GreenScreen Certified™

Clean Production Action

Standard for Cleaners & Degreasers in Manufacturing

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

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The GreenScreen Certified™ Standard for Cleaners & Degreasers in Manufacturing provides the means for manufacturers to communicate their use of safer chemicals per the GreenScreen® hazard assessment tools and brands to specify use of products with safer chemicals. GreenScreen Certified ensures value, usability, and relevance for industry professionals wanting to excel in offering products made with preferred chemistry for people and the planet.

Clean Production Action developed the GreenScreen Certified™ Standard for Cleaners & Degreasers in Manufacturing version 1.0 in consultation with a diverse group of stakeholders, including manufacturers, brands, and external scientific experts from non-profit organizations and academic institutions. Thank you to Apple, whose thought leadership in Smarter Chemistry was instrumental in catalyzing the design and development of this GreenScreen Certified™ standard.

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OVERVIEW

1. PURPOSE

1.1 The purpose of this document is to establish a scientifically robust and transparent set of criteria for the identification and certification of cleaners and degreasers with safer chemistries. Use of these criteria by manufacturers demonstrates an on-going commitment to the protection of worker health and safety in manufacturing supply chains.

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 the levels of increasingly stringent certification requirements described herein.

2. SCOPE

2.1 The GreenScreen Certified™ Standard for Cleaners & Degreasers in Manufacturing is for the evaluation of cleaners and degreasers used as manufacturing process chemicals, including direct use chemicals to clean components, casings, and materials or to clean manufacturing machines during operation and maintenance. While a primary focus for this standard is electronics manufacturing, cleaners and degreasers used in other industrial applications are also in the scope.

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

1. Demolding solutions;
2. Cleaners and degreasers used in non-manufacturing processes (e.g., laboratory, office house-keeping, and maintenance unrelated to manufacturing); and
3. Surface treatment agents used to promote adhesion.

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

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

3. SERVICE OPTIONS FOR CERTIFICATION

The process for achieving certification involves both a review of the product against the criteria and issuance of the certification. The review of the product can be done by a GreenScreen Certified Reviewer or by Clean Production Action. The process steps vary for each of these options and are described in detail in Annex 1 and Annex 2, respectively. Issuance of the certification is by Clean Production Action.

Compiling necessary data for certification requires intensive supply chain engagement that is outside the scope of the certification process. These services are offered by GreenScreen Certified Reviewers and Clean Production Action. Contact a GreenScreen Certified Reviewer or Clean Production Action for more information.

4. TERMS AND DEFINITIONS

TERM	DEFINITION
Additive	An intentionally added chemical compound, chemical substance, or mixture of chemical substances (e.g., surfactant, solvent, stabilizer, or 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 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™ standard.
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#").
Certification Level	One of the levels of requirements for safer chemicals in products specified in the GreenScreen Certified standards.
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/learn/full-greenscreen-method). 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. 8; https://unece.org/ghs-rev8-2019, accessed 3/28/21.)
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); http://www.reachonline.eu/REACH/EN/REACH_EN/article3.html, accessed 3/28/21.) 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
Cleaners	Chemicals and chemical mixtures used to remove contaminants, unwanted materials, and/or manufacturing processing residues (e.g. lubricants, adhesives, solder flux residues, plastic residue, mold releases, etc.) from: • Individual parts, subcomponents, assemblies, process substrates, and/or final assembled products; and/or • Manufacturing equipment to manufacture individual components or final product.
Fixed List	A restricted substances list (RSL) Reference List where chemical group membership is finite.
GreenScreen Assessment	The assessment of an individual chemical using the GreenScreen method (see https://www.greenscreenchemicals.org/learn/full-greenscreen-method). 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™ Reviewer	An organization approved by Clean Production Action to review products against the GreenScreen Certified standards. Reviewers also offer supply chain engagement services. Reviewers may be Licensed GreenScreen Profilers or Licensed GreenScreen Consultants.
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 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/guidance-and-method-documents-downloads)
GreenScreen List Translator™ Score	A score that is assigned to a chemical screened against all GreenScreen Specified Lists 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/guidance-and-method-documents-downloads)
Homogeneous Material (Material)	"One material of uniform composition throughout or a material, consisting of a combination of materials, that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes." (EU Directive 2008/98/EC; https://www.eea.europa.eu/policy-documents/waste-framework-directive-2008-98-ec, accessed 9/20/21.)
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 3/28/21.)
Intentionally Added	Included to serve a desired function; not an impurity or a residual.
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 for clients. (See https://www.greenscreenchemicals.org/assess/profilers)
Monomer	See "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(6); http://www.reachonline.eu/REACH/EN/REACH_EN/article3.html, accessed 3/28/21.)

TERM	DEFINITION
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.
Ozone Depleting Substances (ODS)	"Substances known to deplete the stratospheric ozone layer. The ODS controlled under the Montreal Protocol and its Amendments are chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC), halons, methyl bromide (CH3Br), carbon tetrachloride (CCl4), methyl chloroform (CH3CCl3), hydrobromofluorocarbons (HBFC) and bromochloromethane (CHBrCl)." (California Air Resources Board; https://ww3.arb.ca.gov/cc/capandtrade/protocols/ods/ods.htm, accessed 3/28/21.)
Per- 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: 1) 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; 2) Polyfluoroalkyl substances: Substances for which all hydrogen atoms on at least one (but not all) carbon atom have been replaced by fluorine atoms; 3) Fluoropolymers: Carbon-only polymer backbone with fluorine atoms directly bound; 4) Perfluoropolyethers: Carbon and oxygen polymer backbone with fluorine atoms directly bound to carbon atoms; or 5) 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 3/28/21; 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 3/28/21.) The reference list of PFAS by chemical abstract service number as defined by the Organisation for Economic Development (OECD) is available here: https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals, accessed 9/22/21.
Platinum Hazard Criteria	The hazard classification restrictions and data requirements that must be met for GreenScreen Benchmark-2 substances (Platinum level only).
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(5); http://www.reachonline.eu/REACH/EN/REACH_EN/article3.html, accessed 3/28/21.)

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); http://www.reachonline.eu/REACH/EN/REACH_EN/article3.html, accessed 3/28/21.)
Polymeric Material	A mixture of one or more polymer substance(s) or polymer mixture(s), all other functional 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 additives and/or chemical substances.
Product Inventory Form	A form for listing the product contents for each product being certified. See Section 6 for additional required information.
Product Review Report	The checklist and/or form used by Clean Production Action and/or GreenScreen Certified Reviewer to document evaluation of a product for compliance with all GreenScreen Certified standard requirements.
Residual	Chemical or substance added upstream in the supply chain to serve a desired function: 1) In the additive or homogeneous material but not in the final product as placed on the market; or 2) In the production of the additive or homogeneous material. For example, this may refer to substances included in a manufacturing process to aid processing, as well as inputs to a reaction process such as reagents, catalysts, monomers, or preservatives for raw materials.
Residual Monomer	An unintended impurity in a polymer substance.
Restricted Substances List (RSL)	The list of chemicals and chemical classes that certified products shall not contain as defined in the standard.
Restricted Substances List (RSL) Reference List	The list of chemical group members for restricted chemical groups in the standard.
RSL Threshold	A "not to exceed" limit used an RSL.
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 3/28/21.)
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 3/28/21.)
Valid GreenScreen Assessment	A GreenScreen assessment report that is not expired or superseded. See GreenScreen Terms of Use for details: https://www.greenscreenchemicals.org/about/greenscreen-terms-of-use.

CERTIFICATION REQUIREMENTS

5. SUMMARY OF REQUIREMENTS

The requirements for each certification level are summarized in Table 1 below. Each product must meet all requirements to be awarded certification to a specified level. See Sections 6 through 13 for full program requirements.

TABLE 1: **Summary of Certification Requirements**

Section	Requirement	Certification Levels		
		Silver	Gold	Platinum
7. Green Screen Hazard Evaluation	Screening with GreenScreen List Translator™: 1) Intentionally added chemical compounds at any level (i.e., >0% by mass (0 ppm)) in the product; and 2) Impurities and/or residuals ≥ 0.01% by mass (100 ppm) in the product.	√	√	√
	Assessment with GreenScreen® for Safer Chemicals:[1] 1) Intentionally added substances at any level (i.e., >0% by mass (0 ppm)) in the product; and 2) Impurities and residuals ≥ 0.01% by mass (100 ppm) in the product.		√	√
	None of the chemical compounds screened have a GreenScreen List Translator™ score of LT-1.	√	√	√
	None of the substances assessed have a score of GreenScreen Benchmark-1.	If available[2]	√	√
	Substances with a GreenScreen Benchmark-2 score must meet the Platinum Hazard Criteria, including hazard classification restrictions and data requirements.			√
8. Restricted Substances List	Product meets all Restricted Substances List (RSL) requirements and thresholds.	√	√	√
9.1 Analytical Testing	Product meets Analytical Testing requirements.	√	√	√
9.2 Skin & Eye Irritation	Product meets Skin & Eye Irritation Requirements.	√	√	√

1 For the Gold level, GreenScreen assessments are not required for chemicals in the Product Inventory that are on the US Environmental Protection Agency Safer Chemical Ingredients List (SCIL).

2 For the Silver level, GreenScreen assessments are preferentially used if they are freely and publicly available.

6. PRODUCT INVENTORY

A Product Inventory meeting the specifications outlined in this Section is required for certification. Primary and secondary packaging used to ship the product undergoing certification is outside the certification scope.

6.1 Additives Inventory

6.1.1 Identify 100% by mass of the additives in the product; and

6.1.2 List the following for each additive in the product:

1. Additive trade name,
2. Additive supplier name,
3. Additive function, and
4. Additive percent by mass (%) in product.

6.2 Chemical Inventory

6.2.1 Identify all intentionally added chemicals present at any level (i.e., > 0% by mass (0 ppm)) in each additive;

6.2.2 Identify impurities and residuals present ≥ 0.01% by mass (100 ppm) in each additive; and

6.2.3 List the following information for each chemical in each additive:[3,4]

1. Chemical name and CASRN,
2. Chemical percent by mass (%) in additive,
3. Chemical function (intentionally added, impurity, or residual), and
4. Substance role if intentionally added or description if impurity or residual.

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3 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. Service options and provider directory available at: https://www.greenscreenchemicals.org/assess/gs-professionals.

4 For additives that are polymeric materials, each polymer species, monomer, and catalyst in a polymer substance or polymer mixture must be listed as a separate ingredient. Polymeric materials include one or more polymer substances and/or polymer mixtures and potentially one or more additives. (See Section II–Assessing Polymers in the GreenScreen® for Safer Chemicals Hazard Assessment Guidance Version 1.4.)

7. GREENSCREEN HAZARD EVALUATION

The Product Inventory completed in Section 6 will be used to evaluate the product using GreenScreen List Translator screening and/or chemical hazard assessment following GreenScreen for Safer Chemicals, depending on the certification level.

7.1 Silver Screening Requirements

7.1.1 Each intentionally added chemical compound present at any level (i.e., > 0% by mass (0 ppm)) and each impurity and each residual present ≥ 0.01% by mass (100 ppm) in the product is screened with GreenScreen List Translator™.

7.1.2 Each screened chemical compound in the Product Inventory has a GreenScreen List Translator™ score of LT-P1, LT-UNK, and/or NoGSLT.[5] No LT-1 scores are permitted in certified products. No GreenScreen Benchmark-1 scores are permitted in certified products when there is a freely and publicly available GreenScreen assessment.

7.2 Gold Assessment Requirements

7.2.1 Each intentionally added substance present at any level (i.e., > 0% by mass (0 ppm)) and each impurity and each residual present ≥ 0.01% by mass (100 ppm) in the product are assessed with GreenScreen for Safer Chemicals, with the following exception and modification:

1. Exception: GreenScreen assessments are not required for substances listed on the US Environmental Protection Agency Safer Chemical Ingredients List (SCIL).
2. Modification: GreenScreen assessments of polymer substances for the Gold level of certification do not require a potential chemical of high concern analysis to be conducted (See Section 15.4 in the GreenScreen® for Safer Chemicals Hazard Assessment Guidance). Instead, each residual monomer and each catalyst present ≥ 0.01% by mass (100 ppm) in the product must meet the requirement of 7.1.2.

7.2.2 Each assessed substance has a valid GreenScreen assessment and GreenScreen Benchmark score.[6] No Benchmark-1 or Benchmark-1_{TP} scores are permitted in certified products.[7]

7.3 Platinum Assessment Requirements

7.3.1 Each intentionally added substance present at any level (i.e., > 0% by mass (0 ppm)) and each impurity and each residual present ≥ 0.01% by mass (100 ppm) in the product are assessed with GreenScreen for Safer Chemicals.

7.3.2 Each assessed substance has a valid GreenScreen assessment and GreenScreen Benchmark score.[6] No Benchmark-1, are permitted in assessed chemical substances of certified products.[7]

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5 Clean Production Action or a third-party GreenScreen Certified Reviewer 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 toxnot (no cost) and Pharos Chemical and Materials Library (fee based).

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.

7.3.3 Substances with a GreenScreen score of Benchmark-2, Benchmark-2_{DG}, or Benchmark-2_{TP} require evaluation against the Platinum Hazard Criteria and must meet all the criteria.

7.4 Platinum Hazard Criteria

The Platinum level of certification allows use of some chemicals with a score of Benchmark-2 while prohibiting others. The chemicals that are prohibited have hazards most relevant to worker health and safety.

For the Platinum level of certification, substances with a score of Benchmark-2, Benchmark-2_{DG}, or Benchmark-2_{TP} must meet all the criteria outlined in this section.

7.4.1 Substances shall not be classified as any of the following for Group I Human Health Endpoints

7.4.1.1 Moderate for Carcinogenicity (C) or Mutagenicity (M), or

7.4.1.2 Moderate for Reproductive Toxicity (R) or Developmental Toxicity (D) and demonstrates adverse effects at doses at or below the following TSCA 8(e) Guidance Values in Table 2.

TABLE 2: **US Environmental Protection Agency (EPA) Toxic Substances Control Act (TSCA) Section 8(e) Guidance Values**

Route of Administration (units)	TSCA 8(e) Guidance Value[8]
Oral (milligrams/kilogram body weight/day) (mg/kg bw/d)	250
Dermal (mg/kg bw/d)	500
Inhalation (vapor/gas) (milligrams/liter/6 hours/day) (mg/L/6h/d)	2.5
Inhalation (dust/mist) (mg/L/6h/d)	0.5

7.4.2 Substances shall not be classified as any of the following for Group II Human Health Endpoints

4.7.2.1 Very High for Acute Mammalian Toxicity (AT).

7.3.2 Substances shall not be classified as any of the following for Group II* Human Health Endpoints

7.4.3.1 High for Systemic Toxicity & Organ Effects - Repeated Exposure (ST-repeated),

7.4.3.2 High for Neurotoxicity - Repeated Exposure (N-repeated),

7.4.3.3 High for Skin Sensitization (SnS), or

7.4.3.4 High for Respiratory Sensitization (SnR).

8 USEPA. Methodology for Risk-Based Prioritization under ChAMP. 2009 https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/PB2010101039.xhtml, (accessed 9/20/21).

7.4.4 Substances shall not be classified as any of the following for Physical Hazard Endpoints

7.4.4.1 Very High for Reactivity (Rx); or

7.4.4.2 Very High for Flammability (F).

7.4.5 Substances shall meet the following data requirements:

7.4.5.1 Benchmark-2 data requirements as outlined in GreenScreen® for Safer Chemicals Hazard Assessment Guidance; and

7.4.5.2 Data are required for both skin and eye irritation.

8. RESTRICTED SUBSTANCES LIST (RSL)

All chemicals, impurities, and residuals in the Chemical Inventory are compared against the GreenScreen Certified for Cleaners & Degreasers RSL and must meet the following requirements:[9]

- Products shall not contain RSL chemicals from chemical groups listed in Table 3 that are intentionally added at any level (i.e., > 0% by mass (0 ppm)) in the product.
- Products shall not contain RSL chemicals from chemical groups listed in Table 3 that are impurities in the product above the impurity threshold specified in the table.

TABLE 3: **GreenScreen Certified Cleaners & Degreasers Restricted Substances List (RSL)**

Restricted Chemical Group	Chemical Group Members	Impurity Threshold
Chlorinated Organic Compounds	• Chemicals meeting the definition of Chlorinated Organic Compound (See Section 4).	None detected by analytical testing (See Section 9.1)
Brominated Organic Compounds	• Chemicals meeting the definition of Brominated Organic Compound (See Section 4).	None detected by analytical testing (See Section 9.1)
Per- and Polyfluoroalkyl Substances (PFAS)	• Chemicals meeting the definition of PFAS (See Section 4); and • Includes but is not limited to chemicals in the Comprehensive Global Database of PFASs by the Organisation for Economic Cooperation and Development (OECD).	0.01% by mass (100 ppm) in the product
Cyclic Volatile Methyl Siloxanes (VMSs)	• Chemicals on the following fixed list includes: – Dodecamethylcyclohexasiloxane (D6), CASRN 540-97-6, – Decamethylcyclopentasiloxane (D5), CASRN 541-02-6, and – Octamethylcyclotetrasiloxane (D4), CASRN 556-67-2.	0.01% by mass (100 ppm) in the product
Methanol	• Methanol, CASRN 67-56-1	0.01% by mass (100 ppm) in the product
Solvents	• Chemicals on the following fixed list: – Benzene, CASRN 71-43-2; – N-Hexane, CASRN 110-54-3; – Toluene, CASRN 108-88-3; and – N-methylpyrrolidone (NMP), CASRN 872-50-4.	None detected by analytical testing (See Section 9.1)
Ozone Depleting Substances (ODS)	• Chemicals meeting the definition of Ozone Depleting Substance (See Section 4); and • Chemicals from the fixed list in the RSL Reference List (See Section A3.2 in Annex).	0.01% by mass (100 ppm) in the product
Alkylphenols & Alkylphenol Ethoxylates	• Chemicals meeting the definition of Alkylphenol or Alkylphenol Ethoxylate (See Section 4) and containing one or more alkyl chains with a carbon chain length of six carbons or more; and • Includes but is not limited to chemicals in the RSL Reference List (See Section A3.2 in Annex).	0.01% by mass (100 ppm) in the product

9 The RSL is intended to reflect best practices and thresholds listed may go beyond regulations. If regulatory requirements are more stringent than the RSL requirements, the regulatory requirements must be met.

9. PRODUCT-LEVEL REQUIREMENTS

9.1 Analytical Testing

Manufacturers shall submit documentation demonstrating the product meets the maximum concentration values for the chemicals of concern listed in Table 4 below. Clean Production Action may, at any time, test the certified product to confirm it meets the product-level testing requirements.

9.1.1 Must be from an independent, third-party laboratory that is ISO/IEC 17025 accredited and the accreditation scope includes the test method(s) being applied to meet the Table 4 requirements; and

9.1.2 Must be for tests performed no more than one year prior to the date of application for certification.

TABLE 4: **Product-Level Analytical Testing Requirements**

Chemical Group	Chemical Name	CASRN	Test Method	Product-level maximum concentration value
Chlorinated Organic Compounds	Total organic chlorine	Not Applicable (N/A)	EN 14582 for total chlorine; 0.005% (50 ppm) Minimum Detection Limit	0.01% by mass (100 ppm)
Brominated Organic Compounds	Total organic bromine	N/A	EN 14582 for total bromine; 0.005% (50 ppm) Minimum Detection Limit	0.01% by mass (100 ppm)
Solvents	Benzene	71-43-2	Solvent extraction, analyzed by GC-MS or HPLC-MS; 0.0005% (5 ppm) Minimum Detection Limit	None detected
	N-Hexane	110-54-3		
	Toluene	108-88-3		
	N-methylpyrrolidone (NMP)	872-50-4		

9.2 Skin & Eye Irritation

The product must meet all of the following requirements for all certification levels:

9.2.1 Product pH shall be ≥ 2 and ≤ 11.5;

9.2.2 Products with pH <2 or >11.5 shall be certified if not classified as GreenScreen Very High for Skin Irritation (IrS) or Eye Irritation (IrE) based on product testing data (see Annex 4 for example test guidelines); and

9.2.3 Concentrated products with pH <2 or >11.5 shall be certified provided all of the following closed dilution-controlled dispensing system requirements are met:

1. The manufacturer can demonstrate that the product is designed to be used only in a closed dilution-controlled dispensing system;
2. The closed dilution-controlled dispensing system prevents backflow and is designed to minimize waste and cross-contamination;[10]
3. The pH at the most concentrated use dilution is within the acceptable range of 2 to 11.5;
4. The primary packaging is designed to minimize the potential for human exposures or environmental releases (e.g., through a drop test); and
5. Any reference to certification against these criteria is not used on the product (or packaging) when it is a concentrate (but may be used in promotional materials).

10 See American Society of Sanitary Engineering standard 1055B for specifications.

10. DOCUMENTATION REQUIREMENTS

Clean Production Action performs a certification review of the following required documentation against the certification requirements:

1. Product Inventory
    a. Additive Inventory
    b. Chemical Inventory
2. Safety Data Sheets (SDSs)
3. GreenScreen List Translator scores[11]
4. GreenScreen assessments and Benchmark scores (Gold and Platinum only)
5. Results from analytical testing

All documentation is submitted by the Applicant.

11. CERTIFICATION AND LICENSING

The Applicant must submit all required documentation as applicable to the certification level to Clean Production Action and sign a license agreement with Clean Production Action to be awarded certification. A license agreement is required to use a GreenScreen Certified Certification Mark on products and marketing materials.

A certificate for a certified product (or products) is issued by Clean Production Action after the certification review is complete and a license agreement is executed.

11 GreenScreen List Translator scores are generated by a GreenScreen Service Provider or Clean Production Action.

12. CERTIFICATION, LABELING, AND DURATION

12.1 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.

12.2 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. Only the core design mark or the design mark with the corresponding level for which the product has achieved certification 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 sublicensing 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.

12.3 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.

12.4 Duration of Certification

Certificates for Version 1 of this standard are valid through July 31, 2027 and require 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, and each subsequent year during the valid duration, the licensee must renew the certificate by: 1) paying an annual renewal fee; 2) reporting any product changes; and 3) signing a statement by the CEO or a senior manager that no changes have been made to the product's chemical composition. At the time of annual renewal, recertification will be required if changes have occurred that may affect the product inventory and hazard assessment.

Certificate holders may choose to recertify the product(s) upon expiration of the certificate.

ANNEX 1 – CERTIFICATION PROCESS STEPS WITH CLEAN PRODUCTION ACTION

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

ANNEX 2 – CERTIFICATION PROCESS STEPS WITH GREENSCREEN CERTIFIED REVIEWER

A2.1 Product Review Process using a GreenScreen Certified Reviewer

1. Applicant registers on the GreenScreen Certified website.
2. Applicant contacts Clean Production Action-approved GreenScreen Certified Reviewer to begin the product review process.
3. GreenScreen Certified Reviewer confirms with Clean Production Action that Applicant registered for GreenScreen Certified and determines whether product(s) are within scope.
4. Applicant hires GreenScreen Certified Reviewer to complete the product review.
5. GreenScreen Certified Reviewer informs Applicant of the results of the product review and provides Applicant a completed Product Review Report.

A2.2 Certification Process with Clean Production Action

1. Applicant submits completed Product Review Report to Clean Production Action to initiate certification review and licensing services.
2. Clean Production Action sends Applicant an invoice.
3. Applicant pays the invoice.
4. Clean Production Action performs certification review. Clean Production Action requests additional information from Applicant or GreenScreen Certified Reviewer, as needed.
5. Clean Production Action informs Applicant of the results.
6. Applicant informs Clean Production Action whether they will proceed with a License Agreement for products that meet the certification requirements.
7. Clean Production Action sends Applicant a License Agreement.
8. Applicant signs and returns the License Agreement.
9. Clean Production Action countersigns the License Agreement and sends an executed copy to the Applicant.
10. Clean Production Action sends Applicant certificate(s) for certified product(s).

ANNEX 3 – CLEANERS & DEGREASERS RSL REFERENCE LIST

This Annex contains RSL Reference Lists for use in identifying chemical group members of restricted chemical groups listed in Section 8.

A3.1 Ozone Depleting Substances (ODS)

[Back to RSL Summary Table]

Chemical group members belonging to the Ozone Depleting Substances group include the fixed list in the following table:

TABLE A1: **RSL Reference List for Ozone Depleting Substances**

Chemical Name	CASRN
Trichlorofluoromethane (CFC-11)	75-69-4
Dichlorodifluoromethane (CFC-12)	75-71-8
Chlorotrifluoromethane (CFC-13)	75-72-9
Pentachlorofluoroethane (CFC-111)	354-56-3
1,1,2,2-Tetrachloro-1,2-difluoroethane (CFC-112)	76-12-0
1,1,1,2-Tetrachloro-2,2-difluoroethane (CFC-112a)	76-11-9
1,1,2-Trichloro-1,2,2 trifluoroethane (CFC-113)	76-13-1
1,1,1-Trichloro-2,2,2 trifluoroethane (CFC-113a)	354-58-5
Dichlorotetrafluoroethane (CFC-114)	76-14-2
Monochloropentafluoroethane (CFC-115)	76-15-3
Heptachlorofluoropropane (CFC-211)	135401-87-5
1,1,1,2,2,3,3-Heptachloro-3-fluoropropane (CFC-211aa)	422-78-6
1,1,1,2,3,3,3-Heptachloro-2-fluoropropane (CFC-211ba)	422-81-1
Hexachlorodifluoropropane (CFC-212)	3182-26-1
Pentachlorotrifluoropropane (CFC-213)	2354-06-5; 134237-31-3
Tetrachlorotetrafluoropropane (CFC-214)	29255-31-0
1,2,2,3-Tetrachloro-1,1,3,3-tetrafluoropropane (CFC-214aa)	2268-46-4
1,1,1,3-Tetrachloro-2,2,3,3-tetrafluoropropane (CFC-214cb)	—
1,2,2-Trichloropentafluoropropane (CFC-215aa)	1599-41-3
1,2,3-Trichloropentafluoropropane (CFC-215ba)	76-17-5
1,1,2-Trichloropentafluoropropane (CFC-215bb)	—
1,1,3-Trichloropentafluoropropane (CFC-215ca)	—
1,1,1-Trichloropentafluoropropane (CFC-215cb)	4259-43-2

TABLE A1: **RSL Reference List for Ozone Depleting Substances** (CONTINUED)

Chemical Name	CASRN
Dichlorohexafluoropropane (CFC-216)	661-97-2
Monochloroheptafluoropropane (CFC-217)	422-86-6; 76-18-6
Dibromodifluoromethane (Halon 1202)	75-61-6
Bromochlorodifluoromethane (Halon 1211)	353-59-3
Bromotrifluoromethane (Halon 1301)	75-63-8
Dibromotetrafluoroethane (Halon 2402)	124-73-2
Tetrachloromethane (carbon tetrachloride)	56-23-5
1,1,1-Trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane	71-55-6
Bromomethane (methyl bromide)	74-83-9
Bromoethane (ethyl bromide)	74-96-4
1-Bromopropane (n-propyl bromide)	106-94-5
Trifluoroiodomethane (trifluoromethyl iodide)	2314-97-8
Chloromethane (methyl chloride)	74-87-3
Dibromofluoromethane	1868-53-7
Bromodifluoromethane	1511-62-2
Bromofluoromethane	373-52-4
Tetrabromofluoroethane	306-80-9
Tribromodifluoroethane	—
Dibromotrifluoroethane	354-04-1
Bromotetrafluoroethane	124-72-1
Tribromofluoroethane	—
Dibromodifluoroethane	75-82-1
Bromotrifluoroethane	421-06-7
Dibromofluoroethane	358-97-4
Bromodifluoroethane	420-47-3; 357188-74-0
Bromofluoroethane	762-49-2
Hexabromofluoropropane	—
Pentabromodifluoropropane	—
Tetrabromotrifluoropropane	—
Tribromotetrafluoropropane	—
Dibromopentafluoropropane	431-78-7
Bromohexafluoropropane	2252-78-0

TABLE A1: **RSL Reference List for Ozone Depleting Substances** (CONTINUED)

Chemical Name	CASRN
Pentabromofluoropropane	—
Tetrabromodifluoropropane	—
Tribromotrifluoropropane	—
Dibromotetrafluoropropane	—
Bromopentafluoropropane	460-88-8
Tetrabromofluoropropane	—
Tribromodifluoropropane	70192-80-2
Dibromotrifluoropropane	431-21-0
Bromotetrafluoropropane	679-84-5
Tribromofluoropropane	75372-14-4
Dibromodifluoropropane	460-25-3
Bromotrifluoropropane	421-46-5
Dibromofluoropropane	51584-26-0
Bromodifluoropropane	—
Bromofluoropropane	1871-72-3
Bromochloromethane	74-97-5
Sulfur hexafluoride	2551-62-4
Dichlorofluoromethane (HCFC-21)	75-43-4
Chlorodifluoromethane (HCFC-22)	75-45-6
Chlorofluoromethane (HCFC-31)	593-70-4
1,1,2,2-Tetrachloro-1-fluoroethane (HCFC-121)	354-11-0
1,1,1,2-Tetrachloro-2-fluoroethane (HCFC-121a)	354-14-3
Trichlorodifluoroethane (HCFC-122)	41834-16-6
1,2,2-Trichloro-1,1-difluoroethane (HCFC-122)	354-21-2
1,1,2-Trichloro-1,2-difluoroethane (HCFC-122a)	354-15-4
1,1,1-Trichloro-2,2-difluoroethane (HCFC-122b)	354-12-1
Dichlorotrifluoroethane (HCFC-123)	34077-87-7
Dichloro-1,1,2-trifluoroethane	90454-18-5
2,2-dichloro-1,1,1-trifluroethane	306-83-2
1,2-dichloro-1,1,2-trifluroethane (HCFC-123a)	354-23-4
1,1-dichloro-1,2,2-trifluroethane (HCFC-123b)	812-04-4
Chlorotetrafluoroethane (HCFC-124)	63938-10-3

TABLE A1: **RSL Reference List for Ozone Depleting Substances** (CONTINUED)

Chemical Name	CASRN
2-chloro-1,1,1,2-tetrafluoroethane	2837-89-0
1-chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	354-25-6
Trichlorofluoroethane (HCFC-131)	27154-33-2
1-Fluoro-1,2,2-trichloroethan	359-28-4
1,1,2-Trichloro-1-fluoroethane (HCFC-131a)	811-95-0
1,1,1-trichloro-2-fluoroethane (HCFC-131b)	2366-36-1
Dichlorodifluoroethane (HCFC-132)	25915-78-0
1,2-Dichloro-1,2-difluoroethane (HCFC-132)	431-06-1
1,1-Dichloro-2,2-difluoroethane (HCFC-132a)	471-43-2
1,2-Dichloro-1,1-difluoroethane (HCFC-132b)	1649-08-7
1,1-Dichloro-1,2-difluoroethane (HCFC-132c)	1842-05-3
Chlorotrifluoroethane (HCFC-133)	431-07-2
1-Chloro-1,2,2-trifluoroethane (HCFC-133)	1330-45-6
2-Chloro-1,1,1-trifluoroethane (HCFC-133a)	75-88-7
1-Chloro-1,1,2-trifluoroethane (HCFC-133b)	421-04-5
Dichlorofluoroethane (HCFC-141)	25167-88-8
1,2-Dichloro-1-fluoroethane (HCFC-141)	430-57-9
1,1-Dichloro-2-fluoroethane (HCFC-141a)	430-53-5
1,1-Dichloro-1-fluoroethane (HCFC-141b)	1717-00-6
Chlorodifluoroethane (HCFC-142)	25497-29-4
2-Chloro-1,1-difluoroethane (HCFC-142)	338-65-8
1-Chloro-1,1-difluoroethane (HCFC-142b)	75-68-3
1-Chloro-1,2-difluoroethane (HCFC-142a)	338-64-7
Chlorofluoroethane (HCFC-151)	110587-14-9
1-Chloro-2-fluoroethane (HCFC-151)	762-50-5
1-Chloro-1-fluoroethane (HCFC-151a)	1615-75-4
Hexachlorofluoropropane (HCFC-221)	134237-35-7; 29470-94-8
1,1,1,2,2,3-Hexachloro-3-fluoropropane (HCFC-221ab)	422-26-4
Pentachlorodifluoropropane (HCFC-222)	134237-36-8
1,1,1,3,3-pentachloro-2,2-difluoropropane (HCFC-222ca)	422-49-1
1,2,2,3,3-pentachloro-1,1-difluoropropane (HCFC-222aa)	422-30-0
Tetrachlorotrifluoropropane (HCFC-223)	134237-37-9

TABLE A1: **RSL Reference List for Ozone Depleting Substances** (CONTINUED)

Chemical Name	CASRN
1,1,3,3-Tetrachloro-1,2,2-trifluoropropane (HCFC-223ca)	422-52-6
1,1,1,3-Tetrachloro-2,2,3-trifluoropropane (HCFC-223cb)	422-50-4
Trichlorotetrafluoropropane (HCFC-224)	134237-38-0
1,3,3-Trichloro-1,1,2,2-tetrafluoropropane (HCFC-224ca)	422-54-8
1,1,3-Trichloro-1,2,2,3-tetrafluoropropane (HCFC-224cb)	422-53-7
1,1,1-Trichloro-2,2,3,3-tetrafluoropropane (HCFC-224cc)	422-51-5
Dichloropentafluoropropane (HCFC-225)	127564-92-5
2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa)	128903-21-9
2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba)	422-48-0
1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225bb)	422-44-6
3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	422-56-0
1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	507-55-1
1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC-225cc)	13474-88-9
1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC-225da)	431-86-7
1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225ea)	136013-79-1
1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC-225eb)	111512-56-2
Chlorohexafluoropropane (HCFC-226)	134308-72-8
2-Chloro-1,1,1,3,3,3-hexafluoro-propane (HCFC-226da)	431-87-8
Pentachlorofluoropropane (HCFC-231)	134190-48-0
1,1,1,2,3-pentachloro-2-fluoro-propane (HCFC-231bb)	421-94-3
Tetrachlorodifluoropropane (HCFC-232)	134237-39-1
1,1,1,3-Tetrachloro-3,3-difluoropropane (HCFC-232fc)	460-89-9
Trichlorotrifluoropropane (HCFC-233)	134237-40-4
1,1,1-Trichloro-3,3,3-trifluoropropane (HCFC-233fb)	7125-84-0; 7125-83-9
Dichlorotetrafluoropropane (HCFC-234)	127564-83-4
1,2-Dichloro-1,2,3,3-tetrafluoropropane (HCFC-234db)	425-94-5
Chloropentafluoropropane (HCFC-235)	134237-41-5
1-Chloro-1,1,3,3,3-pentafluoropropane (HCFC-235fa)	460-92-4
Tetrachlorofluoropropane (HCFC-241)	134190-49-1
1,1,2,3-Tetrachloro-1-fluoropropane (HCFC-241db)	666-27-3
Trichlorodifluoropropane (HCFC-242)	134237-42-6
1,3,3-Trichloro-1,1-difluoropropane (HCFC-242fa)	460-63-9

TABLE A1: **RSL Reference List for Ozone Depleting Substances** (CONTINUED)

Chemical Name	CASRN
Dichlorotrifluoropropane (HCFC-243)	134237-43-7
1,1-dichloro-1,2,2-trifluoropropane	7125-99-7
2,3-dichloro-1,1,1-trifluoropropane	338-75-0
3,3-dichloro-1,1,1-trifluoropropane	460-69-5
Chlorotetrafluoropropane (HCFC-244)	134190-50-4
3-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244ca)	679-85-6
1-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244cc)	421-75-0
Trichlorofluoropropane (HCFC-251)	134190-51-5
1,1,3-Trichloro-1-fluoropropane (HCFC-251fb)	818-99-5
1,1,2-Trichloro-1-fluoropropane (HCFC-251dc)	421-41-0
Dichlorodifluoropropane (HCFC-252)	134190-52-6
1,3-Dicloro-1,1-difluoropropane (HCFC-252fb)	819-00-1
Chlorotrifluoropropane (HCFC-253)	134237-44-8
3-chloro-1,1,1-trifluoropropane (HCFC-253fb)	460-35-5
Dichlorofluoropropane (HCFC-261)	134237-45-9
1,1-Dichloro-1-fluoropropane (HCFC-261fc)	7799-56-6
1,2-Dichloro-2-fluoro-propane (HCFC-261ba)	420-97-3
Chlorodifluoropropane (HCFC-262)	134190-53-7
1-Chloro-2,2-difluoropropane (HCFC-262ca)	420-99-5
2-Chloro-1,3-difluoropropane (HCFC-262da)	102738-79-4
1-Chloro-1,1-difluoropropane (HCFC-262fc)	421-02-3
Chlorofluoropropane (HCFC-271)	134190-54-8
2-Chloro-2-fluoropropane (HCFC-271ba)	420-44-0
1-Chloro-1-fluoropropane (HCFC-271fb)	430-55-7

A3.2 Alkylphenols and Alkylphenol Ethoxylates

[Back to RSL Summary Table]

Chemical group members belonging to the Alkylphenols and Alkylphenol Ethoxylates group include but are not limited to those listed in the following table:

TABLE A2: **RSL Reference List for Alkylphenols and 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(1,1,2,2tetramethylpropyl)-	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

TABLE A2: **RSL Reference List for Alkylphenols and Alkylphenol Ethoxylates** (CONTINUED)

Chemical Name	CASRN
4-Octylphenol	71902-25-5
4-Octylphenol polyethoxylate	26636-32-8
4-tert-Octylphenol	140-66-9
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-h ydroxy-, 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

TABLE A2: **RSL Reference List for Alkylphenols and Alkylphenol Ethoxylates** (CONTINUED)

Chemical Name	CASRN
sec-Octylphenol	93891-78-2
tert-Octylphenol	27193-28-8
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

TABLE A2: **RSL Reference List for Alkylphenols and Alkylphenol Ethoxylates** (CONTINUED)

Chemical Name	CASRN
4-Nonylphenol	29832-11-9
4-Nonylphenol (branched)	84852-15-3
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

TABLE A2: **RSL Reference List for Alkylphenols and Alkylphenol Ethoxylates** (CONTINUED)

Chemical Name	CASRN
Nonylphenol, ethoxylated, monoether with sulfuric acid, sodium salt	9014-90-8
Nonylphenylpolyoxyethylene sulfosuccinate	54612-36-1
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

TABLE A2: **RSL Reference List for Alkylphenols and Alkylphenol Ethoxylates** (CONTINUED)

Chemical Name	CASRN
Soprophor	37251-69-7
Zinc bis(nonylphenolate)	77194-15-1
Zinc bis(p-nonylphenolate)	74230-03-8
2-Dodecylphenol	5284-29-7
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

ANNEX 4. TEST METHODS FOR SKIN AND EYE IRRITATION

TABLE A3: **OECD Test Methods for Skin and Eye Irritation**[12]

Assay	Skin Irritation	Eye Irritation	Skin Sensitization
In vitro assays	• Test No. 431: In vitro skin corrosion: reconstructed human epidermis (RHE) test method, • Test No. 435: In Vitro Membrane Barrier Test Method for Skin Corrosion, or • Test No. 439: In Vitro Skin Irritation: Reconstructed Human Epidermis Test Method.	• Test No. 437: Bovine Corneal Opacity and Permeability Test Method for Identifying i) Chemicals Inducing Serious Eye Damage and ii) Chemicals Not Requiring Classification for Eye Irritation or Serious Eye Damage, • Test No. 438: Isolated Chicken Eye Test Method for Identifying i) Chemicals Inducing Serious Eye Damage and ii) Chemicals Not Requiring Classification for Eye Irritation or Serious Eye Damage, • Test No. 460: Fluorescein Leakage Test Method for Identifying Ocular Corrosives and Severe Irritants, • Test No. 491: Short Time Exposure In Vitro Test Method for Identifying i) Chemicals Inducing Serious Eye Damage and ii) Chemicals Not Requiring Classification for Eye Irritation or Serious Eye Damage, or • Test No. 492: Reconstructed human Cornea-like Epithelium (RhCE) test method for identifying chemicals not requiring classification and labelling for eye irritation or serious eye damage.	• Test No. 442B: Skin Sensitization, • Test No. 442C: In Chemico Skin Sensitisation, • Test No. 442D: In Vitro Skin Sensitisation, or • Test No. 442E: In Vitro Skin Sensitisation.
In vivo assays	• Test No. 404: Acute Dermal Irritation/ Corrosion	• Test No. 405: Acute Eye Irritation/ Corrosion	• Test No. 429: Skin Sensitisation or • Test No. 406: Skin Sensitisation.

12 Access to OECD Test Methods: https://www.oecd-ilibrary.org/environment/oecd-guidelines-for-the-testing-of-chemicals-section-4-health-effects_20745788?page=1 (accessed 9/20/21).

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