General purposes may include shopping centers, airport lobbies, grocery stores, office buildings, homes, and garages.

[3] Green Seal has not conducted a comprehensive review of the chemistry, health, and environmental effects or the performance of anti-graffiti coatings. These product categories may be addressed in a future revision of this standard.

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2.0 PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS

All criteria apply to the product produced by the manufacturer for all labeled and marketed uses that apply and do not include additives introduced at the point-of-sale.

2.1 Wall and Ceiling Coatings for Interior Use

2.1.1 General Requirements

2.1.1.1 Adhesion

- Products intended to be applied on concrete shall demonstrate 200 psi failure in the concrete, as determined by ASTM D7234, with concrete samples prepared according to ASTM F710 or SSPC SP-13.
- Products not intended to be applied on concrete shall demonstrate a minimum of 50% or better rating for wet and dry adhesion over the intended substrate, as determined by ASTM D3359.

2.1.1.2 Applicability (Flow and Leveling) shall be demonstrated by either

- a minimum 6 rating for foaming, leveling, and spatter resistance, as determined by ASTM D7073,

OR

- a 12–14 minimum drawdown as tested by ASTM D4400.

2.1.2 Interior Topcoats shall also meet the following requirements:

2.1.2.1 Scrubbability (Abrasion Resistance). Using a shim, the product shall demonstrate 400 scrub cycles before failure per Leneta Calibration Scrub Panel Form P121-C, as determined by ASTM D2486.

2.1.2.2 Washability (Stain Removal). The product shall demonstrate the following minimum requirements for stain removal, as determined by ASTM D4828.

Flat Topcoat	5 minimum rating
Non-Flat Topcoat	7 minimum rating

2.1.3 Hiding Power (Opacity). Products intended to be opaque shall also demonstrate a minimum 0.95 contrast ratio at 400 square feet per gallon, as determined by ASTM D2805. Compliance will be determined on dried film of the un-tinted product having a minimum 80% reflectance.

2.1.4 Impact Resistance. Products intended to provide impact resistance shall demonstrate impact resistance that is equivalent to or better than that of a *benchmark product* in its *product class* when tested according to ASTM D2794.

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2.2 Wall and Ceiling Coatings for Exterior Use

2.2.1 General Requirements

2.2.1.1 Adhesion

- Products intended to be applied on concrete shall demonstrate 200 psi failure in the concrete, as determined by ASTM D7234, with concrete samples prepared according to ASTM F710 or SSPC SP-13.
- Products not intended to be applied on concrete shall demonstrate a minimum 50% or better rating for wet and dry adhesion over the intended substrate, as determined by ASTM D3359.

2.2.1.2 Applicability (Flow and Leveling) shall be demonstrated by either

- a minimum 6 rating for foaming, leveling, and spatter resistance, as determined by ASTM D7073,

OR

- a 12–14 minimum drawdown, as tested by ASTM D4400.

2.2.2 Exterior Topcoats shall also meet the following requirements:

2.2.2.1 Fade Resistance. Using 4 oz. of red iron oxide pigment per gallon of product, the product shall demonstrate a minimum durability total color change of $\Delta E < 5$ over 1,000 hours using QUV-A bulbs with a moisture and/or condensation cycle, following the guidelines in ASTM G151.

2.2.2.2 Flexibility. The product shall show no signs of cracking, peeling, or loss of adhesion, as determined by ASTM D522 under the following cure conditions: 3 days' air dry followed by 1 week at 50°C.

2.2.2.3 Water Resistance. The product shall show no signs of washing off, lifting, or wrinkling, as tested by ASTM D1735.

2.2.3 Hiding Power (Opacity). Products intended to be opaque shall also demonstrate a minimum 0.95 contrast ratio at 400 square feet per gallon, as determined by ASTM D2805. Compliance will be determined on dried film of the untinted product having a minimum 80% reflectance.

2.3 Floor Paints

2.3.1 General Requirements

2.3.1.1 Adhesion

- Products intended to be applied on concrete shall demonstrate 200 psi failure in the concrete, as determined by ASTM D7234, with concrete samples prepared according to ASTM F710 or SSPC SP-13.

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- Products not intended to be applied on concrete shall demonstrate a minimum 50% or better rating for wet and dry adhesion over the intended substrate, as determined by ASTM D3359.

2.3.1.2 Applicability (Flow and Leveling) shall be demonstrated by a minimum 7 rating, as determined by ASTM D4062.

2.3.1.3 Dry Film Thickness. The product shall have a dry film thickness of 10 mils (0.25 mm) or less.

2.3.1.4 Alkali Resistance. The product shall show no signs of lifting, wrinkling, disintegration, or more than a slight color change after 16 hours of exposure to 0.5N sodium hydroxide solution by spot test, as determined by ASTM D1308.

2.3.1.5 Scrubbability (Abrasion Resistance). Using a C-17 wheel and 500-gram weight, the product shall demonstrate a wear index of 200 or less, as determined by ASTM D4060.

2.3.2 Exterior Topcoats shall also meet the following requirements:

2.3.2.1 Fade Resistance. Using 4 oz. of red iron oxide pigment per gallon of product, the product shall demonstrate a minimum durability total color change of $\Delta E < 5$ over 1,000 hours using QUV-A bulbs with a moisture and/or condensation cycle, following the guidelines in ASTM G151.

2.3.2.2 Flexibility. The product shall show no signs of cracking, peeling, or loss of adhesion, as determined by ASTM D522 under the following cure conditions: 3 days' air dry followed by 1 week at 50°C.

2.3.2.3 Water Resistance. The product shall show no signs of washing off, lifting, or wrinkling, as tested by ASTM D1735.

2.3.3 Hiding Power (Opacity). Products intended to be opaque shall also demonstrate a minimum 0.95 contrast ratio at 400 square feet per gallon, as determined by ASTM D2805. Compliance will be determined on dried film of the un-tinted product having a minimum 80% reflectance.

2.4 Floor Coatings. For testing purposes, the dry film thickness of the product and curing duration shall be consistent with the manufacturer-recommended application.

2.4.1 Adhesion. The product shall demonstrate dry pull-off adhesion of at least 400 psi, as determined by ASTM D7234, with concrete samples prepared according to ASTM F710 or SSPC SP-13.

2.4.2 Abrasion Resistance. Using a CS-17 wheel, 1,000-gram weight, and 1,000 cycles, the product shall have a weight loss of 100 mg or less, as determined by ASTM D4060.

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2.4.3 Slip Resistance. The product shall have a dry static coefficient of friction of at least 0.5, as measured by either ASTM D2047 or UL 410.

2.4.4 Water and Salt Water Resistance. The product shall show no signs of lifting, wrinkling, disintegration, or color change after 7 days of exposure to water when tested according to ASTM D1308. Products that will be subject to vehicular traffic shall also show no signs of lifting, wrinkling, disintegration, or color change after 7 days of exposure to a 15% sodium chloride solution when tested according to ASTM D1308.

2.4.5 Chemical Resistance. The product shall demonstrate chemical resistance that is equivalent to or better than that of a *benchmark product* in its *product class* for the majority of tested chemicals. Testing shall be conducted according to ASTM D1308 with a 16-hour exposure period. Testing shall include a minimum of 7 representative chemicals covering at least 3 of the following classes: detergents, acids, alkalis, alcohols, and aliphatic solvents. The selection of test chemicals shall be based on the marketed uses of the product.

2.4.6 Hot Tire Resistance. Products that will be subject to tire traffic shall demonstrate hot tire resistance with no loss of adhesion at a temperature of 140ºF and a force that is representative of the product's marketed use. Testing shall be conducted using an objective, scientifically validated method conducted under controlled and reproducible laboratory conditions. Test methodology and results shall be documented in sufficient detail.[4]

2.5 Anti-Corrosive Coatings[5]

2.5.1 Adhesion. The product shall demonstrate a minimum 50% or better rating for wet and dry adhesion over the intended substrate, as determined by ASTM D3359.

2.5.2 Applicability (Flow and Leveling) shall be demonstrated by either

- a minimum 6 rating for foaming, leveling, and spatter resistance, as determined by ASTM D7073,

OR

- a 12–14 minimum drawdown, as tested by ASTM D4400.

2.5.3 Corrosion Resistance. Using manufacturer-recommended minimum dry film thickness and application to hot rolled steel panels,[6] the product shall have a minimum rust rating of 9 per SSPC-VIS 2 after 300 hours of exposure, as determined by ASTM D5894.

2.6 Non-Elastomeric Reflective Wall Coatings

[4] Test methodology should typically include use of a tire material sample. Tire pressure should be representative of the intended application for the *floor coating* (e.g., 50 to 150 psi) based on typical loads.

[5] These include rust-preventative coatings.

[6] The hot rolled steel test panels should adhere to Society for Protective Coatings (SSPC) Paint 23 or Paint 24 specifications. If there is no recommended film thickness, then the DFT of each coat shall be 60 to 90 micrometers (2.5 to 3.5 mils).

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2.6.1 Adhesion

- Products intended to be applied on concrete shall demonstrate 200 psi failure in the concrete, as determined by ASTM D7234.
- Products not intended to be applied on concrete shall demonstrate a minimum 50% or better rating for wet and dry adhesion over the intended substrate, as determined by ASTM D3359.

2.6.2 Applicability (Flow and Leveling) shall be demonstrated by either

- a minimum 6 rating for foaming, leveling, and spatter resistance, as determined by ASTM D7073,

OR

- a 12–14 minimum drawdown, as tested by ASTM D4400.

2.6.3 Accelerated Weathering. The product shall show no signs of blistering, chalking, checking, cracking, flaking, or loss of adhesion with a maximum change of 10 gloss level units after 500 hours using QUV-A bulb, as measured by ASTM D714.

2.6.4 Flexibility. The product shall show no signs of cracking, peeling, or loss of adhesion, as determined by ASTM D522 under the following cure conditions: 3 days' air dry followed by 1 week at 50°C.

2.6.5 Solar Reflectance. The product shall meet the requirements in the following table, as determined by ASTM C1549 or ASTM E1918.

Characteristic	Performance Specification	
	Light Tones	Dark Tones
Solar Reflectance	≥ 0.65	≥ 0.40

2.6.6 Thermal Emittance. The product shall have a thermal emittance of 75% or more, as determined by ASTM C1371.

2.6.7 Hiding Power (Opacity). Products intended to be opaque shall also demonstrate a minimum 0.95 contrast ratio at 400 square feet per gallon, as determined by ASTM D2805. Compliance will be determined on dried film of the un-tinted product having a minimum 80% reflectance.

2.7 Elastomeric Reflective Wall Coatings

2.7.1 Dry Film Thickness. The product shall have a dry-film thickness of at least 17 mils.

2.7.2 Accelerated Weathering. The product shall show no signs of cracking or checking after 1,000 hours, as determined by ASTM G155.

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2.7.3 Elongation and Tensile Strength. The product shall show minimum 100% elongation and minimum 200 psi tensile strength, as determined by ASTM D2370.

2.7.4 Flexibility. The product shall demonstrate 0.5 mandrel bend at –15°F, as determined by ASTM D522 with cure conditions of 3 days' air dry followed by 1 week at 50°C.

2.7.5 Fungi Resistance. The product shall show zero rating, according to ASTM G21.

2.7.6 Solar Reflectance. The product shall meet the requirements in the following table, as determined by ASTM C1549 or ASTM E1918.

Characteristic	Performance Specification	
	Light Tones	Dark Tones
Solar Reflectance	≥ 0.65	≥ 0.40

2.7.7 Thermal Emittance. The product shall have a thermal emittance of 75% or more, as determined by ASTM C1371.

2.8 Reflective Roof Coatings

2.8.1 Physical Properties. The product shall meet the requirements in ASTM D6083.

2.8.2 Solar Reflectance. The product shall meet the requirements in the following table, as determined by ASTM C1549 or ASTM E1918.

Characteristic	Performance Specification	
	Low-Slope Roofs	Steep-Slope Roofs
Initial Solar Reflectance	≥ 0.65	≥ 0.25
Maintenance of Solar Reflection	≥ 0.50 (three years after installation under normal conditions)	≥ 0.15 (three years after installation under normal conditions)

2.8.3 Thermal Emittance. The product shall have a thermal emittance of 80% or more, as determined by ASTM C1371.

2.9 Fire Resistive and Intumescent Coatings

2.9.1 Adhesion. The product shall demonstrate a minimum 50% or better rating for wet and dry adhesion over the intended substrate, as determined by ASTM D3359.

2.9.2 Applicability (Flow and Leveling) shall be demonstrated by either

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- a minimum 6 rating for foaming, leveling, and spatter resistance, as determined by ASTM D7073,

OR

- a 12–14 minimum drawdown, as tested by ASTM D4400.

2.9.3 Fire Resistance.[7] The product shall demonstrate a fire resistance rating that is consistent with the labeling,[8] as determined by ASTM Designation E119.

2.9.4 Flame Spread and Smoke Development. The product shall demonstrate a Flame Spread Index of 0–25 (Class A) and a Smoke Development Index of 0-450 (Class A), based on the Life Safety Code (NFPA 101)[5] and Section 803.1 of the International Building Code, as determined using ASTM E84.

2.10 Concrete and Masonry Sealers

2.10.1 General Requirements. Except for *basement specialty coatings*, the product shall be tested for each performance parameter in this section that is included on the product label or marketing. Each test shall demonstrate that the product performs as well as or better than a *benchmark product* in its *product class*.

For purposes of the test, the curing duration of the *concrete/masonry sealer* shall be similar to that of the *benchmark product*, and for *film forming* products, the dry-film thickness of the *concrete/masonry sealer* shall be similar to that of the *benchmark product*. Both shall be representative of the manufacturer-recommended application. Testing shall be performed according to the following standard test methods or equivalent test methods:

2.10.1.1 Water Resistance. ASTM C67, ASTM C97, or ASTM C140
2.10.1.2 Fungi Resistance. ASTM D3273 or ASTM D3274
2.10.1.3 Abrasion Resistance /Hardening of Cured Concrete. ASTM D4060
2.10.1.4 Alkali Resistance. ASTM D1308
2.10.1.5 Acid Resistance. ASTM D1308
2.10.1.6 Staining Resistance. ASTM D1308
2.10.1.7 UV Light Resistance. ASTM G151[9]
2.10.1.8 Water Vapor Transmission. ASTM E96/E96M

2.10.2 Basement Specialty Coatings shall meet the following performance requirements and demonstrate any of the additional parameters (2.10.1.3–2.10.1.8) included on the product label or marketing:

2.10.2.1 Water Resistance. The product must be capable of withstanding at least 10 psi of hydrostatic pressure, as determined according to ASTM D7088.

[7] *Fire-resistive coatings* and the agencies that test them must be approved by building code officials.
[8] For example, 1-hour, 2-hour, or 4-hour.
[9] Suggested test parameters include 1,000 hours using QUV-A bulbs with a moisture and/or condensation cycle, unless otherwise appropriate for the product.

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2.10.2.2 Fungi Resistance. The product must be resistant to mold and mildew growth and must achieve a microbial growth rating of 8 or more, as determined according to ASTM D3273 and ASTM D3274.

2.11 Wood Stains for Interior Use

2.11.1 Blush Resistance. When prepared and tested on a dry film thickness of 1 mil according to ASTM D1735 for 2 hours, the product shall have a rating of 8 as per ASTM STP500 after a 24-hour recovery period.

2.11.2 Chemical Resistance. When tested according to ASTM D1308 using the covered spot test for 1-hour exposure over the intended substrate, and after a 1-hour recovery period, the product shall demonstrate a rating of 8 as per ASTM STP500.

2.12 Wood Stains for Exterior Use

2.12.1 Exterior Penetrating Stains

2.12.1.1 Blush Resistance. When prepared and tested on a 1 mil–thick dry film according to ASTM D1735 for 2 hours, the product shall have a rating of 8 as per ASTM STP500 after a 24-hour recovery period.

2.12.2 Exterior Film-Forming Stains

2.12.2.1 Blush Resistance. When prepared and tested on a 1 mil–thick dry film according to ASTM D1735 for 2 hours, the product shall have a rating of 7 as per ASTM STP500 after a 24-hour recovery period.

2.12.2.2 Pencil Hardness. When prepared and tested on a 1 mil–thick dry film according to ASTM D3363, the product shall have a pencil hardness of 2H or greater.

2.12.2.3 Adhesion. The product shall have an adhesion of 3B or higher after 7 days' cure time when tested according to ASTM D3359 on a dried film of 0.5 to 1 mil thickness.

2.13 Wood Finishes for Interior Use

2.13.1 Pencil Hardness. When prepared and tested on a 1 mil–thick dry film according to ASTM D3363–92a, the product shall have a pencil hardness of 2H or greater.

2.13.2 Chemical Resistance. When tested according to ASTM D1308 for 1 hour with the covered spot test and a 1-hour recovery period over the intended substrate, the product shall demonstrate a rating of 8 as per ASTM STP500.

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2.13.3 Adhesion. The product shall have an adhesion of 4B or higher after 7 days' cure time when tested according to ASTM D3359 on a dried film of 0.5 to 1 mil thickness.

2.13.4 Water Resistance. If intended as a *waterproofing sealer*, the product shall show a minimum 60% water repellent efficiency when tested according to ASTM D4446.

2.14 Wood Finishes for Exterior Use

2.14.1 Pencil Hardness. When prepared and tested on a 1 mil–thick dry film according to ASTM D3363, the product shall have a pencil hardness of 2H or greater.

2.14.2 Dry Time. When tested according to ASTM D1640, the product shall have a maximum dry-to-touch time of 4 hours.

2.14.3 Adhesion. The product shall have an adhesion of 4B or higher after 7 days' cure time when tested according to ASTM D3359 on a dried film of 0.5 to 1 mil thickness.

2.14.4 Blister Resistance. The product shall have a rating of 10 as per ASTM D714 when tested according to ASTM D4585 for 24 hours at 100°F.

2.14.5 Water Resistance. If intended as a *waterproofing sealer*, the product shall show a minimum of 60% water repellent efficiency when tested according to ASTM D4446.

2.15 Interior Clear Metal Lacquers

2.15.1 Chemical Resistance. When tested according to ASTM D1308 for 1 hour with the covered spot test and a 1-hour recovery period over the intended substrate, the product shall demonstrate a rating of 8 as per ASTM STP500.

2.15.2 Adhesion. The product shall have an adhesion of 4B or higher after 7 days' cure time when tested according to ASTM D3359 on a dried film of 0.5 to 1 mil thickness.

2.15.3 Surface Hardness. The product shall have a minimum surface hardness of 3H when tested according to ASTM D3363 (7.1.1) on a dried film of 1/3 to 1 mil thickness.

2.15.4 Moisture Resistance. The product shall have a moisture resistance of a minimum of 48 hours when tested according to ASTM D2247.

2.15.5 Salt Spray Resistance. The product shall have a minimum salt spray resistance of 24 hours when tested according to ASTM B117.

2.15.6 Wear Resistance. The wear resistance shall be 8 liters or higher when tested according to ASTM D968, applying the product according to ASTM D823 with silica, and on a 1/3- to 1-mil dry film thickness measured according to ASTM D1005, ASTM D1186, or ASTM D1400.

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2.15.7 Reversibility. When tested according to ASTM D4752 with a maximum 20 double rubs for complete removal on a 1/3- to 1-mil dry film, the product must be able to be removed by nothing stronger than acetone after an air dry of 72 hours.

2.15.8 Perspiration Resistance. The product shall have a minimum of 2 cycles when tested according to ANSI/ BHMA A156.18.

2.16 Exterior Clear Metal Lacquers

2.16.1 Adhesion. The product shall have an adhesion of 4B or higher after 7 days' cure time when tested according to ASTM D3359 on a dried film of 0.5 to 1 mil thickness.

2.16.2 Surface Hardness. The product shall have a minimum surface hardness of 3H or higher when tested according to ASTM D3363 (7.1.1) on a dried film of 1/3 to 1 mil thickness.

2.16.3 Moisture Resistance. The product shall have a moisture resistance of a minimum of 96 hours (4 days) when tested according to ASTM D2247.

2.16.4 Chemical Resistance. The product shall demonstrate a rating of 10 when tested in accordance to ASTM D-1308; 3-1-2; 6-1-7 for a minimum 15 minutes.

2.16.5 Salt Spray Resistance. The product shall have a minimum salt spray resistance of 96 hours (4 days) when tested in accordance to ASTM B117.

2.16.6 Wear Resistance. The wear resistance shall be 4 liters or higher when tested according to ASTM D968, applying the product according to ASTM D823 with silica, and on a 1/3- to 1-mil dry film thickness measured according to ASTM D1005, ASTM D1186, or ASTM D1400.

2.16.7 Reversibility. When tested according to ASTM D4752 with a maximum 20 double rubs for complete removal on a 1/3 to 1 mil dry film, the product must be able to be removed by nothing stronger than acetone after an air dry of 72 hours.

2.16.8 UV Resistance. The product shall have an ultraviolet (UV) resistance of a minimum of 144 hours when tested with ASTM G154. The test specimen must be prepared and exposed according to ASTM G151.

2.17 Alternative Performance Requirements. Alternatively, the product shall demonstrate that it performs as well as or better than a *benchmark product* in its *product class* for the key parameters required for it to fulfill the intended function(s), as defined in the appropriate subsections of Section 2.0.

This comparison shall be conducted using an objective, scientifically validated method conducted under controlled and reproducible laboratory conditions. Test methodology and results shall be documented in sufficient detail.

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3.0 PRODUCT-SPECIFIC HEALTH AND ENVIRONMENTAL REQUIREMENTS

All requirements pertain to the product produced by the manufacturer and do not include additives introduced at the point-of-sale, unless otherwise specified.

3.1 Carcinogens, Mutagens, and Reproductive Toxins. The product shall not contain any *ingredients* that are *carcinogens*, *mutagens*, or *reproductive toxins*.

> **Exemption:** An exception shall be made for titanium dioxide and, for products that are pre-tinted by the manufacturer, carbon black. As allowed under this exception, carbon black shall be less than or equal to 1% by weight of the product.[10]

> **Exemption:** Free crystalline silica[11] shall not be *intentionally added* to the product as an *ingredient*. Crystalline silica present as a naturally occurring contaminant in mineral-based raw materials[12] is not included in this prohibition.

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.

3.2 Prohibited Ingredients. The product shall not contain the following *ingredients*:

- 1,2-dichlorobenzene
- Alkylphenol ethoxylates
- Formaldehyde donors
- *Hazardous air pollutants*
- Halogenated *solvents*
    - Additionally, methylene chloride[13] and perchloroethylene[14] shall not be *intentionally added* to the product.
- *Ozone-depleting compounds*
- Heavy metals: lead, mercury, cadmium, hexavalent chromium, and antimony in the elemental form or compounds
- The phthalate esters:
    - di (2-ethylhexyl) phthalate
    - butyl benzyl phthalate
    - di-n-butyl phthalate

[10] Titanium dioxide: EC Number 236-675-5, CAS Number 13463-67-7; carbon black: EC Number 215-609-9, CAS Number 1333-86-4.
[11] Crystalline silica is currently listed as a known human carcinogen when respired.
[12] Examples of mineral-based raw materials include mined extender pigments, calcium carbonate, and diatomaceous earth.
[13] CAS Number 75-09-2, EC Number 200-838-9.
[14] CAS Number 127-18-4, EC Number 204-825-9.

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  - di-n-octyl phthalate
  - diethyl phthalate
  - dimethyl phthalate
- Triphenyl tins and tributyl tins
- Triclosan

Exemption: For the following product categories, cobalt and manganese are allowed at levels that do not exceed 0.06% (as total metal) in the product: wood stains, wood finishes, and clear metal lacquers (Sections 2.11–2.16 in this standard).

Exemption: For *lacquers* intended for metal substrates only, PCBTF (parachlorobenzotrifluoride, CAS# 98-56-6), a halogenated *solvent*, is allowed at levels that do not exceed 10% by weight in the product.

3.3 Volatile Aromatic Hydrocarbons. The product shall contain no more than 0.5% by weight of sum total of *volatile aromatic hydrocarbons*.[15]

3.4 Volatile Organic Compounds (VOCs) Content Limits. The *VOC* content of the product shall not exceed the content limits for its product category as set by CARB Suggested Control Measure for Architectural Coatings (2007).[16]

Exception: For *low-solids coatings*, the CARB *VOC* limit for *low-solids coatings* shall apply instead of the *VOC* limit that would otherwise apply for the product category (as mandated by CARB).[17]

Exception: Products labeled as *industrial maintenance coatings* shall meet the *VOC* limits for their relevant product category.[18]

Exception: Products sold in containers equal to or smaller than 1 liter are not exempted from the *VOC* content limit for their product category (even though exempted by CARB).[19]

For other product categories not regulated by CARB, the *VOC* level shall not exceed a limit set by CARB for a similar product category. If no CARB category, or similar CARB product category exists, the *VOC* limit shall not exceed the limit for the applicable product category in the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.

[15] Testing for the concentration of these compounds will be performed if they are determined to be present in the product during a materials audit.
[16] See Appendix 2 for the *VOC* limits specified in California Air Resources Board Suggested Control Measure for Architectural Coatings (2007).
[17] Note that *low-solids coatings* have a separate *VOC* limit and that their *VOC* content is calculated differently.
[18] That is, they will not be allowed to meet the higher *VOC* limits set by CARB for *industrial maintenance coatings*. This standard is not intended to establish leadership criteria for *industrial maintenance coatings* per se (see Section 1.0).
[19] CARB currently grants an exemption from *VOC* limits to products sold in containers equal to or smaller than 1 liter (known as the Small Container Exemption).

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3.4.1 Calculation of VOC Content.

Coating VOC: For all product categories except *low-solids coatings*, the *VOC* content of the product shall be calculated according to "VOC Regulatory,"[20]

$$\text{VOC Regulatory} = \frac{(Ws - Ww - Wec)}{(Vm - Vw - Vec)}$$

Where:

VOC Regulatory = grams of VOC per liter of coating, less water and exempt compounds (also known as "Coating VOC")
Ws = weight of volatiles, in grams
Ww = weight of water, in grams
Wec = weight of exempt compounds, in grams
Vm = volume of coating, in liters
Vw = volume of water, in liters
Vec = volume of exempt compounds, in liters

VOCs for Low-Solids Coatings: For *low-solids coatings*, the *VOC* content of the product shall be calculated according to "VOC Actual,"[21]

$$\text{VOC Actual} = \frac{(Ws - Ww - Wec)}{(Vm)}$$

Where:

VOC Actual = grams of VOC per liter of coating (also known as "Material VOC")
Ws = weight of volatiles, in grams
Ww = weight of water, in grams
Wec = weight of exempt compounds, in grams
Vm = volume of coating, in liters

Exempt compounds shall be those defined as such by the U.S. EPA.[22]

VOC content shall exclude *colorants* added at the point-of-sale and any *VOC*s generated as a result of chemical or curing reactions on-site.

For multi-component products, *VOC* content shall be determined based on the sum of all components added together, using the appropriate calculation.

[20] As defined in SCM, 2007, Subsection 4.66.
[21] As defined in SCM, 2007, Subsection 4.64.
[22] According to the definition of *VOCs* in this standard, exempt compounds are considered those listed by EPA in 40 CFR §51.100 (s). The current version of this regulation can be found at http://www.ecfr.gov/cgi-bin/text-idx?SID=049f1f9562e072c158ad6e4a47d076a2&node=pt40.2.51&rgn=div5#se40.2.51_1100.

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3.4.2 Methods for Determining VOCs. The *VOC* content shall be determined in one of the following ways for compounds present in the product at 0.01% or more:

- **Product Formulation**
  By summing the percentage by weight contribution from all *VOC ingredients* listed in the formulation of the product, and which have a boiling point of less than or equal to 280°C at 1 standard atmosphere (101.3 kPa).

- **Mass Difference Methods**
  According to EPA Method 24, ASTM D2369, SCAQMD Method 304, or ISO 11890-1 (or equivalent), modified to include all *VOC ingredients*.

- **GC/MS Methods**
  According to ASTM D6886, SCAQMD Method 313, or ISO 11890-2 (or equivalent), summing all those *VOC ingredients* that have a boiling point of less than or equal to 280°C at 1 standard atmosphere (101.3 kPa).

Another scientifically validated test method may be used if it is justified and documented in sufficient detail.

3.5 VOCs of Colorant Added at Point-of-Sale. The *VOC* concentration of the product including the colorant added at the point-of-sale shall not exceed 50 grams of *VOC* per liter of product above the levels allowed for the product without colorant.[23]

An average *VOC* level calculation for a colorant shall be applied unless a manufacturer can provide documentation of the *VOC* levels of the colorant(s) and assurance that only those colorant(s) tested shall be used with the product.[24]

3.6 VOCs Emissions Evaluation. Products intended for *interior* application[25] shall be tested according to, and meet the emissions limits[26] specified in, the California Department of Public Health (CDPH) Standard Method v1.2 (2017).[27] As specified within the CDPH Standard Method, product specimens must undergo testing for the full 14-day (336-hour) period.

Products marketed for use in school classrooms must be evaluated using the classroom scenario. Products marketed for use in other spaces must be evaluated using the default private office scenario.

[23] *VOC* limits and measurement methods for the products are specified in Section 3.4.
[24] If information is not available about the *VOC* content in the *colorants*, an average of 70 grams/liter from the *colorant* will be added to the *VOC* content of the base paint product, for each paint type (*flat, nonflat, primer,* etc.).
[25] Products designed or marketed for application to substrates within the building's waterproofing membrane.
[26] See Appendix 3 for the maximum allowable concentrations, specified in the CDPH Standard Method v1.2.
[27] https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/CDPH%20Document%20Library/CDPH-IAQ_StandardMethod_V1_2_2017_ADA.pdf.

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Laboratories that conduct the tests must be accredited under ISO/IEC 17025 for the test methods they use.

Note: See Appendix 3 for CDPH v1.2 emissions limits.

3.7 Nanoparticles. Reserved. [28]

4.0 PACKAGING REQUIREMENTS

4.1 Packaging. The packaging shall be one of the following:

- contain a minimum of 20% *recovered material* content.
- recyclable as part of a manufacturer's *take-back program.*
- a *source-reduced package*.

Exemption: Plastic packaging containers may be exempted from the requirements of this section if they are manufactured for use in the shipment of hazardous materials and

- are prohibited from being manufactured with used material by federal packaging material specifications set forth in CFR 49, Sections 178.509 and 178.522,

OR

- are subject to testing standards set forth in CFR 49, Sections 178.600 to 178.609, inclusive,

OR

- are addressed by recommendations of the UN on the transport of dangerous goods.

4.2 Material Restrictions.

4.2.1 Phthalates and the heavy metals lead, mercury, cadmium, and hexavalent chromium shall not be *intentionally introduced* in the packaging.

4.2.2 The sum of the concentrations of lead, mercury, cadmium, and hexavalent chromium in the packaging shall not exceed 100 ppm by weight (0.01%).

An exception to 4.2.1 and 4.2.2 is allowed for packages that would not contain these compounds except for the addition of *recovered material*.

5.0 USER INFORMATION AND PRODUCT LABEL REQUIREMENTS

5.1 User Information. The manufacturer shall provide information to the consumer through print, online, or other accessible media, including:

- Instructions for purchasing the necessary amount of product needed for a specific job.
- Instructions for adequate ventilation during application and drying.
- Instructions on proper use of the product.

[28] Green Seal has not conducted a comprehensive review of the chemistry, health, and environmental effects or the performance of products that contain engineered nanoparticles. Products with engineered nanomaterials may be addressed in a future revision of this standard.

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- A statement encouraging consultation with local authorities for proper disposal or recycling opportunities for leftover product and packaging.
- If a manufacturer provides a *take-back program*, instructions on how the product and packaging can be returned.

5.2 Product Label. The manufacturer's label shall include a statement encouraging consultation with local authorities regarding proper disposal or recycling opportunities for leftover product and packaging.

The label shall include:

- instructions for appropriate purchasing, adequate ventilation during drying time, and proper use of the product,

OR

- a reference to consumer education information by print, online, or other accessible media.

If the manufacturer provides a *take-back program*, the label shall include instructions on how the product and packaging can be returned.

6.0 TRADEMARK USE REQUIREMENTS

6.1 Trademark Use. Any use of the Green Seal® Certification Mark or the Green Seal name, e.g., on the product, product label, packaging, secondary documents, or promotional materials, must be in accordance with Green Seal's Trademark Use Guidelines.[29]

6.2 Misleading Claims. Green Seal trademarks shall not appear in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the certification.

[29] www.greenseal.org/trademark-use-guidelines

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ANNEX A – DEFINITIONS (Normative)

The following terms are italicized throughout the standard.

Anti-corrosive Coating. A *coating* formulated and recommended for use in preventing the corrosion of metal substrates. Rust-preventative coatings are a subset of this class.

Architectural Coating. A *coating* applied at the site of installation to stationary structures and their accessories, to mobile homes, to pavements, or to curbs. Accessories may include bathroom and kitchen fixtures; cabinets; concrete forms; doors; elevators; fences; hand railings; heating equipment, air-conditioning equipment, and other fixed mechanical equipment or stationary tools; lampposts; partitions; pipes and piping systems; rain gutters and downspouts; stairways, fixed ladders, catwalks, and fire escapes; and window screens.

Basement Specialty Coating. A clear, *transparent,* or opaque coating that is labeled and formulated for application to concrete and masonry surfaces to provide a hydrostatic seal for basements and other below-grade surfaces.

Benchmark Product. A product used for comparison in performance testing. For the purposes of this standard, this is considered a national market-leading product, typically selected from the three or four top-selling brands or companies for its *product class* from nationwide data.[30]

Carcinogen. A chemical listed as a known, probable, reasonably anticipated, or possible human carcinogen by the International Agency for Research on Cancer (Groups 1, 2A, and 2B), the National Toxicology Program (Groups 1 and 2), the U.S. Environmental Protection Agency's Integrated Risk Information System (weight-of-evidence classifications A, B1, B2, and C, carcinogenic, likely to be carcinogenic, and suggestive evidence of carcinogenicity or carcinogen potential), or the U.S. Occupational Safety and Health Administration.

Clear Brushing Lacquer. A clear, protective *finish* intended exclusively for application by brush, excluding clear *lacquer* sanding *sealers*. This product is typically formulated with nitrocellulose or synthetic resins to dry by solvent evaporation, providing a solid, protective film.

Clear Metal Lacquer. Ferrous and nonferrous ornamental metal *lacquer* and surface protectants as classified under EPA, 40 CFR Part 59, 48848 Vol. 63, No. 176, September 1998, last amended 9-99. This classification refers specifically to clear *coatings* for the protection of polished and satin metal, such as brass, bronze, aluminum, and stainless steel.

Coating. A material applied onto or impregnated into a substrate for decorating, protecting, identifying, filling or concealing surface irregularities, modifying light and heat radiation characteristics, or other functional purposes.

Colorant. Concentrated color (dyes or pigments) that can be added to finished *products* to make specific colors. Unless otherwise specified, it is the maximum amount recommended for use by the manufacturer.

[30] It is recommended that manufacturers discuss their product testing with Green Seal before the testing is performed to ensure that the choice of comparison product(s) is appropriate.

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Concrete and Masonry Sealer. A clear, *transparent,* or opaque *coating* that is intended primarily for application to concrete and masonry surfaces to perform one or more of the following functions: prevent penetration of water; provide resistance against abrasion, alkalis, acids, mildew, staining, or ultraviolet light; or harden or dustproof the surface of aged or cured concrete. Examples include *penetrating* and *film-forming* products for *interior* and *exterior* use and *basement specialty coatings* for *interior* use.

Conjugated Oil Varnish. A clear or *transparent* wood *coating* labeled as such, excluding *lacquers* or *shellacs*, based on a naturally occurring conjugated vegetable oil (tung oil), determined using ASTM D2245, modified with other natural or synthetic resins. A minimum 50% of the resin solids consist of conjugated oil.

Elastomeric Reflective Wall Coating. A *coating* that is designed and intended for the modification of light and heat radiation characteristics and has elastic properties allowing it to stretch in the summertime heat and return to its original shape without damage.[31]

Exterior. An exterior product is formulated and intended for application on outdoor surfaces. If a product is multipurpose (i.e., for *interior* and exterior application), the stricter requirement applies, and the product must meet all the appropriate performance criteria.

Film-forming. Providing a solid dry film on a substrate by creating a pliable, cohesive, and continuous covering.

Finish. A clear, *transparent,* or opaque *coating* that is intended for wood or metal substrates and forms a film that sits on or in the surface of the substrate. Examples include *varnishes*, *shellacs*, *waterborne* finishes, polyurethane, and *lacquer* (including *lacquer* sanding *sealers*).

Fire-resistive Coating. A *coating* that reduces the spread of fire by increasing the fire endurance of structural materials. Examples include sprayed fire-resistive materials and intumescent fire-resistive coatings that are used to bring structural materials into compliance with federal, state, and local building code requirements.

Flat. Having a specular gloss that registers less than 15 on an 85-degree meter or less than 5 on a 60-degree meter, according to ASTM D523.

Floor Paint. A paint that is intended for floors and applied by roller or brush. For the purposes of this standard, floor paints do not include epoxy or urethane flooring systems, or those that include coarse aggregates, color chips, or flakes as part of a multipart flooring system.

Floor Coating. A clear, *transparent,* or opaque coating that is intended to provide long-term durability on general-purpose flooring, such as concrete, masonry, tile, and terrazzo, typically found on floor surfaces in hallways, lobbies, stores, garages, or steps. For the purposes of this standard, floor coatings do not include finishes intended for wood floors, floor care products designed to be periodically removed and reapplied, or products designed to meet the extreme environments in the definition for *industrial maintenance coating*.

[31] From the U.S. EPA Heat Island Effect Glossary.

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Hazardous Air Pollutant. Any compound listed as a hazardous air pollutant by U.S. EPA in the Clean Air Act, Section 112(b) (1). Ethylene glycols are included on this list, as of late 2015, while propylene glycols are not.

Industrial Maintenance Coating. A high-performance coating designed to meet extreme conditions, such as immersion in water, exposure to corrosive chemicals, temperatures above 121ºC, frequent heavy abrasion, or *exterior* exposure of metal structural components. Note: CARB allows higher *VOC* levels in products labeled as *Industrial Maintenance Coatings* than for the product category whose function most closely aligns with them.

Ingredient. Any constituent of a *product* that is intentionally added or known to be a contaminant that comprises at least 0.01% by weight of the product. For products comprised of multiple parts that are mixed on site (multi-component products), this 0.01% ingredient threshold or any other similar threshold applies to the total weight of all parts added together (i.e., the combined parts).

Intentional Introduction. The act of deliberately using a material where its continued presence is desired in the final product to provide a specific characteristic, appearance, or quality. Intentional introduction does not include the use of the material as a processing aid or intermediate during manufacturing, where the presence of a residual of that material in the final product is not desired or deliberate.

Interior. An interior product is formulated and intended for application on indoor surfaces. If a product is multipurpose (i.e., for interior and *exterior* application), the stricter requirement applies, and the product must meet all the appropriate performance criteria.

Intumescent Coating. A type of *fire-resistive coating* that reduces the spread of fire on combustible and noncombustible substrates through a chemical reaction that causes the coating to swell and form a protective barrier. Under this standard, such coatings must meet the *VOC* limits for *fire-resistive coatings*.

Lacquer. A clear or *transparent finish*, including clear lacquer sanding *sealers*, formulated with cellulosic or synthetic resins to dry by evaporation without chemical reaction and to provide a solid, protective film.

Low Solids Coating. A product containing 120 grams or less of solids per liter (1 pound or less of solids per gallon) of *coating* material as recommended for application by the manufacturer. Solids are the nonvolatile portion that remains after the *coating* dries.

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 mutations in the germ cells of humans, under the Harmonized System for the Classification of Chemicals Which Cause Mutations in Germ Cells (UN Economic Commission for Europe, Globally Harmonized System of Classification and Labeling of Chemicals).

Nonelastomeric Reflective Wall Coating. A latex and thermoplastic *coating* intended to modify light and heat radiation characteristics with a dry film thickness of 5 mils or greater.

Nonflat. Having a specular gloss that registers 15 or greater on an 85-degree meter or 5 or greater on a 60-degree meter according to ASTM D523.

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Ozone-depleting Compound. A compound with an ozone-depletion potential greater than 0.01 (CFC 11=1) according to the U.S. EPA list of Class I and Class II Ozone-Depleting Substances.

Paint. A type of pigmented *coating.*

Penetrating. Suffusing the substrate without forming a surface film and without hiding the grain.

Pigment. A composition of dyes, colorants, or combinations that do not fully obscure the texture of the substrate when applied.

Postconsumer Content. Material that would otherwise be destined for solid waste disposal, having completed its intended end-use and product life cycle. Postconsumer material does not include materials and by-products generated from, and commonly reused within, an original manufacturing and fabrication process.

Primary Package. Packaging material that physically contains and touches the product, not including any cap or lid.

Primer or Undercoat. A *coating* that is intended for one or more of the following purposes: to provide a firm bond between the substrate and a subsequent *coating*; to prevent a subsequent *coating* from being absorbed into the substrate; to prevent harm to a subsequent *coating* from materials in the substrate; or to provide a smooth surface for application of a subsequent *coating*.

Product Class. A category of products that are formulated and labeled to perform similar performance functions on similar substrates. *Coatings* in the same class are intended for equivalent function and performance, such as similar levels of durability and similar dry film thicknesses.

Recovered Material. Matter that has been diverted from the waste stream. Recovered material may include pre- and *postconsumer material*, cuttings, trimmings, obsolete inventories, and rejected unused stock; it excludes material capable of being reused within the process that generated it.

Reflective Roof Coating. A nonbituminous *coating* intended for application to roofs for the primary purpose of reflecting ultraviolet light or reflecting solar radiation

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., also known as Proposition 65).

Sealer. A *coating*, either *penetrating* or *film-forming*, that blocks materials from penetrating into or leaching out of a substrate.

Shellac. A clear or *pigmented finish* formulated with the resinous secretions of the lac beetle (*Lacifer lacca*) and formulated to dry by evaporation without a chemical reaction

Solvent. The liquid portion of paints and coatings that dissolves the functional components and evaporates as the coating dries.

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Source-reduced Package. A package that has at least 20% less material (by weight) compared to containers commonly used for that product type. For bag-in-the-box type packages, the box is included in the weight if the box is used during product use.

Stain. A clear, *transparent,* or opaque *coating* intended to change the color of a surface but not conceal the grain pattern or texture. Stains can be either *penetrating* or *film-forming* and may include *toners* and *sealers*.

Take-back Program. A company program that has been demonstrated to receives at least 50% of sold containers for recycling or reuse

Toner. A *pigmented penetrating stain* intended for use on surfaces to produce a uniform *coating* that does not obscure the grain or texture of the wood.

Topcoat. The outermost layer of a *paint* or *coating* system

Transparent. A *pigmented coating* that does not fully obscure the surface texture of the substrate.

Varnish. A clear or *transparent finish*, excluding *lacquer* and *shellac*, formulated to dry by chemical reaction on exposure to air. Varnish may contain small amounts of *pigment* to color a surface or to control the final sheen or gloss of the *finish.*

Volatile Aromatic Hydrocarbon. Any hydrocarbon (comprising only H and C atoms) containing one or more 6-carbon benzene rings in the molecular structure with a boiling point of less than or equal to 250°C measured at 1 standard atmosphere (101.3 kPa)

Volatile Organic Compound (VOC). Any organic compound that participates in atmospheric photochemical reactions as defined by the U.S. EPA in 40 CFR §51.100(s).[32] VOC Exempt Compounds, which are not considered VOCs for the purposes of calculating VOC content, are those listed in 40 CFR §51.100(s).

Waterborne. A *coating* that contains 5% or more water as the volatile constituent.

Waterproofing Sealer. A *coating* formulated for the primary purpose of preventing water from penetrating porous substrates

Waterproofing Concrete or Masonry Sealer. A clear or pigmented sealer that is formulated for sealing concrete and masonry to provide resistance against water, alkalis, acids, ultraviolet light, or staining.

[32] The current version of this regulation can be found at http://www.ecfr.gov/cgi-bin/text-idx?SID=049f1f9562e072c158ad6e4a47d076a2&node=pt40.2.51&rgn=div5#se40.2.51_1100

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APPENDIX 1 – SCOPE (Informative)

Examples of products included in or excluded from the scope of GS-11:

Products included in GS-11

- paints (interior and exterior)
- wall and ceiling coatings
- anti-corrosive coatings
- floor paints
- floor coatings
- primers or undercoats
- reflective roof coatings
- reflective wall coatings (elastomeric and non-elastomeric)
- fire resistive and intumescent coatings
- concrete and masonry sealers
- clear brushing lacquers
- conjugated oil varnishes
- finishes
- lacquers
- low-solids coatings
- sealers
- shellacs
- stains
- varnishes
- hygienic wall coatings
- decorative wall coatings
- impact resistant wall coatings

Products excluded from GS-11

- products sold in aerosol cans
- industrial, marine, or automotive coatings
- paint strippers
- bituminous coatings
- concrete curing compounds
- anti-graffiti coatings
- mastic texture coatings
- reactive penetrating sealers (as defined by SCAQMD)
- graphic arts coatings (sign paints)
- recycled latex paint (covered in GS-43)
- floor finish and finish strippers for industrial and institutional use (included in GS-40)
- graffiti remover (included in GS-52 and GS-53)
- dry film products

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APPENDIX 2 – CARB SCM 2007 VOC LIMITS (Informative)

Coating Category	VOC Limits g/L
Flat Coatings	50
Nonflat Coatings	100
Nonflat - High Gloss Coatings	150
Specialty Coatings	
Basement Specialty Coatings	400
Concrete/Masonry Sealers	100
Fire Resistive Coatings (GS-11: *Intumescent coatings*)	350
Floor Coatings (GS-11: *Floor paints*)	100
Low-Solids Coatings [a]	120
Primers, Sealers, and Undercoaters	100
Roof Coatings	50
Rust Preventative Coatings (GS-11: *Anti-corrosive coatings*)	250
Shellacs, Clear	730
Shellacs, Opaque	550
Stains	250
Wood Coatings (GS-11: Includes s*ealers* and *water-proofing sealers* labeled for use on wood or metal substrates)	275

[a] **Low-Solids Coatings**. As per CARB,[33] the *VOC* content of *Low-Solids Coatings* (120 grams or less of solids per liter) is calculated differently, as *VOC* Actual, and shall meet the *VOC* limit specified here, rather than the *VOC* limit specified for its product category.

[33] CARB Suggested Control Measures for Architectural Coatings, Sub-section 4.65 VOC Content. https://ww2.arb.ca.gov/sites/default/files/2020-10/2007%20SCM.pdf

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APPENDIX 2 CONTINUED

The following CARB categories are not included in GS-11

- Aluminum roof coatings
- Bituminous roof coatings
- Bituminous roof primers
- Bond breakers
- Concrete curing compounds
- Driveway sealers
- Dry fog coatings
- Faux finishing coatings
- Form-release compounds
- Graphic arts coatings (sign paints)
- High -temperature coatings
- Industrial maintenance coatings
- Magnesite cement coatings
- Mastic texture coatings
- Metallic pigmented coatings
- Multi-color coatings
- Pre-treatment wash primers
- Reactive penetrating sealers
- Recycled coatings
- Stone consolidants
- Swimming pool coatings
- Traffic marking coatings
- Tub and tile refinish coatings
- Waterproofing membranes
- Wood preservatives
- Zinc-rich primers

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APPENDIX 3 – CDPH v1.2 Target CREL VOCs (Informative)

The following table is taken from the CDPH Standard Method, v1.2 (2017).[34] CRELs are Chronic Reference Exposure Levels.

Table 4-1 Target CREL VOCs and their maximum allowable concentrations

No.	Compound Name	CAS No.	Allowable Conc.[a] ($\mu g/m^3$)
1	Acetaldehyde	75-07-0	70
2	Benzene	71-43-2	1.5 [b]
3	Carbon disulfide	75-15-0	400
4	Carbon tetrachloride	56-23-5	20
5	Chlorobenzene	108-90-7	500
6	Chloroform	67-66-3	150
7	Dichlorobenzene (1,4-)	106-46-7	400
8	Dichloroethylene (1,1)	75-35-4	35
9	Dimethylformamide (N,N-)	68-12-2	40
10	Dioxane (1,4-)	123-91-1	1,500
11	Epichlorohydrin	106-89-8	1.5
12	Ethylbenzene	100-41-4	1,000
13	Ethylene glycol	107-21-1	200
14	Ethylene glycol monoethyl ether	110-80-5	35
15	Ethylene glycol monoethyl ether acetate	111-15-9	150
16	Ethylene glycol monomethyl ether	109-86-4	30
17	Ethylene glycol monomethyl ether acetate	110-49-6	45
18	Formaldehyde	50-00-0	9 [c]
19	Hexane (n-)	110-54-3	3,500
20	Isophorone	78-59-1	1,000
21	Isopropanol	67-63-0	3,500
22	Methyl chloroform	71-55-6	500
23	Methylene chloride	75-09-2	200
24	Methyl *t*-butyl ether	1634-04-4	4,000
25	Naphthalene	91-20-3	4.5
26	Phenol	108-95-2	100
27	Propylene glycol monomethyl ether	107-98-2	3,500
28	Styrene	100-42-5	450
29	Tetrachloroethylene	127-18-4	17.5
30	Toluene	108-88-3	150
31	Trichloroethylene	79-01-6	300
32	Vinyl acetate	108-05-4	100
33-35	Xylenes, technical mixture (m-, o-, p-xylene combined)	108-38-3, 95-47-6, 106-42-3	350

[34] https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/CDPH%20Document%20Library/CDPH-IAQ_StandardMethod_V1_2_2017_ADA.pdf

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APPENDIX 4 – LIST OF TEST METHODS (Informative)

ANSI/BHMA A156.18 American National Standard for Materials and Finishes
ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM C67 Standard Test Method for Sampling and Testing Brick an Structural Clay Tile
ASTM C97 Standard Test Method for Absorption and Bulk Specific Gravity of Dimension Stone
ASTM C140 Standard Test Method for Sampling and Testing Concrete Masonry Units and Related Units
ASTM C1371 Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
ASTM C1549 Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
ASTM D522 Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
ASTM D523 Standard Test Method for Specular Gloss
ASTM D523 Standard Test Method for Specular Gloss Paint
ASTM D714 Standard Test Method for Evaluating Degree of Blistering of Paints
ASTM D823 Standard Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels
ASTM D968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1005 Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers
ASTM D1186 Standard Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
ASTM D1308 Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D1400 Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base
ASTM D1640 Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings
ASTM D1735 Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus
ASTM D2047 Standard Test Method Static Coefficient of Friction
ASTM D2245 Standard Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints.
ASTM D2247 Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity
ASTM D2369 Standard Test Method for Volatile Content of Coatings.
ASTM D2370 Standard Test Method for Tensile Properties of Organic Coatings
ASTM D2486 Standard Test Method for Scrub Resistance of Wall Paints
ASTM D2794 Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D2805 Standard Test Method for Hiding Power of Paints by Reflectrometry
ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
ASTM D3274 Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation
ASTM D3359 Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D3363 Standard Test Method for Film Hardness by Pencil Test
ASTM D4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

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ASTM D4062 Standard Test Method for Leveling of Paints by Draw-Down Method
ASTM D4400 Standard Test Method for Sag Resistance of Paints Using a Multinotch Applicator
ASTM D4446 Standard Test Method for Anti-Swelling Effectiveness of Water-Repellent Formulations and Differential Swelling of Untreated Wood When Exposed to Liquid Water Environments
ASTM D4585 Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation
ASTM D4752 Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
ASTM D4828 Standard Test Method for Practical Washability of Organic Coatings
ASTM D5894 Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM D6083 Standard Specification for Liquid Applied Acrylic Coating Used in Roofing.
ASTM D6886 Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography
ASTM D7073 Standard Guide for Application and Evaluation of Brush and Roller Applied Paint Films
ASTM D7088 Standard Practice for Resistance to Hydrostatic Pressure for Coatings Used in Below Grade Applications Applied to Masonry
ASTM D7234 Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
ASTM E-84 Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M Standard Test Method for Water Vapor Transmission of Materials
ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E1918 Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
ASTM G151 Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
ASTM G155 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
ASTM STP500 Paint Testing Manual
CDPH Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2
EPA METHOD 24—Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings
ISO 11890-1: Paints and varnishes – Determination of volatile organic compound (VOC) content – Part 1: Difference method
ISO 11890-2 Paints and varnishes – Determination of volatile organic compound (VOC) content – Part 2: GC/MS method
SCAQMD Method 304: Determination of volatile organic compounds (VOC) in various materials.
SCAQMD Method 313-91: Determination of volatile organic compounds (VOC) by gas chromatography/mass spectrometry (GC/MS)

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SSPC-VIS 2 Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces
SSPC SP-13 Standard Method for Surface Preparation of Concrete.
UL 410 Slip Resistance of Floor Surface Materials

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