Google

Restricted Substances Specification

990-00012-00-E

1.0 Introduction

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1.1 Scope

At Google, our values reflect the fundamental importance of inclusion, openness, science, and commitment to the environment. Operating our business in an environmentally sustainable way has been a core value from the beginning. Our goal is to design, manufacture, and sell products that are safe, efficient, and sustainable. One of the ways we do this is by restricting chemicals of concern and working toward creating and integrating safer substitutes for them.

The Google Restricted Substances Specification describes our commitment towards the elimination of hazardous chemicals in all Google branded consumer products, accessories, all products used in data centers, manufacturing processes, and retail packaging. We want to ensure that once we eliminate a chemical of concern, it stays out. The restrictions in this specification are a compilation of international regulations and Google policies.

We require all suppliers to adhere to the restrictions and reporting requirements detailed in this specification for Google branded consumer hardware and all products used in data centers. It does not apply to the parts or products of other Google affiliates and subsidiaries such as Verily, Calico Labs, or Waymo. Supplier's conformance with this specification does not relieve or diminish the supplier's obligation to comply with all applicable laws. All restrictions, reporting requirements, and processes in the specification go into effect on the date of publication.

Questions regarding the Google Restricted Substances Specification should be directed to env-compliance@google.com.

1.2 Definitions

Antimicrobial: A substance or agent that kills microorganisms or stops their growth.

Article: The smallest discrete object whose shape, surface or design determines its function to a greater degree than its chemical composition (e.g., a plastic housing, stainless steel screw). (Note: See the most current guidance provided by the EU Chemicals Agency.)

Assembly/Sub-Assembly: A collection of articles composed of components and materials (e.g., a populated PCB, display assembly, connector, battery pack).

Biocide: See Antimicrobial.

CAS: Chemical Abstract Service registry number is an internationally recognized number to uniquely identify a chemical.

EEE: Electrical and electronic equipment.

Endocrine Disrupting Chemical EDC: Chemical that can interfere with the endocrine (hormone) system.

Exemption: The condition of not being subject to the requirement in the specification. Google authorizes exemptions on a limited basis where the substance is not regulated by law but Google has determined that it is not technically feasible or a compliant material is not readily available to meet the requirements of the intended application (see Waiver for temporary deviations).

Full Material Disclosure (FMD): Sustainability initiative that requires vendors to provide the complete chemical composition of the parts and materials supplied to Google.

Global Warming Potential: The cumulative direct and indirect warming impacts integrated over a period of time from the emission of a unit of mass of gas relative to carbon dioxide, which is assigned a value of 1.

Google Policy: Google restrictions that go beyond regulatory requirements based on their hazard or toxicological profile, corporate initiative, or best practices. This document is setting the policy for these restrictions.

Homogeneous Material: A material of uniform composition throughout or a material, consisting of a combination of materials, that cannot be disjointed, disaggregated, or separated into different materials by mechanical actions such

as unscrewing, cutting, crushing, grinding, and abrasive processes. The definition is consistent with Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS 2). Examples of homogeneous materials include a plastic cover to a computer screen, a copper wire inside a cable, and the solder component of a solder joint. All EEE consist of many different homogeneous materials and the maximum concentration values are applied to each of the homogeneous materials individually.

Intentionally Added: The deliberate use of a substance in the formulation of a product, subpart, or material where the substance's continued presence is desired to provide a specific characteristic, appearance, or quality.

Manufacturing Process Chemical: Those chemicals that are used during the course of manufacturing a product and maintaining the related equipment but that are not integrated into the product (e.g., a cleaner, degreaser, machine cutting fluid). This does not include substances, materials, parts, or components that are specified for integration into the product (e.g., paints, inks, coatings).

Non-detect/Not detectable: Below the validated test method detection limit for a particular compound in a particular matrix.

Organonitrogen Flame Retardant: A chemical with a functional use of inhibiting or resisting the spread of fire and contains carbon and nitrogen.

Organophosphorus Flame Retardant: A chemical with a functional use of inhibiting or resisting the spread of fire and contains carbon and phosphorus.

Packaging: Materials used to protect the finished product during shipment to the end-customer.

Per- and Polyfluoroalkyl Substances (PFAS): Per- and Polyfluoroalkyl Substances (PFAS), synthetic organofluorine compounds that contain at least one perfluoroalkyl moiety.

ppm: Parts per million by weight of a substance, equivalent to 1 mg/kg or 0.0001% by weight. For manufacturing process chemicals with breathing zone limits expressed in ppm, it refers to parts of vapor or gas per million parts of contaminated air by volume at 25°C and 1 atmosphere.

Prolonged Skin Contact: Contact with the skin for potentially more than 10 minutes on three or more occasions or 30 minutes on one or more occasions within two weeks.

Waiver: A temporary, conditional, and time-bound approved deviation to a requirement.

Wearable Product: Product that is worn on the body during intended use.

Volatile Organic Compound (VOC): Organic compound with an initial boiling point of 250 ^{o}C at 101.3 kPa and participates in atmospheric photochemical reactions.

2.0 Restrictions for Products

The following restrictions apply to all homogenous materials in Google consumer products, accessories, all products used in data centers, or uncured formulations as designated.

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
Adhesive Monomers Class I	See Appendix A	Adhesives used in wearable products	No intentional use		Adhesives	Google Policy
Adhesive Monomers Class II	See Appendix A	Adhesives used in wearable products	Must pass Google review for use		Adhesives	Google Policy
Antimony Trioxide	1309-64-4	All materials	1000 ppm	Glass and ceramics	Flame retardant, opacifying agent for glass / ceramics.	Google Policy
Arsenic and its compounds	Includes but is not limited to: 7440-38-2	Glass and Non-Metals	50 ppm	Semiconductor or substrates and dopants, and optical lenses (e.g., GaAs semiconductors, LEDs)	Opacifying agent for glass / ceramics. Manufacture of semiconductors and printed circuit boards.	EC 1907/2006 and amendments (REACH) Google Policy
		Metals and Alloys	1000 ppm		Present in raw materials that are used for copper and lead refining.	EC 1907/2006 and amendments (REACH) Google Policy
Asbestos and its compounds	See Appendix A	All materials	Shall not be used		Thermal insulator, fiber filled plastic parts, composites.	EC 1907/2006 and amendments (REACH) Swiss Chemical Risk Reduction Ordinance (ORRChem)
Aromatic Amines, Azo Colorants, and Azo Dyes	See Appendix A	All materials	20 ppm sum total content		Dye or colorant for plastics and textiles, polyurethane production, hardener for epoxy resin and adhesives, intermediates for high performance polymers.	EC 1907/2006 and amendments (REACH) GB 18401-2010 (China) GB 20400-2006 (China) Google Policy US TSCA 40 CFR 721.1660 Taiwan CNS 15290
Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene (BNST)	68921-45-9	All materials	Non-detect (< 0.1 ppm)		Antioxidant in lubricants.	Canadian Environmental Protection Act, 1999
Beryllium and its compounds	Includes but is not limited to: 7440-41-7	All materials	1000 ppm		Beryllium-copper alloys in contacts of electrical connectors and EMI springs. Beryllium oxide insulator in radio transceiver modules.	Google Policy IEEE 1680.1

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
Benzene	71-43-2	Solvents in paints, primers, coatings, inks, lubricants and adhesives	100 ppm in the wet formulation		Solvents in paints, primers, coatings, inks, and adhesives.	Google Policy Canadian Environmental Protection Act, 1999
Bromine (Br) and its compounds	Includes but is not limited to: 7726-95-6	All materials	900 ppm Br 1500 ppm Br + Cl	Notwithstanding conformance to all global regulations, product certifications (including UL110 and IEEE 1680.1), and market requirements, the following are exempted. -Bromine used in pigments in display and camera color filters -Inorgainc salts used in batteries -Plastics, elastomers, and textiles where bromine originates from pigments/dyes	Adhesives, coatings, colorants, pigments, paints, solder flux.	UL 110 IEEE 1680.1 Google Policy Swedish Act 2016:1067
Biphenol A (BPA)	80-05-7	All materials	1000 ppm Report unpolymerized content		Adhesives, plastics, epoxy resin	Google Policy
Brominated Flame Retardants (BFRs)	Includes but is not limited to those found in Appendix A	All materials	Shall not be used Note: Demonstrated bromine levels < 900 ppm can be used to indicate the material does not contain a BFR		Flame retardant for plastic & rubber parts, plastic parts of electrical components, printed circuit boards, flexible printed circuits, adhesives, coatings, paints.	Google Policy
Cadmium and its compounds	Includes but is not limited to: 7440-43-9	Battery cells and packs	10 ppm		Electrodes of nickel-cadmium batteries.	Korean Quality Management and Safety Control of Industrial Products Act 2011/65/EU 2013/56/EU IEEE 1680.1 Taiwan BSMI RoHS China RoHS 2 - GB/T 26572
		All other materials	100 ppm	Google approved RoHS exemptions. See Table 2.1.	Pigment or stabilizer in plastic/rubber parts used in electrical components, printed circuit boards, flexible printed circuits, adhesives, coatings, paints. Alloying element in copper parts.	

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
Chlorinated Paraffins, Short Chain (SCCP) Chlorinated Paraffins, Medium Chain (MCCP)	85535-84-8 85535-85-9	All SCCPs (C10 - C13) All MCCPs (C14 - C17)	Shall not be used (SCCP < 30 ppm) (MCCP < 100 ppm)		Lubricants and coolants in metal cutting and metal forming operations and as secondary plasticizers and flame retardants in plastics.	EC 1907/2006 and amendments (REACH) US EPA SNUR 2070-AJ73 Stockholm Convention
Chlorine (Cl) and its compounds	Includes but is not limited to: 7782-50-5	All materials	900 ppm Cl 1500 ppm Br + Cl	Notwithstanding conformance to all global regulations, product certifications (including UL110 and IEEE 1680.1), and market requirements, the following are exempted: -Chlorine used in pigments in display and camera color filters -Inorgainc salts used in batteries -Plastics, elastomers, and textiles where chlorine originates from pigments/dyes -Chlorine as a process residual (e.g, NaCl, catalysts)	Wire and cable insulation/ jacket, plastic and rubber parts, plastic parts of electrical components, adhesives, coatings, paints, tubing, conformal coatings, solder flux.	UL 110 IEEE 1680.1 Google Policy Swedish Act 2016:1067
Chlorinated Flame Retardants (CFRs)	Includes but is not limited to those found in Appendix A	All materials	Shall not be used Note: Demonstrated chlorine levels < 900 ppm can be used to indicate the material does not contain a CFR		Plastic, elastomers, rubbers, adhesives.	Google Policy
Chlorinated Organic Solvents	See Appendix A	Solvents in paints, primers, coatings, inks, lubricants and adhesives	1000 ppm in the 'wet', uncured formulation			EC 1907/2006 and amendments (REACH) Google Policy Canadian Environmental Protection Act, 1999
Chromium, hexavalent and its compounds (Cr(VI), Cr6+)	Includes but not limited to: 18540-29-9	Leather	3 ppm		Leather processing and corrosion protection for metal parts and fasteners.	EC 1907/2006 and amendments (REACH)
		Finishes and coatings	Non-detect (< 0.1 ppm)			Google Policy 2011/65/EU
		All other materials	1000 ppm			Google Policy 2011/65/EU

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
Dimethyl fumarate (DMFu)	624-49-7	All materials	0.1 ppm		Fungicide and mold inhibitor used in leather, desiccant.	2010/153/EC EC 1907/2006 and amendments (REACH) UL110
Endangered Species of Flora and Fauna	Not applicable	All materials	Shall not be used		Wood paneling, pallets, paper, packaging, veneers, coverings, and leather.	US Lacey Act EU Timber Regulation
Formaldehyde	50-00-0	Textiles and Leather	75 ppm		Thermoset plastics (urea formaldehyde, melamine), adhesives for plywood and particleboard and fiberboard plywood, finishes to make fabrics crease-resistant.	GB 18401 (China) Germany ChemVerbotsV Taiwan CNS 15290
		Composite wood products	0.05 ppm (emission)			US 40 CFR 770.10 US California Air Resources Board Japan Law 112
		All other materials	300 ppm <0.124 mg/ m^3 (Release)			Google Policy
Halogenated Diphenyl Methanes Monomethyl tetrachloro diphenyl methane Monomethyl dichloro diphenyl methane Monomethyl dibromo diphenyl methane	 76253-60-6 81161-70-8 99688-47-8	All materials	Non-detect (< 0.1 ppm)		Dielectric fluids in capacitors and transformers, heat transfer fluids, hydraulic fluids, plasticizers, dye solvents, germicides.	EC 1907/2006 and amendments (REACH)
Hexabromocyclododecane (HBCDD) Hexabromocyclododecane 1,2,5,6,9,10-Hexabromocyclododecane alpha-Hexabromocyclododecane beta-Hexabromocyclododecane gamma-Hexabromocyclododecane	 25637-99-4 3194-55-6 134237-50-6 134237-51-7 134237-52-8	All materials	Shall not be used (< 5 ppm)		Flame retardant.	EU 2016/293 amending Annex I of EC 850/2004 Stockholm Convention EU 2019/1021
Hexachlorobutadiene	87-68-3	All materials	Non-detect (< 0.1 ppm)		Solvent	US TSCA 40 CFR 751
Lead and its compounds	Includes but not limited to: 7439-92-1	Batteries	40 ppm		Solder, coatings, glass, steel, copper alloys, aluminum alloys, plastics, stabilizer, pigment, drying agent in paints and coatings.	2006/66/EC
		Plastic and elastomeric materials, paints, inks, non-metallic and non-ceramic coatings	90 ppm total			Consumer Product Safety Improvement Act of 2008 (CPSIA) California Proposition 65
		All other materials	1000 ppm	Google approved RoHS exemptions. See Table 2.1.		2011/65/EU

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
Mercury and its compounds	Includes but not limited to: 7439-97-6	Battery Cells	1 ppm			Taiwan Battery Laws Korea Battery Laws New York Env Law § 27-0719 2006/66/EC Google Policy
		Plastic materials, paints, inks, non-metallic and non-ceramic coatings	60 ppm			Consumer Product Safety Improvement Act of 2008 (CPSIA)
		All other materials	Intentionally added 1000 ppm		Compact fluorescent lights, switches, dyes.	2011/65/EU
Methyl-phenol compounds	95-48-7 106-44-5 108-39-4 1319-77-3	All materials	10 ppm			Canadian Environmental Protection Act, 1999
Musk Xylene (5-tert-butyl-2,4,6-trinitro-m-xylene)	81-15-2	All materials	Non-detect (<0.1 ppm)		Fragrance fixative.	EC 1907/2006 and amendments (REACH)
Organonitrogen Flame Retardants	Several	Electronic display (Screen area > 15.5 square inches) enclosures and their stands	Intentionally added 1000 ppm		Flame retardant	Washington State 173-337 WAC NY Senate Bill S4630B
Organophosphorus Flame Retardants	Several	Electronic display (Screen area > 15.5 square inches) enclosures and their stands	Intentionally added 1000 ppm		Flame retardant	Washington State 173-337 WAC NY Senate Bill S4630B
Organotin (Organostannic) Compounds	See Appendix A	Textiles and Leather	1 ppm		Adhesive, paint, stabilizer, catalyst, and additive.	Taiwan CNS 15290
		All other materials	1000 ppm by weight of tin			EC 1907/2006 and amendments (REACH) 2009/425/EC Canadian Environmental Protection Act, 1999
Ozone Depleting Chemicals (ODCs)	See Appendix A	All materials	Non-detect (< 0.1 ppm)		Foaming agent, semiconductor manufacturing.	Montreal Protocol US Clean Air Act Google Policy
Pentachlorothiophenol (PCTP)	133-49-3	All materials	Non-detect (< 0.1 ppm)		Rubber	US TSCA 40 CFR 751
Perchlorates Sodium perchlorate Potassium perchlorate Ammonium perchlorate Lithium perchlorate Magnesium perchlorate	 7601-89-0 7778-74-7 7790-98-9 7791-03-9 10034-81-8	All materials	0.006 ppm		Coin / Button cell batteries.	CA DTSC Perchlorate Contamination Prevention Act (AB 826)

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
PFCAs (C9-C14), their salts, and related substances	See Appendix A	All materials	25 ppb for the sum of PFCAs and their salts 260 ppb for the sum of PFCA related subtances		Surfactants, inks, production of fluoropolymers	EC 1907/2006 and amendments (REACH)
Perfluorohexanoic Acid (PFHxA), its salts, and related substances	Includes but is not limited to those found in Appendix A	All materials	25 ppb for the sum of PFHxA and its salts 1 ppm for the sum of PFHxA related substances		Surfactant, impregnation agent in textiles, photolithographic chemicals.	Google Policy
Perfluorohexane Sulfonate (PFHxS), its salts, and related substances	Includes but is not limited to those found in Appendix A	All materials	25 ppb for the sum of PFHxS and its salts 1 ppm for the sum of PFHxS related substances		Surfactant, impregnation agent in textiles, photolithographic chemicals.	(EU) 2019/1021
Perfluorooctanoic Acid (PFOA), its salts, and related substances	See Appendix A	All materials	25 ppb for the sum of PFOA and its salts ≤ 1 µg/m2 coated area 1000 ppb for the sum of PFOA related substances		Surfactant, impregnation agent in textiles, photolithographic chemicals.	Norway FOR-2004-06-01-922 Canadian Environmental Protection Act, 1999 (EU) 2019/1021
Perfluorooctane Sulfonates (PFOS) and its derivatives	See Appendix A	All materials	Shall not be used (< 0.05 ppm) ≤ 1 µg/m2 coated area		Surfactant, impregnation agent in textiles, photolithographic chemicals.	(EU) 2019/1021 Canadian Environmental Protection Act, 1999 Stockholm Convention
Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-	3846-71-7	All materials	5 ppm			EC 1907/2006 and amendments (REACH) Japanese Chemical Substances Control Law
Phenol isopropylated phosphate (3:1)	68937-41-7	All materials	Non-detect (< 0.1 ppm)		Flame retardant in plastics, greases, coatings	US TSCA 40 CFR 751
Phthalates	See Appendix A	All materials	1000 ppm sum total content		Plasticizer	California Proposition 65 EC 1907/2006 and amendments (REACH) 2011/65/EU Google Policy

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
Polybrominated Biphenyl (PBB) Polybrominated biphenyls Firemaster BP-6 Hexabromobiphenyl Octabromobiphenyl Decabromobiphenyl	Examples include but not limited to: 67774-32-7 59536-65-1 36355-01-8 27858-07-7 13654-09-6	All materials	1000 ppm sum total content		Flame retardant in plastics and printed circuit boards.	2011/65/EU EC 1907/2006 and amendments (REACH)
Polybrominated Diphenyl Ether (PBDE) Polybrominated diphenyl ether Pentabromodiphenylether Octabromodiphenylether Decabromodiphenylether	Examples include but not limited to: 1163-19-5 32534-81-9 32536-52-0 1163-19-5	All materials	1000 ppm sum total content		Flame retardant in plastics and printed circuit boards.	2011/65/EU
Polychlorinated Biphenyl (PCB)	1336-36-3	All materials	Non-detect (< 0.1 ppm)		Capacitor, transformer, heat transfer fluids, lubricants.	EC 850/2004 Japan Chemical Substances Control Law
Polychlorinated Naphthalene (PCN)	70776-03-3	All materials	Non-detect (< 0.1 ppm)		Lubricants, paint, capacitors, wood preservative.	Japanese Chemical Substances Control Law Google Policy
Polychlorinated Terphenyl (PCT)	61788-33-8	All materials	Non-detect (< 0.1 ppm)		Capacitor, transformer, heat transfer fluids, lubricants.	EC 1907/2006 and amendments (REACH) Google Policy
Polyvinyl Chloride (PVC) and its copolymers	9002-86-2	All materials	Shall not be used Note: Demonstrated chlorine levels < 900 ppm can be used to indicate the material does not contain PVC		Electrical insulator, wire insulation, cable jackets, tape, tubing, shock and vibration dampening cushions, plastic films packaging clamshells.	Google Policy UL 110
Radioactive Substances	n/a	All materials	Ionizing radiation not detected above background levels		Ionization smoke sensors, phosphorescent inks.	EU-D 96/29/Euratom Japanese laws for the Regulation of Nuclear Source Material, Nuclear Fuel Material, and Reactors (1986)

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
Tetrabromobisphenol-A (TBBPA)	79-94-7	All materials	Shall not be used Note: Demonstrated bromine levels < 900 ppm can be used to indicate the material does not contain TBBPA		Flame retardants in plastics, printed circuit boards, wire insulation, cable jacketing, tape, and tubing.	Google Policy Swedish Act 2016:1067
2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	All materials	Shall not be used (<1 ppm)		UV Stabilizer	Stockholm Convention
REACH Restricted Substances (Annex XVII of EC 1907/2006)	https://echa.europa.eu/substances-restricted-under-reach	All relevant materials restricted under Annex XVII	Refer to Annex XVII			EC 1907/2006 and amendments (REACH)
Volatile Organic Compounds (VOCs)	Several	Adhesives	Must meet all applicable requirements and limits in China Standard GB 33372-2020	Exempted uses must be reviewed and approved by Google	Solvents	GB 33372-2020
		Cleaners	Must meet all applicable requirements and limits in China Standard GB 38508-2020			GB 38508-2020
		Inks	Must meet all applicable requirements and limits in China Standard GB 38507-2020			GB 38507-2020
		Paints/ Coatings	Must meet all applicable requirements and limits in China standard GB 30981-2020			GB 30981-2020

Table 2.1 Google DSPA Approved RoHS Exemptions

Substance	Exemption	Description
Cadmium	None	
Lead	6(a)-I	Lead as an alloying element in steel for machining purposes containing up to 0.35% lead by weight and in batch hot dip galvanised steel components containing up to 0.2% lead by weight.
	6(b)-I	Lead as an alloying element in aluminium containing up to 0.4 % lead by weight, provided it stems from lead-bearing aluminium scrap recycling.
	6(b)-II	Lead as an alloying element in aluminium for machining purposes with a lead content up to 0.4% by weight.
	7(a)	Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead).
	7(c)-I	Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.
	7(c)-II	Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC.
	13(a)	Lead in white glasses used for optical applications.
	13(b)-I	Lead in ion-colored optical filter glass types.
Mercury	None	
Hexavalent Chromium	None	
Polybrominated biphenyl (PBB)	None	
Polybrominated diphenyl ether (PBDE)	None	
Dibutyl phthalate (DBP)	None	
Butyl benzyl phthalate (BBP)	None	
Bis-(2-ethylhexyl) phthalate (DEHP)	None	
Diisobutyl phthalate (DIBP)	None	

Note: This table of approved exemptions may be amended periodically as the EU Commission expires, renews and splits exemptions

Table 2.2 Google Cloud Approved RoHS Exemptions

Substance	Exemption	Description
Cadmium	None	
Lead	6(a)-I	Lead as an alloying element in steel for machining purposes containing up to 0.35% lead by weight and in batch hot dip galvanised steel components containing up to 0.2% lead by weight.
	6(b)-I	Lead as an alloying element in aluminium containing up to 0.4 % lead by weight, provided it stems from lead-bearing aluminium scrap recycling.
	6(b)-II	Lead as an alloying element in aluminium for machining purposes with a lead content up to 0.4% by weight.
	6(c)	Copper alloy containing up to 4% lead by weight.
	7(a)	Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead).
	7(c)-I	Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.
	7(c)-II	Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC.
	13(a)	Lead in white glasses used for optical applications.
	13(b)-I	Lead in ion-colored optical filter glass types.
Mercury	None	
Hexavalent Chromium	None	
Polybrominated biphenyl (PBB)	None	
Polybrominated diphenyl ether (PBDE)	None	
Dibutyl phthalate (DBP)	None	
Butyl benzyl phthalate (BBP)	None	
Bis-(2-ethylhexyl) phthalate (DEHP)	None	
Diisobutyl phthalate (DIBP)	None	

Note: This table of approved exemptions may be amended periodically as the EU Commission expires, renews and splits exemptions

Table 2.3 Approved Google Policy Exemptions

Substance	Exemption*	Exempted Use
Antimony Trioxide	SB-I	Glass and ceramics
Arsenic and its compounds	AS-I	Semiconductor or substrates and dopants, and optical lenses (e.g., GaAs semiconductors, LEDs)
Bromine (Br) and its compounds	BR-I	Notwithstanding conformance to all global regulations, product certifications (including UL110 and IEEE 1680.1), and market requirements, the following are exempted. -Bromine used in pigments in display and camera color filters -Plastics, elastomers, and textiles where bromine originates from pigments/dyes
Chlorine (Cl) and its compounds	CL-I	Notwithstanding conformance to all global regulations, product certifications (including UL110 and IEEE 1680.1), and market requirements, the following are exempted: -Chlorine used in pigments in display and camera color filters -Plastics, elastomers, and textiles where chlorine originates from pigments/dyes -Chlorine as a process residual (e.g, NaCl, catalysts)

*Note: The exemption codes given are internal references to be used when submitting a Google Material Declaration Form (MDF).

3.0 Restrictions for Prolonged Skin Contact

The following additional restrictions apply to all homogenous materials in Google consumer products and accessories that are in prolonged skin contact applications. Restrictions in Section 2 also apply to materials used in prolonged skin contact applications. Examples of products that have materials in prolonged skin contact include phones, tablets, laptops, and wearables. All materials in prolonged skin contact must also meet the requirements contained in Google Specification: G990-07492-00 Materials Prolonged Skin Contact Specification.

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
Arsenic and its compounds	Includes but is not limited to: 7440-38-2	Parts and materials with direct and prolonged skin contact	1 ppm (extractable)		Opacifying agent for glass / ceramics. Manufacture of semiconductors and printed circuit boards.	EC 1907/2006 and amendments (REACH)
Benzene	71-43-2	Parts and materials with direct and prolonged skin contact	5 ppm		Solvent	EC 1907/2006 and amendments (REACH)
Benzotrichloride	98-07-7	Parts and materials with direct and prolonged skin contact	1 ppm		Solvent	EC 1907/2006 and amendments (REACH)
Benzyl chloride	100-44-7	Parts and materials with direct and prolonged skin contact	1 ppm		Solvent	EC 1907/2006 and amendments (REACH)
Bisphenol A (BPA)	80-05-7	Parts and materials with direct and prolonged skin contact	50 ppm residual		Monomer in polycarbonate and related polymers.	Google Policy California Proposition 65 Canadian Environmental Protection Act, 1999
Cadmium and its compounds	Includes but is not limited to: 7440-43-9	Parts and materials with direct and prolonged skin contact	1 ppm (extractable)		Pigment or stabilizer in plastic/rubber parts used in electrical components, printed circuit boards, flexible printed circuits, adhesives, coatings, paints. Alloying element in copper parts.	EC 1907/2006 and amendments (REACH)
Chromium, hexavalent and its compounds (Cr(VI), Cr6+)	Includes but not limited to: 18540-29-9	Parts and materials with direct and prolonged skin contact	1 ppm (extractable)		Leather processing and corrosion protection for metal parts and fasteners.	EC 1907/2006 and amendments (REACH)
Lead and its compounds	Includes but not limited to: 7439-92-1	Parts and materials with direct and prolonged skin contact	1 ppm (extractable)		Solder, coatings, glass, steel, copper alloys, aluminum alloys, plastics, stabilizer, pigment, drying agent in paints and coatings.	EC 1907/2006 and amendments (REACH)
N-methyl-2-pyrrolidone (NMP)	872-50-4	Parts and materials with direct and prolonged skin contact	3000 ppm		Solvent	EC 1907/2006 and amendments (REACH)

Substance Name	CAS	Scope	Limit	Exemptions	Typical Uses	Reference
N,N-dimethylacetamide (DMAC)	127-19-5	Parts and materials with direct and prolonged skin contact	3000 ppm		Solvent	EC 1907/2006 and amendments (REACH)
N,N-dimethylformamide (DMF)	68-12-2	Parts and materials with direct and prolonged skin contact	3000 ppm		Solvent	EC 1907/2006 and amendments (REACH)
Nickel and its compounds	7440-02-0	Parts and materials with direct and prolonged skin contact	0.28 µg / cm^2 / week Ni leach rate		Metal plating, alloying element in stainless steel.	EC 1907/2006 and amendments (REACH) UL 110
p-chlorobenzotrichloride	5216-25-1	Parts and materials with direct and prolonged skin contact	1 ppm		Solvent	EC 1907/2006 and amendments (REACH)
Polycyclic Aromatic Hydrocarbons (PAHs)	See Appendix A	Parts and materials with direct and prolonged skin contact	1 ppm per individual PAH compound 10 ppm for sum of all listed PAHs		Plastics, dyes, carbon black.	EC 1907/2006 and amendments (REACH) California Proposition 65 Google Policy
1,4,5,8-tetraaminoanthraquinone; C.I. Disperse Blue 1	2475-45-8	Parts and materials with direct and prolonged skin contact	50 ppm		Dye	EC 1907/2006 and amendments (REACH)
Benzenamine, 4,4'-(4-iminocyclohexa-2,5-dienylidenemethylene)dianiline hydrochloride; C.I. Basic Red 9	569-61-9	Parts and materials with direct and prolonged skin contact	50 ppm		Dye	EC 1907/2006 and amendments (REACH)
[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien1-ylidene]dimethylammonium chloride; C.I. Basic Violet 3 with ≥ 0,1 % of Michler's ketone	548-62-9	Parts and materials with direct and prolonged skin contact	50 ppm		Dye	EC 1907/2006 and amendments (REACH)
4-chloro-o-toluidinium chloride	3165-93-3	Parts and materials with direct and prolonged skin contact	30 ppm		Intermediate in dye production	EC 1907/2006 and amendments (REACH)
2-Naphthylammoniumacetate	553-00-4	Parts and materials with direct and prolonged skin contact	30 ppm		Intermediate in dye production	EC 1907/2006 and amendments (REACH)
4-methoxy-m-phenylene diammonium sulphate; 2,4-diaminoanisole sulphate	39156-41-7	Parts and materials with direct and prolonged skin contact	30 ppm		Intermediate in dye production	EC 1907/2006 and amendments (REACH)
2,4,5-trimethylaniline hydrochloride	21436-97-5	Parts and materials with direct and prolonged skin contact	30 ppm		Intermediate in dye production	EC 1907/2006 and amendments (REACH)
Quinoline	91-22-5	Parts and materials with direct and prolonged skin contact	50 ppm		Intermediate in dye production	EC 1907/2006 and amendments (REACH)

4.0 Restrictions for Packaging

The following restrictions apply to all homogenous materials in Google's retail packaging.

Substance	CAS	Scope	Limit	Typical Uses	Reference
Arsenic and its compounds	Includes but is not limited to: 7440-38-2	Wood products and pallets	Non-detect (< 0.1 ppm)	Wood preservative.	EC 1907/2006 and amendments (REACH)
Bisphenol A (BPA)	80-05-7	Thermal Paper	Non-detect (< 0.1 ppm)		Google Policy EC 1907/2006 and amendments (REACH)
Bromine and its compounds	Includes but is not limited to: 7726-95-6	All homogenous materials in packaging	900 ppm Br 1500 ppm Br + Cl		Google Policy
Cadmium (Cd) and its compounds	Includes but is not limited to: 7440-43-9	All homogenous materials in packaging	100 ppm (Cd + Cr-6 +Hg + Pb)		94/62/EC (Packaging Directive) US Toxics Packaging Clearinghouse (TPCH)
Chlorine and its compounds	Includes but is not limited to: 7782-50-5	All homogenous materials in packaging	900 ppm Cl 1500 ppm Br + Cl		Google Policy
Chromium, hexavalent (Cr-VI, Cr6+) and its compounds	Includes but is not limited to: 18540-29-9	All homogenous materials in packaging	100 ppm (Cd + Cr-6 +Hg + Pb)		94/62/EC (Packaging Directive) US Toxics Packaging Clearinghouse (TPCH)
Endangered Species of Flora and Fauna	Not Applicable	All homogeneous materials	Shall not be used	Wood paneling, pallets, paper, packaging, veneers, coverings, and leather	US Lacey Act EU Timber Regulation
Formaldehyde	50-00-0	Composite Wood Products	0.05 ppm (emission)	Thermoset plastics (urea formaldehyde, melamine), adhesives, finishes to make fabrics crease-resistant	GB 18401 (China) Germany ChemVerbotsV Taiwan CNS 15290
		Textiles and leather	75 ppm		US 40 SFR 770.10 US California Air Resources Board Japan Law 112
Lead (Pb) and its compounds	Includes but is not limited to: 7439-92-1	All homogenous materials in packaging	100 ppm (Cd + Cr-6 +Hg + Pb)		94/62/EC (Packaging Directive) US Toxics Packaging Clearinghouse (TPCH)
Mercury (Hg) and its compounds	Includes but is not limited to: 7439-97-6	All homogenous materials in packaging	100 ppm (Cd + Cr-6 +Hg + Pb)		94/62/EC (Packaging Directive) US Toxics Packaging Clearinghouse (TPCH)

Substance	CAS	Scope	Limit	Typical Uses	Reference
Mineral Oils	Many	Inks used in packaging and paper printing	1,000 ppm (uncured ink)	Solvent	France Decree No. 2020-1725
Ozone Depleting Chemicals (ODCs)	See Appendix	All homogeneous materials	Non-detect (< 0.1 ppm)		Montreal Protocol US Clean Air Act Google Policy
Per- and Polyfluoroalkyl Substances (PFAS)	Many	All homogeneous materials	Detectable levels	Various.	Google Policy
Polystyrene, Expanded (EPS)	9003-53-6	All homogenous materials in packaging	Shall not be used as packaging material in the primary product packaging	Packaging cushions.	South Korea Resource Recycling Act Google Policy
Polyvinyl chloride (PVC)	9002-86-2	All homogenous materials in packaging	Shall not be used. Note: Demonstrated chlorine levels < 900 ppm can be used to indicate the material does not contain PVC		Google Policy
REACH Restricted Substances (Annex XVII of EC 1907/2006)	https://echa.europa.eu/substances-restricted-under-reach	All relevant materials restricted under Annex XVII	Refer to Annex XVII		EC 1907/2006 and amendments (REACH)

5.0 Restrictions for Manufacturing Processes

The following manufacturing process chemical restrictions (also known as the Manufacturing Restricted Substance List) apply to supplier manufacturing operations as designated. Google acknowledges that restricted substances may be present as unintentional impurities. When impurities are present in excess of the stated content limit, exposure must comply with the established threshold limit value. Substances listed as "Restricted" may not be intentionally added outside of the exception(s) noted under Scope. The restrictions in this specification are a compilation of international regulations and Google policies, but not a comprehensive list of all potential hazardous ingredients. Supplier should assess and evaluate ingredients in their manufacturing process chemicals using a comprehensive chemical hazard assessment framework and proactively implement safer alternatives where possible.

Manufacturing Process Chemicals	CAS	Scope	Conditions for use	Threshold Limit Value	Reference
Benzene	71-43-2	Supplier's manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.	No intentional use (<100 ppm content)	Breathing zone < 0.1 ppm (0.32 mg/m^3)	NIOSH Google Policy
Bis (chloromethyl) ether	542-88-1	Supplier's manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.	No intentional use (<100 ppm content)	Breathing zone <0.001 ppm (0.005 mg/ m3)	IARC Google Policy California OSHA PEL ACGIH
Chlorinated Organic Solvents	See Appendix A	Supplier's manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.	No intentional use (<100 ppm content)	Breathing zone < 0.05 ppm	Google Policy
N,N-Dimethylformamide	68-12-2	Supplier's manufacturing operations except for controlled conditions where there are no known alternatives and approved by Google	No intentional use (<100 ppm content)	Breathing zone <5 ppm (15 mg/m3)	Google Policy ACGIH EU REACH
Ethylbenzene	100-41-4	Supplier's manufacturing operations except for controlled conditions where there are no known alternatives and approved by Google.	No intentional use (<100 ppm content)	Breathing zone <5 ppm (22 mg/m3)	Google Policy California OSHA PEL
2-Ethoxyethanol	110-80-5	Supplier's manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.	No intentional use (<100 ppm content)	Breathing zone <0.5 ppm (1.8 mg/m3)	NIOSH Google Policy
2-Ethoxyethylacetate	111-15-9	Supplier's manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.	No intentional use (<100 ppm content)	Breathing zone <0.5 ppm (2.7 mg/m3)	NIOSH Google Policy
German Supply Chain Due Diligence Act (Lieferkettengesetz)	Several	Compliance with all relevant requirments	Compliance with all relevant requirments	N/A	German Supply Chain Due Diligence Act (Lieferkettengesetz)

Manufacturing Process Chemicals	CAS	Scope	Conditions for use	Threshold Limit Value	Reference
n-Hexane	110-54-3	Supplier's manufacturing operations including cleaning agents, degreasers and demolding solutions	No intentional use (<100 ppm content)	Breathing zone < 28 ppm (100 mg/m^3)	ACGIH NIOSH Google Policy
Methanol	67-56-1	Supplier's manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.	No intentional use (<100 ppm content)	Breathing zone <200 ppm (260 mg/m3)	Google Policy NIOSH OSHA California OSHA PEL ACGIH
N-methylpyrrolidone (NMP)	872-50-4	Cleaning agents, degreasers and demolding solutions in Supplier's manufacturing operations except for use as a photoresist stripper or other uses under controlled conditions and approved by Google.	Restricted	Breathing zone < 1 ppm (4 mg/m3)	AIHA TWA California OSHA PEL Google Policy
Ozone Depleting Chemicals (ODCs)	See Appendix A	Supplier's manufacturing operations.	No intentional use		Montreal Protocol US Clean Air Act
Perfluorooctane Sulfonates (PFOS) and PFOS salts	See Appendix A	Supplier's manufacturing operations except for IC photolithography and photographic coating processes under controlled conditions and where there are no known alternatives	Restricted	Breathing zone < 0.005 mg/m3	Stockholm Convention on Persistent Organic Pollutants EU Regulation 850/2004 (as amended) Canada Regulation SOR/2008-177
n-Propyl Bromide (nPB)	106-94-5	Supplier's manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.	No intentional use (<100 ppm content)	Breathing zone <0.1 ppm (0.5 mg/m3	Google Policy EU SVHC OSHA ACGIH
Sulfur Hexafluoride (SF6)	2551-62-4	Supplier's manufacturing operations except for controlled conditions of IC manufacturing (e.g. etching, plasma cleaning) where there are no known alternatives.	Restricted	Breathing zone < 1000 ppm (6000 mg/ m3)	High GWP California OSHA PEL OSHA
Toluene	108-88-3	Supplier's manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.	No intentional use (<100 ppm content)	Breathing zone <10 ppm (37 mg/m3)	California OSHA PEL Google Policy
Xylene and its isomers	1330-20-7	Supplier's manufacturing operations except for controlled conditions where there are no known alternatives and approved by Google.	No intentional use (<100 ppm content)	Breathing zone <100 ppm (435 mg/m3)	Google Policy ACGIH California OSHA PEL

6.0 Reportable Substances

Suppliers are required to report the presence of chemicals of concern in all homogenous materials as detailed below. Devices and Services suppliers shall report to the Environmental Compliance team at env-compliance@google.com and/or submission of Google Material Declaration Form (MDF). For products used in data center, suppliers shall report to the Environmental Compliance team at ti-env-compliance@google.com and/or submission of Material Declaration Form (MDF).

Substance	CAS	Reporting Limit	Scope	Typical Uses	References
Antimicrobials and Biocides	n/a	Detectable levels	All homogenous materials	Antimicrobial additives in textiles and adhesives (e.g. silver-ion).	US EPA FIFRA EU BPR Regulation 528/2012
California Proposition 65 List of Chemicals	https://oehha.ca.gov/proposition-65/proposition-65-list	Detectable levels	All homogenous materials	Various.	California Proposition 65
Cobalt and its compounds	Includes but not limited to: 7440-48-4	100 ppm	All homogenous materials	Metal alloys, batteries, catalysts, pigments, and coloring.	EC 1907/2006 and amendments (REACH) Canadian Environmental Protection Act, 1999 Washington State Children Safe Products Act
Endocrine Disrupting Chemicals (EDCs)	Many	Detectable levels	All homogenous materials	Various.	Google Policy
IEC 62474 Declarable Substances	https://std.iec.ch/iec62474	Refer to the declarable substance list for applicable reporting limits	All homogenous materials	Various.	IEEE 1680.1 Google policy
Nanomaterials	Many	Detectable levels	Engineered materials that contain particles, in an unbound state or as an aggregate o ran agglomerate, and where, for 50% or more of the particles in the number size distribution, one or more external dimensions are in the size range 1-100 nanometer (nm)	Silver nanoparticles, carbon nanotubes and graphene, nanoscale cerium dioxide, nano titanium dioxide, nanoscale iron, and nanometer-size copper particles.	France Decree No. 2012-232 Environmental Code Article L. 523-4
Skin Sensitizing, Irritative, and/ or Corrosive Substances	Many	Detectable levels	Parts and materials with direct and prolonged skin contact	Various.	EU CLP Regulation Google Policy
Per- and Polyfluoroalkyl Substances (PFAS)	Many	Detectable levels	All homogenous materials	Various.	Google Policy
Triphenyl Phosphate (TPhP)	115-86-6	1000 ppm	All homogenous materials	Flame Retardant	Google Policy

7.0 Future Phase-Out for Products

Google intends to phase out hazardous chemicals to protect human health and the environment. Devices and Services suppliers shall report use to the Environmental Compliance team at env-compliance@google.com and/or submission of Google Material Declaration Form (MDF). For products used in data center, suppliers shall report to the Environmental Compliance team at ti-env-compliance@google.com and/or submission of Material Declaration Form (MDF).The substances below are subject to future restriction and suppliers must take action to proactively identify suitable replacements.

Substance Name	CAS	Scope	Priority	Limit	Reference
Bisphenol F	620-92-8	All homogenous materials	1	50 ppm residual	Google policy
Bisphenol S	80-09-1	All homogenous materials	1	50 ppm residual	Google policy
Ethylbenzene	100-41-4	Solvents in paints, primers, coatings, inks, lubricants and adhesives	1	1000 ppm in the wet formulation	Google policy
Lead and its compounds	Includes but not limited to: 7439-92-1	Applications using EU RoHS exemptions	1	1000 ppm	Google policy
Toluene	108-88-3	Solvents in paints, primers, coatings, inks, lubricants and adhesives	1	1000 ppm in the wet formulation	Google policy
REACH Candidate List of Substances of Very High Concern (SVHC)	https://echa.europa.eu/candidate-list-table	Articles as defined by REACH	2	1000 ppm at the article level (see note below)	IEEE 1680.1 UL 110 EC 1907/2006 and amendments (REACH)
REACH Authorized Substances (Annex XIV of EC 1907/2006)	https://echa.europa.eu/authorisation-list	All homogenous materials	2	1000 ppm at the article level (see note below)	EC 1907/2006 and amendments (REACH)
Xylene and its isomers	1330-20-7 95-47-6 108-38-3 106-42-3	Solvents in paints, primers, coatings, inks, lubricants and adhesives	2	1000 ppm in the wet, uncured formulation	Google policy

Note: "Article" is defined consistent with the most recent available ECHA guidance on substances in articles, https://echa.europa.eu/guidance-documents/guidance-on-reach.

Phase-out Priorities

Priority 1: Vendors must provide Google with phaseout timeline and alternatives assessment. See section 9.0.

Priority 2: Vendors to proactively work to identify suitable replacements. See section 9.0.

8.0 Future Phase Out for Manufacturing Process

Google intends to phase out hazardous chemicals to protect human health and the environment. The substances below are subject to future restriction. Suppliers must take action to report the current use in manufacturing of Google parts and components and proactively identify suitable replacements.

Substance Name	CAS	Scope	Priority	Limit	Reference
Hydrofluorocarbons (HFCs)	See Appendix A	Supplier to evaluate whether alternatives are available for existing and new applications (e.g. refrigerant), to understand existing ban or restriction for some applications/jurisdictions, and to address concerns and associated business risks due to high potential to phase out/down or severely restrict use of the chemical in the future.	1	No intentional use	Montreal Protocol amendment to phase out stating 2019-2028 because High GWP, CA ARB to cut high GWP HFCs
Perfluorocarbons (PFCs)	See Appendix A	Supplier to evaluate whether alternatives are available for existing and new applications (e.g. solvents for electronics or metal cleaning), to understand existing ban or restriction for some applications/jurisdictions, and to address concerns and associated business risks due to high potential to phase out/down or severely restrict use in the future.	1	No intentional use	High GWP

Phase-out Priorities

Priority 1: Vendors must provide Google with phaseout timeline and alternatives assessment. See section 3.0.

Priority 2: Vendors to proactively work to identify suitable replacements. See section 3.0.

9.0 Safer Chemistry Requirements

The restrictions in this specification are a compilation of international regulations and Google policies, but not a comprehensive list of all potential hazardous ingredients. Vendors should assess and evaluate ingredients in their material formulations using a comprehensive chemical hazard assessment framework and proactively implement safer alternatives where possible. In order to reduce the potential for regrettable substitutions when phasing out a chemical of concern, suppliers are required to perform an alternatives assessments using a comprehensive chemical hazard assessment framework such as the GreenScreen® for Safer Chemicals (https://www.greenscreenchemicals.org), the US EPA Safer Choice criteria (https://www.epa.gov/saferchoice) ,Cradle to Cradle Certified® (https://c2ccertified.org/), or ChemFORWARD® (https://www.chemforward.org/). The supplier should focus on selecting chemistry with inherently low hazard toxicological properties. The supplier shall conduct a hazard evaluation at its expense or obtain the evaluation from its sub-suppliers.

For the substance categories below, vendors must assess and evaluate if safer alternatives exist for the intended application. A chemical hazard assessment must be conducted if one doesn't exist. If no technical alternatives exist the supplier must contact saferchemistry@google.com and provide the information listed below to preauthorize the use in Google products:

Name of substance
Chemical CAS number (if applicable)
Material Vendor and Grade
Technical justification
Roadmap and timeline for safer substitution

Substance Category	CAS	Scope	Conditions for use	Limit	Reference
Per- and Polyfluoroalkyl Substances (PFAS)	Many	All materials	Preauthorization required for use	25 ppb	Google Policy
Solvents (Wet formulation for inks, coatings, adhesives, primers, and cleaners)	Many	**ChemFORWARD:** Hazard Band F **Greenscreen:** Benchmark 1 **C2CC**: x-PBT, x-CMR, x/c-CMR(Cat 1), x/c-E (also x* and x*-CMR and banned) **Safer Choice:** Grey square	Preauthorization required for use	Intentionally added	Google Policy
Flame Retardants	Many	**ChemFORWARD:** Hazard Band F **Greenscreen:** Benchmark 1 **C2CC**: x-PBT, x-CMR, x/c-CMR(Cat 1), x/c-E (also x* and x*-CMR and banned) **Safer Choice:** Grey square	Preauthorization required for use	Intentionally added	Google Policy

10.0 Requirements for Children's Products

All homogenous materials in Google consumer products and accessories that are intended to be marketed to children must meet all applicable laws and requirements in the markets in which they are sold. A non-exhaustive list of requirements are listed in this section. Materials must also meet all additional requirements contained in this specification.

Regulation	Substances	Scope	Reference
Canada Consumer Product Safety Act	Lead	User accessable substrates	Canada SOR/2018-83
Canadian Phthalates Regulation	Several	User accessable substrates	Canada SOR/2016-188
EU Safety of Toys Regulation	Several	Applicable migration of certain elements	EN71-3: 2019 Migration of Certain Elements Google Policy
Maine Toxic Chemicals in Children's Products law	Several	Must meet chemical restrictions and reporting requirements for all materials.	Maine Title 38, Chapter 16-D
Oregon Toxic-Free Kids Act	Several		Oregon 431A.253 - 431A.280
NY Toxic Chemicals in Children's Products	Several	Must meet chemical restrictions and reporting requirements for all materials.	NY Title IX of Article 37
US CPSIA	Lead	User accessable substrates	US CPSIA - Children's Products
Vermont Chemicals of High Concern to Children	Several	Must meet chemical restrictions and reporting requirements for all materials.	VT Vermont Statute Title 18, Chapter 38A
Washington State's List of Chemicals of High Concern to Children (CHCC)	Several	Must meet chemical restrictions and reporting requirements for all materials.	Washington State - Children's Safe Products Act

11.0 Supplier Demonstration of Conformance

Suppliers must submit test reports from certified labs at the homogeneous material level for the following substances:

Substance Name	Test Method	Scope
Arsenic (As)	Total digestion followed by ICP-MS	Display, cover and enclosure glass
Beryllium (Be)	US EPA 3050B US EPA 3052 Others approved by Google	Metals and alloys in the following part types: Springs, Connectors, Antennas .Pins (audio, charging, and pogo), and Switches Note: The manufacturer may submit a certified mill test certificate for the specific metal alloy in lieu of testing
Bisphenol A	Solvent extraction followed by LC-MS	External plastic materials with the potential for skin contact under normal use conditions.
Bromine Chlorine Fluorine	EN 14582 or US EPA SW-846 5050/9056	All homogenous materials except metals, glass, and ceramics
Cadmium (Cd) Hexavalent Chromium (Cr6+) Lead (Pb) Mercury (Hg)	IEC 62321	All homogeneous materials
Polybrominated biphenyl (PBB) Polybrominated dipenyl ether (PBDE)	IEC 62321	All homogeneous materials except metals, glass, and ceramics
Bis(2-ethylhexyl) phthalate (DEHP) Benzyl butyl phthalate (BBP) Dibutyl phthalate (DBP) Diisobutyl phthalate (DIBP)	IEC 62321	All homogeneous materials except metals, glass, and ceramics
Volatile Organic Compounds (VOCs)	As specified in the following China VOC Standards: Adhesives - GB 33372-2020 Cleaners - GB 38508-2020 Inks - GB 38507-2020 Paints/ Coatings - GB 30981-2020	Adhesives, cleaners, inks, and paints/ coatings Test reports to be stored on hand in the facilities in China where the materials are being applied/used
Additional substances upon request		

11.1 Test Report Requirements

- Test reports must be at the homogenous material level.
- Test reports must be no more than 2 years old from the date submitted to Google or Google's manufacturing partners. Test reports older than 2 years will be rejected.
- A nationally or internationally certified laboratory must issue the test report. Results from supplier-owned laboratories are acceptable if the lab is independently certified (e.g., ISO 17025)
- Test results based on X-ray Fluorescence Spectroscopy (XRF) are not acceptable.
- The most currently published revision of a test method specification is to be used.
- Test reports shall be provided at the suppliers expense.

11.2 Material Declaration Form (MDF)

Suppliers are required to submit material declaration forms through a process defined by Google. This includes the requirement for suppliers to submit declarations and test reports to Google's manufacturing partners as requested.

11.3 Refresh Policy

Google may request updated test reports at its sole discretion, at the supplier's expense, as a demonstration of conformance. Test reports are valid for the life of the component provided that constituent materials have not changed. In this event, suppliers should be prepared to show evidence that constituent materials have not changed.

11.4 Data Retention Policy

All compliance documentation (e.g., test reports and declarations) must be retained by the supplier for a minimum of 10 years as part of the supplier's record-keeping process. Digital formats are acceptable unless otherwise noted. Suppliers are also expected to have compliance assurance processes and systems to control and maintain the data.

11.5 Waiver/Deviation Process

Suppliers must contact Google in writing if they are seeking a waiver or deviation to a requirement in this specification. The following information must be provided in the request:

1. The substance name
2. CAS number
3. The concentration of the substance in the homogenous material (ppm or weight percent)
4. The reason why a deviation is necessary
5. When the deviation will be resolved

Google will review the request and provide a decision by email. Devices and Services suppliers can contact Google at env-compliance@google.com for more information. For products used in data center, supplier can contact Google at ti-env-compliance@google.com for more information.

12.0 Additional Requirements

12.1 Reformulation Notification

Suppliers are required to notify Google and obtain consent before reformulating or implementing any change that will affect the chemical composition (intentional or residual) of a material and its potential to comply with this specification.

12.2 Full Material Disclosure (FMD)

Vendors are required to provide the complete chemical composition of materials used in Google products as part of the material and part qualification process. Submissions must be made using the Google Material Declaration Form (MDF) form or a preapproved industry standard format.

13.0 References

2009/425/EC: Commission Decision 2009/425/EC of 28 May 2009 amending Council Directive 76/769/EEC: As regards restrictions on the marketing and use of organostannic compounds for the purpose of adapting its Annex I to technical progress.

2010/153/EC: Prolonging the validity of Decision 2009/251/EC requiring Member States to ensure that products containing the biocide dimethylfumarate are not placed or made available on the market.

2011/65/EU: The restriction of the use of certain hazardous substances in electrical and electronic equipment ("RoHS Recast"). This directive replaces the directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

2011/696/EU: Commission recommendation of 18 October 2011 on the definition of nanomaterial.

2013/56/EU: 2013/56/EU Directive amended 2006/66/EC Directive of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC.

40 CFR 721.1660 - Benzidine-based chemical substances.

40 CFR 770.10 - Formaldehyde emission standards.

814.81 Ordinance of 18 May 2005 on the Reduction of Risks relating to the Use of Certain Particularly Dangerous Substances, Preparations and Articles (Chemical Risk Reduction Ordinance, ORRChem

94/62/EC: Directive of the European Parliament and of the Council on Packaging and Packaging waste, 94/62/EC, December 1994.

ACGIH: American Conference of Governmental Industrial Hygienist (ACGIH), Guide to Occupational Exposure Values, 2013.

AIHA TWA: The AIHA Guideline Foundation Workplace Environmental Exposure Levels® (WEELs®) provide guidance for protecting most workers from adverse health effects related to occupational chemical exposures expressed as time-weighted average (TWA).

CA DTSC: California Department of Toxic Substances Control; Perchlorate Contamination Prevention Act of 2003, AB 826.

Cal OSHA: California Department of Public Health, Occupational Health Branch, PELs, Title 8, section 5155/AC-1.

California Prop 65: The Safe Drinking Water and Toxic Enforcement Act of 1986, California Health and Safety Code, Division 20, Chapter 6.5, sections 25249.5 through 25249.13.

Canada SOR/2016-188: Phthalates regulation

Canada SOR/2018-83: Consumer Products Containing Lead Regulations

Canadian Environmental Protection Act, 1999 (CEPA 1999): Chemicals Management Plan, Section 71.

ChemVerbotsV: Chemical Prohibition Ordinance, Germany.

Children's Safe Products Act (CSPA): Washington State's Children's Safe Products Act reporting List of Chemicals of High Concern to Children (CHCC), US.

China RoHS: Administration methods for use of hazardous substance in electrical and electronic products, Ministry of Industry and Information Technology of People's Republic of China, Order#32, January 21, 2016.

CLP Regulation (EC) No. 1272/2008: Classification, Labeling and Packaging complements Dangerous Substances Directive (67/548/EEC) and the Dangerous Preparations Directive (1999/45/EC) replaced by REACH directive.

CNS 15290 Safety of Textile Products (General Requirements). Taiwan.

Commission Regulation (EU) 2016/293 of 1 March 2016 amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annex I (Text with
EEA relevance)

CPSIA, 2008: Consumer Product Safety Improvement Act of 2008–Public Law 110-314; US.

Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC

Directive 2013/59/Euratom - protection against ionising radiation

EC/757/2010: Commission Regulation (EU) No. 757/2010 amending Regulation (EC) No. 850/2004 of the European Parliament and of the Council on persistent organic pollutants (perfluorooctane sulfonates) as regards Annexes IV and V.

EN 14582:2007: Characterization of waste. Halogen and sulfur content. Oxygen combustion in closed systems and determination methods. British Standards Institute, 2007

EN 1811:2023: Reference test method for release of nickel from all post assemblies that are articles intended to come into direct and prolonged contact with the skin.

EN71-3: 2019 Migration of Certain Elements, EU Safey of Toys Regulation

EPA SW-846 5050/9056: Bomb preparation method for solid waste; Method 9056: Determination of inorganic anions by ion chromatography. EPA,1994.

EU Timber Regulation: Regulation laying down the obligations of operators who place timber and timber products on the market: (EU) No. 995/2010.

(EU) 2015/863: Ammends EU RoHS directive 2011/65/EU to include restrictions on additional substances.

France Decree No. 2012-232, Environmental Code Article L. 523-4: Annual declaration of nanoparticles in substances

France Decree No. 2020-1725: Extended producer responsibility regulation that places additional requirements on the use of mineral oils in packaging.

GB 18401: Chinese National General Safety Technical Code for Textile Products: GB 18401–2010.

GB 20400: Limit of Harmful Matters in Leather and Fur, 2006 (Chinese mandatory standard).

GB 30981-2020: Limit of harmful substances of industrial protective coatings.

GB 33372-2020: Limit of volatile organic compounds content in adhesive.

GB 38507-2020: Limits of volatile organic compounds (VOCs) in printing ink.

GB 38508-2020: Limits for volatile organic compounds content in cleaning agents.

GB/T 26572: Chinese Standards on the Requirements of Concentration Limits for Certain Restricted Substances in Electrical and Electronic Products, 2011.

GBZ 2.1-2007: Occupational exposure limits for hazardous agents in the workplace in China, 1 November 2007.

IEC 62321: Determination of certain substances in electrotechnical products. IEC, 2008. Updates in 2013 and 2015.

IEEE 1680: IEEE STD 1680-2020a, IEEE Standard for Environmental Assessment of Personal Computer Products, Including Laptop Personal Computers, Desktop Personal Computers, and Personal Computer Monitors, IEEE, 2020.

Japan Chemical Substances Control Law (CSCL): Japanese Chemical Substances Control Law (CSCL) and amendments, 2011.

Japan Law 112 - Act on Control of Household Products Containing Harmful Substances

Japanese Laws: Japanese Laws for the Regulation of Nuclear Source Material, Nuclear Fuel Material, and Reactors, 1986.

Lacey Act (16 U.S.C. §§ 3371–3378): Amended in the Food, Conservation, and Energy Act of 2008
(Pub.L. 110-234, H.R. 2419, 122 Stat. 923, enacted May 22, 2008), expanded its protection to a broader range of plants and plant products (Section 8204. Prevention of Illegal Logging Practices).

Maine Title 38, Chapter 16-D: Maine Toxic Chemicals in Children's Products law

Montreal Protocol: Montreal Protocol on Substances that Deplete the Ozone Layer, September 1987.

New York Environmental Law § 27-0719 regarding Battery management and disposal.

NY Title IX of Article 37: NY Toxic Chemicals in Children's Products

NIOSH: National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards CDC, 2014.

Norway FOR-2004-06-01-922: Regulations relating to restrictions on the use of health hazardous chemicals and other products (Product Regulations).

Oregon 431A.253 - 431A.280: Oregon Toxic-Free Kids Act

REACH 1907/2006 and amendments: Annex XVII of Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

REACH, Article 59 (10): Candidate List of substances of very high concern for Authorisation under
REACH regulation.

REACH: Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC

Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products Text with EEA relevance

South Korea Resource Recycling Act

Sweden Law (2016: 1067) a tax on chemicals in certain electronics

Taiwan BSMI RoHS: CNS 15663 is the technique standards of Taiwan BSMI RoHS.

UL110 Standard for Sustainability for Mobile Phones, ed. 2: 2017

US Clean Air Act of 1963: An Act to improve, strengthen, and accelerate programs for the prevention and abatement of air pollution. 42 U.S. Code Chapter 85

US EPA 3050B: EPA method describing acid digestion of sediments, sludges, and soils.

US EPA 3052: EPA method describing microwave assisted acid digestion of siliceous and organically based matrices.

US EPA 5021A: Method to determine volatile organic compounds in soils and other solid matrices using equilibrium headspace analysis.

US EPA, SNUR 2070-AJ73: EPA's significant new use rule for short-chain chlorinated paraffins, under TSCA Section 5(a)(2), December 2014.

VT Vermont Statute Title 18, Chapter 38A: Vermont Chemicals of High Concern to Children

14.0 Revision History

Revision	Changes
Rev A	Initial release
Rev. B	Added in Table 1 restricted substances table: red phosphorus, Brominated/chlorinated flame retardants, poly vinyl chloride and all phthalates. Removal from reportable substances table: Brominated/chlorinated flame retardants, poly vinyl chloride and all phthalates.
Rev. C	New format. Updated and added definitions. Updated all references. Added product restrictions for antimony trioxide, arsenic, BNST, beryllium, benzene, BPA, elemental bromine and chlorine, chlorinated organic solvents, DMFu, endangered species, halogenated diphenyl methanes, musk xylene, organotins, PFOA, TBBPA, and REACH restricted substances. Expanded Azo dyes/colorants category to cover Aromatic amines, Azo colorants, and Azo dyes. Cadmium - added limit for batteries. Hexavalent Chromium - added limit for leather. Formaldehyde - Added limits for textiles, leather, composite wood products, and other materials. HBCDD - reduced limit from 1000 ppm to 100 ppm. Lead - removed subcategory for cable jacketing and added a lower limit for polymeric materials, paints, inks, and non-metallic and non-ceramic coatings. Mercury - added limit for batteries and a lower limit for plastic materials, paints, inks, and non-metallic and non-ceramic coatings. Nickel - changed limit from 1000 ppm content to a leach rate limit. Organotins - expanded scope of chemicals covered and updated limits. PFOS - added limits for textiles, mixtures / preparations, and all other materials. Phthalates - changed limit from 1000 ppm individual to 1000 ppm sum total content. PVC - updated limit to 'non-use' from 1000 ppm. Removed red phosphorus from product restrictions. Retired all Google approved exemptions for: all mercury exemptions, 5a, 5b, 7b, and 15. Added approved exemptions to align with recent EU Commission delegated directives. Packaging restrictions - Added new limits for arsenic, BPA, elemental bromine and chlorine, and PVC. Removed the separate section for non-electronic product restrictions. Reportable substances - added antimicrobials / biocides, California Proposition 65, cobalt and its compounds, nanomaterials, Washington State's List of Chemicals of High Concern to Children, and IEC 62474 substances of concern. Removed bismuth from reportables. The following previous reportables became newly restricted in this revision: antimony trioxide, arsenic and its compounds, beryllium and its compounds, BPA, PFOA, and TBBPA. Added new sections for manufacturing process chemical restrictions, future phase out for both products and manufacturing process chemicals, supplier demonstration of conformance, reformulation notification, alternatives assessment for safer chemistry, references, and appendix.
Rev. D	Updated and added definitions. Updated all references. Added product restrictions for PFHxA, PFHxS, Phenol isopropylated phosphate (3:1), and VOCs. Added limits for formaldehyde, PFOA, and PFOS. Added related substances to scope of PFOA and PFOS restriction. Removed EU RoHS exemptions 8b and 13(b)-II from Google Approved RoHS exemptions table. Created new table for Google approved exemptions and included entries for Antimony trioxide, As, Br, and Cl. Added new section for Restrictions in Wearable Products. Moved restrictions for BPA, Nickel leach, and PAHs and added new restrictions on several CMR substances to Restrictions in Wearables Products section. Added new packaging restriction for mineral oils. Added new Manufacturing Process restrictions for Bis (chloromethyl) ether, N,N-Dimethylformamide, Ethylbenzene, 2-Ethoxyethanol, 2-Ethoxyethylacetate, Methanol, n-Propyl Bromide (nPB), Xylene and its isomers, and deleted Beryllium and its compounds. Added reporting requirements for EDCs, PFAS, Skin sensitizing/irritative, and/or corrosive substances, and TPhP. Added lead and organonitrogen/ organophosphorus flame retardants as a priority 1 Future Phase out for products. Included SDoC as reporting method for disclosure to Google. Removed reporting requirement for Diphenylamine, substituted (SDPA). Narrowed scope for As and Be testing and added VOC test requirements in Demonstration of Compliance Section. Increased scope of Alternatives Assessment section to include vendor expectation of proactive formulation review and added Full Material Disclosure (FMD) requirement in Additional Requirements section.

Rev. E	Added Google Cloud to scope of specification. Updated all references. Added product restrictions for adhesive monomers, bisphenol A, hexachlorobutadiene, methyl phenol compounds, PCTP, PFCAs, organic phosphorus/ nitrogen flame retardants in displays, and UV 328. Updated limits for PFHxA, PFHxA, PFOA, and PFOS. Added related substances to scope of PFOA and PFOS restriction. Removed EU RoHS exemption 6(c) from Google Approved RoHS exemptions table. Created new table for Google Cloud approved exemptions. Added new section for Safer Chemistry Requirements and Requirements for Children's Products. Added new packaging restriction for PFAS and updated restriction limit for mineral oils. Updated MDF as reporting method for disclosure to Google and added Google Cloud contact information. Added fluorine test requirement and VOC report scoping. Added additional annex for Adhesive monomers and PFCAs.

Appendix A – Referenced Substances

A.1 Adhesive Monomers Class I

CAS	Substance Name
1070-70-8	Butanediol diacrylate
2399-48-6	Tetrahydrofurfuryl acrylate
84100-23-2	4-tert-Butylcyclohexyl acrylate (TBCHA)
63225-53-6	2-Acryloyloxyethyl butylcarbamate
5888-33-5	Isobornyl acrylate
13048-33-4	1,6-Hexanediol diacrylate
7328-17-8	2-(2-Ethoxyethoxy)ethyl acrylate
15625-89-5	Trimethylolpropane triacrylate
48145-04-6	2-Phenoxyethyl acrylate (PHEA)
42978-66-5	Tripropylene glycol diacrylate

A.2 Adhesive Monomers Class II

CAS	Substance Name
66492-51-1	Cyclic trimethylol-propane formal acrylate (CTFA)
818-61-1	2-hydroxyethyl acrylate (HEA)
42594-17-2	Tricyclododecane dimethanol diacrylate (TCDDMDA)
2495-35-4	Benzyl acrylate (BZA)
15206-55-0	Methyl phenylglyoxalate
86178-38-3	3,3,5-Trimethylcyclohexyl acrylate (TMCHA)
5117-12-4	4-Acryloylmorpholine (ACMO)
141-32-2	Butyl acrylate
1663-39-4	tert-Butyl acrylate
106-63-8	Isobutyl acrylate
79-10-7	Acrylic acid
1330-61-6	Isodecyl acrylate
84434-11-7	Ethyl trimethylbenzoyl phenylphosphinate
103-11-7	2-Ethylhexyl acrylate
96-33-3	Methyl acrylate
2680-03-7	N,N-Dimethylacrylamide
97-86-9	Isobutyl methacrylate
140-88-5	Ethyl acrylate
7534-94-3	Isobornyl methacrylate

A.3 Aromatic Amines, Azo Colorants and Azo Dyes

CAS	Substance Name
101-14-4	2,2'-dichloro-4,4'-methylenedianiline (MOCA)
101-77-9	4,4'-Methylenedianiline (MDA)
101-80-4	4,4'-Oxydianiline
106-47-8	4-Chloroaniline
119-90-4	3,3'-Dimethoxybenzidine
119-93-7	3,3'-Dimethylbenzidine
120-71-8	p-Cresidine
122-39-4	N,N-Diphenylamine
137-17-7	2,4,5-Trimethylaniline
139-65-1	4,4'-Thiodianiline
60-09-3	4-aminoazobenzene
615-05-4	2,4-Diaminoanisole
838-88-0	4,4'-methylenedi-o-toluidine
90-04-0	o-Anisidine
91-59-8	2-Naphthylamine
91-94-1	3,3'-Dichlorobenzidine
92-67-1	4-Biphenylamine
92-87-5	Benzidine
95-53-4	o-Toluidine
95-69-2	4-Chloro-o-toluidine
95-80-7	2,4-Diaminotoluene
97-56-3	o-aminoazotoluene
99-55-8	2-Amino-4-nitrotoluene
95-68-1	2,4-Xylidine
87-62-7	2,6-Xylidine
531-85-1	[1,1'-Biphenyl]-4,4'-diamine, dihydrochloride (Benzidene)
573-58-0	1- Naphthalenesulfonic acid, 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis[4-amino-, disodium salt. (C.I. Direct Red 28, C.I. #22120)
1937-37-7	2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4'-[(2,4-diaminophenyl) azo][1,1'-biphenyl]-4- yl] azo]-5-hydroxy-6-(phenylazo)-, disodium salt. (C.I. Direct Black 38, C.I. #30235)
2302-97-8	1-Naphthalenesulfonic acid, 8,8'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis[7-hydroxy-, disodium salt. (C.I. Direct Red 44, C.I. #22500)
2429-73-4	2,7-Naphthalenedisulfonic acid, 5-amino-3-[[4'-[(7-amino-1-hydroxy-3-sulfo-2-naphthalenyl) azo][1,1'-biphenyl]-4-yl]azo]-4-hydroxy-,trisodium salt. (C.I. Direct Blue 2, C.I. #22590)
2429-79-0	Benzoic acid, 5-[[4'-[(1-amino-4-sulfo-2-naphthalenyl) azo][1,1'-biphenyl]-4-yl]azo]-2- hydroxy-, disodium salt. (C.I. Direct Orange 8, C.I. #22130)
2429-81-4	Benzoic acid, 5-[[4'-[[2,6-diamino-3-[[8-hydroxy-3,6-disulfo-7-[(4- sulfo-1-naphthalenyl)azo]-2-naphthalenyl]azo]-5- methylphenyl]azo][1,1'- biphenyl]-4-yl]azo]-2-hydroxy-, tetrasodium salt. (C.I. Direct Brown 31, C.I. #35660)
2429-82-5	Benzoic acid, 5-[[4'-[(7-amino-1-hydroxy-3-sulfo-2-naphthalenyl)azo][1,1'-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt. (C.I. Direct Brown 2, C.I. #22311)
2429-83-6	2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4'-[(2,4-diamino-5-methylphenyl)azo] [1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)-, disodium salt. (Direct Black 4, C.I. #30245)

A.3 Aromatic Amines, Azo Colorants and Azo Dyes (continued)

CAS	Substance Name
2429-84-7	Benzoic acid, 5-[[4'-[(2-amino-8-hydroxy-6-sulfo-1-naphthalenyl)azo][1,1'-biphenyl]-4-yl] azo]-2-hydroxy-, disodium salt. (C.I. Direct Red 1, C.I. #22310)
2586-58-5	Benzoic acid, 5-[[4'-[[2,6-diamino-3-methyl-5-[(4-sulfophenyl)azo]phenyl]azo] [1,1'-biphenyl]-4- yl]azo]-2-hydroxy-,disodium salt. (C.I. Direct Brown 1:2, C.I. #30110)
2602-46-2	2,7-Naphthalenedisulfonic acid, 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis[5-amino-4-hydroxy-, tetrasodium salt. (C.I. Direct Blue 6, C.I. #22610)
2893-80-3	Benzoic acid, 5-[[4'-[[2,4-dihydroxy-3-[(4-sulfophenyl) azo]phenyl]azo][1,1'-biphenyl]-4- yl] azo]-2-hydroxy-, disodium salt. (C.I. Direct Brown 6, C.I. #30140)
3530-19-6	1,3-Naphthalenedisulfonic acid, 8-[[4'-[(4-ethoxyphenyl)azo][1,1'-biphenyl]-4-yl]azo]-7-hydroxy-, disodium salt. (C.I. Direct Red 37, C.I. #22240)
3567-65-5	1,3-Naphthalenedisulfonic acid, 7-hydroxy-8-[[4'-[[4-[[(4-methylphenyl)sulfonyl]oxy] phenyl]azo][1,1'-biphenyl]-4-yl]azo]-, disodium salt. (C.I. Acid Red 85, C.I. #22245)
3626-28-6	2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3-[[4'-[(4-hydroxyphenyl)azo][1,1'-biphenyl]-4- yl]azo]-6-(phenylazo)-, disodium salt. (C.I. Direct Green 1, C.I. #30280)
3811-71-0	Benzoic acid, 5-[[4'-[[2,4-diamino-5-[(4-sulfophenyl) azo]phenyl]azo][1,1' biphenyl]-4- yl] azo]-2-hydroxy-, disodium salt. (C.I. Direct Brown 1, C.I. #30045)
4335-09-5	2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-6-[[4'-[(4-hydroxyphenyl)azo] [1,1'-biphenyl]-4- yl]azo]-3-[(4-nitrophenyl)azo]-, disodium salt. (C.I. Direct Green 6, C.I. #30295)
6358-80-1	2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3-[[4'-[[4-hydroxy-2-[(2-methylphenyl) amino]phenyl]azo] [1,1'- biphenyl]-4-yl]azo]-6-[(4-sulfophenyl) azo]-, trisodium salt. (C.I. Acid Black 94, C.I. #30336)
6360-29-8	Benzoic acid, 5-[[4'-[[4-[(4-amino-7-sulfo-1-naphthalenyl)azo]-6-sulfo-1-naphthalenyl]azo] [1,1'-biphenyl]-4-yl] azo]-2- hydroxy-,trisodium salt. (C.I. Direct Brown 27, C.I. #31725)
6360-54-9	Benzoic acid, 5-[[4'-[[2,6-diamino-3-methyl-5-[(4-sulfophenyl)azo]phenyl] azo] [1,1'-biphenyl]-4-yl]azo]-2- hydroxy-3-methyl-,disodium salt. (C.I. Direct Brown 154, C.I. #30120)
8014-91-3	Benzoic acid, 3,3'-[(3,7-disulfo-1,5-naphthalenediyl)bis [azo(6-hydroxy-3,1-phenylene) azo[6(or7)-sulfo-4,1-naphthalenediyl]azo[1,1'-biphenyl]-4,4'-diylazo]]bis[6-hydroxy-,hexasodium salt. (C.I. Direct Brown 74, C.I. #36300)
16071-86-6	Cuprate(2-), [5-[[4'-[[2,6-dihydroxy-3-[(2-hydroxy-5-sulfophenyl)azo]phenyl] azo][1,1'-biphenyl]-4-yl]azo]-2-hydroxybenzoato(4-)]-, disodium salt. (C.I. Direct Brown 95, C.I. #30145)
117-33-9	1,3-Naphthalenedisulfonic acid, 7-hydroxy-8-[2-[4'-[2-(4-hydroxyphenyl)diazenyl] [1,1'-biphenyl]-4-yl]diazenyl]-
65150-87-0	1,3,6-Naphthalenetrisulfonic acid, 8-hydroxy-7-[2-[4'-[2-(2-hydroxy-1-naphthalenyl) diazenyl][1,1'-biphenyl]-4-yl]diazenyl]-,lithium salt (1:3)
68214-82-4	2,7-Naphthalenedisulfonic acid, 5-amino-3-[2-[4'-[2-(7-amino-1-hydroxy-3-sulfo-2-naphthalenyl)diazenyl][1,1'-biphenyl]-4-yl]diazenyl]-4-hydroxy-, sodium salt (1:2)
72379-45-4	2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3-[2-[4'-[2-[2-hydroxy-4-[(2-methylphenyl)amino]phenyl]diazenyl][1,1'- biphenyl]-4-yl]diazenyl]-6-(2-phenyldiazenyl)-
-	2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy [[[(substituted phenylamino)] substituted phenylazo] diphenyl]azo-,phenylazo-, disodium salt
-	4-(Substituted naphthalenyl)azo diphenylyl azo-substituted carbopolycycle azo benzenesulfonic acid, sodium salt
-	4-(Substituted phenyl)azo biphenylyl azosubstituted carbopolycycloazo benzenesulfonic acid, sodium salt
-	4-(Substituted phenyl)azo biphenylyl azo - substituted carbopolycycle azo benzenesulfonic acid, sodium salt
-	Phenylazoaminohydroxynaphthalenylazobiphenylazo substituted benzene sodium sulfonate

A.4 Asbestos and its compounds

CAS	Substance Name
1332-21-4	Asbestos
77536-66-4	Actinolite
12172-73-5	Amosite
77536-67-5	Anthrophyllite
12001-29-5 132207-32-0	Chrysotile
12001-28-4	Crocidolite
77536-68-6	Tremolite

A.5 Brominated Flame Retardants

CAS	Substance Name
94334-64-2	TBBPA carbonate oligomer
21850-44-2	TBBPA-bis(2,3-dibromopropyl ether)
25327-89-3	TBBPA-bis(allyl ether)
4162-45-2	TBBPA-bis(2-hydroxyethyl ether)
13654-09-6	Decabromobiphenyl (DeBB)
632-79-1	Tetrabromophthalic anhydride (TBPA)
20566-35-2	TBPA diester/ether diol
32588-76-4	Ethylene bis(tetrabromophthalimide)
24407-32-7	3,4,5,6-Tetrabromophthalimide
25357-79-3	Disodium salt of tetrabromophthalate
25637-99-4 3194-55-6	Hexabromocyclododecane (HBCD)
3322-93-8	Dibromoethyldibromocyclohexane
52907-07-0	Ethylenebis(5,6-dibromonorbornane-2,3-dicarboximide)
3296-90-0	Dibromoneopentyl glycol (DBNPG)
36483-57-5	Tribromoneopentyl alcohol (TBNPA)
593-60-2	Vinyl bromide (VBr)
118-79-6	2,4,6-Tribromophenol (TBP)
37853-59-1	1,2-Bis(tribromophenoxy)ethane (HBPE)
3278-89-5	2,4,6-Tribromophenyl allyl ether (TBP-AE)
69882-11-7	Poly(dibromophenylene oxide) (PDBPO)
85-22-3	Pentabromoethylbenzene (5BEB)
58965-66-5	Tetradecabromo-1,4-diphenoxybenzene (TDBDPB)
59447-55-1	Poly(pentabromobenzyl acrylate) (PBB-PA)
31780-26-4	Polydibromostyrene (PDBS)
88497-56-7	Brominated polystyrene (BrPS)
3194-57-8	Tetrabromocyclooctane

A.6 Chlorinated Flame Retardants

CAS	Substance Name
115-28-6	Chlorendic acid
115-96-8	Tris(2-chloroethyl)phosphate (TCEP)
13560-89-9	Dechlorane plus
13674-84-5	2-Propanol, 1-chloro-, 2,2',2"-phosphate (TCPP)
13674-87-8	tris (1,3-dichloro-2-propyl) phosphate (TDCPP)

A.7 Chlorinated Organic Solvents

CAS	Substance Name
Chlorinated Methanes [6 items]	
75-27-4	Bromodichloromethane
56-23-5	Carbon tetrachloride
67-66-3	Chloroform
124-48-1	Dibromochloromethane
75-09-2	Methylene chloride
74-87-3	Methyl chloride
Chlorinated Ethanes [9 items]	
75-00-3	Chloroethane
75-34-3	1,1-Dichloroethane
107-06-2	1,2-Dichloroethane
67-72-1	Hexachloroethane
76-01-7	Pentachloroethane
630-20-6	1,1,1,2-Tetrachloroethane
79-34-5	1,1,2,2-Tetrachloroethane
71-55-6	1,1,1-Trichloroethane
79-00-5	1,1,2-Trichloroethane
Chlorinated Ethylenes [5 items]	
75-35-4	1,1-Dichloroethylene
540-59-0	1,2-Dichloroethylene
156-59-2	cis-1,2-Dichloroethylene
127-18-4	Tetrachloroethylene
79-01-6	Trichloroethylene

A.8 Hydrofluorocarbons (HFCs)

CAS	Substance Name
75-46-7	HFC-23 (CHF3)
75-10-5	HFC-32 (CH2F2)
593-93-3	HFC-41 (CH3F)
138495-42-8	HFC-43-10mee (C5H2F10)
354-33-6	HFC-125 (C2HF5)
359-35-3	HFC-134 (CHF2CHF2)
811-97-2	HFC-134a (CH2FCF3)
430-66-0	HFC-143 (CH2FCHF2)
420-46-2	HFC-143a (C2H3F3)
624-72-6	HFC-152 (CH2FCH2F)
75-37-6	HFC-152a (C2H4F2)
353-36-6	HFC-161 (CH3CH2F)
431-89-0	HFC-227ea (C3HF7)
677-56-5	HFC-236cb (CH2FCF2CF3)
431-63-0	HFC-236ea (CHF2CHFCF3)
690-39-1	HFC-236fa (C3H2F6)
679-86-7	HFC-245ca (C3H3F5)
460-73-1	HFC-245fa (CHF2CH2CF3)
406-58-6	HFC-365mfc (CH3CF2CH2CF3)

A.9 Organotin (Organostannic) Compounds

CAS	Substance Name
Multiple	Monobutyltin (MBT) Compounds
Multiple	Monoctyltin (MOT) Compounds
Multiple	Dibutyltin (DBT) Compounds
Multiple	Dioctyltin (DOT) Compounds
Multiple	Tetrabutylin (TeBT)
Multiple	Tetraoctyltin (TeOT)
Multiple	Tributylin (TBT) Compounds
Multiple	Tricyclohexyltin (TCyT) Compounds
Multiple	Triphenyltin (TPhT) Compounds

A.10 Ozone Depleting Chemicals

CAS	Substance Name
75-69-4	Trichlorofluoromethane (CFC-11)
75-71-8	Dichlorodifluoromethane (CFC-12)
75-72-9	Chlorotrifluoromethane (CFC-13)
354-56-3	Pentachlorofluoroethane (CFC-111)
76-12-0	Tetrachlorodifluoroethane (CFC-112)
76-12-0	1,1,2,2-Tetrachloro-1,2-difluoroethane (CFC-112)
76-11-9	1,1,1,2-Tetrachloro-2,2-difluoroethane (CFC-112a)
76-13-1	Trichlorotrifluoroethane (CFC-113)
76-13-1	1,1,2-Trichloro-1,2,2 trifluoroethane (CFC-113)

A.10 Ozone Depleting Chemicals (CONTINUED)

CAS	Substance Name
354-58-5	1,1,1-Trichloro-2,2,2 trifluoroethane (CFC-113a)
76-14-2	Dichlorotetrafluoroethane (CFC-114)
76-15-3	Monochloropentafluoroethane (CFC-115)
422-78-6, 135401-87-5	Heptachlorofluoropropane (CFC-211)
422-78-6	1,1,1,2,2,3,3-Heptachloro-3-fluoropropane (CFC-211aa)
422-81-1	1,1,1,2,3,3,3-Heptachloro-2-fluoropropane (CFC-211ba)
3182-26-1	Hexachlorodifluoropropane (CFC-212)
2354-06-5; 134237-31-3	Pentachlorotrifluoropropane (CFC-213)
29255-31-0	Tetrachlorotetrafluoropropane (CFC-214)
2268-46-4	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)
1599-41-3	Trichloropentafluoropropane (CFC-215)
1599-41-3	1,2,2-Trichloropentafluoropropane (CFC-215aa)
76-17-5	1,2,3-Trichloropentafluoropropane (CFC-215ba)
812-30-6	1,1,2-Trichloropentafluoropropane (CFC-215bb)
1652-81-9	1,1,3-Trichloropentafluoropropane (CFC-215ca)
4259-43-2	1,1,1-Trichloropentafluoropropane (CFC-215cb)
661-97-2	Dichlorohexafluoropropane (CFC-216)
422-86-6, 76-18-6	Monochloroheptafluoropropane (CFC-217)
75-61-6	Dibromodifluoromethane (Halon 1202)
353-59-3	Bromochlorodifluoromethane (Halon 1211)
75-63-8	Bromotrifluoromethane (Halon 1301)
124-73-2	Dibromotetrafluoroethane (Halon 2402)
56-23-5	Tetrachloromethane (carbon tetrachloride)
71-55-6	1,1,1-Trichloroethane (methyl chloroform)
74-83-9	Bromomethane (methyl bromide)
74-96-4	Bromoethane (ethyl bromide)
2314-97-8	Trifluoroiodomethane (trifluoromethyl iodide)
74-87-3	Chloromethane (methyl chloride)
1868-53-7	Dibromofluoromethane
1511-62-2	Bromodifluoromethane
373-52-4	Bromofluoromethane
306-80-9	Tetrabromofluoroethane
353-97-9	Tribromodifluoroethane
353-97-9	1,1,2-Tribromo 1,2-difluoroethane
677-34-9	1,2,2-Tribromo 1,1-difluoroethane
354-04-1	Dibromotrifluoroethane
124-72-1	Bromotetrafluoroethane
172912-75-3	Tribromofluoroethane
420-88-2	1,1,2-tribromo-1-fluoroethane
598-67-4	1,1,2-tribromo-2-fluoroethane
75-82-1	Dibromodifluoroethane
421-06-7	Bromotrifluoroethane
358-97-4	Dibromofluoroethane
420-47-3	Bromodifluoroethane
762-49-2	Bromofluoroethane

A.10 Ozone Depleting Chemicals (CONTINUED)

CAS	Substance Name
-	Hexabromofluoropropane
-	Pentabromodifluoropropane
-	Tetrabromotrifluoropropane
666-48-8	Tribromotetrafluoropropane
431-78-7	Dibromopentafluoropropane
2252-78-0	Bromohexafluoropropane
-	Pentabromofluoropropane
148875-98-3	Tetrabromodifluoropropane
431-48-1 421-90-9	Tribromotrifluoropropane
460-86-6	Dibromotetrafluoropropane
460-88-8	Bromopentafluoropropane
-	Tetrabromofluoropropane
70192-80-2	Tribromodifluoropropane
431-21-0	Dibromotrifluoropropane
679-84-5	Bromotetrafluoropropane
75372-14-4	Tribromofluoropropane
460-25-3	Dibromodifluoropropane
421-46-5	Bromotrifluoropropane
51584-26-0	Dibromofluoropropane
420-89-3	Bromodifluoropropane
1871-72-3	Bromofluoropropane
74-97-5	Bromochloromethane
75-43-4	Dichlorofluoromethane (HCFC-21)
75-45-6	Chlorodifluoromethane (HCFC-22)
593-70-4	Chlorofluoromethane (HCFC-31)
134237-32-4	Tetrachlorofluoroethane (HCFC-121)
354-14-3	1,1,2,2-Tetrachloro-1-fluoroethane (HCFC-121)
354-11-0	1,1,1,2-Tetrachloro-2-fluoroethane (HCFC-121a)
41834-16-6	Trichlorodifluoroethane (HCFC-122)
354-21-2	1,2,2-Trichloro-1,1-difluoroethane (HCFC-122)
354-15-4	1,1,2-Trichloro-1,2-difluoroethane (HCFC-122a)
354-12-1	1,1,1-Trichloro-2,2-difluoroethane (HCFC-122b)
34077-87-7	Dichlorotrifluoroethane (HCFC-123)
90454-18-5	Dichloro-1,1,2-trifluoroethane
306-83-2	2,2-dichloro-1,1,1-trifluroethane
354-23-4	1,2-dichloro-1,1,2-trifluroethane (HCFC-123a)
812-04-4	1,1-dichloro-1,2,2-trifluroethane (HCFC-123b)
63938-10-3	Chlorotetrafluoroethane (HCFC-124)
2837-89-0	2-chloro-1,1,1,2-tetrafluoroethane
354-25-6	1-chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)
359-28-4	Trichlorofluoroethane (HCFC-131)
359-28-4	1-Fluoro-1,2,2-trichloroethan
811-95-0	1,1,2-Trichloro-1-fluoroethane (HCFC-131a)
2366-36-1	1,1,1-trichloro-2-fluoroethane (HCFC-131b)
431-06-1	Dichlorodifluoroethane (HCFC-132)
431-06-1	1,2-Dichloro-1,2-difluoroethane (HCFC-132)
471-43-2	1,1-Dichloro-2,2-difluoroethane (HCFC-132a)

A.10 Ozone Depleting Chemicals (CONTINUED)

CAS	Substance Name
1649-08-7	1,2-Dichloro-1,1-difluoroethane (HCFC-132b)
1842-05-3	1,1-Dichloro-1,2-difluoroethane (HCFC-132c)
1330-45-6, 431-07-2	Chlorotrifluoroethane (HCFC-133)
1330-45-6	1-Chloro-1,2,2-trifluoroethane (HCFC-133)
75-88-7	2-Chloro-1,1,1-trifluoroethane (HCFC-133a)
421-04-5	1-Chloro-1,1,2-trifluoroethane (HCFC-133b)
25167-88-8	Dichlorofluoroethane (HCFC-141)
430-57-9	1,2-Dichloro-1-fluoroethane (HCFC-141)
430-53-5	1,1-Dichloro-2-fluoroethane (HCFC-141a)
1717-00-6	1,1-Dichloro-1-fluoroethane (HCFC-141b)
25497-29-4	Chlorodifluoroethane (HCFC-142)
338-65-8	2-Chloro-1,1-Difluoroethane (HCFC-142)
75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)
338-64-7	1-Chloro-1,2-difluoroethane (HCFC-142a)
110587-14-9	Chlorofluoroethane (HCFC-151)
762-50-5	1-Chloro-2-fluoroethane (HCFC-151)
1615-75-4	1-Chloro-1-fluoroethane (HCFC-151a)
134237-35-7, 29470-94-8	Hexachlorofluoropropane (HCFC-221)
422-26-4	1,1,1,2,2,3-Hexachloro-3-fluoropropane (HCFC-221ab)
134237-36-8	Pentachlorodifluoropropane (HCFC-222)
422-49-1	1,1,1,3,3-pentachloro-2,2-difluoropropane (HCFC-222ca)
422-30-0	1,2,2,3,3-pentachloro-1,1-difluoropropane (HCFC-222aa)
134237-37-9	Tetrachlorotrifluoropropane (HCFC-223)
422-52-6	1,1,3,3-Tetrachloro-1,2,2-trifluoropropane (HCFC-223ca)
422-50-4	1,1,1,3-Tetrachloro-2,2,3-trifluoropropane (HCFC-223cb)
134237-38-0	Trichlorotetrafluoropropane (HCFC-224)
422-54-8	1,3,3-Trichloro-1,1,2,2-tetrafluoropropane (HCFC-224ca)
422-53-7	1,1,3-Trichloro-1,2,2,3-tetrafluoropropane (HCFC-224cb)
422-51-5	1,1,1-Trichloro-2,2,3,3-tetrafluoropropane (HCFC-224cc)
127564-92-5	Dichloropentafluoropropane (HCFC-225)
128903-21-9	2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa)
422-48-0	2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba)
422-44-6	1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225bb)
422-56-0	3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)
507-55-1	1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)
13474-88-9	1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC-225cc)
431-86-7	1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC-225da)
136013-79-1	1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225ea)
111512-56-2	1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC-225eb)
134308-72-8	Chlorohexafluoropropane (HCFC-226)
431-87-8	2-Chloro-1,1,1,3,3,3-hexafluoro-propane (HCFC-226da)
134190-48-0	Pentachlorofluoropropane (HCFC-231)
421-94-3	1,1,1,2,3-pentachloro-2-fluoro-propane (HCFC-231bb)
134237-39-1	Tetrachlorodifluoropropane (HCFC-232)
460-89-9	1,1,1,3-Tetrachloro-3,3-difluoropropane (HCFC-232fc)
134237-40-4	Trichlorotrifluoropropane (HCFC-233)

A.10 Ozone Depleting Chemicals (CONTINUED)

CAS	Substance Name
7125-84-0, 7125-83-9	1,1,1-Trichloro-3,3,3-trifluoropropane (HCFC-233fb)
127564-83-4	Dichlorotetrafluoropropane (HCFC-234)
425-94-5	1,2-Dichloro-1,2,3,3-tetrafluoropropane (HCFC-234db)
134237-41-5	Chloropentafluoropropane (HCFC-235)
460-92-4	1-Chloro-1,1,3,3,3-pentafluoropropane (HCFC-235fa)
134190-49-1	Tetrachlorofluoropropane (HCFC-241)
666-27-3	1,1,2,3-Tetrachloro-1-fluoropropane (HCFC-241db)
134237-42-6	Trichlorodifluoropropane (HCFC-242)
460-63-9	1,3,3,Trichloro-1,1-difluoropropane (HCFC-242fa)
134237-43-7	Dichlorotrifluoropropane (HCFC-243)
7125-99-7	1,1-dichloro-1,2,2-trifluoropropane
338-75-0	2,3-dichloro-1,1,1-trifluoropropane
460-69-5	3,3-dichloro-1,1,1-trifluoropropane
134190-50-4	Chlorotetrafluoropropane (HCFC-244)
679-85-6	3-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244ca)
421-75-0	1-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244cc)
134190-51-5	Trichlorofluoropropane (HCFC-251)
818-99-5	1,1,3-Trichloro-1-fluoropropane (HCFC-251fb)
421-41-0	1,1,2-Trichloro-1-fluoropropane (HCFC-251dc)
134190-52-6	Dichlorodifluoropropane (HCFC-252)
819-00-1	1,3-Dicloro-1,1-difluoropropane (HCFC-252fb)
134237-44-8	Chlorotrifluoropropane (HCFC-253)
460-35-5	3-chloro-1,1,1-trifluoropropane (HCFC-253fb)
134237-45-9	Dichlorofluoropropane (HCFC-261)
7799-56-6	1,1-Dichloro-1-fluoropropane (HCFC-261fc)
420-97-3	1,2-Dichloro-2-fluoro-propane (HCFC-261ba)
134190-53-7	Chlorodifluoropropane (HCFC-262)
420-99-5	1-Chloro-2,2-difluoropropane (HCFC-262ca)
102738-79-4	2-Chloro-1,3-difluoropropane (HCFC-262da)
421-02-3	1-Chloro-1,1-difluoropropane (HCFC-262fc)
134190-54-8	Chlorofluoropropane (HCFC-271)
420-44-0	2-Chloro-2-fluoropropane (HCFC-271ba)
430-55-7	1-Chloro-1-fluoropropane (HCFC-271fb)

A.11 Perfluorocarbons (PFCs)

CAS	Substance Name
75-73-0	Tetrafluoromethane (CF4)
76-16-4	Hexafluoroethane (C2F6)
76-19-7	Octafluoropropane (C3F8)
355-25-9	Perfluorobutane (C4F10)
115-25-3	Perfluorocyclobutane (C4F8)
678-26-2	Perfluoropentane (C5F12)
355-42-0	Perfluorohexane (C6F14)
335-57-9	Perfluoroheptane (C7F16)
307-34-6	Perfluorooctane (C8F18)

A.12 PFCAs (C9-C14)

CAS	Substance Name
375-95-1	Perfluorononan1-oic acid
335-76-2	Nonadecafluorodecanoic acid
2058-94-8	Henicosafluoroundecanoic acid
307-55-1	Tricosafluorododecanoic acid
72629-94-8	Pentacosafluorotridecanoic acid
376-06-7	Heptacosafluorotetradecanoic acid

A.13 Perfluorohexanoic Acid (PFHxA)

CAS	Substance Name
307-24-4	Perfluorohexanoic Acid
335-56-8	1-Bromoperfluorohexane
355-43-1	Perfluorohexyl Iodide
375-82-6	1H,1H-Perfluoro-1-Heptanol
647-42-7	2-(perfluorohexyl)ethanol
2043-57-4	1,1,1,2,2,3,3,4,4,5,5,6,6-Tridecafluoro-8-iodooctane
2144-53-8	2-(Perfluorohexyl)ethyl methacrylate
17527-29-6	Perfluorohexylethyl acrylate
21615-47-4	Ammonium perfluorohexanoate
25291-17-2	(Perfluorohexyl)ethylene
27619-89-2	3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctane-1-sulfonyl chloride
27619-97-2	6:2 Fluorotelomer sulfonate
34455-29-3	2-[dimethyl-[3-(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctylsulfonylamino)propyl]azaniumyl] acetate
38550-34-4	1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodononane
38565-52-5	3-perfluorohexyl-1,2-epoxypropane

49859-70-3	2-[Methyl[(perfluorohexyl)ethylsulfonyl]amino]ethyl 2-propenoate
51851-37-7	Perfluorooctyl triethoxysilane
59587-38-1	Potassium 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctanesulphonate
68391-08-2	2-Perfluoroalkyl (C6-C12) ethanol
73609-36-6	Dichloromethyl(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)silane
78560-45-9	Trichloro((perfluorohexyl)ethyl)silane
80475-32-7	N-(3-(Dimethylamino)propyl)-3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctanesulphonamide N-oxide
85857-16-5	1H,1H,2H,2H-Perfluorooctyltrimethoxysilane
85857-17-6	Dimethoxymethyl((perfluorohexyl)ethyl)silane
85995-91-1	Alkyl iodides, C8-14, γ-ω-perfluoro
90622-71-2	Alkyl iodides, C6-18, perfluoro
182176-52-9	Ethaneperoxoic acid, reaction products with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl thiocyanate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl thiocyanate
132182-92-4	3-Methoxyperfluoro(2-methylpentane)

A.14 Perfluorohexane Sulfonate (PFHxS)

CAS	Substance Name
355-46-4	Perfluorohexanesulfonic Acid
3871-99-6	Potassium perfluorohexanesulfonate
68259-08-5	Tridecafluoro-1-hexanesulfonic acid, ammonium salt
70225-16-0	Bis(2-hydroxyethyl)ammonium perfluorohexanesulfonate

A.15 Perfluorooctanoic Acid (PFOA)

CAS	Substance Name
2395-00-8	PFOA Potassium Salt
3108-24-5	Ethyl PFOA
335-67-1	PFOA
335-66-0	Perfluorooctanoyl fluoride
335-93-3	PFOA Silver Salt
335-95-5	PFOA Sodium Salt
376-27-2	Methyl PFOA
3825-26-1	PFOA Ammonium Salt

A.16 Perfluorooctane Sulfonates (PFOS)

CAS	Substance Name
144089-15-6	PFOS Tetraethylammonium salt
1691-99-2	N-ethylheptadecafluoro-n-(2-hydroxyethyl)octanesulphonamide
1763-23-1	Perfluorooctane sulfonic acid
2355-31-9	N-[(heptadecafluorooctyl)sulfonyl]-n-methyl-glycine
24448-09-7	Heptadecafluoro-n-(2-hydroxyethyl)-n-methyloctanesulphonamide
251099-16-8	1-Decanaminium, N-decyl-N,N-dimethyl-, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonate
2795-39-3	Potassium perfluorooctanesulfonate
2806-24-8	Perfluorooctane sulfonamidoacetic acid
29081-56-9	Ammonium heptadecafluorooctanesulphonate
29457-72-5	Lithium perfluorooctane sulfonate
2991-50-6	N-ethyl-n-((heptadecafluorooctyl)sulfonyl)-glycine
307-35-7	Perfluorooctanesulfonyl fluoride
31506-32-8	Heptadecafluoro-N-methyloctanesulphonamide
4021-47-0	PFOS Sodium Salt
45298-90-6	PFOS Ion
56773-42-3	Tetraethylammonium perfluoroctanesulfonate
70225-14-8	diethanolamine perfluorooctanesulfonate
754-91-6	Perfluorooctanesulfonamide

A.17 Phthalates

CAS	Substance Name
117-81-7	Diethylhexyl phthalate (DEHP)
117-82-8	Bis-(2-methoxyethyl) phthalate (DMEP)
117-84-0	Di-n-Octyl phthalate (DNOP)
131-11-3	Dimethyl phthalate (DMP)
131-16-8	Di-n-propylphthalate (DPrP)
131-18-0	Di-n-pentyl phthalate (DnPP)
26761-40-0	Di-isodecyl phthalate (DIDP)
27554-26-3	Di-iso-octylphthalate (DIOP)
28553-12-0	Diisononyl phthalate (DINP)
605-50-5	Di-iso-pentyl phthalate (DIPP)
68515-42-4	1,2-Benzenedicarboxylic acid, di-C9-11-branched and linear alkyl esters (DHNUP)
68515-48-0	1,2-Benzenedicarboxylic acid, di-C8-10-branched alkyl esters, C9-rich
68515-49-1	1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich
68515-50-4	di-hexylphthalate, branched and linear (DHxP)
68515-51-5 68648-93-1	1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-Benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate
71850-09-4	Di-iso-hexylphthalate (DIHxP)
71888-89-6	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)
776297-69-9	n-Pentyl-isopentyl phthalate (nPIPP)
84-61-7	Dicyclohexyl phthalate (DCP)
84-66-2	Diethyl phthalate (DEP)
84-69-5	Diisobutyl phthalate (DIBP)
84-74-2	Dibutyl phthalate (DBP)
84-75-3	Di-n-hexyl phthalate (DnHP)
84-76-4	Di-n-nonylphthalate (DNP)
84777-06-0	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear (DPP)
85-68-7	Butylbenzyl phthalate (BBP)

A.18 Polycyclic Aromatic Hydrocarbons (PAHs)

CAS	Substance Name
83-32-9	Acenaphthene
208-96-8	Acenaphthylene
120-12-7	Anthracene
56-55-3	Benzo(a)anthracene
218-01-9	Benzo(a)phenanthrene (chrysene)
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene
192-97-2	Benzo(e)pyrene
191-24-2	Benzo(g,h,i)perylene
205-82-3	Benzo(j)fluoranthene
207-08-9	Benzo(k)fluoranthene
206-44-0	Benzo(j,k)fluorene (Fluoranthene)
189-55-9	Benzo(r,s,t)pentaphene
226-36-8	Dibenz(a,h)acridine
224-42-0	Dibenz(a,j)acridine
53-70-3	Dibenzo(a,h)anthracene
5385-75-1	Dibenzo(a,e)fluoranthene
192-65-4	Dibenzo(a,e)pyrene
189-64-0	Dibenzo(a,h)pyrene
191-30-0	Dibenzo(a,l)pyrene
194-59-2	7H-Dibenzo(c,g)carbazole
86-73-7	Fluorene
193-39-5	Indeno(1,2,3-cd)pyrene
3697-24-3	5-Methylchrysene
91-20-3	Naphthalene
85-01-8	Phenanthrene
129-00-0	Pyrene
27208-37-3	Cyclopenta[c,d]pyrene
2381-21-7	1-methylpyrene