GS-37
Green Seal™ Environmental Standard for General-Purpose, Bathroom, Glass, and Carpet Cleaners Used for Industrial and Institutional Purposes

Third Edition

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THE MARK OF ENVIRONMENTAL RESPONSIBILITY

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GREEN SEAL™

Green Seal is a non-profit organization devoted to environmental standard setting, product certification, and public education. Green Seal's mission is to work towards environmental sustainability by identifying and promoting environmentally responsible products, purchasing, and production. Through its standard setting, certification and education programs, Green Seal:

- identifies products that are designed and manufactured in an environmentally responsible manner;
- offers scientific analyses to help consumers make educated purchasing decisions regarding environmental impacts;
- ensures consumers that any product bearing the Green Seal Certification Mark has earned the right to use it; and
- encourages manufacturers to develop new products that are significantly less damaging to the environment than their predecessors.

The intent of Green Seal's environmental requirements is to reduce, to the extent technologically and economically feasible, the environmental impacts associated with the manufacture, use and disposal of products. Set on a category-by-category basis, Environmental Standards focus on significant opportunities to reduce a product's environmental impact.

Green Seal offers certification to all products covered by its Standards. Manufacturers may submit their products for evaluation by Green Seal. Those which comply with Green Seal's requirements may be authorized to use the Green Seal Certification Mark on products and in product advertising. Manufacturers authorized to use the Green Seal Certification Mark on their product are subject to an ongoing program of testing, inspection, and enforcement.

For additional information on Green Seal or any of its programs, contact:

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FOREWORD

A. Certification. This Environmental Standard contains the basic requirements for General-Purpose, Bathroom, Glass, and Carpet Cleaners used for Industrial and Institutional Purposes (as defined in the Scope section) to be certified by Green Seal™ and for their manufacturers to receive authorization to use the Green Seal Certification Mark on products, on their packaging and in product advertising and promotion. The requirements are based on an assessment of the environmental impacts of product manufacture and use, and were developed with the guidance and input of a stakeholder committee consisting of manufacturers, users, government officials, academic and consulting experts, and environmentalists. The standard was reviewed and approved by consensus of the stakeholder committee, as defined by the International Organization for Standardization (ISO) and the Federal Government (Office of Management and Budget Circular A-119). It is therefore a consensus standard. This standard is subject to revision as further experience and investigation may show it is necessary or desirable. Green Seal solicits information and advice on issues associated with this standard.

B. Compliance with the Standard. Compliance with this Standard is one of the conditions of certification of a product by Green Seal.

C. Compliance with Government Rules. In order to be authorized to use the Green Seal Certification Mark, the manufacturer of the certified product must disclose all governmental allegations or determinations of violation of federal, state, or local environmental laws or regulations with respect to facilities in which the product is manufactured. Certification will be denied any product manufactured in violation of environmental laws or regulations if, in Green Seal's judgment, such violations indicate that the environmental impacts of the product significantly exceed those contemplated in the setting of the standard.

D. Limitations on Purpose of Standard. Green Seal's Standards provide basic criteria to promote environmental quality. Provisions for product safety have not been included in this Standard because government agencies and other national standard-setting organizations establish and enforce safety requirements.

E. Substantially Equivalent Products. Products that are substantially similar to those covered by this Standard in terms of function and environmental impact may be evaluated and certified by Green Seal against the intent of the requirements of this standard.

F. Unanticipated Environmental Impacts. A product which complies with this Standard will not necessarily be certified by Green Seal if, when examined and tested, it is found to have other features which significantly increase its impact on the environment. In such a situation, Green Seal will ordinarily amend its standards or criteria to account for the unanticipated environmental impacts.

G. Certification Agreement and Green Seal Rules. In order to be authorized to apply the Green Seal to a product or its packaging, or to use the Green Seal™ in product advertising or promotion, the manufacturer of the product must (1) sign a Green Seal Certification Agreement that, among other things, defines how and where the Green Seal may be used, (2) pay fees to cover the costs of evaluation and monitoring, (3) undergo an evaluation to determine that the product complies with Green Seal's requirements, (4) agree to an ongoing program of factory inspections and product testing, and (5) comply with the requirements found in the most recent version of "Rules Governing the Use of the Green Seal Certification Mark."

H. Disclaimer of Liability. Green Seal, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. Green Seal shall not incur any obligations or liability for damages, including consequential damages, arising out of or in connection with the interpretation of, reliance upon, or any other use of this Standard.

I. Care in Testing. Many tests required by Green Seal's Standards involve safety considerations. Adequate safeguards for personnel and property should be employed in conducting such tests.

J. Referenced Standards. Standards referenced in this document may have been superseded by a later edition, and it is intended that the most recent edition of all referenced standards be used in determining compliance of a product with this Standard.

K. Labeling Requirements. This Standard neither modifies nor supersedes government labeling requirements. Labeling language which varies in form from the requirements of this section may be used with the written approval of Green Seal.

ENVIRONMENTAL STANDARD

1.0 Scope

This standard establishes environmental requirements for industrial and institutional general-purpose, bathroom, glass, and carpet cleaners. For purposes of this standard, general-purpose, bathroom, glass, and carpet cleaners are defined as those cleaners intended for routine cleaning of offices, institutions, warehouses, and industrial facilities. The standard does not focus on the use of cleaners in households, food preparation operations, or medical facilities.

Due to the large number of possible cleaning products, processes, soil types, and cleaning requirements, the compatibility of cleaners with surface materials is not specifically addressed in this standard. Product users should follow the manufacturers' instructions on compatibility.

Each criterion states whether it applies to the undiluted product or to the product as used.

2.0 Definitions

Bathroom cleaners. This category includes products used to clean hard surfaces in a bathroom such as counters, walls, floors, fixtures, basins, tubs, and tile. It includes products that are required to be registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), such as disinfectants and sanitizers, but does not include products specifically intended to clean toilet bowls.

Carpet cleaners. This category includes products used for routine cleaning of carpets and rugs. This category may include, but is not limited to, products used in cleaning by means of extraction, shampooing, dry foam, bonnet or absorbent compound. It does not include products intended primarily for spot removal. This category does not include any products required to be registered under FIFRA, such as those making claims as sterilizers, disinfectants, or sanitizers.

Concentrate. This is a product that must be diluted by at least eight parts by volume water (1:8 dilution ratio) prior to its intended use.

Dispensing-system concentrates. These are products that are designed to be used in dispensing systems that cannot be practically accessed by users.

General-purpose cleaners. This category includes products used for routine cleaning of hard surfaces including impervious flooring such as concrete or tile. It does not include cleaners intended primarily for the removal of rust, mineral deposits, or odors. It does not include products intended primarily to strip, polish, or wax floors, and it does not include cleaners intended primarily for cleaning toilet bowls, dishes, laundry, glass, carpets, upholstery, wood, or polished surfaces. This category does not include any

products required to be registered under FIFRA, such as those making claims as sterilizers, disinfectants, or sanitizers.

Glass cleaners. This category includes products used to clean windows, glass, and polished surfaces. This category does not include any products required to be registered under FIFRA, such as those making claims as sterilizers, disinfectants, or sanitizers.

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.

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. An ozone-depleting compound is any compound with an ozone-depletion potential greater than 0.01 (CFC 11 = 1).

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 product be diluted 1:64 or 2:64 for use as a general-purpose cleaner, the product shall meet the environmental and performance requirements at a dilution of 2:64.

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.

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.

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

3.0 Product-Specific Performance Requirements

Each product *as used* when diluted with water from the cold tap at no more than 50 ^{o}F, shall clean common soils and surfaces in its category effectively, as measured by a standard test method. Carpet cleaners may be diluted with warm or hot water where required by the test method or performance considerations. Green Seal recommends the following test methods:

General-purpose cleaners. The product shall remove at least 80% of the particulate soil in the American Society for Testing and Materials (ASTM) D4488-95, A5.

Bathroom cleaners. The product shall remove at least 75% of the soil in ASTM D5343 as measured by ASTM D5343.

Carpet cleaners. Using a standard test method, the manufacturer must demonstrate that its product performs as well as a nationally recognized product in its category in both cleaning efficiency and resoiling resistance. Acceptable test methods/procedures to demonstrate performance include, but are not limited to, the following sources: the American Association of Textile Chemists and Colorists (AATCC), ASTM, the Institute of Inspection, Cleaning and Restoration Certification (IICRC), the International Organization for Standardization (ISO), WoolSafe, the Carpet and Rug Institute (CRI) or laboratory testing conducted as part of a bid evaluation by a government purchasing entity.

Glass cleaners. The product shall achieve at least a rating of three in each of the following Consumer Specialty Products Association (CSPA) DCC 09 categories: soil removal, smearing, and streaking.

Using standard test methods, a manufacturer can also demonstrate that its product performs as well as a nationally recognized product in its category or achieves the removal efficiency defined in this section.

4.0 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})	$\leq$ 2,000 mg/kg
Inhalation lethal concentration (LC_{50})	$\leq$ 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.

Toxicity shall be measured on the product as a whole. Alternatively, a mixture need not be tested if existing toxicity information demonstrates that each of the ingredients complies. Ingredients that are nonvolatile do not require inhalation toxicity testing (Appendix A). It is assumed that the toxicity of the individual component compounds are weighted and summed and that there are not synergistic effects (Appendix A).

The toxicity testing procedures should meet the requirements 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), Acute Inhalation Toxicity Test (TG 403), and Acute Dermal Toxicity Test (TG 402).

4.2 Carcinogens and Reproductive Toxins

The *undiluted* product shall not contain any ingredients that are carcinogens or that are known to cause reproductive toxicity. Carcinogens are defined as those chemicals listed as known, probable, or possible human carcinogens 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. Chemicals known to cause reproductive toxicity are defined as those listed 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*.).

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 Code of Federal Regulations (CFR) Part 141.

4.3 Skin and Eye Irritation

The *undiluted* product shall not be corrosive to the skin or eyes. Dispensing-system concentrates shall be tested as used. The undiluted cleaning 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 cleaning 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.

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.

4.5 Combustibility

The *undiluted* product shall not be combustible. The 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 Standards Organization (ISO) 13736 or ISO 2719. Alternatively, the product shall not sustain a flame when tested using ASTM D 4206.

4.6 Photochemical Smog, Tropospheric Ozone Production, and Indoor 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. The volatile organic content of the product as used shall not exceed the following

- 0.1% by weight for dilutable carpet cleaners
- 1% by weight for general-purpose and bathroom cleaners
- 3% by weight for glass cleaners
- 3% by weight for ready-to-use carpet cleaners

The volatile organic content shall be determined by 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 LC_{50} for algae, daphnia, or fish $\geq$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 in ISO 7346.2 for fish and in 40 CFR 797, Subpart B for other aquatic organisms.

4.8 Aquatic Biodegradability

Each of the organic ingredients in the product *as used* shall exhibit ready biodegradability in accordance with the OECD definition except for a FIFRA-registered ingredient in a bathroom cleaner and the polymer portion of a carpet cleaner. However, all other ingredients in a FIFRA-registered bathroom cleaner or carpet cleaner must comply. Biodegradability shall be measured by one of the following methods: ISO 9439 carbon dioxide (CO_2) 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%
% CO_2 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 proving that the ingredient was tested in accordance with standard test procedures.

4.9 Eutrophication

The product *as used* shall not contain more than 0.5% by weight of total phosphorus.

4.10 Packaging

The primary package shall be recyclable. Alternatively, manufacturers may provide for returning and refilling of their packages. An exception may be made for lightweight flexible packaging (e.g., pouches or bags) that represents a significant reduction in material use when compared with rigid packaging.

4.11 Concentrates

The product must be a concentrate, except for FIFRA-registered bathroom cleaners and absorbent compound carpet cleaners.

4.12 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.

4.13 Prohibited Ingredients

The product shall not contain the following ingredients:

- Alkylphenol ethoxylates
- Dibutyl phthalate
- Heavy metals including arsenic, lead, cadmium, cobalt, chromium, mercury, nickel, or selenium
- Ozone-depleting compounds
- Optical brighteners

4.14 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, and the use of equipment. Manufacturers shall have product labeling systems to assist non-English-speaking or illiterate personnel.

4.15 Animal Testing

This section applies to Sections 4.1, 4.3, and 4.7. 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, Green Seal may accept non-animal (in-vitro) test results, providing that the test methods are referenced in peer-reviewed literature and the manufacturer provides the reasons for selecting the particular test method.

5.0 Labeling Requirements

The manufacturer's label shall state clearly and prominently that dilution with water from the cold tap is recommended and shall state the recommended level of dilution. Carpet cleaner labels shall specify the use of cold water for products that do not suffer significant performance degradation in cold water. 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 environmental standard for industrial and institutional cleaners based on its reduced human and aquatic toxicity and reduced smog production potential."
>
> For FIFRA-registered bathroom cleaners, replace "toxicity" with the word "impacts".

APPENDIX A: Evaluation of Toxicity Data

Green Seal will evaluate the toxicity of a product if toxicity data for each of the product ingredients exists. 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 (LD_{50}, LC_{50})
n = number of ingredients

For example, a product containing 5% alkylpolyglycoside, 10% sodium silicate, and 85% water would be compared to the oral toxicity cutoff criterion using:

$$TP = \left(\frac{0.05}{5{,}000} + \frac{0.1}{1{,}280} \right)^{-1}$$

chemical	LD_{50} (oral)[1] mg/kg	wt %	LD_{50} (oral) mg/kg
alkylpolyglycoside	>5,000	5	100,000[2]
sodium silicate	1,280	10	12,800
TP			11,300

1 Toxicity data from Appendix B.
2 Assumed an LD_{50} of 5,000 for purposes of the example.

The cutoff criterion is 2,000 mg/kg, and the toxicity of the product is 11,300 mg/kg. Therefore, the example product complies with the oral toxicity criterion.

Exemptions from toxicity testing

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

If inhalation test data are not available, an inhalation LC_{50} may be estimated using the following formula.

$$LC_{50} = \frac{LD_{50,oral} \times ABS_{GI} \times BW}{ABS_{inh} \times R \times ET \times CF}$$

Where,

$LD_{50,oral}$ = the single dose LD_{50} for the oral pathway (mg/kg)
ABS_{GI} = the gastrointestinal absorption rate, (unitless)
ABS_{inh} = the inhalation absorption rate, (unitless)
R = the respiration rate for the experimental animal (L/min)
ET = the exposure time (hours)
CF = the conversion factor (60 min/hr)
BW = the body weight of animal (kg)

If data are not available, Green Seal will use the EPA Region IV recommended gastrointestinal absorption factor of 0.8 for VOCs and 0.5 for semivolatile organic compounds. Green Seal will use an inhalation absorption rate of 1.0 for all organic compounds. The average weight of a rat is 0.35 kg and its respiration rate is 0.14 L/min. The exposure period is 4 hours.

In order to perform this estimate, the LD_{50} value must be based on a single dose.