GS-51

GREEN SEAL® –STANDARD FOR

LAUNDRY CARE –PRODUCTS FOR INDUSTRIAL AND INSTITUTIONAL USE

EDITION 1.54
September 812, 2017~~79~~

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GREEN SEAL

Green Seal is a nonprofit 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

Edition. This version, Edition 1.4~~3~~5 from September 8, 2017, replaces Edition 1.~~3~~4 from ~~January 11, 2016~~September 8, 2017. Information on the revision of Edition 1.4 can be found on Green Seal's website. ~~This version includes substantive changes.~~

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. These requirements are subject to revision, and generally cover aspects above and beyond regulatory compliance. This standard neither modifies nor supersedes laws and regulations. Any conformity assessment to this standard requires compliance with all applicable laws and regulations for the manufacturing and marketing of the products.

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

Products, 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 a feature of the product that may significantly, and undesirably, increase its impact on the environment, health, or society. In such a situation, Green Seal will ordinarily amend a standard to account for the unanticipated environmental, health, or societal impacts.

Normative references (e.g., other standards) in this standard intend to refer to the most recent edition of the normative reference. Test methods may be required for product evaluation. Unless explicitly stated that a specified method is the only acceptable one, the intent of the standard is that an equivalent test method may be accepted at Green Seal's sole discretion.

Certification to this standard shall be awarded only by Green Seal, or, with Green Seal's explicit written permission, by a third-party certification program conducting on-site audits.

Disclaimer of Liability. Green Seal, as the developer of this standard, shall not incur any obligations or liability for any loss or damages, including, without limitation, indirect, consequential, special, or incidental damages, arising out of or in connection with the interpretation or adoption of, reliance upon, or any other use of this Standard by any party. Green Seal makes no express or implied warranty of merchantability or fitness for a particular purpose, nor any other express or implied warranty with respect to this Standard.

ACRONYMS AND ABBREVIATIONS

AATCC. American Association of Textile Chemists and Colorists.
ACGIH. American Conference of Governmental Industrial Hygienists.
AISE. Association for Soaps, Detergents and Maintenance Products.
AOEC. Association of Occupational and Environmental Clinics.
ASSE. American Society of Sanitary Engineering.
ASTM. ASTM International.
BCF. Bioconcentration Factor.
BOD. Biochemical Oxygen Demand.
BTU. British Thermal Unit.
CARB. Air Resources Board for the State of California.
CAS. Chemical Abstracts Service.
CFR. Code of Federal Regulations.
CFU. Colony Forming Unit.
CSPA. Consumer Specialty Products Association.
DFG. German Deutsche Forschungsgemeinschaft.
DOC. Dissolved Organic Carbon.
EN. European Standard.
EPA. United States Environmental Protection Agency.
FDA. United States Food and Drug Administration.
FIFRA. Federal Insecticide, Fungicide, and Rodenticide Act.
GHS. Globally Harmonized System for the Classification and Labelling of Chemicals.
GMM. Genetically Modified Microorganism.
IFRA. International Fragrance Association.
INCI. International Nomenclature of Cosmetic Ingredients.
ISO. International Organization for Standardization.
IUPAC. International Union of Pure and Applied Chemistry.
JECFA. Joint Food and Agriculture Organization of the United Nations/WHO Expert Committee on Food Additives.
NOP. National Organic Program.
OECD. Organisation for Economic Co-operation and Development.
PMRA. Health Canada's Pesticide Management Regulatory Agency.
SDS. Safety Data Sheets.
SOP. Standard Operating Procedure.
TG. Test Guidance.
ThOD. Theoretical Oxygen Demand.
USDA. U.S. Department of Agriculture.
VOC. Volatile Organic Compound.
WHO. World Health Organization.

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1.0 SCOPE

This standard establishes environmental, health, and social requirements for products that are used to clean, remove stains, and/or otherwise treat the softness, static, or wrinkle characteristics of *laundry*. This standard covers and is limited to *laundry detergent products* (home-style detergent, complete detergent, or multi-component system) for *industrial and institutional use*, as well as pre-treatment *stain* and *spot removing products*, *softening products* (liquids and sheets), *laundry* additives (*bleaching*, *softening*, sour, antichlor, and alkali booster *products*), *anti-static products* (liquid and sheets), *fabric refresher* products, anti-wrinkle products, *laundry prewash* products, and *laundry starch/sizing/fabric finish products*. This standard addresses the products listed above but not the facility where *laundry* care occurs, such as a dry cleaner or commercial laundry. The standard also does not address any equipment, equipment maintenance, or processes used at a laundry (e.g. ozone generation/use). The solvent used at a dry cleaner is considered part of the process; therefore, it is also excluded. This standard includes products used in laundries for health care and food settings, which may include *antimicrobial pesticide products* (e.g., products covered by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)). This standard does not apply to products that contain *enzymes* or *microorganisms* that are sold in *spray packaging*. This standard includes *fabric protectant* products but does not address impregnating products with flame retardant or waterproofing properties. This standard does not address carpet or upholstery cleaning and maintenance products or footwear or leather care products. See Appendix 1 for an example list of products included in this standard.

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

Where there is more than one criterion that applies, the more stringent criterion applies.

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

Criteria that include an asterisk (*) in the title are considered foundational criteria[1].

[1] Foundational criteria are set up to be the same across Green Seal's cleaning product standards, though some unique exceptions may be included for each standard. Revisions to these criteria in the future will apply to all standards that include the identified foundational criteria (excluding unique exceptions).

2.0 PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS

2.1 Product Performance.[2] Each product or a combination of products[3] shall demonstrate effective performance for their intended use following the Framework for Performance Testing in Annex B. All performance tests shall be conducted as comparison tests against *benchmark product(s)* with comparable functions.

The test methods included in the following criteria refer to *household use* machines, but *institutional use* machines can be used with appropriate modifications to the method, as detailed and provided to the certification program.

The following criteria include test methods that are applicable to some product categories, as specified below; for all other product categories, follow section 2.2, Alternative Performance Requirements. Products specifically addressed in section 2.1 may use an alternate test under section 2.2 as long as the relevant characteristics specified under sections 2.1.1, 2.1.2, and 2.1.3 are tested.

2.1.1 Laundry Detergent Performance. *Laundry detergent products* shall demonstrate performance equivalent to or better than a *benchmark product(s)*, and shall be tested for the following characteristics on manufacturer-recommended *laundry* (e.g., cotton, polyester, or cotton/polyester blend).

2.1.1.1 Cleaning. *Laundry detergent products* shall demonstrate general detergency and stain removal using ASTM D4265, with instrumental or visual analysis for determination, for a minimum of four stains. Any stains marketed for use by the product shall be included in the four stains.

2.1.1.2 Color Care. *Laundry detergent products* shall demonstrate that they maintain color fastness using the procedure in ASTM D4265 or AATCC 124 (using machine washing), by assessing color change after 5 wash cycles, with appropriate instrumental or visual analysis for determination.

2.1.2 Stain and Spot Removal Performance.[4] Products sold solely as s*tain removing products* and *bleaching products* shall demonstrate performance equivalent to or better than an appropriate *benchmark product* in their category for cleaning and removing stains on manufacturer-recommended *laundry* (e.g., cotton, polyester, or cotton/polyester blend) using ASTM D4265, with instrumental or visual analysis for determination, for a minimum of four stains. Any stains marketed for use by the product shall be included in the four stains.

[2] It is generally acknowledged that standard methods have not been developed for measuring performance of laundry care products in the industrial and institutional market. The methods provided in this section may be used, but are not a requirement as long as the method used complies with Annex B.
[3] If a combination of products is to be tested for a multi-component system the same combination must be tested for the *benchmark products*. The entire multi-component system does not need to be tested if performance can be measured with a portion of the products (e.g., detergent, builder, and booster).
[4] This method is the same as 2.1.1.1 Cleaning for *laundry detergent products*, thus does not need to be repeated for *laundry detergent products* that are also intended for stain and spot removal.

2.1.3 Softening Performance. Products sold solely as *softening products* shall demonstrate performance equivalent to or better than an appropriate *benchmark product* in their category on manufacturer recommended *laundry* (e.g., cotton, polyester, or cotton/polyester blend) using the Consumer Specialty Products Association (CSPA) DCC-13 series evaluating softness (13B), water absorbency (13D), and static control (13F, using one of described evaluation methods).

2.2 *Alternative Performance Requirements. Alternatively, the product(s) shall demonstrate effective performance equivalent to or better than appropriate *benchmark product(s)* with comparable functions, following the Framework for Performance Testing in Annex B. Relevant characteristics[5] specified in sections 2.1.1, 2.1.2, and 2.1.3 shall apply for those product categories.

3.0 PRODUCT-SPECIFIC SUSTAINABILITY REQUIREMENTS

3.1 *Formula Disclosure for Certification. For certification to this standard, all of the formula *components* shall be disclosed to the certification program, including the chemical name, the Chemical Abstracts Service (CAS) registry number, and the levels (% by weight) of each *component* in the formula.

3.2 *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.

3.3 *Acute Toxicity. The *undiluted product* shall not be toxic to humans. A product is considered toxic if any of the following criteria apply.[6,7]

[5] The relevant characteristics are the assessment endpoint (e.g., detergency & stain removal), the method of determination (e.g., instrumental), the number of cycles, and the number and type of stains, if applicable.
[6] Products meeting the requirements in 3.3 will not fall into hazard categories 1 through 5 for acute oral and dermal toxicity and will not fall into hazard categories 1 through 4 for acute inhalation toxicity under the Globally Harmonized System for the Classification and Labeling of Chemicals (*GHS*) when the whole product is evaluated using the weighted average approach.
[7] Recognizing the need to protect animal welfare, testing to demonstrate conformance should only be done after consulting with the certification program to ensure that other means of determining/estimating conformance have been exhausted as provision 3.2 outlines including existing data, modeling data, data from structural analogs, and other lines of evidence.

Oral lethal dose (LD_{50})	≤ 5,000 mg/kg
Inhalation lethal concentration (LC_{50})	≤ 20,000 ppmV at 1 hour
Dermal lethal dose (LD_{50})	≤ 2,000 mg/kg

For purposes of demonstrating compliance with this requirement, existing acute toxicity data for each of the product's *components* present at 0.01% or more in the *undiluted product* may be used. These data are used to calculate a weighted average that assumes that the toxicity of the individual *components* is additive. The toxicity values are adjusted by the weight of the *components* 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 *component*
TV = the toxicity value for each *component* (LD_{50})
n = number of *components*

Inhalation toxicity shall be determined from all *components* present at 0.01% or more in the *undiluted product,* when the *component* has a vapor pressure greater than 1 mm Hg at 1 atm pressure and 20°C.

Note: Refer to Annex C for potential alternate thresholds for *closed dilution-control systems*.

Note: Refer to Annex D for potential alternate thresholds for *powder/solid/non-aqueous liquid* products.

3.4 *Skin and Eye Damage. The *undiluted product* shall not cause *skin corrosion* or cause *serious eye damage*. For purposes of demonstrating compliance with this requirement, data may be evaluated for each of the product's *components* at present 0.01% or more in the *undiluted product*. If these *components*, at their concentrations in the *undiluted product*, are not shown to cause *skin corrosion* or *serious eye damage*, then the product will not be considered to cause *skin corrosion* or *serious eye damage*. Results from peer-reviewed studies or standard in vitro or in vivo testing methods may also be accepted. Testing is not required for any ingredient for which sufficient information exists.

Further, a product is considered to cause *skin corrosion* or to cause *serious eye damage* if it has a pH less than or equal to 2 or greater than or equal to 11.5, unless data prove otherwise**.**

Note: Refer to Annex C for potential alternate thresholds for *closed dilution-control systems*.

Note: Refer to Annex D for potential alternate thresholds for *powder/solid/non-aqueous liquid* products.

3.5 *Carcinogens and Reproductive Toxins. The *undiluted product* shall not contain any *components* that are *carcinogens* or *reproductive toxins*. The *undiluted product* shall not contain

any *components* at 0.01% or more that, according to published uses,[8] are typically added for the purpose of releasing substances into a raw material or the final product, if those substances are *carcinogens.*

Note: Refer to Annex E for the exemption of titanium dioxide in products that contain *enzymes*.

3.6 *Mutagens and Neurotoxins/Systemic Toxins. The *undiluted product* shall not contain any *components* that have been identified as *mutagens* or *neurotoxins/systemic toxins*.

3.7 *Endocrine Disruptors. The *undiluted product* shall not contain any *components* that are on the U.S. Environmental Protection Agency (EPA) List of Chemicals for Tier 1 Screening that have been shown to disrupt hormones (e.g., have estrogen- or androgen-mediated effects), tested according to the EPA Series 890 - Endocrine Disruptor Screening Program Test Guidelines.

3.8 *Asthmagens. The *undiluted product* shall not contain any *components* present at 0.01% or more that have been identified as *asthmagens*. Refer to Annex E, Requirement D for potential exemptions for *enzymes*.

3.9 *Respiratory Sensitization. The *undiluted product* shall not contain any *components* present at 0.01% or more that have been identified as *respiratory sensitizers*. Refer to Annex E, Requirement D for potential exemptions for *enzymes*.

3.10 *Skin Sensitization. The *undiluted product* shall not be a *skin sensitizer*. For purposes of demonstrating compliance with this requirement, data may be evaluated for each of the product's *components* present at 0.01% or more in the *undiluted product*. If these *components*, at their concentrations in the *undiluted product*, are not shown to be *skin sensitizers*, then the product will not be considered to be a *skin sensitizer*.

3.11 *Skin Absorption. The *undiluted product* shall not contain *components* present at 1% or more in the product that are listed on the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value list carrying a skin notation or substances that are listed on the German Deutsche Forschungsgemeinschaft (DFG) maximum allowable concentrations list with a skin absorption H notation. Further, the product shall not contain *components* at 0.01% or more in the *undiluted product* that sum to 1% in the formula that are listed on ACGIH or DFG with the same target organ.

3.12 *Volatile Organic Compound (VOC) Content. The VOC content of the *product as used* shall not exceed the current regulatory limits of the Air Resources Board for the State of California (CARB) for VOCs in its product category. For product categories not regulated by CARB, the following limitations on VOC level (by weight) shall not be exceeded:

- *Laundry detergent products* (as part of a multi-component system): 4%
- *Laundry detergent products* (as a complete detergent): 12%

[8] Published uses include sources such as peer-reviewed research, industry practice, or manufacturer documentation.

- *Bleaching products*, not sold as *laundry detergent products*: 8%
- *Softening products*: 4%
- *Sour products*: 4%
- Other products: 1%

The VOC content shall be determined in one of the following ways:

- By summing the percent by weight contribution from all organic *components* in the product at 0.01% or more that have a vapor pressure of greater than 0.1 mm mercury at 1 atm pressure and 20º C.
- According to the California Air Resources Board Method 310 (or equivalent), modified to include all *fragrances* and all organic *components* in the product at 0.01% or more.[9]

Current CARB regulatory limits for VOCs.[10]

Product Category	**Effective Date**	**Limit (%)**
Laundry Prewash Aerosol/solid	1/1/1994	22
Laundry Prewash All other forms	1/1/1994	5
Laundry Starch/Sizing/Fabric Finish Product	1/31/2008	4.5

3.13 *Toxicity to Aquatic Life. The *product as used* shall not be toxic to aquatic life. A product is considered not toxic to aquatic life if the lowest available and most representative acute LC_{50} data for fish, daphnia, or algae is greater than or equal to 100 mg/L. For purposes of demonstrating compliance with this requirement, data for each of the product's *components* present at 0.01% or more in the *product as used* may be used to calculate a weighted average (as in section 3.3).

The preferred sources of data come from the following protocols: International Organization for Standardization (ISO) 7346-2 for fish, Organization for Economic Co-operation and Development (OECD) Test Guidance (TG) 203 for fish, OECD TG 202 for daphnia, and OECD TG 201 for algae.

3.14 *Aquatic Biodegradability. Each of the individual organic *components* present at 0.01% or more in the *product as used* shall exhibit ready biodegradability in accordance with the OECD definition, except for polymers. Biodegradability shall be measured according to any of the following methods: ISO 7827, 9439, 10707, 10708, 9408, 14593; OECD Methods 301A – F;

[9] Evaluation of total VOCs in this standard includes all *fragrances* and all VOCs present in the product at 0.01% or more. Evaluation of total VOCs under Method 310 exempts *fragrances* and all organic compounds present below 0.1%.
[10] These limits are a reference to the current CARB regulatory limits and will be updated to reflect any amendments made by CARB in the future.

or OECD 310. Specifically, within a 28-day test, the organic *component* 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%
- Biochemical Oxygen Demand (BOD) > 60%
- BOD, as % of Theoretical Oxygen Demand (ThOD) > 60%
- CO_2 evolution, as % of theoretical CO_2 > 60%

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

Alternative Evaluation Options: Substances that Do Not Exhibit Ready Biodegradability. For organic *components* at 0.01% in the *product as used* that do not exhibit ready biodegradability, one of the following options may be acceptable:

1. The manufacturer may demonstrate biodegradability in sewage treatment plants using the Coupled Units Test found in OECD 303A by demonstrating DOC removal > 90%.
2. The manufacturer may demonstrate that the compound has low aquatic toxicity (acute LC50 ≥ 100 mg/L for algae, daphnia, or fish) and exhibits inherent ultimate biodegradability with biodegradation rates above 70% (measured as BOD, DOC, or COD), per ISO test methods 9887 or 9888 or OECD 302A-C.

Note: Testing is not required for any *component* for which sufficient information exists concerning its biodegradability, either in peer-reviewed literature or databases. In the absence of experimental data, Quantitative Structure-Activity Relationship data from EPA's BioWin (EpiSuite) models may be considered.

3.15 *Bioaccumulating Compounds. The *product as used* shall not contain any *components* present at 0.01% or more that bioaccumulate. A chemical is considered to bioaccumulate when it has a bioconcentration factor (BCF) ≥ 500 (or log K_{ow} ≥4). The preferred source of data is from OECD TG 305 (for BCF). If the chemical meets the requirement for biodegradability, 3.14 herein, it may be considered to not bioaccumulate.

3.16 *Eutrophication. The *product as used* shall not contain phosphorus at more than 0.5% by weight.

3.17 Prohibited Components. The *undiluted product* shall not contain the following *components*:

- 2-butoxyethanol
- Alkylphenol ethoxylates
- *Halogenated organic solvents*
- The heavy metals lead, hexavalent chromium, or selenium; either in the elemental form or compounds
- Nitro-musks
- o-Phenylphenol
- *Ozone-depleting compounds*

- Phthalates
- Polycyclic musks
- Toxic Release Inventory Persistent, Bioaccumulative, and Toxic Chemicals
- Triclosan

3.18 *Combustibility. The *undiluted product* shall not be combustible. The product or 99% by volume of the product *components* present at 0.01% or more in the *undiluted product* shall have a flashpoint above 150°F (65.5°C), as tested using either the Cleveland Open Cup Tester (ASTM D92-05a), 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 D4206 Standard Test Method for Sustained Burning of Liquid Mixtures Using the Small Scale Open-Cup Apparatus.

3.19 *Fragrances. All *fragrances* used shall be produced and handled following the code of practice of the International Fragrance Association (IFRA).

3.20 Colorants. Each *colorant* shall meet one of the following:
- Be certified by the U.S. Food and Drug Administration (FDA) and permitted for ingestion
- Be a *natural component*
- Not have any of the following heavy metals intentionally added: arsenic, cadmium, cobalt, hexavalent chromium, lead, manganese, mercury, nickel, and selenium

3.21 Optical Brighteners. The *product as used* shall not contain any *components* present at 0.01% or more that are *optical brighteners*.

3.22 Concentration and Compaction. The following products shall be concentrated or compacted in order for the normal/medium load dose per kg of dry, soiled laundry of the undiluted product to be at the following levels:

Product[11]	**Concentrated**	**Ultra-Concentrated**
Liquid *laundry detergent products*	5.2 ml/kg (0.08 fl.oz./lb) or less	2.6 ml/kg (0.04 fl.oz./lb) or less
Solid/Powder *laundry detergent products*	9.4 g/kg (0.15 oz/lb) or less	5.0 g/kg (0.08 oz/lb) or less
Softening products, not sold as *laundry detergent products*	5.2 ml/kg (0.08 fl.oz./lb) or less	2.6 ml/kg (0.04 fl.oz./lb) or less

Other products do not have to meet concentration and compaction requirements.

[11] If the *laundry detergent product* is a multi-component system, only the detergent and *softening product* must meet the concentration and compaction requirements.

3.23 *Products Containing Enzymes. Products that contain *enzymes* shall meet all Annex E criteria.

3.24 *Products Containing Microorganisms. Products that contain *microorganisms* shall meet all Annex F criteria.

3.25 *Antimicrobial Agents. Except for *antimicrobial pesticide products*, the use of *antimicrobial agents* is permitted only for preservation or stabilization of the product.

3.26 *Disposable Wipes. Products that are sold in a ready-to-use format may contain disposable wipes/towelettes/sheets or other disposable, single-use materials if they are made from agricultural products, wood pulp, and other cellulosic materials. An exception shall be made for reusable wipes/towelettes/sheets that are intended to be used multiple times (e.g., three or more uses).

4.0 MANUFACTURING SUSTAINABILITY REQUIREMENTS

4.1 *Social Responsibility. Documentation shall be provided that the production of the product meets the following social responsibility requirements:

4.1.1 Freedom of Association and Collective Bargaining. Workers shall have the right to join or form trade unions of their own choosing and their right to bargain collectively shall be recognized and respected. An exception shall be made for inmate workers.

4.1.2 Freedom of Labor. There shall not be forced or bonded labor or use of *child labor*.

4.1.3 Freedom from Discrimination. There shall not be discrimination in terms of race, color, sex, religion, age, disability, gender, marital status, sexual orientation, union membership, political opinion, national extraction, or social origin such that it affects the opportunity or treatment in employment. There shall be no support or tolerance of corporal punishment, physical or verbal coercion, sexual or other harassment, intimidation, or exploitation.

4.1.4 Occupational Health and Safety. A safe and hygienic workplace environment shall be provided with access to potable water. Adequate steps shall be taken to minimize the hazards of the workplace and workers shall receive health and safety training to prevent accidents and injury.

4.1.5 Conditions of Employment. Workers shall work under fair conditions of employment. Wages, working hours and overtime shall meet at a minimum the national legal or industry benchmark standard and regular employment shall be provided.

5.0 PACKAGING SUSTAINABILITY REQUIREMENTS

5.1 Primary Package. A plastic *primary package* shall be one of the following:

- A *source-reduced primary package*
- *Recyclable*
- Contain 25% *post-consumer material*
- A *refillable package* with an effective *take-back program*
- Alternative approaches may be acceptable, if an independent evaluation has shown that, for a substantial majority of communities, their life-cycle benefits are similar to at least two of the approaches listed above.

For materials other than plastic, the *primary package* shall contain at least 25% *post-consumer material* or demonstrate that efforts were made to use the maximum available *post-consumer material* in the package.

5.1.1 *Plastic Labeling. If plastic, the packaging shall be marked with the appropriate Resin Identification Code.

5.2 *Concentrated Product Packaging. *Concentrates* are prohibited from being packaged in spray-dispenser bottles, disposable wipes, or other ready-to-use primary package types.

5.3 Aerosol Packaging. *Aerosol packaging* shall meet the following:

- Manufacturers shall demonstrate that recycling programs for *aerosol packaging* are available to a substantial majority of communities where the product is sold
- Manufacturers shall provide documentation establishing why *aerosol packaging* is necessary for a given product addressing environmental, health, and performance considerations
- *Aerosol packaging* propellant shall meet all of the product-specific sustainability requirements in section 3.0 herein and shall not be a *hazardous air pollutant*
- For Section 3.3 Acute Toxicity herein, *aerosol packaging components* will be evaluated regardless of vapor pressure level
- The product contents from the nozzle to the point-of-delivery shall be in a form that does not contain any inhalable or respirable particles, such as but not limited to foams. If the product contents are delivered in particle form, the particles between 10-2.5 microns shall not comprise more than 1% of the total particles and no particles shall be below 2.5 microns

5.4 *Heavy Metal Restrictions. The heavy metals lead, mercury, cadmium, and hexavalent chromium shall not be *intentionally introduced*. Further, the sum of the concentration levels of these metals present in the packaging shall not exceed 100 ppm; an exception is allowed for *primary packages* that would not exceed this maximum level but for the addition of *post-consumer materials*.

5.5 *Other Restrictions. Phthalates, bisphenol A, and chlorinated packaging material are prohibited from being *intentionally introduced* to plastic packaging; an exception is allowed for *primary packages* that would not have added phthalates, bisphenol A, or chlorinated packaging material but for the addition of *post-consumer material*.

6.0 CERTIFICATION AND LABELING REQUIREMENTS

6.1 Training Requirements. 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 applicable step-by-step instructions for the proper dilution/dosing and use, consequences of improper use or improper dilution/dosing, disposal of the product, and relevant use or maintenance of equipment, as well as recommended personal protection equipment for each stage of use for the product or equipment. Product manufacturers shall make the appropriate product and/or equipment training information, including safety data sheets (SDSs) and technical data sheets, available electronically as well as in hard copy.

6.2 Label Language. The product label shall include English and another language, or English and a graphical representation or icons.

6.2.1 Dilution for Concentrates. For *concentrates*, the manufacturer's label shall state clearly and prominently that dilution with water from the unheated tap is recommended, unless tested otherwise to meet the performance requirements in Section 2.0 herein, and shall state the recommended level of dilution (e.g., for products that use manual dilution or dosage, state amount of product in common and measurable terms such as milliliters, ounces, teaspoons, pumps, or capfuls).

6.2.2 Dosing Directions. For products that are used with wash water,[12] the product label shall clearly and prominently provide directions for dosing normal loads, small loads or those with light soils, and large loads or those with heavy soils (e.g., state amount of product in common and measurable terms such as milliliters, ounces, teaspoons, pumps, or capfuls).

6.2.2.1 Water Hardness Dosing. For products that are used with wash water,[11] the product label shall clearly and prominently provide recommended dosing requirements for expected water hardness levels.

6.2.3 Use Directions. The product label shall clearly and prominently provide directions for use, and any appropriate precautions or recommendations for the use of personal protective equipment. A product certified from a multi-component system shall include a statement on the label that the manufacturer recommends the product be used with a multi-component system.

6.2.3.1 Cold Water Wash Directions. For products that are used with wash water,[11] the product label shall clearly and prominently provide directions for using *cold water* wash temperatures or lower temperatures when possible; an exception shall be made for *antimicrobial pesticide products*, which should state the temperature needed for antimicrobial activity.

[12] Products that are used with wash water include *laundry detergent*, *softening*, *bleaching*, sour, and *laundry prewash products*.

6.2.3.2 Full Loads. For products that are used with wash water,[11] the product label shall clearly and prominently provide the recommendation to run full loads of *laundry*.[13]

6.2.4 Disposal Directions. The product label shall clearly and prominently provide directions for applicable disposal, recycling, reuse, or refill instructions for the package.

6.3 *Antimicrobial Claims. Except for *antimicrobial pesticide products*, antimicrobial, antibacterial, *disinfecting*, or *sanitizing* product claims are prohibited.

6.3.1 Products Making Antimicrobial Claims. *Antimicrobial pesticide products* shall have label instructions that the product should only be used on fabric soils or *laundry* conditions that have been identified to be at risk for disease transmission or where required by regulation. Equivalent language may be approved by the certification program.

6.4 *Organic Claims. Organic claims shall only be based on *certified-organic component* content and shall be supported with documentation that they meet the U.S. Department of Agriculture (USDA) National Organic Program (NOP) or programs determined to be equivalent by or have recognition agreements with the USDA NOP.

6.5 *Natural and Biobased Claims. Only the following natural and *biobased*, or related, claims are allowed when the product meets the criteria outlined:

- "100 percent Natural", "All Natural", "100 percent Biobased", or "All Biobased" shall only contain *natural* or *biobased components*, respectively, excluding water, and with no petroleum, silicone, or *synthetic components*
- "Natural" or "Biobased" products shall contain 95% *natural*, *naturally-derived*, or *biobased components*, respectively, excluding water, and with no petroleum, silicone, or *synthetic components*
- Claims on specific product *components* being "natural" or "biobased" may be permitted if it is a *natural* or *biobased component*

6.6 *Ingredient Line. The product label shall list the product ingredients using the naming convention of the International Nomenclature of Cosmetic Ingredients (INCI) in order of predominance. Where an INCI name does not exist for an ingredient, alternative nomenclature may be used[14]. Ingredients in concentrations of less than 1% may be listed in any order after those in concentrations of more than 1%. A chemical function or chemical class descriptor may be used to protect trade secret information.

[13] If this recommendation is followed, it will reduce the environmental impact from doing laundry.
[14] Alternative nomenclature may include International Union of Pure and Applied Chemistry (IUPAC) name, CAS name, CSPA Dictionary name, and or the common chemical name.

6.6.1 *Consumer and User Communication. The product ingredient line shall be made available to end-users in an easily accessible means in addition to the product label, such as the company website or technical data sheet.

6.6.2 *Fragrances. The general term 'fragrance' may be used for *fragrance components*; in this case, the product label shall direct end-users to additional information. A list of the *fragrance components* that are present in the product at 0.01% or more shall be made available to end-users in an easily accessible means, such as the company website or technical data sheet. Chemical class descriptors may be used to protect trade secret information. Alternatively, the company may provide a link to the IFRA Transparency List,[15] or a subset of this list.

6.7 *Fragrance and Allergen Labeling. The product label and SDS shall declare if a *fragrance* has been added or if no *fragrance* has been added. The product label and SDS shall also indicate if any *allergen components* are present in the product at 0.01% or more (e.g., "Contains allergen [allergen's INCI name]"). Where an INCI name does not exist, alternative nomenclature may be used.[16]

6.8 pH Declaration. Products shall declare the pH of the product, both the *undiluted product* and the *product as used*, on the SDS. Refer to Annex D for potential exemptions for products as *powders/solids/non-aqueous liquids*.

6.9 Certification Mark. The Green Seal® Certification Mark may appear on the product, packaging, secondary documents, and promotional materials, only in conjunction with the certified product. Use of the Mark must be in accordance with *Rules Governing the Use of the Green Seal Certification Mark*.[17]

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.

Green Seal must review all uses of the Certification Mark prior to printing or publishing.

6.10 Use With Other Claims. The Green Seal Certification Mark shall not appear in conjunction with any human health or environmental claims, unless verified and approved in writing by Green Seal.

6.11 Statement of Basis for Certification. Wherever the Green Seal Certification Mark appears, it shall be accompanied by a description of the basis for certification. The description shall be in a location, style, and typeface that are easily readable.

[15] IFRA's Transparency List, http://www.ifraorg.org/en-us/ingredients#.VjpTmitWLxw
[16] Alternative nomenclature may include International Union of Pure and Applied Chemistry (IUPAC) name, CAS name, CSPA Dictionary name, and or the common chemical name.
[17] www.greenseal.org/TrademarkGuidelines

Unless otherwise approved in writing by Green Seal, the description shall read as follows, unless an alternate version is approved in writing by Green Seal:

> This product meets Green Seal™ Standard GS-51 based on effective performance, concentration of product, minimized/recycled packaging, and protective limits on human & environmental toxicity. GreenSeal.org.

If the *closed dilution-control system* product was evaluated in accordance with Annex C, the description shall read as follows, unless an alternate version is approved in writing by Green Seal:

> This product meets Green Seal™ Standard GS-51 based on effective performance, concentration of product, minimized/recycled packaging, and protective limits on human & environmental toxicity. [Acute toxicity and/or skin/eye damage][18] met requirements at the as-used dilution, as specified for closed dilution systems. GreenSeal.org.

If the *powder/solid/non-aqueous liquid* product was evaluated in accordance with Annex D, the description shall read as follows unless an alternate version is approved in writing by Green Seal:

> This product meets Green Seal™ Standard GS-51 based on effective performance, concentration of product, minimized/recycled packaging, and protective limits on human & environmental toxicity. [Powders OR Solids OR Non-aqueous liquids][19] have alternate thresholds for [acute toxicity and/or skin/eye damage][17], and added requirements for packaging and labeling. GreenSeal.org.

For any products that are not concentrated or compacted, the words "concentration of product" shall be deleted.

[18] Only the criteria that were evaluated according to the relevant Annex shall be listed.
[19] The specific type of product shall be listed.

ANNEX A – DEFINITIONS (Normative)

Note that the defined terms are italicized throughout the standard.

Aerosol Packaging. A *primary package* that requires a pressurized propellant to dispense product through a nozzle.

Allergen. Allergenic substances included in Annex III of the European Union Regulation 1223/2009 on Cosmetic Products, 30 November 2009, and those listed by the FDA (including food allergens Food Allergen Labeling and Consumer Protection Act of 2004 (Public Law 108-282, Title II).

Antimicrobial Agent. A substance intended to disinfect, sanitize, reduce, or mitigate growth or development of *microorganisms* and protect inanimate objects, industrial processes or systems, surfaces, water, or other chemical substances from contamination, fouling, or deterioration caused by bacteria, viruses, fungi, protozoa, algae, or slime.

Antimicrobial Pesticide Product. A *registered antimicrobial pesticide product* or a *minimum risk pesticide* product intended for and capable of *disinfecting*, *sanitizing*, reducing, or mitigating growth or development of *microorganisms* and protecting inanimate objects, industrial processes or systems, surfaces, water, or other chemical substances from contamination, fouling, or deterioration caused by bacteria, viruses, fungi, protozoa, algae, or slime.

Anti-Static Product. A product that is intended to eliminate, prevent, or inhibit the accumulation of static electricity.

Asthmagen. A substance designated as an *asthma*-causing agent as specifically listed by Chemical Abstracts Service (CAS) number by the Association of Occupational and Environmental Clinics (AOEC), which after review by AOEC has met the AOEC sensitization criteria (i.e., A with Rs or Rrs), or if classified as a *respiratory sensitizer*, and with a probable/plausible route of inhalation exposure.

Benchmark Product. A product used for comparison in performance testing; for the purposes of this standard this is considered a national market-leading product, typically selected from the top three or four selling brands or companies for its category from nation-wide data.[20]

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

Bleaching Product. A product that is intended to clean and remove stains from textiles and fabric by either oxidatively or reductively modifying the stain such that it becomes more water soluble and easier to remove, or by decolorizing the stain such that it is no longer visible.

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

Carcinogen. A substance listed as a known, probable, reasonably anticipated, or possible human carcinogen by any of the following agencies or programs: International Agency for Research on Cancer (Groups 1, 2A, and 2B); National Toxicology Program (Groups 1 and 2); EPA Integrated Risk Information System (weight-of-evidence classifications A, B1, B2, C, carcinogenic, known/likely human carcinogen, likely to be carcinogenic to humans, and suggestive evidence of carcinogenicity or carcinogen potential); Occupational Safety Health Administration (as *carcinogens* under 29 Code of Federal Regulations (CFR) 1910.1003(a)(1)); or under the *GHS* (hazard categories 1 (H350, may cause cancer) and 2 (H351, suspected of causing cancer)).

Certified-Organic Components. A *component* certified as organic (by meeting the USDA organic standards) by a USDA-accredited certifying agent, by programs determined to be equivalent, or by those that have recognition agreements with the USDA NOP.

Child Labor. Work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development. To avoid child labor the International Labour Organization provides the following instruments: Minimum Age Convention (e.g., a minimum age not less than 15 for standard work and 18 for hazardous work) and the Worst Forms of Child Labour Convention.

Child-Resistant Packaging. As defined by the Poison Prevention Packaging Act: packaging that is designed or constructed to be significantly difficult for children under five years of age to open or obtain a toxic or harmful amount of the substance contained therein within a reasonable time, and not difficult for normal adults to use properly. This does not mean packaging which all such children cannot open or obtain a toxic or harmful amount within a reasonable time. Code of Federal Regulations, Title 16, Part 1700 and Title 40, Part 157.

Closed Dilution-Control System. Systems that control the dilution of a product so that the *undiluted product* cannot be practically accessed by users.

Cold Water. For the purposes of this standard, this refers to water wash temperatures of 68°F +/- 5°F; 20ºC +/- 3°C for *household use* and of 105°F +/- 5°F; 41°C +/- 3°C for *institutional use*.

Colony Forming Unit (CFU). A measure of bacteria concentration assuming that each bacterium is capable of forming a colony.

Colorant. A product *component*, such as a dye or pigment, whose only function is to change the product's color.

Component. A constituent that is deliberately added at any level for its continued presence in the final product to provide a specific characteristic, appearance, or quality, or a contaminant that was not deliberately added but is present in the product above 0.01% by weight.[21]

[21] This definition excludes substances that are intentionally added to a raw material but not intended for their continued presence in the final product. Examples include residual monomers, preservatives, anti-caking agents, and raw material byproducts or contaminants. Naturally occurring elements and chlorinated organics that may be present

Concentrate. A product that must be diluted by water prior to its intended use (e.g., *laundry detergent products* that must be diluted before putting into a washing machine).

Disinfecting. Destroying or irreversibly inactivating infectious *microorganism*s but not necessarily their spores on inanimate objects or surfaces.

Enzyme. A protein that acts as a catalyst in biochemical reactions. Each enzyme is specific to a particular reaction or group of similar reactions.

Fabric Protectant. A product intended to be applied to textile or fabric substrates to protect the surface from soiling or to reduce absorption of liquid into the fabric's fibers. This does not include flame retardant or waterproofing products.

Fabric Refresher. A product intended to neutralize or eliminate odors on non-laundered textiles or fabric. This does not include *anti-static products*, *spot removers*, or *antimicrobial pesticide products*.

Fabric Softener – Single Use Dryer Product. A product intended for single use in the dryer to impart softness to, or control static cling of, a load of washable fabrics. For the purpose of this definition, "single use" means a product that is intended for one-time use during a single drying cycle and is removed after completion of the drying cycle. This does not include products applied to washable fabrics prior to placing the washable fabrics in the clothes dryer.

Fragrance. An additive, often (but not limited to) a multi-*component* additive, used in a product with the purpose of imparting or neutralizing a scent in the product.

Genetically Modified Microorganism (GMM). A *microorganism* in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination. The methods or techniques by which GMM are produced are listed by the European Commission Directive 2009/41/EC on the Contained Use of Genetically Modified Microorganisms.

Halogenated Organic Solvents. An organic solvent containing halogens, including, but not limited to, fluorine, chlorine, bromine, astatine, and iodine.

Hazardous Air Pollutant. A substance listed by the EPA in the Clean Air Act Section 112(b) (1) as a hazardous air pollutant.

Household Use. Use of products that are typically sold to consumers (usually through retail outlets such as stores or online sites) for their own personal use rather than for professional/*institutional use*. This typically includes, but is not limited to, cleaning and treating their personal property.

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as a result of chlorination of the water supply, are not considered intentional components if the concentrations are below the applicable maximum contaminant levels in the National Primary Drinking Water Standards found in 40 CFR Part 141.

Industrial and Institutional Use. Use of products that are typically sold to cleaning professionals for cleaning in commercial or institutional facilities. This typically includes, but is not limited to, cleaning for government agencies, factories, sanitariums, prisons, restaurants, hotels, stores, automobile service and parts centers, health clubs, theaters, transportation companies, hospitals, schools, libraries, auditoriums, office complexes, and similar properties where any resident's personal property is typically cleaned/treated by professionals (e.g., in-house or contract service providers rather than when the residents are responsible for cleaning tasks). This is typically referred to as commercial or professional use compared to *household use*.

Intentionally Introduced. The use of substances for their desired or deliberate presence in the *primary package* for the purpose of providing a specific characteristic or quality. It does not refer to the use of substances as processing aids or the use of an intermediate that imparts certain chemical or physical changes during manufacturing, as long as the substance or intermediate is present in the *primary package* at concentrations below 100 ppm.

Laundry. Textile and fabric materials that require removal of soils or stains or require freshening or treatment (e.g., anti-static, anti-wrinkle, protectant, starch) for use. For the purposes of this standard, this does not include furniture or carpet.

Laundry Detergent Products. A detergent used to enhance the cleansing action of water for textile and fabric substrates. This can consist of a home-style detergent intended for use in a home-style machine in a commercial setting, or a complete detergent or multi-component system intended for use in commercial or industrial washing machines. The complete detergent or multi-component system is typically based on a combination of detergent (*surfactants* and builders) with additives (e.g., *bleaching*, *softening*, sour, antichlor, and alkali booster products) and may include *biobased* detergents.

Laundry Prewash. A product that is intended for application to a textile or fabric prior to laundering in a wet-cleaning process, and that supplements and contributes to the effectiveness of *laundry detergent products* and/or provides specialized performance.

Laundry Starch/Sizing/Fabric Finish Product. A product that is intended for application to a textile or fabric, either during or after laundering, to impart and prolong a crisp, fresh look and may also act to help ease ironing of the fabric.

Microorganism. An organism that cannot be seen by the naked eye (microscopic organisms) including, but not limited to, bacteria, fungi, archaea, and protists. Also included in this category are viruses or virus-like particles, although they are generally regarded as non-living.

Minimum Risk Pesticide. A special class of *antimicrobial pesticide products* that are not subject to federal registration requirements through the EPA because they meet specific requirements under section 25(b) of FIFRA, including, but not limited to, that the *components*, both active and inert, are demonstrably safe for the intended use.

Mutagen. A substance designated as known to induce, be regarded as if they induce, or which cause concern for humans owing to the possibility that they may induce heritable mutations in the germ cells of humans and thus meet the criteria for germ cell mutagenicity hazard categories 1 and 2 (H340 and 341) under the *GHS*.

Natural Component. A *component* that comes from materials found in nature including mineral, forestry, agricultural, or biological materials such as, but not limited to, animal products produced by the animal but not part of the animal; do not contain petroleum or petroleum-derived compounds; do not contain transgenic hybrid organisms (inserted deoxyribonucleic acid that originated in a different species); have been processed without irradiation; and are not chemically altered.

Naturally-Derived Component. A *component* that is partially chemically altered without petroleum *components* and have been minimally processed such that they not be altered to such an extent that they are substantially less biodegradable or more toxic (examples of potentially acceptable processes are included in Appendix 2).

Neurotoxin/Systemic Toxin. A substance designated as producing a specific target organ toxicity arising from either single exposure or repeated exposure and meets the criteria for hazard categories 1 or 2 (H370, H371, H372, H373) under the *GHS*.

Optical Brightener. An additive 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**.**

Ozone-Depleting Compound. A compound with an ozone-depletion potential greater than 0.01 (Chloroflourocarbon - CFC 11=1) according to the EPA list of Class I and Class II Ozone-Depleting Substances, or any substances or mixtures falling into category 1 (H420), hazardous to the ozone layer, under the *GHS*.

Pathogenic Microorganism. For the purposes of this standard this includes microorganisms that cause disease and can be classified as World Health Organization (WHO) Risk Group 2, 3, or 4, including, but not limited to: coliforms, Escherichia coli, Salmonella, Staphylococcus aureus, Pseudomonas aeruginosa, and some yeasts and molds.

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.

Powders/Solids/Non-Aqueous Liquids. Products that cannot be formulated with additional water due to the form of the product, including, but not limited to: powdered detergents, solid bar soaps, detergents in tablet form, detergents as extruded or cast solids, non-aqueous liquid products in a dissolvable shell.

Primary Cleaning Function. For the purposes of this standard, the *primary cleaning function* of a product is to remove soil.

Primary Package. Package material that physically contains and contacts the product, not including the cap or lid. For products that meet the annex requirements for Products as Powders/Solids/Non-Aqueous Liquids, the primary package is the material that holds the individually packaged product units or the entire product contents, but does not include the protective packaging or wrap.

Product As Used. For products that are used with wash water it is the dilution of the product at a rate of 25 liters of wash water per kg (3 gallons per lb) of *laundry* washed[22]. For products that are not used with wash water it is the most concentrated form of the product that the manufacturer recommends for a product's intended use.

Recyclable. The package can be collected in a substantial majority of communities, separated or recovered from the solid waste stream and used again, or reused in the manufacture or assembly of another package or product through an established recycling program.

Reference Product. A standardized product formula that was developed through a consensus-based process.

Refillable Package. A *primary package* that is routinely returned to and refilled by the product manufacturer at least five times with the original product held by the *primary package*, and demonstrated in practice. For the purpose of this standard, the product manufacturer or the product manufacturer's agent may refill a *primary package*.

Registered Antimicrobial Pesticide Product. An *antimicrobial pesticide product* registered with the EPA under FIFRA (7 U.S.C. 136) or registered with Health Canada's Therapeutic Products Directorate or Pesticide Management Regulatory Agency (PMRA).

Reproductive Toxin. A substance listed as a reproductive toxin (including developmental, female, and male toxins) by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Code of Regulations, Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, et. Seq., also known as Proposition 65); or a substance designated as Category 1 (H360), known or presumed reproductive toxicant, or Category 2 (H361), suspected human reproductive toxicant, or having adverse effects on or via lactation (H362), under the *GHS.*

Respiratory Sensitizer. A substance designated as leading to hypersensitivity of the airways following inhalation of the substance and meeting the classification criteria of Category 1 *respiratory sensitization* (H334), in accordance with the *GHS.*

Sanitizing. Reducing, but not necessarily eliminating, *microorganisms* from the inanimate environment to levels considered safe as determined by public health codes or regulations.

[22] Products for use initially with wash water include, but are not limited to, *laundry detergent, softening, bleaching, sour*, and *laundry prewash products*.

Secondary Function. For the purposes of this standard, the secondary function of a product may be to enhance the *primary cleaning function* through bubble or foam formation or to provide some other added functional enhancement (e.g. longer-term cleaning effect).

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. Substances classified as Category 1 for Serious Eye Damage/Eye Irritation (H318) under the *GHS* are also considered to cause serious eye damage.

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. Substances classified as Category 1A, 1B or 1C for Skin Corrosion/Irritation (H314) under the *GHS* are also considered to cause skin corrosion.

Skin Sensitizer. A substance that will lead to an allergic response following skin contact. Identified under Category 1 for skin sensitization (H317) under the *GHS.*

Spot Remover. A product intended to clean localized areas or remove localized spots or stains on textiles or fabric. These products may or may not require subsequent laundering to achieve stain removal. This standard does not include carpet spot removers.

Softening Product. A product used to make fabric softer and prevent static. This may be a standalone product or a combination product (e.g., detergent plus softener product).

Sour Product. A product used to change the pH of *laundry* wash from alkaline conditions down to more safe and neutral conditions.

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

Spray Packaging. A *primary package* that dispenses the product through a nozzle and the product is in small droplets (i.e., a spray). It does not require a pressurized propellant to dispense the product. Trigger bottles or squeeze bottles that dispense a foam or a liquid stream are not considered spray packaging.

Stain Removing Product. A product that is intended to remove stains from textiles and fabric. This includes, but is not limited to, products making stain removing claims, *laundry detergent products*, *spot removers*, and *bleaching products*.

Surfactant. A compound that reduces interfacial tension between two liquids or a liquid and a solid. This includes detergents, wetting agents, and emulsifiers.

Synthetic Component. A *component* created artificially rather than naturally or from *natural components*. For the purposes of this standard, *naturally-derived components* are not considered synthetic *components*.

Take-Back Program. A program sponsored by the original product manufacturer that has been demonstrated to receive at least 50% of sold *primary packages* for recycling or reuse.

Toxic Release Inventory Persistent, Bioaccumulative, and Toxic Chemicals. The chemicals listed by the EPA on the Toxic Release Inventory as Persistent, Bioaccumulative and Toxic Chemicals.

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

World Health Organization Risk Group 1. *Microorganisms* that are unlikely to cause human or animal disease under the basis for classification defined by the WHO in the Laboratory Biosafety Manual. In the case that a particular strain has conflicting risk group designations on various international lists, the most hazardous (highest level) designation will be utilized. The biosafety designation lists that will be consulted include:

- Australia/New Zealand
- Belgium
- Switzerland
- United Kingdom
- Germany
- United States Department of Health and Human Services, National Institutes of Health
- European Commission
- Singapore
- Japan

ANNEX B – FRAMEWORK FOR PERFORMANCE TESTING (Normative)

The purpose of performance testing shall be to demonstrate that the product or combination of products[23] performs equivalent to or better than appropriate *benchmark product(s)*[24] in the category. The framework allows for a wide range of test procedures as long as the requirements below are part of the test procedure as documented in the test report.

Test Method

Testing shall be performed using an objective, scientifically-validated method conducted under controlled and reproducible laboratory conditions. This may be conducted by the manufacturer or an external laboratory that has ISO 9001 certification or equivalent quality control verification, or ISO 17025 accreditation,

Test Report

Test methodology and summarized results shall be documented in report format and provided to the certification program. The test report must contain the following requirements, and shall note any parameter variations between the test product(s) and the *benchmark product(s)*.

Product Parameters

- Include a description of the test product(s) and *benchmark product(s)*
- Provide the dosage and method of dosing for both the product(s) and the comparison *benchmark product(s)* following manufacturer recommendations **(***concentrate* products shall be diluted, as required, just prior to testing using unheated water from the tap)
- Identify the target soil level (e.g., light, normal, heavy)

Water Parameters

- Identify the water hardness, specified as parts per million (ppm) or grains per gallon (gpg), and the calcium/magnesium ratio (as calcium carbonate), as well as the method of producing hardness
- Report the water temperature of the wash cycle and rinse cycle in °F (°C), including any differences between the test product and *benchmark product*
- Indicate the water level or amount of water in the main wash

Test Parameters

- Report the type and size of washing machine
- Identify the laundry load by weight and composition
- Include the characteristics of the soils and stains to be tested and the fabric substrates
- Report the number of repetitions

[23] If a combination of products is to be tested for a multi-component system the same combination must be tested for the *benchmark products*. The entire multi-component system does not need to be tested if performance can be measured with a portion of the products (e.g., detergent, builder, and booster).

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

Test Results

- Report the final test results and provide any significant observations or statistical analysis, if applicable

ANNEX C – CLOSED DILUTION-CONTROL SYSTEM (Normative)

Closed Dilution-Control System. *Institutional use* products in *closed dilution-control systems* that meet all of the following requirements may be evaluated for acute toxicity (3.3) and skin and eye damage (3.4) herein with the *product as used* (rather than with the *undiluted product*).

A. Practically Inaccessible. The *primary package* shall not allow for access/exposure of the product during routine handling of the *primary package*, such as while transferring from shipping cartons, after opening a cap or lid, or when connecting to the dispensing system.

B. Spill Resistant. The *primary package* shall require coupling to a specially designed device in order to dispense product.

C. Drop Test. The *primary package*, with the lid on, shall be durable as demonstrated by passing the following drop test: drop the product from a height of 48 inches with 4 drops: flat-on-bottom, flat-on-top, flat-on-side, and corner; with passing results including that the *primary packages* must not leak, contents must be retained, and no damage to the outer *primary package* likely to adversely affect safety must be sustained.

D. Backflow Prevention. The product shall have backflow prevention included in the *closed dilution-control system* that meets the American Society of Sanitary Engineering's (ASSE) 1055B standard.

E. Safety Data Sheet. The product label and SDS shall include the applicable text “meets Green Seal’s requirements for acute toxicity and/or skin and eye damage at the as-used dilution”.

F. Certifier’s Web Site. The Web site of the certification program listing certified products shall identify which products were evaluated as-used, and which health criteria were evaluated as-used.

ANNEX D – POWDERS/SOLIDS/NON-AQUEOUS LIQUIDS (Normative)

Products as Powders/Solids/Non-Aqueous Liquids. *Powder/solid/non-aqueous liquid* products that meet all of the following requirements may be exempt from the skin and eye damage criterion (3.4) and may have an alternate threshold of 300 mg/kg for oral acute toxicity (3.3) herein. They shall also be exempt from pH declaration (6.9) for the *undiluted product*.

A. Packaging Requirements. The product shall meet the requirements under **either** A(1) Child-Resistant Packaging Requirements **or** A(2) Packaging Durability Requirements.

(1) Child-Resistant Packaging. The product shall be packaged in *child-resistant packaging* following the ASTM D3475 classification. *Child-resistant packaging* must be tested per ISO 8317 or European Standard (EN) 862.

(2) Packaging Durability. The product shall meet the following requirements to be considered durable.

i. Drop Test. The *primary package*, including any lid, shall be durable as demonstrated by passing the following drop test: drop the product from a height of 48 inches with 4 drops scenarios: flat-on-bottom, flat-on-top, flat-on-side, and corner; with passing results including that the packages must not leak, contents must be retained, and no damage to the outer package likely to adversely affect safety must be sustained.

ii. Spill Resistant. The *primary package* shall not spill when tipped over, turned upside down or shaken and shall not leak when exposed to water.

iii. Practically Inaccessible. The *primary package* shall not allow for easy access/exposure of the product during routine handling of the package, such as while transferring from shipping cartons, during storage, or after opening (e.g. the user still cannot get at the contents, or the contents are protected or wrapped).

B. Dispensing Exposure Requirements. Documentation shall be provided to demonstrate that expected dispensing situations will not result in incidental contact exposure to oral consumption/toxicity, skin corrosion, or eye damage.

C. Labeling Requirements. The product label shall include the following in a conspicuous location:

- The signal word “WARNING” or ‘CAUTION” on products which cause *skin corrosion*, cause *serious eye damage*, or have an acute toxicity greater than or equal to 300 mg/kg and less than or equal to 5,000 mg/kg, with the applicable precautionary measures:
    - May cause skin corrosion, do not get on skin
    - May cause serious eye damage, do not get in eyes
    - Harmful if swallowed, do not ingest

- Instruction, when necessary or appropriate, for first-aid treatment
- The statement “KEEP OUT OF REACH OF CHILDREN” or its practical equivalent in capitalized text

ANNEX E – ENZYMES (Normative)

Products Containing Enzymes. Products that contain *enzymes* shall meet all of the following:

A. Enzyme Form. *Enzymes* in the product shall be in liquid form or an encapsulated solid (or other dust-free solid) with a minimum diameter of 0.15 mm. Smaller diameters may be permitted for solid products if they are demonstrated to result in airborne *enzyme* concentrations equivalent to or less than encapsulated solids with a 0.15mm diameter.

B. Enzyme Source. The source from which *enzyme*s were derived shall be identified to a species level and disclosed to the certification program.

C. Enzyme Source Microorganisms. For *enzymes* derived from *microorganisms*, documentation shall be provided that the source *microorganism* is absent from the finished product. Test methodology and results shall be documented in sufficient detail and provided to the certification program. If the product does not conform to this provision, then all *microorganism*s shall meet the requirements in section Annex F herein.

D. ~~Sensitization and Asthma~~Exemptions. *Enzymes* are exempted from the requirements for *Asthmagens* (3.8) and *Respiratory Sensitization* (3.9) herein. Titanium dioxide[25] is exempt from the prohibition on *carcinogens* (3.5 herein) when it is present only due to the use of *enzymes*. For products sold in solid form, e.g., powders, bars, tablets, titanium dioxide must be bound within the product or enzyme matrix or bonded to other *ingredients*.

E. Enzyme Labeling. Products containing *enzymes* shall include the following on the product label:

- A declaration that the "product contains enzymes", in addition to the listing in the ingredient line
- A statement that "This product contains material that may cause or aggravate asthma" and instruction, when necessary or appropriate, for follow-up treatment

F. Industrial Hygiene. Documentation shall be provided to the certification organization that demonstrates that the manufacturer has implemented an industrial hygiene plan intended to minimize concentrations of and exposure to airborne *enzymes* (e.g., engineering controls, work practices, and personal protective equipment) and monitor the air concentrations of the *enzyme/s* and worker illness/sensitization due to the *enzyme/s*. An example of best practices that may be applicable for this plan is available at AISE.

[25] Titanium Dioxide: EC Number 236-675-5, CAS Number 13463-67-7

ANNEX F – MICROORGANISMS (Normative)

Products Containing Microorganisms. Products that contain *microorganisms* shall meet all of the following with any specified testing conducted with an objective, scientifically-validated method under controlled and reproducible laboratory conditions (appropriate testing details shall be provided to the certification program):

A. Genetically Modified Microorganisms in Microbial Products. The presence of *GMM* as *components* in finished products is prohibited.

B. Microorganism Biosafety. All *microorganisms* shall be classified as *WHO Risk Group 1* or equivalent biosafety designation. For strains that do not appear on any international biosafety designation lists, alternative means may be acceptable; consultation with the certifying organization may be required.

C. Microorganism Strain Identification. *Microorganism* strains shall be identified through a taxonomic review (e.g., genetic or phenotypic analysis) that is provided by a full-service culture collection listed with the World Federation of Culture Collections, whether or not the strain is part of the collection.

D. Absence of Contaminants. *Pathogenic microorganisms* shall not be present in the microbial strain, finished product, or at the end of the product's intended shelf life. Testing for the presence of *pathogenic microorganisms* shall be conducted according to the Joint Food and Agriculture Organization of the United Nations/WHO Expert Committee on Food Additives (JECFA) Combined Compendium of Food Additive Specifications standard microbiological analytical methods or comparable method and a Certificate of Analysis shall be provided to the certification program.

E. Effective Prevention Measures and Treatment. All *microorganisms* shall be demonstrated to be susceptible to the following prevention and treatment measures:

- An *anti-microbial agent*, as demonstrated by testing the microbial strain against an acceptable substance (i.e., an EPA general disinfectant, Center for Disease Control low-level disinfectant, or a registered *antimicrobial agent* by Health Canada) in accordance with the EPA/Office of Pesticide Programs Standard Operating Procedure (SOP) or the AOAC International Use Dilution Method for Testing Disinfectants, SOP Number: MB-05-04
- One of the five major antibiotic classes (aminoglycoside, macrolide, beta-lactam, tetracycline and fluoroquinolones), as demonstrated by testing the microbial strain in accordance with Beckman Dickinson BBL antimicrobial susceptibility disc method.

F. Microbial Count. A *microorganism* used to serve the *primary cleaning function* in the *undiluted product* shall have a plate count that is greater than or equal to $1x10^7$ *CFU* per milliliter for liquid products and $1x10^9$ *CFU* per gram for solid products. A total plate count shall be conducted in accordance with the methods for microbiological analyses listed in the JECFA Combined Compendium of Food Additive Specifications or comparable method. An

exception shall be made for *microorganisms* used to serve a *secondary function* in the *undiluted product*.

G. Labeling Requirements. Products containing *microorganisms* shall include the following on the label:

- A declaration that the product contains *microorganisms*
- A statement that the product should not be used in patient areas of hospitals and that immune-compromised individuals should avoid exposure to products containing *microorganisms* from both direct use and incidental contact during or shortly after application to these products, especially when the treated areas are still wet
- Contact with open cuts or sores should be avoided
- Users should wash their hands after using the product
- Instructions that *microorganisms* may not be effective in the presence of *antimicrobial agents* such as chlorine bleach
- Instructions that the product shall not be used on food-contact surfaces
- Instructions that products containing *microorganisms* should not be sprayed directly into the air

APPENDIX 1 – SCOPE (Informative)

Examples of *industrial use* products included in or excluded from the scope of GS-51:

Products Included

- *Anti-static products*
- Anti-wrinkle products
- *Antimicrobial pesticide products* for *laundry* care
- *Bleaching products*
- Commercial and *institutional use laundry* products (e.g., those used in dry cleaning facilities or commercial laundries)
- Home-style detergents used in a home-style machine in the industrial and institutional market ((e.g., those used in a nursing home or with automated product dispensers)
- *Fabric protectant* products
- *Fabric refreshers*
- *Fabric softener-single use dryer product*
- *Laundry* additives (e.g., *bleaching products, softeners, sour products*, antichlors, water conditioners, alkali boosters)
- *Laundry detergent products* (complete detergent and multi-component systems)
- *Laundry prewash* products
- *Laundry starch/sizing/fabric finish products*
- Products that contain *enzymes* or *microorganisms* and are packaged in trigger bottles or squeeze bottles
- Soap nuts/*biobased* detergents
- *Softening products*
- Spot removing products (for *laundry*)
- *Stain removing products*

Products Excluded

- Air fresheners (designed to mask odor)
- Carpet cleaning, spot remover, and maintenance products (included in GS-37)
- Cleaning products for *laundry* machines for *industrial and institutional use* (included in GS-53) and *household use* (included in GS-52)
- *Laundry detergent products* sold in Laundromat dispensers (included in GS-48)
- Fabric impregnating treatments such as flame retardants or waterproofing
- Floor finish and finish strippers (included in GS-40)
- Footwear care products
- General-purpose, bathroom, glass, and carpet cleaner products marketed specifically for *industrial and institutional use* (included in GS-37) and *household use* (included in GS-8)
- Hand cleaning products for *industrial and institutional use* (covered in GS-41), *household use* (covered in GS-44)
- *Laundry* and washing machines
- Ozone generation and use
- Solvents used in dry cleaning operations
- Leather care products for *industrial and institutional use* (included in GS-53) and *household use* (included in GS-52)
- Products that contain *enzymes* or *microorganisms* that are sold in, or with, spray packaging
- Specialty cleaning products for *industrial and institutional use* (included in GS-53) and *household use* (included in GS-52)
- Upholstery cleaning and maintenance products for *industrial and institutional use* (included in GS-53) and *household use* (included in GS-52)

APPENDIX 2 – PROCESSING METHODS OF NATURALLY-DERIVED COMPONENTS (Informative)

Examples of Potentially Acceptable Processing Methods of *Naturally-Derived Components* (which must also meet all the requirements in the standard):

- Esterification, Etherification, and Transesterification (to produce esters and ethers like polyglycerols)
- Glucosidation (to produce glucosides)
- Hydrogenation (of fats and oils)
- Hydrolysis and Hydrogenolysis (to produce hydrolyzed proteins, glycerin and fatty acids, and fatty alcohols)
- Other Condensation Reactions like Acylation of proteins and Sulfation of fatty alcohols
- Saponification (to produce soap)