



GS-40

**GREEN SEAL™ STANDARD FOR
FLOOR-CARE PRODUCTS FOR
INDUSTRIAL AND INSTITUTIONAL USE**

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THE MARK OF ENVIRONMENTAL RESPONSIBILITY

GREEN SEAL™

Green Seal is a non-profit organization whose mission is to use science-based programs to empower consumers, purchasers, and companies to create a more sustainable world. Green Seal sets leadership standards that aim to reduce, to the extent technologically and economically feasible, the environmental, health, and social impacts throughout the life-cycle of products, services, and companies. The standards may be used for conformity assessment, purchaser specifications, and public education.

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

General. The final issued standard was developed in an open and transparent process with stakeholder input that included 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, services, or organizations covered in the scope of the standard. The requirements included in the standard are subject to revision. Provisions for safety have not been included in this standard. This standard neither modifies nor supersedes laws and regulations. Compliance with this Standard is not a substitute for, and does not assure, compliance with any applicable law or regulations. Compliance with all applicable laws and regulations is a required prerequisite for the manufacturing and marketing of the products. This standard (and any corresponding conformity assessment) presumes compliance with all applicable laws and regulations.

Products, services, or organizations 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, service, or organization to be evaluated.

This standard may not anticipate features 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 its standards to account for the unanticipated environmental, health, and societal impacts.

Normative references (e.g., other standards) in this standard intend to refer to the most recent edition of the normative reference.

Edition. This version is the Second Edition from September 1, 2011 (with editorial changes made on October 1, 2011) and supersedes the First Edition from November 12, 2004.

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Tests may be required by the standard that involve safety considerations. Adequate safeguards for personnel and property should be employed in conducting such tests.

ACRONYMS AND ABBREVIATIONS

ASTM. ASTM International, a standard setting organization formerly known as the American Society for Testing and Materials

BOD. Biological Oxygen Demand

DOC. Dissolved Organic Carbon

ISO. International Organization for Standardization

OECD. Organization for Economic Co-operation and Development

GREEN SEAL™ STANDARD FOR FLOOR-CARE PRODUCTS FOR INDUSTRIAL AND INSTITUTIONAL USE, GS-40

1.0 SCOPE

This standard establishes environmental requirements for industrial and institutional floor-care products. The floor-care products addressed by this standard include floor finish and floor finish stripper. For purposes of this standard, floor finish (also called floor polish) is defined as any product designed to polish, protect, or enhance floor surfaces by leaving a protective wax, polymer, or resin coating that is designed to be periodically removed (stripped) and reapplied. Floor finish stripper (or floor finish remover – referred to here as “stripper”) is defined as a product designed to remove floor finish through breakdown of the finish polymers, or by dissolving or emulsifying the finish, polish, or wax. This standard does not address general-purpose cleaners that can be used to clean floors¹, floor sealers, spray buffing products, or products designed to remove floor wax solely through abrasion. See Appendix 1 for an example list of products included in this standard.

Product users should follow the manufacturers’ instructions on compatibility. Each application must be designed to work together in an environmentally preferable system of overall floor care. Therefore, both the finish and its compatible stripper(s) must meet all of these criteria unless otherwise indicated.

Each criterion states whether it applies to the *undiluted product* or to the *product as used*. All criteria pertain to both finishes and strippers unless otherwise indicated.

Words and phrases described in the standard that appear in *italics* have a corresponding definition located in the definition section of the standard, Annex A.

2.0 PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS

2.1 Slip Resistance. Floor finish products shall have a static coefficient of friction of at least 0.5 as measured by either ASTM International (ASTM) D2047-99 or Underwriters Laboratories Method 410.

2.2 Additional Performance Requirements. Each product shall perform effectively, as measured by the following standard test methods:

- **Removability:** The floor finish and compatible stripper shall achieve a removal ease rating of “good” as measured by ASTM D1792-82, Standard Test Method for Long-Term Removability Properties of Floor Polishes. In the case of a floor finish and stripper proposed for

¹ GS-37 addresses general-purpose cleaners, including those that are used to clean floors.

certification together, they should be tested together, with the candidate stripper replacing the ASTM standard-defined stripper. In the case of a floor finish alone proposed for certification, it should be tested with a Green Seal-certified stripper, with the Green Seal-certified stripper replacing the ASTM standard-defined stripper. In the case of a stripper alone proposed for certification, it should be tested with a Green Seal-certified finish, with the candidate stripper replacing the ASTM standard-defined stripper.

- Soil Resistance: The floor finish shall perform as well as a nationally recognized product of its type in its category as measured by ASTM D3206-92, Standard Test Method for Soil Resistance of Floor Polishes.
- Detergent Resistance: The floor finish shall demonstrate minimal deterioration by achieving a detergent resistance rating of “very good”, as measured by ASTM D3207-92, Standard Test Method for Detergent Resistance of Floor Polish Films. The floor finish shall be tested using a GS-37 certified floor cleaner at the recommended dilution rate for routine floor maintenance as listed on packaging, or the ASTM cleaning solution specified in ASTM D3207-9.

Products shall be tested as used, and if diluted, products shall be diluted with water from the cold tap at no more than 50 °F.

3.0 PRODUCT-SPECIFIC HEALTH AND ENVIRONMENTAL REQUIREMENTS

3.1 Toxic Compounds. The *undiluted product* shall not be toxic to humans. *Dispensing-system concentrates* shall be tested as used. A product is considered toxic if any of the following criteria apply:

Oral lethal dose 50 (LD ₅₀)	≤ 2,000 mg/kg
Inhalation lethal concentration (LC ₅₀)	≤ 20 mg/L*

* If the vapor-phase concentration of the product at room temperature is less than 20 mg/L, it should be tested at its saturation concentration. If it is not toxic at this concentration, it passes the inhalation criterion.

The toxicity testing procedures shall follow the protocols put forth by the Organization for Economic Cooperation and Development (OECD) Guidelines for Testing of Chemicals. These protocols include: Acute Oral Toxicity Test (TG 401) and Acute Inhalation Toxicity Test (TG 403). Toxicity shall be measured on the product as a whole.

To demonstrate compliance with this requirement, a mixture need not be tested if existing toxicological information demonstrates that each of the *ingredients* complies. It is assumed that the toxicity of the individual *ingredients* is additive and that there are no synergistic effects. The toxicity values are adjusted by the weight of the *ingredient* in the product and summed using the following formula:

$$TP = \left(\sum_{i=1}^n \frac{wt_i}{TV_i} \right)^{-1}$$

Where,

TP = toxicity of the product

wt_i = the weight fraction of the *ingredient*

TV = the toxicity value for each *ingredient* (LD₅₀, LC₅₀)

n = number of *ingredients*

Inhalation toxicity will not be required for any *ingredient* with a vapor pressure of 1 mmHg or less.

3.2 Carcinogens, Mutagens, and Reproductive Toxins. The *undiluted product* shall not contain any *ingredients* that are *carcinogens*, *mutagens*, or *reproductive toxins*. For purposes of this standard, naturally occurring elements and chlorinated organics that may be present as a result of chlorination of the water supply and that are listed as *carcinogens*, *mutagens*, or *reproductive toxins* may be present as impurities if the concentrations are below the applicable maximum contaminant levels in the National Primary Drinking Water Standards found in 40 Code of Federal Regulations Part 141.

3.3 Corrosiveness. The *undiluted product* shall not be *corrosive* to the skin or eyes. *Dispensing-system concentrates* shall be tested as used. The *undiluted product* shall not be *corrosive* to the skin, as tested using the Human Skin Construct systems (Liebsch et al. 2000; Fentem et al. 1998). The *undiluted product* shall also not be *corrosive* to the eye as tested using the bovine cornea opacity and permeability test (Sina et al. 1995) after a 10-minute exposure. Green Seal will also accept the results of other peer-reviewed or standard in vitro or in vivo test methods demonstrating that the product mixture is not *corrosive*.

If the pH of the product exceeds 11.5, the whole product shall be tested for *corrosiveness*. The pH is measured using a pH meter and Method 9040 in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, U.S. Environmental Protection Agency Publication SW-846.

3.4 Skin Sensitization. The *undiluted product* shall not be a skin sensitizer, as tested by the OECD Guidelines for Testing Chemicals, Section 406. *Dispensing-system concentrates* shall be tested as used. Green Seal shall also accept the results of other standard test methods, such as those described in Buehler (1994) or Magnusson and Kligman (1969), as proof that the product or its

ingredients are not skin sensitizers. If a product contains a known skin sensitizer at or above a concentration of 0.1%, then the product as a whole shall be considered a skin sensitizer, except where explicit data demonstrate that it is not a skin sensitizer.

3.5 Flammability. The *undiluted product* or 99% by volume of the product *ingredients* shall have a flashpoint above 150°F, as tested using either the Cleveland Open Cup Tester (ASTM D92-97) or a closed-cup method International Organization for Standardization (ISO) 13736 or ISO 2719. Alternatively, the product shall not sustain a flame when tested using ASTM D 4206.

3.6 Air Quality. The *product as used* shall not contain substances that contribute significantly to the production of photochemical smog, tropospheric ozone, or poor indoor-air quality. Therefore, the volatile organic content of the finish product, as used, shall not exceed 7% by weight, and the volatile organic content of the stripper product, as used, shall not exceed 3% by weight at the greatest recommended amount of dilution (suitable for light to medium buildup), and shall not exceed 7% by weight for the least recommended amount of dilution (suitable for heavy buildup). Total volatile organic compound content shall be determined according to California Air Resources Board Method 310.

3.7 Toxicity to Aquatic Life. The *product as used* shall not be toxic to aquatic life. A compound is considered not toxic to aquatic life if it meets one or more of the following criteria:

Acute LC50 for algae, daphnia, or fish >100 mg/L

For purposes of demonstrating compliance with this requirement, aquatic toxicity testing is not required if sufficient aquatic toxicity data exist for each of the product's *ingredients* to demonstrate that the product mixture complies. Aquatic toxicity tests shall follow the appropriate protocols put forth in ISO 7346.2 or OECD test guidance 203 for fish and in OECD test guidance 201 and 202 for algae and daphnia, respectively.

3.8 Eutrophication. Phosphates and phosphonates shall not be present in the *product as used* in quantities above 0.5% by weight of total phosphorus.

3.9 Aquatic Biodegradability. Each of the organic *ingredients* in the *product as used* shall exhibit ready biodegradability in accordance with the OECD definition, except for the polymer, wax, and/or resin portion of a floor finish. Biodegradability shall be measured by one of the following methods: OECD TG 301A-F, ISO 9439 carbon dioxide (CO₂) evolution test, ISO 10708 (two-phase closed-bottle test), ISO 10707 (closed bottle test), or ISO 7827 (dissolved organic carbon removal). Specifically, within a 28-day test, the

ingredient shall meet one of the following criteria within 10 days of the time when biodegradation first reaches 10%:

- Removal of dissolved organic carbon (DOC) > 70%
- Biological oxygen demand (BOD) > 60%
- % of BOD of theoretical oxygen demand > 60%
- % CO₂ evolution of theoretical > 60%

For organic *ingredients* that do not exhibit ready biodegradability in these tests, the manufacturer may demonstrate biodegradability in sewage treatment plants using the Coupled Units Test found in OECD 303A by demonstrating DOC removal > 90%.

Testing is not required for any *ingredient* for which sufficient information exists concerning its biodegradability, either in peer-reviewed literature or databases or by proving that the *ingredient* was tested in accordance with standard test procedures.

3.10 Packaging. The *primary package* shall be *recyclable*. An exception may be made for lightweight flexible packaging (e.g., pouches or bags) that represents a significant reduction in material use.

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

- Alkylphenol ethoxylates
- Phthalates
- Zinc or other heavy metals, including arsenic, lead, cadmium, cobalt, chromium, mercury, nickel, selenium
- *Optical brighteners*
- *Ozone-depleting compounds*

3.12 Training. The product manufacturer, its distributor, or a third party shall offer training or training materials in the proper use of the product. These shall include step-by-step instructions for the proper dilution, use, disposal, the use of equipment, and proper ventilation. Manufacturers shall have product-labeling systems to assist non-English-speaking or illiterate personnel.

3.13 Fragrances. Manufacturers shall identify any fragrances on their material safety data sheets. Any *ingredient* added to a product as a fragrance must follow the Code of Practice of the International Fragrance Association.

3.14 Animal Testing. To avoid new animal testing, previous test results will be accepted as evidence of meeting a criterion. When existing data are not available, the preferred methods for new testing include methods that replace,

reduce, or refine animal use, particularly those recommended by the Interagency Coordinating Committee on the Validation of Alternative Methods or the European Centre for the Validation of Alternative Methods, unless indicated otherwise. In addition, other non-animal (in-vitro) test results, modeling data, data from structural analogs, and other lines of evidence may be accepted, provided that the methods are peer-reviewed and applicable. Specific in vitro or modeling methods may be noted in the standard, but additional options may be accepted by the certification program.

Further, a mixture need not be tested if existing information demonstrates that each of the applicable components complies with the criterion.

4.0 LABELING REQUIREMENTS

Where dilution is required, the manufacturer's label shall clearly and prominently direct the user to dilute with water from the cold tap and shall state the recommended level of dilution. The manufacturer shall also include detailed instructions for proper use and disposal and for the use of personal protective equipment.

Whenever the Green Seal 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 read as follows:

This product meets the Green Seal Standard for Floor-Care Products for Industrial and Institutional Use, GS-40, based on its reduced human and aquatic toxicity and reduced smog production potential.

ANNEX A- Normative

Definitions of Terms

(note that the defined terms are italicized throughout the standard)

Carcinogen. A chemical listed as a known, probable, or possible human carcinogen by the International Agency for Research on Cancer, the National Toxicology Program, the U.S. Environmental Protection Agency, or the Occupational Health and Safety Administration.

Corrosive. A substance that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact.

Dispensing-system concentrate. Products that are designed to be used in dispensing systems that cannot be practically accessed by users.

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.

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, 2003).

Optical brighteners. Additives designed to enhance the appearance of colors and whiteness in materials by absorbing ultraviolet radiation and emitting blue radiation. Also known as fluorescent whitening agents.

Ozone-depleting compounds. Any compound with an ozone-depletion potential greater than 0.01 (CFC 11 = 1).

Primary packaging. This packaging is the material physically containing and coming into contact with the product, not including the cap or lid of a bottle.

Product as used. This is the most concentrated form of the product that the manufacturer recommends for a product's intended use. For example, if a manufacturer recommends a concentrated floor-stripping product be diluted 1:4 with water, the product shall meet the environmental and performance requirements at a dilution of 1:4.

Recyclable package. This package can be diverted from the waste stream through available processes and programs, and can be collected, processed, and returned to use in the form of raw materials or products.

Reproductive toxin. A chemical listed as a *reproductive toxin* 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.).

Undiluted product. This is the most concentrated form of the product produced by the manufacturer for transport outside its facility.

APPENDIX 1- Informative

Examples of products included in and excluded from the scope of GS-40:

Products Included in GS-40

- Floor finish (also called floor polish)
- Floor finish stripper (or floor finish remover – referred to here as “stripper”)

Products Excluded from GS-40

- Cleaners/degreasers marketed as suitable for cleaning soils in production and maintenance applications without enzymes or microorganisms (included in GS-34)
- Floor sealers
- General-purpose, restroom, glass and carpet cleaners for industrial and institutional use without enzymes or microorganisms (included in GS-37)
- General-purpose, bathroom, glass, and carpet cleaner products marketed specifically for household use without enzymes or microorganisms (included in GS-8)
- Hand cleaning products for industrial and institutional use (covered in GS-41) or household use (covered in GS-44)
- Products designed to remove floor wax solely through abrasion
- Specialty cleaning products for industrial and institutional use (GS-53)
- Specialty cleaning products for household use (GS-52)
- Spray buffing products