



**GREEN SEAL™ PROPOSED REVISED
ENVIRONMENTAL STANDARD FOR
GENERAL-PURPOSE, BATHROOM, GLASS,
AND CARPET CLEANERS USED FOR
INDUSTRIAL AND INSTITUTIONAL
PURPOSES (GS-37)**

November 16, 2007

THE MARK OF ENVIRONMENTAL RESPONSIBILITY

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**GREEN SEAL™ PROPOSED REVISED ENVIRONMENTAL STANDARD FOR
GENERAL-PURPOSE, BATHROOM, GLASS, AND CARPET CLEANERS USED
FOR INDUSTRIAL AND INSTITUTIONAL PURPOSES (GS-37)**

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GREEN SEAL™ PROPOSED REVISED ENVIRONMENTAL STANDARD FOR GENERAL-PURPOSE, BATHROOM, GLASS, AND CARPET CLEANERS USED FOR INDUSTRIAL AND INSTITUTIONAL PURPOSES (GS-37)**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. Further, the criteria in this standard include consideration of vulnerable population requirements in institutional settings such as schools, day care facilities, nursing homes, and other 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

2.1 Asthma. Asthma is a chronic respiratory illness that intermittently impairs breathing. It is characterized by variable airflow obstruction, commonly presenting with symptoms of cough, wheeze, shortness of breath, or chest tightness, which may be mild, moderate, severe and even life-threatening. Symptoms may resolve completely between active episodes. Symptoms may occur during exposure, immediately after exposure or up to 24 hours later in a "late phase," even interrupting sleep.

A chemical is considered capable of causing asthma if it is specifically listed as an Asthmagen by the Association of Occupational and Environmental Clinics (AOEC).

2.2 Bathroom Cleaners. Products in this category include those used to clean hard surfaces in a bathroom such as counters, walls, floors, fixtures, basins, tubs, toilets, and tile.

2.3 Carcinogens. Chemicals listed as a known, probable, reasonably anticipated, or a possible human carcinogen by the International Agency for Research on

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Cancer (IARC) (Groups 1, 2A, and 2B), the National Toxicology Program (NTP) (Groups 1 and 2), the U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) (weight-of-evidence classifications A, B1, B2, C, carcinogenic, likely to be carcinogenic, and suggestive evidence of carcinogenicity or carcinogen potential), or the Occupational Safety and Health Administration (OSHA).

2.4 Carpet Cleaners. Products developed to perform routine cleaning or spot 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.

2.5 Concentrate. Product, as sold, that must be diluted by at least thirty-two parts by volume water (1:32 dilution ratio) prior to its intended use.

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

2.7 Fragrance: An additive, often (but not limited to) a multi-component additive, used in a product with the purpose of changing the scent of the product.

2.8 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 dishes, laundry, toilets, glass, carpets, upholstery, wood, or polished surfaces.

2.9 Glass Cleaners. This category includes products used to clean windows, glass, dry erase boards, and mirrored surfaces.

2.10 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.

2.11 Intentional Component. A deliberately added product component, where it is added for its continued presence in the final product to provide a specific characteristic, appearance, or quality. Naturally occurring elements and chlorinated organics, which may be present as a result of chlorination of the water supply, are not considered intentional components if the concentrations are below the

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applicable maximum contaminant levels in the National Primary Drinking Water Standards found in 40 Code of Federal Regulations (CFR) Part 141.

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

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

2.14 Optical Brighteners. Additives designed to enhance the appearance of colors and whiteness in materials by absorbing ultraviolet radiation and emitting blue radiation. These compounds are also known as fluorescent whitening agents.

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

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

2.17 Product As Used. 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 health and environmental requirements at a dilution of 2:64.

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

2.19 Recyclable. The package can be collected in a substantial majority of communities, separated or recovered from the solid waste stream and used again, or

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reused in the manufacture or assembly of another package or product through an established recycling program.

2.20 Recycled. A product or material which has been diverted from disposal in a landfill and has been reused in the production of another product.

2.21 Refillable Package. A container which is routinely returned to and refilled by the product manufacturer at least five times with the original product held by the package. For the purpose of this program, the product manufacturer or the product manufacturer's agent may refill a package.

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

2.23 Reusable Package. A container which is routinely reused at least five times to store the original product contained by the package.

2.24 Serious Eye Damage. The production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the anterior surface of the eye, which is not fully reversible within 21 days of application.

2.25 Skin Corrosion. The production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis, following the application of a test substance for up to 4 hours. Corrosive reactions are typified by ulcers, bleeding, bloody scabs, and, by the end of observation at 14 days, by discoloration due to blanching of the skin, complete areas of alopecia, and scars.

2.26 Skin Sensitizer. A substance that causes an immunologically mediated cetaceous reaction, also known as allergic contact dermatitis

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

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3.0 PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS

3.1 Product Performance. Each product shall clean common soils and surfaces in its category effectively, at the most dilute/least concentrated manufacture-recommended dilution level, as measured by a standard test method. Products shall be diluted, as required, just prior to testing using water from the cold tap at no more than 50°F. 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:

3.1.1 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.

3.1.2 Bathroom Cleaners. The product shall remove at least 75% of the soil in ASTM D5343-06 as measured by the standard.

3.1.3 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 Seal of Approval program (CRI), or laboratory testing conducted as part of a bid evaluation by a government purchasing entity.

3.1.4 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.

3.2 Alternative Performance Requirements. Alternatively, a product can demonstrate adequate performance through testing using another scientifically validated method conducted by a credible third party under controlled and reproducible laboratory conditions. Test methodology must be documented in sufficient detail for Green Seal's review.

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4.0 PRODUCT-SPECIFIC HEALTH AND ENVIRONMENTAL REQUIREMENTS**4.1 Oral Toxicity**

The *undiluted* product shall not be toxic to humans. A product is considered toxic if any of the following criteria apply:

$$\text{Oral lethal dose 50 (LD}_{50}\text{)} \leq 5,000 \text{ mg/kg}$$

Toxicity shall be measured on the product as a whole. The toxicity testing procedures should meet the requirements put forth by the Organization for Economic Cooperation and Development (OECD) Guidelines for Testing of Chemicals Acute Oral Toxicity Test (TG 401). Testing is not required for any ingredient for which sufficient information exists.

Dispensing-system concentrates may be tested *as used*, but will require the qualification designation (see Labeling section 6.5).

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)

n = number of ingredients

4.2 Inhalation Toxicity

The product *as used* shall not produce room air levels of an ingredient or ingredients that are considered toxic by inhalation. A product is exempt from the inhalation toxicity criterion if it contains no ingredients with a vapor pressure greater than 0.1 mm Hg.

A product is considered to be toxic through inhalation if it has an acute inhalation toxicity (LC50) of <= 20 mg/L at 1 hr, or if the weighted ingredient average LC50

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is ≤ 20 mg/L at 1 hr, determined from all ingredients with a vapor pressure greater than 0.1 mm Hg at ambient temperature.

Alternatively, a product may undergo chamber testing. When tested using the Small Chamber Emissions Test Method (Attachment B), a product is considered toxic if any of the following criteria are exceeded:

	Short-Term (Acute)	Long-Term (Chronic)
TVOC (mg/m ³) ¹	≤ 5.0	≤ 0.22
Formaldehyde (ppm) ²	≤ 0.040	≤ 0.013
Toxins with inhalation threshold values	Less Than the ATSDR MRL and the CA AREL ³	Less Than the ATSDR MRL, the CA CREL, and the EPA RfC ⁴

NA = Not Applicable

¹Defined to be the total response of measured VOCs falling within the C₄ – C₁₆ range, with responses calibrated to a toluene surrogate.

²Short-term level based on the ATSDR Acute Duration Minimal Risk Level (MRL). Long-term level based on 1/2 CAL-EPA 1-hour Reference Exposure Level (REL).

³ Compared to ATSDR Acute Duration MRL and CA Acute Reference Exposure Level (AREL), or other relevant threshold value.

⁴ Compared to the EPA Reference Concentration (RfC), CA CREL, and the ATSDR Intermediate or Chronic Duration MRL. Intermediate MRLs shall be used if a Chronic MRL is not available for that compound, or other relevant threshold value.

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

4.4 Skin and Eye Irritation. The *undiluted* product shall not be corrosive to the skin or cause serious eye damage as defined by the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). Further, a product is considered corrosive to skin or to cause serious eye damage if it has a pH of 2 or less or a pH of 11.5 or greater, unless tested and proven otherwise. Dispensing-system concentrates may be tested *as used*, but will require the qualification designation (see Labeling section 6.5).

A product shall be evaluated for skin corrosion and eye damage following the testing and evaluation strategy described in the GHS. Green Seal prefers that an *in vitro* test validated by the Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM) or the European Centre for the Validation of Alternative Methods (ECVAM) be used. Green Seal will also accept the results of other peer-reviewed or standard *in vitro* or *in vivo* test methods

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demonstrating that the product mixture is not corrosive. Testing is not required for any ingredient for which sufficient information exists.

4.5 Skin Sensitization. The *undiluted* product shall not be a skin sensitizer, as tested by the local lymph node assay (LLNA) or following EPA test guidelines for skin sensitization (OECD Guideline 429, OPPTS 870.2600). Green Seal will accept the results of other standard test methods, such as the guinea pig maximization test (OECD Guideline 406) or the Buehler test (OECD 406), as proof that the product in its most concentrated form is not a skin sensitizer when data from LLNA tests are not available. Any new product or ingredient testing should use the LLNA. Dispensing-system concentrates may be tested *as used*, but will require the qualification designation (see Labeling section 6.5). Testing is not required for any ingredient for which sufficient information exists.

4.6 Skin Absorption. The *undiluted* product shall not contain ingredients, present at greater than or equal to 1% in the product, that are listed on the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value list (TLV) carrying a skin notation, or substances that are listed on the German Deutsche Forschungsgemeinschaft (DFG) Maximum Allowable Concentrations (MAK) list with a skin absorption H notation. Dispensing-system concentrates may be evaluated *as used*, but will require the qualification designation (see Labeling section 6.5).

4.7 Ingredients that Cause Asthma. The *undiluted* product shall not contain any ingredients that cause asthma. Dispensing-system concentrates may be evaluated *as used*, but will require the qualification designation (see Labeling section 6.5).

4.8 Volatile Organic Compounds. 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
- 1% by weight for glass cleaners
- 1% by weight for ready-to-use carpet cleaners

The volatile organic content shall be determined by California Air Resources Board Method 310, modified to not allow the exemptions for fragrances and low vapor pressure organic compounds specified under Method 310.

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4.9 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, using a weighted average approach. Aquatic toxicity tests shall follow the appropriate protocols in ISO 7346-2 for fish, OECD test guidance 203 for fish, OECD test guidance 201 for algae, and OECD test guidance 202 for daphnia.

4.10 Aquatic Biodegradability. Each of the individual organic ingredients in the product *as used* shall exhibit ready biodegradability in accordance with the OECD definition except for the polymer portion of a carpet cleaner. However, all other ingredients in a carpet cleaner must comply. Biodegradability shall be measured according to any of the following methods: ISO 7827, 9439, 10707, 10708, 9408, 14593; OECD Methods 301A – F; or OECD 310. 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 $> 60\%$

Per OECD guidance (2003) the 10-day window requirement does not apply to structurally-related surfactant homologues.

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 $> 90\%$.

An exception shall be made for an organic ingredient that does not exhibit ready biodegradability if it has low aquatic toxicity, is not bioaccumulating, and exhibits biodegradation rates above 70% (measured as BOC, DOC, or COD), per ISO test methods 9887 or 9888; or OECD 302A, B, or C.

For purposes of this section, low aquatic toxicity is defined as having an acute *and* chronic aquatic toxicity > 100 mg/L where chronic aquatic (fish) toxicity is measured per OECD Method 204. Bioaccumulating is defined as having a bioconcentration factor (BCF) greater than 100 (or \log BCF > 2).

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Testing is not required for any ingredient for which sufficient information exists concerning its biodegradability, either in peer-reviewed literature or databases.

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

4.12 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 D92-05a) or the following closed-cup methods, the Abel Closed-Cup method (ISO 13736) or the Pensky-Martens Closed-Cup method (ISO 2719). Alternatively, the product shall not sustain a flame when tested using ASTM D 4206.

4.13 Other Prohibited and Restricted Ingredients.

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

- Alkylphenol ethoxylates
- Heavy metals including, lead, hexavalent chromium, or selenium both in the elemental form or compounds.
- Ozone-depleting compounds
- Optical brighteners
- Phthalates
- Nitro-musks
- Polycyclic musks
- 2-butoxyethanol
- Formaldehyde-donors

4.13.2 Restricted Ingredients. The product *as used* shall not contain the following ingredients above the specified restricted levels:

- D-limonene shall be limited to a concentration of 20 millimoles (mmol) or less per liter.
- Terpene hydrocarbons, other than d-limonene, (e.g. pinene, myrcene) shall be limited to 10 mmol or less per liter.

4.14 Fragrances. Fragrances added to the product must follow the Code of Practice of the International Fragrance Association. All fragrance components must be disclosed to Green Seal and meet all other criteria of this standard. The material safety data sheet (MSDS) must identify that fragrance has been added.

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4.15 Concentrates. The product must be a concentrate, except for toilet bowl cleaners, carpet spot removers, and absorbent compound carpet cleaners.

4.16 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.

5.0 PACKAGING REQUIREMENTS

5.1 Recyclable Package. The primary package must be recyclable or be a source-reduced container that has been light-weighted by at least 20% compared to traditional packaging.

5.2 Recovered Material Content. The primary package must contain at least 25 percent post-consumer material or be a refillable or reusable package.

5.3 Concentrated Product Packaging. Concentrated products are prohibited from being packaged in ready-to-use forms, including but not limited to, spray-dispenser bottles.

5.4 Dispensing-System Concentrate Packaging.

5.4.1 Dispensing-system concentrate packaging shall deliver the recommended dilution accurately and shall not function when the water flow is inadequate to provide an accurate dilution of the concentrate..

5.4.2 The dispensing-system concentrate packaging shall be closed and tamper-proof such that the undiluted product is inaccessible to the user.

5.4.3 The dispensing system shall have a backflow prevention assembly that has been certified by the Foundation for Cross Connection Control and Hydraulic Research (FCCC&HR) to have successfully completed the Laboratory and Field Evaluation phases of the approval program.

5.5 Aerosol Cans. Aerosol cans are prohibited.

5.6 Heavy Metal Restrictions. Heavy metals, including lead, mercury, cadmium, and hexavalent chromium, shall not be intentionally introduced. Further, the sum of the concentration levels of these metals present shall not

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exceed 100 parts per million by weight (0.01%); an exception is allowed for refillable packages or packages that would not exceed this maximum level but for the addition of recovered materials. Further, intentional introduction does not include the use of one of the metals as a processing aid or intermediate to impart certain chemical or physical changes during manufacturing, where the incidental retention of a residual of that metal in the final packaging or packaging component is not desired or deliberate, if the final packaging or packaging component complies with the incidental concentration restrictions of 100 ppm.

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

6.0 TRAINING AND LABELING REQUIREMENTS

6.1 Training. The product manufacturer, its distributor, or a third party shall offer training or training materials on the proper use of the product. This shall include step-by-step instructions for the proper dilution, use, disposal of the product, and the use of equipment, as well as recommended personal protection equipment for each stage of the product or equipment's use.

Product manufacturers shall make the appropriate product and/or equipment training information, including MSDSs and technical data sheets, available electronically as well as in hard copy.

6.2 Label Language. The manufacturer's label shall include English and another language or English and a graphical representation or icons in order to assist illiterate or non-English speaking personnel.

6.3 Label Dilution Directions. 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.

6.4 Label Use and Disposal Directions. The manufacturer's label shall have clear disposal, recycling, reuse, or refill instructions, proper and clear directions for use, appropriate precautions and recommendations for the use of personal protective equipment.

6.5 DSC Qualification Designation. When a dispensing-system concentrate product requires the allowed exemptions to pass the health criteria in the standard,

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a qualification designation will be made available on Green Seal's listing of certified products.

6.6 Certification Mark. The Green Seal Certification Mark may appear on the packaging and may appear on the product itself. The Green Seal Certification mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the certification.

6.7 Statement of Basis for Certification. 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™ environmental standard for industrial and institutional cleaners based on its reduced human and environmental toxicity and reduced volatile organic compound content.”

APPENDIX A**SMALL CHAMBER TEST METHOD**

Testing to determine indoor air exposures to chemicals is based on ASTM D 5116 – 06 Standard Guide for Small Scale Environmental Chamber Determination of Volatile Organic Emissions from Indoor Materials / Products. In this test, indoor air exposures are generated using dynamic environmental chambers to test emissions from products. Indoor air is measured for acute and chronic exposure levels. The test is conducted for a minimum of 48 hours. Acute levels must be met at 4 hours; chronic levels must be met at 48 hours.

The product shall be tested *as used*, used as directed from the manufacturer, the test conducted as directed by the ASTM method, and using sample prep guidelines still under development. Three data points are required to establish an emissions decay curve at 4, 24, and 48 hours.

VOC emission factor results obtained from chamber emission tests are to be converted through modeling into estimated airborne concentrations that are relevant to potential indoor inhalation exposures of building occupants. The calculation is accomplished using the steady-state mass balance model described in Equation C1. Room VOC concentrations shall be calculated by the following general equation:

$$C_{voc_j}(t = X) = \frac{A_{source} E_{voc_j}(t = X)}{Q_{office}} \quad (\text{Eq. C1})$$

where,

$C_{voc_j}(t = X)$ is the calculated office concentration for VOC j,
at time X hours in $\mu\text{g}/\text{m}^3$

$E_{voc_j}(t = X)$ is the workstation emission factor for VOC j
at time X hours, ($\mu\text{g h}^{-1} \text{m}^{-2}$)

Q_{room} is the room ventilation rate, m^3/h

A_{source} is the source amount.

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To estimate airborne concentrations, the model requires input for the amount of product used, the volume of the space and the outdoor air ventilation rate in the room.

School classroom scenario: Use a 24- ft wide by 40- ft long classroom with an 8.5-ft high ceiling. Use a ventilation rate of 0.9 h⁻¹. Assume that only 90% of the room volume of 231 m³ is ventilated at this rate due to occupancy of the space by cabinetry, furnishings and other room contents. The calculations result in floor and ceiling surface area of 89.2 m². A net wall area of 94.6 m² is calculated based on the total wall area minus the area of a door and two windows. This model is based on the California High Performance Schools model.

ADDENDUM

GREEN SEAL CRITERIA FOR VERIFICATION OF OPTIONAL CLAIMS FOR GS-37 CERTIFIED CLEANERS

A. SCOPE

This criteria document establishes environmental requirements for optional verified claims on GS-37 certified products.

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

B. DEFINITIONS

B.1 Biobased: The content of a product that is from biological products or renewable materials, forestry or agricultural materials (including plant, animal, and marine materials).

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

B.3 Fragrance: An additive, often (but not limited to) a multi-component additive, used in a product with the purpose of changing the scent of the product.

B.4 Greenhouse gas (GHG): Components of the atmosphere that contribute to the greenhouse effect including water vapor, carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons, chlorofluorocarbons, and ozone.

B.5 Ingredient: Any constituent of a product that is intentionally added or known to be a contaminant that comprises at least 0.01% by weight of the product.

B.6 Renewable energy: Energy from non-depleting sources and derived from natural processes that are replenished constantly including wind, solar, water, geothermal, and biofuels.

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

C. CLAIM CRITERIA

C.1 No Added Fragrance: A product will be verified to contain no added fragrance when no fragrance ingredients are in the product. However, this does not imply that the product has no scent or odor.

C.2 Manufactured with Green Energy: A product shall be verified to be manufactured with green energy if the energy requirements for product and package production were directly fueled with a minimum of 75% renewable energy, not including any renewable energy certificate purchases.

C.3 Made with Zero Waste: A product shall be verified to be manufactured with zero waste when there was no disposal of waste (solid or water) during the production of the product and package. Responsible material management can be done within the company or with proven partnerships to result in zero net waste.

C.4 Made with Zero GHG Emissions: A product shall be verified to be manufactured with zero greenhouse gas emissions when there is no net GHG emissions during production of the product and package. This can be achieved within the company, with proven partnerships, or through carbon offset programs. If a carbon offset program is used for 100% of the emissions, a successful emissions reduction program must be demonstrated, with 10% or greater annual reductions in emissions.

C.5 Biobased Product: A product is verified to be a biobased product when its biobased carbon content is determined to be at least 50% of the total carbon, as determined with the ASTM International Radioisotope Standard Method D6866. Alternatively, the biobased components shall comprise at least 50% of the total weight of product, minus product water content, as determined with ingredient information.

D. LABELING REQUIREMENTS:

D.1 The verified claim may only appear on packaging, literature, or marketing materials for GS-37 certified products.

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

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

No Added Fragrances: This product meets the Green SealTM environmental standard for industrial and institutional cleaners based on its reduced human and environmental toxicity and reduced volatile organic compound content. This product was also verified by Green Seal to contain no added fragrance ingredients.

Made with Green Energy: This product meets the Green SealTM environmental standard for industrial and institutional cleaners based on its reduced human and environmental toxicity and reduced volatile organic compound content. This product was also verified by Green Seal to have been manufactured with at least 75% renewable energy.

Made with Zero Waste: This product meets the Green SealTM environmental standard for industrial and institutional cleaners based on its reduced human and environmental toxicity and reduced volatile organic compound content. This product was also verified by Green Seal to have been manufactured in a process that produced no net water or solid waste.

Made with Zero GHG Emissions: This product meets the Green SealTM environmental standard for industrial and institutional cleaners based on its reduced human and environmental toxicity and reduced volatile organic compound content. This product was also verified by Green Seal to have been manufactured with no net greenhouse gas emissions.

Biobased Product: This product meets the Green SealTM environmental standard for industrial and institutional cleaners based on its reduced human and environmental toxicity and reduced volatile organic compound content. This product was also verified to contain at least 50% biobased components.