GreenScreen Certified™

CLEAN PRODUCTION ACTION

Standard for Firefighting Foam

Class A Foam Concentrates
Class B Foam Concentrates
Class A Wetting Agents
Class A&B Wetting Agents

Version 2.0 • September 2020

Clean Production Action designs and delivers strategic solutions for green chemicals, sustainable materials and environmentally preferable products.

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The GreenScreen CertifiedTM Standard for Firefighting Foam: Class A Foam Concentrates, Class B Foam Concentrates, Class A Wetting Agents, Class A&B Wetting Agents provides the means for manufacturers to communicate their use of safer chemicals per the GreenScreen® for Safer Chemicals hazard assessment method. GreenScreen Certified ensures value, usability, and relevance for industry professionals wanting to excel in offering safer chemical formulations used in product manufacturing.

Clean Production Action developed the GreenScreen Certified™ Standard for Firefighting Foam versions 1.0 and 2.0 in consultation with a diverse group of stakeholders, including manufacturers, purchasers, and external scientific experts from consulting firms, non-profit organizations and government agencies.

This effort would not have been possible without the help of the technical peer reviewers and key contributors (listed below), who devoted their time and considerable expertise to the development of this standard. Providing advice and feedback during technical peer review shall in no way be construed as support for the final standard. The key contributors ultimately take responsibility for all content and any flaws or errors contained herein. In producing the final standard, we thank Ellen Goldberg of Clean Production Action for her efforts in developing legal terms of use and website resources necessary to implement and launch the certification program.

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OVERVIEW

1. PURPOSE

1.1 This guidance document outlines the requirements and process for the GreenScreen Certified™ Standard for Firefighting Foam: Class A Foam Concentrates, Class B Foam Concentrates, Class A Wetting Agents, Class A&B Wetting Agents (GreenScreen Certified Standard for Firefighting Foam), administered by Clean Production Action.

1.2 Clean Production Action awards GreenScreen Certified™ Certification Marks via license to manufacturers and suppliers who have paid the required license fee and have demonstrated that their product(s) meet one of three levels of increasingly stringent certification requirements as defined by the GreenScreen Certified™ Standard for Firefighting Foam. Certificate holders are required to notify Clean Production Action immediately of any formulation changes that occur.

2. SCOPE

2.1 The GreenScreen CertifiedTM Standard for Firefighting Foam is for the evaluation of two different types of firefighting water additives, namely 1) Firefighting Foam concentrates[1] or 2) Wetting Agents,[2] designed for suppression NFPA Class A and/or Class B fires.

2.2 Product categories that are within the scope of this standard include but are not limited to:

2.2.1 Firefighting Foam concentrates designed for Class B fires as defined by the NFPA Code of Standards; and

2.2.2 Firefighting Foam concentrates designed for Class A fires as defined by the NFPA Code of Standards: and

2.2.3 Firefighting Foam concentrates designed for more than one class of fires that includes Class A and/or Class B; and

2.2.4 Wetting Agents designed for Class A&B fires as defined by the NFPA Code of Standards; and

2.2.5 Wetting Agents designed for Class A fires as defined by the NFPA Code of Standards; and

2.2.6 Wetting Agents designed for more than one class of fires that includes Class A and/or Class B.

1 Firefighting Foam concentrates are included in the scope of NFPA 11 and UL 162 Listed

2 Wetting Agents are included in the scope of USDA, UL Classified, and NFPA 18

2.3 Product categories that are outside of the scope of this standard include but are not limited to:

2.3.1 Firefighting water additives, including foam concentrates or wetting agents, designed for suppression of one or more NFPA Classes of fuels that do not include Class A fuels or Class B fuels (i.e., NFPA fuel classifications of Class C, D, and/or K); and

2.3.2 Discharge devices.

2.4 The certification Applicant should contact Clean Production Action (greenscreen@cleanproduction.org) if questions arise as to whether certain products are within the scope of this standard.

2.5 GreenScreen Certified™ Certification Marks do not guarantee adherence to any other external quality, performance, or regulatory requirements.

3. SUMMARY OF REQUIREMENTS

The certification requirements for each certification level are summarized in Table 1 below. Each product must meet all requirements for the specified certification level in order to be awarded certification. See Sections 6 through 10 for complete program requirements.

TABLE 1: **Summary of Certification Requirements**

SECTION #	REQUIREMENTS	BRONZE	SILVER	GOLD
6. Product Inventory	Product Inventory includes: a. Additives Inventory: 100% of additives in the product are identified; and b. Chemical Inventory: All intentionally added chemical compounds (present >0 ppm) and impurities present at or above 0.01% by weight (100 ppm) in the additives are identified	✓	✓	✓
7.1 Chemical Hazard Assessment	Intentionally added chemical compounds (>0 ppm) and impurities at or above 0.01% by weight (100 ppm) in the product are screened with GreenScreen List Translator™	✓	✓	✓
	Intentionally added substances (>0 ppm) and impurities present at or above 0.01% by weight (100 ppm) in the product are assessed with GreenScreen		✓	✓
	None of the chemical compounds screened have a GreenScreen List Translator™ score of LT-1	✓	✓	✓
	None of the substances assessed have a GreenScreen score of Benchmark-1[1]		✓	✓
	None of the substances assessed have a GreenScreen score of Benchmark-1, Benchmark-2, Benchmark-2_{DG}, or Benchmark-2_{TP}			✓
	Each substance meets US EPA Master Criteria for Environmental Toxicity and Fate		✓	✓
	Each substance meets US EPA Safer Choice Criteria for Environmental Toxicity and Fate for Chemicals in Direct Release Products			✓
7.2.1 Restricted Substances List	Product meets all Restricted Substances List (RSL) criteria and thresholds	✓	✓	✓
7.2.2 Requirements for Microorganisms	Product meets requirements for microorganisms (if present)	✓	✓	✓
7.2.3 Analytical Testing—Total Organic Fluorine	Product meets analytical testing requirements for total organic fluorine	✓	✓	✓
7.2.4. Analytical Testing—Acute Aquatic Toxicity	Product-level acute aquatic toxicity LC50 or EC50 > 10 mg/L for each of the following groups of organisms: fish, aquatic invertebrates, and algae	✓	✓	✓

1 For Bronze, GreenScreen BM-1 assessments are preferentially used if they are freely and publicly available.

4. TERMS AND DEFINITIONS

TERM	DEFINITION
100 ppm	One hundred parts per million (ppm) is equivalent to 0.01% by weight.
Additive	A chemical compound, chemical substance, or mixture of chemical substances intentionally added to impart a desired characteristic to a product or serve a particular function in the product (e.g., surfactant, solvent, stabilizer, colorant). Additives can be polymeric or non-polymeric in nature.
Alkylphenols (AP)	Chemical compounds that consist of one or more alkyl chains bound to a phenol. Phenol consists of an aromatic ring and a hydroxyl group. An alkyl chain is an acyclic saturated hydrocarbon (consisting of hydrogen and carbon atoms arranged in a tree structure in which all carbon-carbon bonds are single) with the general formula CnH_2n_{+1}.
Alkylphenol Ethoxylates (APEOs)	Derivatives of alkylphenols prepared by a chemical reaction between ethylene oxide and an alkylphenol, resulting in an ethoxylated chain with the general formula $-(OC_2H_4)_nOH$ replacing the hydroxyl group.
Applicant	An organization or entity that submits a product formulation or formulations for certification according to a specific GreenScreen Certified™ standard.
Authorized GreenScreen Assessment	A GreenScreen assessment completed by an Authorized GreenScreen Practitioner™ for his or her registered organization only. An Authorized assessment can be upgraded to a Certified assessment through Clean Production Action and would then qualify for use in the GreenScreen Certified Program.
Authorized GreenScreen Practitioner™	An individual who has completed advanced training in the GreenScreen method, has demonstrated scientific expertise and capacity to perform a high-quality GreenScreen assessment, and is licensed by Clean Production Action to conduct GreenScreen assessments for his or her registered organization.
CASRN	Chemical Abstracts Service Registry Number (also known as "CAS#").
Catalyst	Chemical compound or substance that causes or accelerates a chemical reaction without itself being affected.
Certification Level	One of three levels of requirements for safer chemicals in product formulations specified in the GreenScreen Certified Standard for Firefighting Foam v1.0: Bronze, Silver, and Gold.
Certified GreenScreen Assessment	A GreenScreen assessment completed by a Licensed GreenScreen Profiler or Clean Production Action Consulting Toxicologist (including an assessment performed by an Authorized GreenScreen Practitioner and upgraded to a Certified assessment through Clean Production Action). Note: The term "Certified GreenScreen Assessment" is distinct from a GreenScreen Certified Product. The former refers to the assessment of an individual chemical using the GreenScreen method (see https://www.greenscreenchemicals.org/assess/assess-gs-details). The latter refers to a product that Clean Production Action has verified to meet the GreenScreen Certified Standard for the relevant product category and the manufacturer has signed a license agreement with Clean Production Action.
Chemical	See Chemical Compound.
Chemical Compound	A molecule (or molecular entity) composed of atoms of more than one element held together by chemical bonds and typically identified by CASRN. Synonyms used in this guidance include "chemical" or "compound."
Chemical Mixture	"A mixture or a solution composed of two or more substances in which they do not react." (GHS Rev. 7; https://www.unece.org/trans/danger/publi/ghs/ghs_rev07/07files_e0.html, accessed 4/17/2018)
Chemical Substance "Substance"	"A chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent, which may be separated without affecting the stability of the substance or changing its composition." (REACH Article 3(1); https://reachonline.eu/reach/en/title-i-chapter-2-article-3.html, accessed 11/11/19). A chemical substance is comprised of constituents (i.e., chemical compounds and/or chemical elements), and a chemical substance can be a component within a mixture.

TERM	DEFINITION
Class A Fire	"A fire in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics." (NFPA Glossary of Terms 2018 Edition; https://www.nfpa.org/Codes-and-Standards/Resources/Glossary-of-Terms, accessed 10/29/19)
Class B Fire	"A fire in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases." (NFPA Glossary of Terms 2018 Edition; https://www.nfpa.org/Codes-and-Standards/Resources/Glossary-of-Terms, accessed 10/29/19)
Direct Release Products	"Products that are intended for use in applications that result in their immediate release to the environment, so that they bypass sewage treatment or septic systems, shortening the time for degradation prior to entering sensitive environments. Home car washes, boat cleaners, and graffiti removers are examples of direct-release products." (Safer Choice Criteria for Environmental Toxicity and Fate for Chemicals in Direct Release Products; http://www2.epa.gov/saferchoice/standard#tab-3, accessed 6/12/19)
Discharge Device	"A device designed to discharge water or foam-water solution in a predetermined, fixed, or adjustable pattern. Examples include, but are not limited to, sprinklers, spray nozzles, and hose nozzles." (NFPA Glossary of Terms 2018 Edition; https://www.nfpa.org/Codes-and-Standards/Resources/Glossary-of-Terms, accessed 9/3/19)
Foam Concentrate	"A concentrated liquid foaming agent as received from the manufacturer." (NFPA Glossary of Terms 2018 Edition; https://www.nfpa.org/Codes-and-Standards/Resources/Glossary-of-Terms, accessed 9/3/19)
Firefighting Water Additive	"An agent that, when added to water in proper quantities, suppresses, cools, mitigates fire and/or vapors, and/or provides insulating properties for fuels exposed to radiant heat or direct flame impingement. Water additives can materially reduce the surface tension of water and increase its penetrating and spreading abilities. They also might provide enhanced cooling, emulsification, and foaming characteristics."(NFPA Glossary of Terms 2019 Edition; https://www.nfpa.org/Codes-and-Standards/Resources/Glossary-of-Terms, accessed 7/21/19)
Genetically Modified Organisms (GMO)	"Organisms (i.e., plants, animals, or microorganisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination." (World Health Organization; https://www.who.int/foodsafety/areas_work/food-technology/faq-genetically-modified-food/en, accessed 6/12/19)
GreenScreen Assessment	The assessment of an individual chemical using the GreenScreen method (see https://www.greenscreenchemicals.org/assess/assess-gs-details). An Authorized GreenScreen assessment and a Certified GreenScreen assessment are two types of GreenScreen assessments and reflect the type of assessor producing the assessment.
GreenScreen Benchmark™ Score	A score that is assigned to a chemical evaluated using the GreenScreen® for Safer Chemicals method. GreenScreen Benchmark scores range from 1 to 4, with each increasing Benchmark score defining progressively less hazardous chemicals. (GreenScreen Guidance and Resources; https://www.greenscreenchemicals.org/learn/full-greenscreen-method)
GreenScreen Certified™ Certification Marks	The trademarked logos and phrase that may be licensed by Clean Production Action for use by a successful Applicant to describe the products that meet all of the requirements of a specified level (Bronze, Silver, or Gold) of the GreenScreen Certified™ Standard for the relevant product category and as verified and approved by Clean Production Action.
GreenScreen List Translator™	A streamlined chemical hazard assessment method developed by Clean Production Action that produces a GreenScreen List Translator score. (GreenScreen Guidance and Resources Section IV; https://www.greenscreenchemicals.org/learn/full-greenscreen-method).
GreenScreen List Translator™ Score	A score that is assigned to a chemical screened against all GreenScreen Specified Lists (Annex 11) using GreenScreen List Translator guidance. List Translator scores include LT-1, LT-P1, LT-UNK and NoGSLT. (GreenScreen Guidance and Resources Section IV; https://www.greenscreenchemicals.org/learn/greenscreen-list-translator).

TERM	DEFINITION
Impurity	"An unintended constituent present in a substance as manufactured. It may, for example, originate from the starting materials or be the result of secondary or incomplete reactions during the production process. While it is present in the final substance, it was not intentionally added. In most cases impurities constitute less than 10% of the substance." (ECHA; https://echa-term.echa.europa.eu, accessed 10/11/17)
Intentionally Added	Included to serve a desired function; not an impurity.
Licensed GreenScreen Profiler	An organization with expertise in toxicology and comparative chemical hazard assessment that is licensed by Clean Production Action to provide GreenScreen assessments for a fee to clients. (http://greenscreenchemicals.org/professionals/profilers)
Monomer	"A substance, which is capable of forming covalent bonds with a sequence of additional like or unlike molecules under the conditions of the relevant polymer forming reaction used for the particular process." (REACH Article 3(1); https://reachonline.eu/reach/en/title-i-chapter-2-article-3.html, accessed 11/11/19)
Non-Disclosure Agreement (NDA)	A legally binding agreement between organizations for the purpose of protecting confidential information shared during the certification process.
Organohalogen	A chemical containing one or more halogen atoms (typically chlorine, bromine, fluorine, or iodine) bound to a carbon atom.
Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)	A class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom. The class includes all structural groups defined by Buck et al, 2011, as well as all new structural groups identified by OECD in 2018. The structural groups defined by Buck et al, 2011, include: a) Perfluoroalkyl substances: Substances for which all hydrogen atoms on all carbon atoms (except for carbons associated with functional groups) have been replaced by fluorine atoms; b) Polyfluoroalkyl substances: Substances for which all hydrogen atoms on at least one (but not all) carbon atom have been replaced by fluorine atoms; c) Fluoropolymers: Carbon-only polymer backbone with fluorine atoms directly bound; d) Perfluoropolyethers: Carbon and oxygen polymer backbone with fluorine atoms directly bound to carbon atoms; or e) Side-chain fluorinated polymers: Variable composition non-fluorinated polymer backbone with fluorinated side chains. Additional groups defined by OECD, 2018, include perfluorinated alkanes, perfluorinated alkenes, perfluoroalkyl alcohols, perfluoroalkyl ketones, semi-fluorinated ketones, side-chain fluorinated aromatics, some hydrocarbons, hydrofluoroethers, and hydrofluoroolefins. (Buck, R. et al, 2011. Perfluoroalkyl and Polyfluoroalkyl Substances in the Environment: Terminology, Classification, and Origins. Integrated Environmental Assessment and Management 7(4): 513–541; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3214619, accessed 6/18/19; and Environment Directorate OECD, Toward a New Comprehensive Global Database of Per- and polyfluoroalkyl substances (PFAS): Summary Report on Updating the OECD, 2007, List of Per- and polyfluoroalkyl substances (PFAS), OECD Environment, Health and Safety Series on Risk Management No. 39, Paris 2018; http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV-JM-MONO(2018)7&doclanguage=en, accessed 6/18/19). The reference list of PFASs by chemical abstract service number as defined by the Organisation for Economic Development (OECD) (http://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals, accessed 10/11/18).
Polymer Mixture	A mixture comprised of a polymer substance and unreacted monomer(s).
Polymer Species	"Molecules characterized by the sequence of one or more types of monomer units. Such molecules must be distributed over a range of molecular weights, wherein differences in the molecular weight are primarily attributable to differences in the number of monomer units. Polymer species comprise the | following: (a) a simple weight majority (i.e., 50%) of molecules containing at least three monomer units, which are covalently bound to at least one other monomer unit or other reactant; or (b) less than a simple weight majority of molecules of the same molecular weight." In the context of this definition a "monomer unit" means the reacted form of a monomer in a polymer." (REACH Article 3(1); https://reachonline.eu/reach/en/title-i-chapter-2-article-3.html, accessed 11/11/19)

TERM	DEFINITION
Polymer Substance	A substance comprised of constituents: polymer species, additives necessary to preserve stability, and impurities deriving from the manufacturing process used, but excluding any solvent, which may be separated without affecting the stability of the substance or changing its composition. (Based on REACH Article 3(1); https://reachonline.eu/reach/en/title-i-chapter-2-article-3.html, accessed 11/11/19)
Polymeric Material	A mixture of one or more polymer substance(s) or polymer mixture(s), all other additives (i.e., intentionally added substances), and unintentional impurities.
Polymeric Material Impurities	Impurities imparted to the polymeric material from a source other than the intentionally added components.
Product	A finished good composed of parts, homogeneous materials, and/or chemical substances. A product may function as part of another product. A product may be made of one or more homogeneous materials.
Product Inventory Form	A form for listing the product contents for each product being certified. See form instructions and tables for additional required information.
Proprietary Ingredient	Ingredients in products that are confidential to the manufacturer or producer.
Residual Monomer	An unintended impurity in a polymer substance. (GreenScreen Guidance and Resources; https://www.greenscreenchemicals.org/learn/full-greenscreen-method)
Siloxanes	"Siloxanes, often also described as silicones, are molecules with an oxygen–silicon backbone (Si–O–Si), where each Si atom carries two organic groups, mostly methyl, ethyl, or phenyl groups. Depending on their molecular weight, siloxanes can be characterized as linear or cyclic volatile methylsiloxanes, polydimethylsiloxanes (PDMS), or polyethermethylsiloxanes (PEMS)." (Fromme Hermann. Cyclic Volatile Methylsiloxanes: Occurrence and Exposure. Reference Module in Earth Systems and Environmental Sciences. 2018; https://www.sciencedirect.com/topics/medicine-and-dentistry/siloxane, accessed 8/12/19)
Substance Impurity	An impurity of a chemical substance or polymer substance, such as a residual catalyst. See also "Impurity."
Substance Role	The specific purpose that a chemical serves in a material, product, or process. (Adapted from Tickner, Joel A. et al, "Advancing Safer Alternatives Through Functional Substitution", DOI: 10.1021/es503328m, Environ. Sci. Technol. 2015, 49, 742–749; https://pubs.acs.org/doi/abs/10.1021/es503328m, accessed 10/14/19)
Unreacted Monomer	An intended component in a polymer mixture. (GreenScreen Guidance and Resources; https://www.greenscreenchemicals.org/learn/full-greenscreen-method)
Valid GreenScreen Assessment	A GreenScreen Assessment report that is not expired or been superseded. See GreenScreen Terms of Use for details.
Verification Summary Report	The checklist and/or form used by Clean Production Action and/or third-party service providers to document compliance with the GreenScreen Certified standard requirements.
Wetting Agent	"A concentrate that when added to water reduces the surface tension and increases its ability to penetrate and spread." (NFPA Glossary of Terms 2018 Edition; https://www.nfpa.org/Codes-and-Standards/Resources/Glossary-of-Terms, accessed 9/3/19)

CERTIFICATION PROCESS

5. PROCESS STEPS

1. Applicant contacts Clean Production Action to begin the certification process.
2. Clean Production Action determines whether product is within scope.
3. Clean Production Action sends the following materials to the Applicant:
    a. Non-disclosure agreement (NDA);
    b. Application Form;
    c. Product Inventory Form; and
    d. Instructions for analytical testing.
4. Applicant signs NDA and completes the Application Form. Applicant sends signed NDA and signed Application Form to Clean Production Action.
5. Clean Production Action countersigns NDA and sends executed NDA to Applicant.
6. Clean Production Action sends Applicant an invoice for verification.
7. Applicant pays the invoice for verification.
8. Applicant submits the completed Product Inventory Form, Safety Data Sheets for all inputs including mixtures and polymers purchased from suppliers, and analytical testing results.
9. Clean Production Action performs verification. Clean Production Action requests additional information from Applicant as needed.
10. Clean Production Action informs Applicant of the verification results.
11. Applicant informs Clean Production Action whether they will proceed with licensing.
12. Clean Production Action sends Applicant an invoice for the license fee and a License Agreement.
13. Applicant signs and returns the License Agreement and pays the invoice.
14. Clean Production Action countersigns the License Agreement and sends an executed copy to Applicant.
15. Clean Production Action lists certified product(s) on the Clean Production Action website and sends Applicant certificate(s) for certified product(s).

PROGRAM REQUIREMENTS

6. PRODUCT INVENTORY

This section describes requirements for a comprehensive product inventory of chemical compounds in firefighting water additives. These inventory requirements apply to the finished product as placed for sale on the market. Primary and secondary packaging is not included in this certification. A Product Inventory is required to submit a product for review under the GreenScreen Certified™ Standard for Firefighting Foam. Note: Applicants can redact chemical name and CASRN only if accompanied by a valid GreenScreen assessment. Where hazard scores are used for redacted chemical name(s), the name of the assessor and date of assessment must be provided along with a traceable alphanumeric ID number.[2]

Product Inventory Requirements:

1. Basic product inventory requirements:
    a. Additives Inventory
        i. Trade name of 100% of the additive(s) in the product;
        ii. Supplier name of each additive in the product;
        iii. Weight percent of each additive in the product;
        iv. Function for each additive in the product (e.g., wetting agent, surfactant, dispersing agent, emulsifier, etc.); and
        v. Safety Data Sheets for each additive in the product.
    b. Chemical Inventory
        i. Chemical name and CASRN of each intentionally added chemical compound present above 0% by weight (0 ppm) in the additive;
        ii. Chemical name and CASRN of each impurity present at or above 0.01% by weight (100 ppm) in the additive;
        iii Substance Role in the additive (e.g., monomer, catalyst, stabilizer, pigment, dye, plasticizer, flame retardant, corrosion inhibitor, biocide, lubricant, etc.); and
        iv. Weight percent of each intentionally added chemical compound and each impurity in the additive.

2 Service options and provider directory available at: https://www.greenscreenchemicals.org/certified/service-providers

2. Polymeric materials include one or more polymer substances and/or polymer mixtures and potentially one or more additives such as colorant or plasticizer. The polymer substance or mixture includes polymer species, monomer(s), and catalyst(s). Each polymer species, monomer, and catalyst in a polymer substance or polymer mixture must be listed as a separate ingredient and meet the basic product inventory requirements (#1 above), including manufacturer-specific trade name of the polymer substance or polymer mixture.[3]

3. Additives often contain more than one chemical compound. Each chemical compound in an additive must be listed as a separate ingredient and meet the basic product inventory requirements (#1 above).

3 For Silver and Gold levels of certification, the information specified above is collected and used by the assessor to generate the GreenScreen Benchmark score(s).

7. PRODUCT EVALUATION

A product must meet all requirements for the relevant certification level in Section 7.1 and all requirements in section 7.2.

7.1 Chemical Hazard Assessment

7.1.1 Bronze Screening Requirements

1. Each intentionally added chemical compound present above 0% by weight (>0 ppm) and each impurity present at or above 0.01% by weigh (100 ppm) in the product is screened with GreenScreen List Translator™.
2. Each screened chemical compound in the Product Inventory has a GreenScreen List Translator™ score[4] of LT-P1, LT-UNK, and/or NoGSLT. No LT-1 scores are permitted in certified products.[5]
3. Product-level acute aquatic toxicity testing results in LC50 and/or EC50 values >10 mg/L for each of the following groups of organisms: fish, aquatic and invertebrates, and algae.

7.1.2 Silver Assessment Requirements

1. Each intentionally added substance present above 0% by weight (>0 ppm) and each impurity present at or above 0.01% by weight (100 ppm) in the product are assessed with GreenScreen.
2. Each assessed chemical substance in the Product Inventory has a valid GreenScreen assessment[6] and GreenScreen Benchmark score. No Benchmark-1 scores are permitted in assessed chemical substances of certified products.[7] For surfactants, GreenScreen BM-U scores are allowable if the data gaps driving the score are for human health endpoints.
3. Product-level acute aquatic toxicity testing results in LC50 and/or EC50 values >10 mg/L for each of the following groups of organisms: fish, aquatic invertebrates, and algae.
4. Each assessed chemical substance in the Product Inventory meets the US EPA Master Criteria for Environmental Toxicity and Fate.[8]

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4 Clean Production Action screens each entry in the Product Inventory using GreenScreen® List Translator™. An Applicant may wish to perform an optional **pre-screen** of chemicals in the Product Inventory to determine if any have a GreenScreen List Translator score of LT-1 before applying to the program. Online tools that provide automation for GreenScreen List Translator scoring include Pharos (no cost) and toxnot (no cost).

5 No GreenScreen Benchmark-1 scores are permitted in assessed materials of Bronze certified products, where there is a freely and publicly available GreenScreen assessment.

6 An Applicant may use valid Certified GreenScreen assessment(s) obtained either through public databases or through commissioning an assessment. New Certified GreenScreen assessments are generated (typically by a Licensed GreenScreen Profiler) for all remaining substances. Authorized assessments generated by Authorized GreenScreen Practitioners and upgraded to Certified assessments through Clean Production Action qualify for use in the GreenScreen Certified™ Program.

7 For GreenScreen Benchmark-U, filling data gaps with the "worst-case" hazard level must result in a GreenScreen Benchmark score that fulfills the certification level requirements.

8 Access US EPA Safer Choice Master Criteria: https://www.epa.gov/saferchoice/safer-choice-master-criteria-safer-chemical-ingredients

7.1.3 Gold Assessment Requirements

1. Each intentionally added substance present above 0% by weight (>0 ppm) and each impurity present at or above 0.01% by weight (100 ppm) in the product are assessed with GreenScreen.
2. Each assessed chemical substance in the Product Inventory has a valid GreenScreen assessment[9] and GreenScreen Benchmark score. No Benchmark-1, Benchmark-2, Benchmark-2_{DG}, or Benchmark-2_{TP} scores are permitted in assessed chemical substances of certified products.[10]
3. Product-level acute aquatic toxicity testing results in LC50 and/or EC50 values >10 mg/L for each of the following groups of organisms: fish, aquatic invertebrates, and algae.
4. Each assessed chemical in the Product Inventory meets the Safer Choice Criteria for Environmental Toxicity and Fate for Chemicals in Direct Release Products.[11]

7.2 Other Criteria

A product must meet all of the following requirements:

7.2.1 Restricted Substances List (RSL)

Each chemical compound in the Product Inventory is compared to the RSL in Table 2 below. The product shall not contain:

- Any intentionally added chemical compound or member of a compound group included in Table 2 present above 0% by weight (> 0ppm) in the product; nor
- Any chemical compound or member of a compound group included in Table 2 that is an impurity present in the product at or above the impurity threshold specified in Table 2.

7.2.2 Requirements for Microorganisms

Microorganisms intentionally added to products shall not be genetically modified organisms (GMOs) and must meet criteria for NIH Risk Groups II, III, and IV.[12]

7.2.3 Analytical Testing—Total Organic Fluorine

Analytical testing is required on three product samples from three different lots to verify total organic fluorine content by combustion ion chromatography is below the RSL threshold of 0.0001% by weight (1 ppm). Clean Production Action may, at any time, test the certified product to confirm it meets the restriction requirements.

The testing laboratory is selected by Clean Production Action. Clean Production Action provides the applicants with information necessary to submit samples for testing.

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9 An Applicant may use valid Certified GreenScreen assessment(s) obtained either through public databases or through commissioning an assessment. New Certified GreenScreen assessments are generated (typically by a Licensed GreenScreen Profiler) for all remaining substances. Authorized assessments generated by Authorized GreenScreen Practitioners and upgraded to Certified assessments through Clean Production Action qualify for use in the GreenScreen Certified™ Program.

10 For GreenScreen Benchmark-U, filling data gaps with the "worst-case" hazard level must result in a GreenScreen Benchmark score that fulfills the certification level requirements.

11 Access Safer Choice Criteria for Environmental Toxicity and Fate for Chemicals in Direct Release Products: https://www.epa.gov/saferchoice/standard

12 Access NIH Guidelines: https://osp.od.nih.gov/wp-content/uploads/NIH_Guidelines.html

TABLE 2: **GreenScreen Certified Firefighting Foam Restricted Substances List**

CHEMICAL GROUP	CHEMICAL NAME	CASRN	IMPURITY THRESHOLD
Alkylphenols & Alkylphenol Ethoxylates	All chemical compounds meeting the definition of alkylphenol or alkylphenol ethoxylate and containing one or more alkyl chains with a carbon chain length of six carbons or more are restricted in certified products, including but not limited to the list of chemicals in Annex 1.	Various; see Annex I for reference list	0.01% by weight (100 ppm)
Organohalogens	All chemical compounds meeting the definition of organohalogen are restricted in certified products.	Various	0.01% by weight (100 ppm)
Perfluoroalkyl and polyfluoroalkyl Substances (PFASs) [10]	See the OECD list of PFAS substances.[13]	Various	0.0001 % by weight (1 ppm) total organic fluorine[14]
Siloxanes: Cyclic Volatile Methyl Siloxanes	Octamethylcyclotetrasiloxane (D4)	556-67-2	0.01% by weight (100 ppm)
	Decamethylcyclopentasiloxane (D5)	541-02-6	
	Dodecamethylcyclohexasiloxane (D6)	540-97-6	
	Mixtures containing one or more of the above	Various	
Zero Discharge of Hazardous Chemicals Manufacturing Restricted Substances List	ZDHC MRSL V2.0[15]	Various; see reference	Varies; See reference

7.2.4 Analytical Testing—Acute Aquatic Toxicity

Product-level data for determination of acute aquatic toxicity are required for each of the following groups of organisms: fish, aquatic invertebrates, and algae (all fresh water). Acceptable test method(s) are listed in Table 3 below. On a case by case basis, available data from alternative test methods may be accepted.

The data must be provided for the product as sold. The LC50 or EC50 value for each group of organisms must be >10 mg/L to be certified according to this standard.

TABLE 3: **Acute Aquatic Toxicity Test Methods**

GROUP OF ORGANISMS	ACCEPTABLE TEST METHOD
Fish	OECD 203 or USEPA OPPT 850.1075
Aquatic Invertebrates	OECD 202 Part 1 Daphnia sp., Acute Immobilisation Test or USEPA OPPTS 850.1010 or 850.1035
Algae	OECD 201 or USEPA OPPTS 850.5400 Tiers I and II

13 OECD Portal: http://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals

14 See Section 7.2.3 for analytical testing requirements.

15 http://www.roadmaptozero.com/programme/manufacturing-restricted-substances-list-MRSL-conformity-guidance

8. DOCUMENTATION REQUIREMENTS

Verification services are performed by Clean Production Action, and include a review of the following required documentation against all certification requirements. All documentation is submitted by the Applicant.

1. Product Inventory
2. Safety Data Sheets (SDSs)
3. GreenScreen List Translator scores
4. GreenScreen assessments and Benchmark scores
5. Results from analytical testing

9. VERIFICATION AND LICENSING

The Applicant must submit all required documentation in Section 8, as applicable to the certification level, to Clean Production Action and have a signed license agreement with Clean Production Action in order to be awarded certification and a license to use the Bronze-, Silver-, or Gold- GreenScreen Certified Certification Mark on products and marketing materials.

A certificate for a certified product (or products) is issued by Clean Production Action after Verification is complete, a License Agreement is executed, and the license fee paid. Unless otherwise specified or requested by the Applicant, multiple products will be listed on the same Bronze-, Silver-, or Gold-level certificate.

10. CERTIFICATION AND LABELING

10.1 Disclaimer of Liability

Clean Production Action, 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. Clean Production Action 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.

10.2 Certification Mark

The appropriate GreenScreen Certified Mark may appear on the product, packaging, secondary documents, and promotional materials, only in conjunction with the certified product. And, only the core design mark or the design mark with the corresponding level (bronze, silver, or gold), which the product has achieved may be used in conjunction with that certified product. All of the Applicant's use of the GreenScreen Certified Mark(s) shall be in accordance with the terms of the executed license agreement. No sub-licensing of the Mark(s) is allowed.

The GreenScreen Certified Mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead customers as to the extent or nature of the certification. Clean Production Action must review all uses of the GreenScreen Certified Mark prior to printing or publishing.

10.3 Use with Other Claims

The GreenScreen Certified Mark shall not appear in conjunction with any human health or environmental claims, unless verified and approved in writing by Clean Production Action.

10.4 Duration of Certification

Certificates are valid for five years and require an annual renewal. **Any** changes to the product during the valid certification period (e.g., changes to chemical composition) must be reported to Clean Production Action immediately, and may invalidate the certificate.

After the first year of the certificate, the licensee must renew the certificate by completing the following three steps:

1. Pay an annual renewal fee;
2. Report any changes to the product and/or product chemical composition (e.g., change in dilution, change in ratios of existing additives or chemicals, addition or removal of a chemical or additive); and
3. Sign a statement by the CEO or a senior manager that the product inventory is complete and accurate.

At the time of annual renewal, recertification may be required if changes have occurred that affect the product inventory and/or hazard assessment.

11. ANNEX I – REFERENCE LIST OF ALKYLPHENOLS & ALKYLPHENOL ETHOXYLATES

CHEMICAL NAME	CASRN
Phenol, 4-(1- ethyl-1,2- dimethylpropyl)-	30784-27-1
Phenol, 4-(1- ethyl-2,2- dimethylpropyl)-	861010-65-3
Phenol, 4-(1- ethyl-3- methylbutyl)-	854904-92-0
Phenol, 4-(1- ethylpentyl)-	6465-74-3
Phenol, 4-(1- methylhexyl)-	6863-24-7
Phenol, 4-(1- propylbutyl)-	6465-71-0
Phenol, 4-(1,1- diethylpropyl)-	37872-24-5
Phenol, 4-(1,1- dimethylpentyl)-	30784-31-7
Phenol, 4-(1,1,2- trimethylbutyl)-	861011-60-1
Phenol, 4(1,1,2,2tetramethylpropy l)-	72861-06-4
Phenol, 4-(1,1,3- trimethylbutyl)-	33104-11-9
Phenol, 4-(1,2- dimethylpentyl)-	854904-93-1
Phenol, 4-(1,2,2- trimethylbutyl)-	911371-06-7
Phenol, 4-(1,3- dimethylpentyl)-	71945-81-8
Phenol, 4-(1,3,3- trimethylbutyl)-	911371-07-8
Phenol, 4-(1,4- dimethylpentyl)-	857629-71-1
Phenol, 4-(3- ethylpentyl)-	911370-98-4
Phenol, 4-(3- methylhexyl)-	102570-52-5
Phenol, 4-(4- methylhexyl)-	1139800-98-8
Phenol, 4-(5- methylhexyl)-	100532-36-3
Phenol, 4-[2methyl-1-(1- methylethyl)propyl]-	1824346-00-0
Phenol, 4-heptyl-	1987-50-4
Phenol, 4-tert- heptyl-	288864-02-8
Phenol, heptyl derivs.	72624-02-3
2-Ethylhexylphenol	1331-54-0
2-n-Octylphenol	949-13-3
2-tert-Octylphenol	67554-50-1
4-n-Octylphenol	1806-26-4
4-Octylphenol	71902-25-5
4-Octylphenol polyethoxylate	26636-32-8
4-tert-Octylphenol	140-66-9

CHEMICAL NAME	CASRN
4-tert-Octylphenol diethoxylate	68310-57-6
C8 Branched alkyl phenol ethoxylate	68987-90-6
Ethanol, 2-(2-(4-(1,1,3,3-tetramethylbutyl) phenoxy)ethoxy)-	2315-61-9
Ethanol, 2-(octylphenoxy)- = Octylphenolethoxylate	1322-97-0
Isooctylphenol	11081-15-5
Octoxynol-1	2315-67-5
Octoxynol-9	9002-93-1
Octylphenoxy polyethoxyethanol	9036-19-5
Phenol, (1-methylheptyl)-	27985-70-2
Phenol, 2-(1,1,3,3-tetramethylbutyl)-	3884-95-5
Phenol, 2-(1-ethylhexyl)-	17404-44-3
Phenol, 2-(1-methylheptyl)-	18626-98-7
Phenol, 2-(1-propylpentyl)-	37631-10-0
Phenol, 2-sec-octyl-	26401-75-2
Phenol, 4-(1-ethylhexyl)-	3307-00-4
Phenol, 4-(1-methylheptyl)-	1818-08-2
Phenol, 4-(1-propylpentyl)-	3307-01-5
Phenol, 4-octyl-, branched	99561-03-2
Phenol, 4-sec-octyl-	27214-47-7
p-Isooctylphenol	27013-89-4
Poly(oxy-1,2-ethanediyl), -(octylphenyl)- -hydroxy-	9063-89-2
Poly(oxy-1,2-ethanediyl), -[(1,1,3,3-tetramethylbutyl) phenyl]- -hydroxy-, phosphate	52623-95-7
Poly(oxy-1,2-ethanediyl), -sulfo–(octylphenoxy)-, branched, sodium salt	69011-84-3
Poly(oxy-1,2-ethanediyl), -sulfo–[(1, 1,3,3-tetramethylbutyl)phenoxy]-, sodium salt	55348-40-8
Poly(oxy-1,2-ethanediyl), alpha-((1,1,3,3-tetramethylbutyl)phenyl)-omega-hydroxy-, phosphate	52276-83-2
Poly(oxy-1,2-ethanediyl), alpha-(3-octylphenyl)-omega-hydroxy	81642-15-1
Poly(oxy-1,2-ethanediyl), alpha-(4-isooctylphenyl)-omega-hydroxy-	51651-58-2
Poly(oxy-1,2-ethanediyl), alpha-(isooctylphenyl)-omega-hydroxy	9004-87-9
Polyethylene glycol benzyl (1,1,3,3-tetramethylbutyl)phenyl ether	60864-33-7
sec-Octylphenol	93891-78-2
tert-Octylphenol	27193-28-8

CHEMICAL NAME	CASRN
Triton® X-405	2497-59-8
(C9)Alkylated phenol	68081-86-7
14-(Nonylphenoxy)-3,6,9,12-tetraoxatetetradecan-1-ol	26264-02-8
2,6-di-tert-butyl-4-nonylphenol	4306-88-1
2-[2-[2-(4-Nonylphenoxy)ethoxy]ethoxy]ethanol	51437-95-7
20-(4-Nonylphenoxy)-3,6,9,12,15,18-hexaoxaicosan-1-ol	27942-27-4
20-(Nonylphenoxy)-3,6,9,12,15,18-hexaoxaicosan-1-ol	27177-03-3
26-(4-Nonylphenoxy)-3,6,9,12,15,18,21,24-octaoxahexacosan-1-ol	14409-72-4
26-(Nonylphenoxy)-3,6,9,12,15,18,21,24-octaoxahexacosan-1-ol	42173-90-0
2-Nonylphenol	136-83-4
3-(1,1-Dimethylheptyl)phenol	70120-12-6
3,6,3-Nonylphenol-13C6	1173020-38-6
3,6,3-Nonylphenol-d2	1173020-19-3
3E2-Nonylphenol isomer	186825-39-8
3-Nonylphenol	139-84-4
4-(1,1,2-Trimethylhexyl)phenol	497103-56-7
4-(1,1,4-Trimethylhexyl)phenol	1988-28-9
4-(1,1,5-Trimethylhexyl)phenol	521947-27-3
4-(1,3,5-Trimethylhexyl)phenol	64114-43-8
4-(1-Ethyl-1,3-dimethylpentyl)phenol	186825-36-5
4-(1-Ethyl-1,4-dimethylpentyl)phenol	142731-63-3
4-(1-Ethyl-1-methylhexyl)phenol	52427-13-1
4-(2,4-Dimethylheptane-3-yl)phenol	1158978-65-4
4-(2,6-Dimethylheptyl)phenol	63085-63-2
4-(2-Ethyl-1,1-dimethylpentyl)phenol	478243-86-6
4-(Nonan-3-yl)phenol	17404-67-0
4-[2-Methyl-1-(1-methylethyl-d6)pentyl]phenol	1285987-04-3
4-N-Nonylphenol-2,3,5,6-D4,OD	358730-95-7
4-n-Nonylphenol-d4	1173019-62-9
4-Nonylphenol monoethoxylate	104-35-8
4-Nonylphenol	29832-11-9
4-Nonylphenol (branched)	84852-15-3

CHEMICAL NAME	CASRN
4-Nonylphenol (linear)	104-40-5
4-Nonylphenol diethoxylate	20427-84-3
4-t-Nonylphenol diethoxylate	156609-10-8
Barium Nonylphenolate, carbon dioxide, overbased	68515-89-9
Barium, carbonate 4-nonylphenol complexes	68442-67-1
Bariumbis(Nonylphenolate)	28987-17-9
C9-Alkylstrf phenol sulfides	68515-93-5
Calcium bis(nonylphenolate)	30977-64-1
Decaethylene glycol, isononylphenyl ether	65455-72-3
Dinonyl phenol	1323-65-5
Dinonylphenol ethoxylates, branched	68891-21-4
Dinonylphenol, branched	84962-08-3
Ethanol, 2-(2-(2-(2-(4-nonylphenoxy)ethoxy)ethoxy)ethoxy)-	7311-27-5
Ethanol, 2-(2-(nonylphenoxy)ethoxy)-	27176-93-8
Ethanol, 2-(4-nonylphenoxy)-	104-35-8
Ethanol, 2-(nonylphenoxy)-	27986-36-3
Ethoxylated Nonylphenol Phosphate	51811-79-1
Ethoxynonyl-benzene	28679-13-2
Isononylphenol	11066-49-2
Isononylphenol ethoxylate	37205-87-1
Nonoxynol-8	27177-05-5
Nonoxynol-9	26571-11-9
Nonylphenol (mixed isomers)	25154-52-3
Nonylphenol ethoxylate	37340-60-6
Nonylphenol phosphite (3:1)	26523-78-4
Nonylphenol polyethylene glycol ether	20636-48-0
Nonylphenol polyethylene glycol ether	27177-01-1
Nonylphenol polyethylene glycol ether	27177-08-8
Nonylphenol, branched	90481-04-2
Nonylphenol, branched, ethoxylated	68412-54-4; 37205-87-1
Nonylphenol, ethoxylated, monoether with sulfuric acid, sodium salt	9014-90-8
Nonylphenylpolyoxyethylene sulfosuccinate	54612-36-1

CHEMICAL NAME	CASRN
o-Isononylphenol	27938-31-4
p-(1,1-Dimethylheptyl)phenol	30784-30-6
p-(1-Methyloctyl)phenol	17404-66-9
Pentaoxaheptadecan-1-ol,17-(4-nonylphenoxy)-	34166-38-6
Phenol, 2-nonyl-, branched	91672-41-2
Phenol, 4-(1,1,2,4-tetramethylpentyl)-	851401-44-0
Phenol, 4-(1,1,3-trimethylhexyl)-	174305-83-0
Phenol, 4-(1,2,5-trimethylhexyl)-	142731-55-3
Phenol, 4-(1,2-dimethyl-1-propylbutyl)-	866790-13-8
Phenol, 4-(1,2-dimethylheptyl)-	142731-58-6
Phenol, 4-(1,3-dimethyl-1-propylbutyl)-	142731-65-5
Phenol, 4-(1,3-dimethylheptyl)-	122961-18-6
Phenol, 4-(1-ethyl-1,2-dimethylpentyl)-	866790-14-9
Phenol, 4-(1-ethyl-2,4-dimethylpentyl)-	66519-71-9
Phenol, 4-(2,4-dimethylheptyl)-	91000-35-0
Phenol, 4-(3-ethyl-1,3-dimethylpentyl)-	881201-77-0
p-Isononylphenol	24518-48-7
p-Isononylphenol	26543-97-5
p-Nonylphenol-13C6	211947-56-7
Poly(oxy(methyl-1,2-ethanediyl)), alpha-(nonylphenyl)-omega-hydroxy-	9064-15-7
Poly(oxy-1,2-ethanediyl), alpha-(1-oxo-2-propenyl)- omega-(nonylphenoxy)-	50974-47-5
Poly(oxy-1,2-ethanediyl), alpha-(2-nonylphenyl)-omega-hydroxy-	51938-25-1
Poly(oxy-1,2-ethanediyl), -sulfo–(nonylphenoxy)-, ammonium salt	9051-57-4
Poly(oxy-1,2-ethanediyl), alpha-(4-nonylphenyl)-omega-hydroxy	27942-26-3
Poly(oxy-1,2-ethanediyl), alpha-(nonylphenyl)- omega-hydroxy-, branched, phosphates	68412-53-3
Poly(oxy-1,2-ethanediyl), alpha-sulfo-omega-(nonylphenoxy)-, branched, ammonium salt	68649-55-8
Polyethylene glycol mono(branched p-nonylphenyl) ether	127087-87-0
Polyethylene glycol nonylphenyl ether	9016-45-9
Polyoxyethylene nonylphenyl ether	26027-38-3
Soprophor	37251-69-7
Zinc bis(nonylphenolate)	77194-15-1
Zinc bis(p-nonylphenolate)	74230-03-8
2-Dodecylphenol	5284-29-7

CHEMICAL NAME	CASRN
3-Dodecylphenol	29665-57-4
Dodecyl phenol	27193-86-8
Phenol, dodecyl-, branched	121158-58-5
Phenol, dodecyl-, branched [1]phenol, 2-dodecyl-, branched [2]phenol, 3-dodecyl-, branched [3]phenol, 4-dodecyl-, branched [4]phenol, (tetrapropenyl) derivatives [5]	210555-94-5
Phenol, dodecyl-, manuf. of, by-products from, high-boiling	90480-99-2
4-Dodecylphenol	104-43-8
Isododecylphenol	11067-80-4

Standard for Firefighting Foam

The GreenScreen CertifiedTM Standard for Firefighting Foam: Class A Foam Concentrates, Class B Foam Concentrates, Class A Wetting Agents, Class A&B Wetting Agents is for evaluation of firefighting water additives used for NFPA Class A and B fires. This standard provides the means for manufacturers to communicate their use of safer chemicals per the GreenScreen® for Safer Chemicals hazard assessment method. GreenScreen Certified ensures value, usability, and relevance for industry professionals wanting to excel in offering safer chemical formulations used in product manufacturing.

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