

GREEN SEAL ENVIRONMENTAL STANDARD FOR FLOOR-CARE PRODUCTS: FINISHES AND COMPATIBLE STRIPPERS USED FOR INDUSTRIAL AND INSTITUTIONAL PURPOSES (GS-40)

First Edition, November 12, 2004
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1. 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.

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.

2. Definitions

Carcinogen. A chemical listed as a known, probable, or possible human carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), 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).

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

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.

3. Product-Specific Performance Requirements

3.1 Slip Resistance. Floor finish products shall have a static coefficient of friction [SCOF] of at least 0.5 as measured by either ASTM D2047-99 or UL Method 410.

3.2 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 D 1792-82, Standard Test Method for Long-Term Removability Properties of Floor Polishes. In the case of a floor finish and stripper proposed for 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 D 3206-92, 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 D 3207-92, 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 D 3207-9.

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.

4. Product-Specific Health and Environmental Requirements

4.1 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.

4.2 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 (CFR) Part 141.

4.3 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 opacity and permeability test (BCOP) (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*, EPA Publication SW-846.

4.4 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.

4.5 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.

4.6 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 VOC content shall be determined according to California Air Resources Board Method 310.

4.7 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.

4.8 Eutrophication

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

4.9 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 (ThOD) > 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 dissolved organic carbon (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.

4.10 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.

4.11 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 (ODCs)

4.12 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.

4.13 Fragrances

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

4.14 Animal Testing

Green Seal wants to discourage animal testing and will accept the results of past peer-reviewed or standard tests demonstrating compliance with a criterion. A mixture need not be tested if existing information demonstrates that each of the ingredients complies with a criterion. Additionally, non-animal (in-vitro) test results may be accepted, providing that the test methods are referenced in peer-reviewed literature and the manufacturer provides the reasons for selecting the particular test method.

5. 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 Green Seal's standard for industrial and institutional floor-care products based on its reduced human and aquatic toxicity and reduced smog production potential.”