Apple Regulated Substances Specification

Version H

Apple Regulated Substances Specification

1.0 Scope

It's Apple's mission to make sure that anyone who assembles, uses, or recycles an Apple product can do so safely. We've led the industry in removing many harmful substances from our product designs, and we go to great lengths to make sure they stay that way. And we're constantly designing our products to be better for the environment, better for the people who use them, and better for the people who make them.

We require our suppliers to adhere to this Regulated Substances Specification, which describes Apple's global restrictions on the use of certain chemical substances or materials in our products, accessories, manufacturing processes, and packaging used for shipping products to Apple's customers. We derive these restrictions from international laws or directives, agency or eco-label requirements, and Apple policies—but in many cases, they go beyond the minimum required by law. And we hold our suppliers accountable by conducting factory audits, testing components with independent laboratories, and verifying the results in a lab we built at our headquarters in Cupertino, California.

Taking precautions against or screening out chemicals of concern listed in this specification should merely be a first step. We expect our suppliers to take their own actions to understand the human health and environmental impacts of all chemicals that are used in the manufacturing process and present in materials supplied to Apple.

2.0 Definitions

Apple Policy: Apple restrictions that go beyond regulatory requirements, based on best industry practices or toxicological properties.

CAS: Chemical Abstracts Service registry numbers that identify unique substances.

Final Assembly Process: Manufacturing process involving assembly of a product that is directly sold to Apple customers, retail stores, or distribution channels.

Homogeneous Material: One material of uniform composition throughout, or a material consisting of a combination of materials, that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding, or 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). Per this specification, the following examples illustrate what is and is not a homogeneous material:

- A plastic cover is a homogeneous material if it consists of one type of plastic that is not coated with other materials nor has other materials attached to it.
- A cable that consists of metal wires surrounded by nonmetallic insulation materials is not a homogeneous material because mechanical processes could separate the different materials. In this case, restrictions apply to each of the separated materials individually.
- A semiconductor package contains many homogeneous materials, including the mold compound, die attach adhesive, die coatings, bonding wires, lead frame, and lead frame platings. Restrictions apply to each individual homogeneous material.
- Printed circuit board laminated materials consist of glass cloth, resins, and copper foil that are each a homogeneous material. Restrictions apply to each individual homogeneous material.

Intentionally Added: Substance deliberately used in the formulation of a material or component, where the presence of the substance in the final product provides a specific characteristic, appearance, or quality.

Packaging: Packaging materials used to enclose or protect Apple products during shipment to the end-customer. Packaging shipped to suppliers or OEMs (e.g., tape and reel, trays), and packaging materials used to encapsulate board-level electrical components such as integrated circuits are not included in this definition.

PPE: Personal protective equipment for protecting workers from exposure to hazardous materials in the workplace specific for the job function.

ppm: Parts per million by weight of a substance; equivalent to 1 mg/kg or 0.0001 weight percent.

3.0 Restricted Substances in Products

Restrictions in Section 3.0 apply to all homogeneous materials used in Apple products, accessories, and packaging as shipped to Apple's end-customers.

Substances and their respective restrictions are listed in alphabetical order. References cite the specific international law or directives, agency or eco-label requirements, and Apple policies that apply. See Section 9 for more details.

3.1 Antimony Trioxide (Sb_2O_3)

The restriction for antimony trioxide (CAS No. 1309-64-4) is as follows:

Restriction	Exceptions	Reference	Application Examples
≤ 1000 ppm	Antimony trioxide used in ceramics and glass	CA Proposition 65	Flame retardant

3.2 Aromatic Amines Released by Azo-Based Dyes

Azo dyes that release any of the aromatic amines with the following CAS numbers must comply with the restriction shown in the chart.

- 2-Naphthylamine (CAS No. 91-59-8)
- 2,4,5-Trimethylaniline (CAS No. 137-17-7)
- 3,3'-Dichlorobenzidine; 3,3'-Dichlorobiphenyl-4,4'-ylenediamine (CAS No. 91-94-1)
- 3,3'-Dimethoxybenzidine o-dianisidine (CAS No. 119-90-4)
- 3,3'-Dimethylbenzidine; 4,4'-Bi-o-toluidine (CAS No. 119-93-7)
- 4-Amino azobenzene (CAS No. 60-09-3)
- 4-Chloro-o-toluidine (CAS No. 95-69-2)
- 4-Chloroaniline (CAS No. 106-47-8)
- 4-Methoxy-m-phenylenediamine (CAS No. 615-05-4)
- 4-Methyl-m-phenylenediamine (CAS No. 95-80-7)
- 4,4'-Methylene-bis-(2-chloro-aniline); 2,2'-Dichloro-4,4'-methylene-dianiline (CAS No. 101-14-4)
- 4,4'-Methylenedi-o-toluidine (CAS No. 838-88-0)
- 4,4'-Methylenedianiline; 4,4'-Diaminodiphenylmethane (CAS No. 101-77-9)
- 4,4'-Oxydianiline (CAS No. 101-80-4)
- 4,4'-Thiodianiline (CAS No. 139-65-1)
- 5-Nitro-o-toluidine (CAS No. 99-55-8)
- 6-Methoxy-m-toluidine p-cresidine (CAS No. 120-71-8)
- Benzidine (CAS No. 92-87-5)
- Biphenyl-4-ylamine; 4-aminobiphenyl; xenylamine (CAS No. 92-67-1)
- o-Aminoazotoluene; 4-amino-2',3-dimethylazobenzene; 4-o-Tolylazo-o-toluidine (CAS No. 97-56-3)
- o-Anisidine; 2-Methoxyaniline (CAS No. 90-04-0)
- o-Toluidine; 2-Aminotoluene (CAS No. 95-53-4)

Restriction	Reference	Application Examples
≤ 20 ppm	2003/3/EC, Bedarfsgegenstande Verordnung	Dye or colorant for plastics and textiles

3.3 Arsenic (As) and its compounds

Arsenic (CAS No. 7440-38-2) is restricted in all materials with the exception of semiconductor substrates and dopants (e.g., GaAs semiconductors). Test reports for arsenic content are required for glass components.

Restriction	Scope	Reference	Application Examples
≤ 50 ppm	All materials except semiconductors (substrates and dopants) and metal alloys	REACH 1907/2006 and amendments, Apple policy	LCD display glass, camera lens, trackpad glass, display cover glass, antifouling agent

Metal alloys must comply with the following restriction:

Restriction	Scope	Reference	Application Examples
≤ 1000 ppm	Metals only	REACH 1907/2006 and amendments	Copper alloys

Arsenic cannot be used for preservation of wood products and must comply with the following restriction:

Restriction	Scope	Reference	Application Examples
≤ 2 ppm	Wood products	REACH 1907/2006 and amendments	Pallets

3.4 Asbestos

In addition to the restriction listed below, asbestos must not be intentionally added.

Restriction	Reference	Application Examples
Non-use	REACH 1907/2006 and amendments	Insulator, filler

3.5 Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene (BNST)

Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene (BNST) (CAS No. 68921-45-9) have the following restriction on use:

Restriction	Reference	Application Examples
Non-use	Canadian Environmental Protection Act, 1999	Antioxidant additive in lubricants

3.6 Beryllium (Be) and its compounds (e.g., Beryllium Oxide)

Apple is phasing out the use of beryllium (CAS No. 7440-41-7) in its products. In applications where suppliers are specified to abide by beryllium restrictions, suppliers are required to comply with the following restriction:

Restriction	Reference	Application Examples
< 1000 ppm Beryllium	Apple specification	Metals and ceramic materials in connectors, stiffeners, AC inlets, springs, EMI finger/spring, transceivers, brackets, housing, buttons, speaker wire, beryllia ceramic, copper beryllium alloys

3.7 Bisphenol A (BPA)

The use of Bisphenol A (CAS No. 80-05-7) in thermal paper is restricted. See Section 4.1 for reportable requirements for Bisphenol A in other applications.

Restriction	Reference	Application Examples
Non-use in thermal paper	Apple policy	Thermal paper coatings

3.8 Bromine (Br) and its compounds

Materials are required to be compliant with Apple specifications on the restriction of bromine and chlorine. The CAS No. for bromine is 7726-95-6.

Restriction	Reference	Application Examples
≤ 900 ppm Bromine	Apple specification	Flame retardant, flux, solder paste
≤ 1500 ppm Bromine + Chlorine cumulative		

3.9 Cadmium (Cd) and its compounds

The following restriction on cadmium (CAS No. 7440-43-9) applies to all materials except battery cells and packaging (i.e., shipping) materials, which are covered in subsequent tables. Exemptions for cadmium approved by the EU RoHS Directive can be found at the following link:

EU RoHS Directive Exemptions

Apple restricts the use of cadmium beyond regulatory limits.

Restriction	Scope	Reference	Application Examples
≤ 50 ppm	Applies to all materials with the following exceptions: • battery cells • packaging	2011/65/EU, IEEE 1680, Reg. (EC) No. 552/2009, Apple specification	Pigment, stabilizer, copper alloy

Battery cells must comply with the following limit on cadmium:

Restriction	Scope	Reference	Application Examples
≤ 20 ppm	Battery cells only	2006/66/EC	Nickel cadmium battery

Cadmium is also restricted in packaging materials that are shipped to end-customers.

Restriction	Scope	Reference	Application Examples
≤ 100 ppm Cd + Cr(VI) + Hg + Pb cumulative	Packaging only	94/62/EC	Packaging materials

3.10 Chlorinated Paraffins, Short and Medium Chain (SCCP, MCCP)

The restriction applies to SCCPs with 10–13 carbon atoms (C_{10} – C_{13}). The restriction also applies to MCCPs with 14–17 carbon atoms (C_{14} – C_{17}). The CAS Nos. for SCCP and MCCP are 85535-84-8 and 85535-84-9, respectively.

Restriction	Reference	Application Examples
≤ 1000 ppm	2002/45/EC, IEEE 1680, Reg. (EC) No. 552/2009, REACH 1907/2006 and amendments, National Environmental Protection Standards of the People's Republic of China	Paint, coating, sealant, flame retardant, textiles, lubricants

3.11 Chlorine (Cl) and its compounds

Materials are required to be compliant with Apple specifications on the restriction of bromine and chlorine. The CAS No. for chlorine is 7782-50-5.

Restriction	Reference	Application Examples
≤ 900 ppm Chlorine	Apple specification	Flame retardant, flux, solder paste
≤ 1500 ppm Bromine + Chlorine cumulative		

3.12 Chromium, hexavalent (Cr(VI), Cr^{6+})

The restriction on hexavalent chromium (CAS No. 18540-29-9) in the following table applies to all materials except packaging (i.e., shipping) materials, which is covered in the subsequent table.

Restriction	Scope	Reference	Application Examples
≤ 500 ppm	All materials except packaging	2011/65/EU, IEEE 1680, CA Proposition 65, Apple specification	Metal coating, pigment

Hexavalent chromium is also restricted in packaging materials that are shipped to end-customers.

Restriction	Scope	Reference	Application Examples
≤ 100 ppm Cd + Cr(VI) + Hg + Pb cumulative	Packaging only	94/62/EC	Packaging materials

3.13 Dimethylfumarate (DMF)

Dimethylfumarate (CAS No. 624-49-7) has the following restriction on use:

Restriction	Reference	Application Examples
≤ 0.1 ppm	2010/153/EC	Biocide, desiccant pack

3.14 Formaldehyde

The restriction on formaldehyde (CAS No. 50-00-0) is as follows:

Restriction	Reference	Application Examples
≤ 0.1 mL/m^3	ChemVerbotsV	Wood, adhesives, plastics

3.15 Halogenated Diphenyl Methanes

The restriction is applicable to:

- Monomethyl-tetrachloro-diphenyl methane / Ugilec 141 (CAS No. 76253-60-6)
- Monomethyl-dichloro-diphenyl methane / Ugilec 121, Ugilec 21 (CAS No. 81161-70-8)
- Monomethyl-dibromo-diphenyl methane / DBBT (CAS No. 99688-47-8)

Restriction	Reference	Application Examples
≤ 1000 ppm	REACH 1907/2006 and amendments, Apple specification	Capacitor, transformer

3.16 Lacey Act and EU Timber Regulation

Per the U.S. Lacey Act (16 U.S.C. §§ 3371–3378) and EU Timber Regulation, Apple prohibits the use and harvesting of endangered species of flora and fauna for use in raw materials, parts, and components in any Apple product and packaging materials. Supplier shall upon request provide Apple with evidence that no illegally sourced timber or endangered species of flora and fauna have been used for production.

Restriction	Reference	Application Examples
Non-use	Lacey Act, EU Timber Regulation	Paper products, cardboard, pallets

3.17 Lead (Pb) and its compounds

The restriction on lead (CAS No. 7439-92-1) in the following table applies to all materials except battery cells and packaging (i.e., shipping) materials that are shipped to end-customers, which are covered in subsequent tables. Exemptions for lead approved by the EU RoHS Directive can be found at the following link:

EU RoHS Directive Exemptions

Restriction	Scope	Reference	Application Examples
≤ 1000 ppm	Applies to all materials, with the following exceptions: • All exemptions in 2011/65/EU and its amendments • Plastic materials, cable jackets and insulation, paints, inks, nonmetallic and nonceramic coatings • Battery cells • Packaging • Surface coating	2011/65/EU, Apple specification	Solder, coatings, glass, steel, copper alloys, aluminum alloys

All plastic (i.e., polymeric) materials, cable jackets, and insulation, paints, inks, nonmetallic and nonceramic coatings must comply with restrictions on the use of lead, as follows:

Restriction	Scope	Reference	Application Examples
≤ 50 ppm	All materials except battery cells, packaging, metals, and ceramics	California Proposition 65, IEEE 1680, Consumer Product Safety Improvement Act of 2008	Stabilizer, pigment, drying agent

Battery cells must comply with the following limits on lead. Apple's limit on lead in batteries goes beyond the regulatory limits.

Restriction	Scope	Reference	Application Examples
≤ 40 ppm	Battery cells only	2006/66/EC	Lead-acid, Zn-Mn, alkaline batteries

Lead is restricted in packaging materials shipped to end-customers.

Restriction	Scope	Reference	Application Examples
≤ 100 ppm Cd + Cr(VI) + Hg + Pb cumulative	Packaging only	94/62/EC	Packaging materials

Products must not contain a concentration of lead greater than 0.009 percent (90 ppm) in paint or any similar surface coatings. The concentration is based on the weight in the nonvolatile portion of the dried paint film.

Restriction	Scope	Reference	Application Examples
≤ 90 ppm	Surface coating	Consumer Product Safety Improvement Act of 2008	Screen surface coating on products

3.18 Mercury (Hg) and its compounds

The restriction on mercury (CAS No. 7439-97-6) in the following table applies to all materials except battery cells and packaging (i.e., shipping) materials, which are covered in subsequent tables.

Restriction	Scope	Reference	Application Examples
≤ 1000 ppm	All materials except battery cells and packaging	2011/65/EU, IEEE 1680, Apple specification	CCFL lamps, switches, dyes

Battery cells must comply with the following limits on mercury:

Restriction	Scope	Reference	Application Examples
≤ 5 ppm	Battery cells only	2006/66/EC	Mercury oxide, zinc-manganese, alkaline manganese batteries

Mercury is also restricted in packaging materials that are shipped to end-customers:

Restriction	Scope	Reference	Application Examples
≤ 100 ppm Cd + Cr(VI) + Hg + Pb cumulative	Packaging only	94/62/EC	Packaging materials

3.19 Nickel (Ni) in alloys, plating, and compounds

Apple restricts the use of nickel (CAS No. 7440-02-0) in alloys, plating, and/or compounds for parts that are frequently contacted by, or in prolonged contact with the end-user's skin. This restriction also applies to stainless steel. If an alloy or plating containing nickel is used on a part frequently contacted by the end-user's skin, the supplier must test the material for the nickel leach rate according to test method EN 1811:2001.

Restriction	Scope	Reference	Application Examples
≤ 0.28µg/cm^2/week leach rate	Parts with direct and prolonged skin contact with user	EN 1811:2011	Metal alloys with nickel, plating material, anti-corrosive alloy

3.20 Organic Tin

The following organic tin (i.e., organostannic) compounds must comply with the restriction listed in the chart below.

- Tri-substituted organic tin compounds such as tributyltin (TBT) and triphenyltin (TPT)
- Dibutyltin (DBT) compounds
- Dioctyltin (DOT) compounds

Restriction	Reference	Application Examples
≤ 1000 ppm	2009/425/EC, REACH 1907/2006 and amendments	Adhesive, paint, stabilizer, catalyst, PVC, textiles

3.21 Perchlorates

Perchlorates must comply with the restriction listed below:

Restriction	Reference	Application Examples
≤ 0.1 ppm	CA DTSC Perchlorate Contamination Prevention Act: AB 826	Lithium perchlorate (CAS No. 7791-03-9) in coin cell batteries

3.22 Perfluorooctane Sulfonates (PFOS)

Perfluorooctane sulfonates (CAS No. 1763-23-1) having a molecular formula $C_8F_{17}SO_2X$, where X is OH, a metal salt, halide, amide, or other derivatives including polymers, are subject to the restriction in the following table for all materials except textiles, coated materials, and preparations. The use of PFOS in applications exempted by EU/850/2004 and EU/757/2010 may be continued.

Restriction	Scope	Reference	Application Examples
≤ 1000 ppm	All materials, except textiles, coated materials, and preparations	EU/850/2004, EU/757/2010, Norway FOR-2004-06-01-922	Surfactant

Textiles or coated materials must meet the following restriction:

Restriction	Scope	Reference	Application Examples
≤ 1µg/m^2 coated area	Textiles and other coated materials	EU/850/2004, EU/757/2010, Norway FOR-2004-06-01-922	Surfactant, impregnation agent in textiles

Preparations must meet the following restriction:

Restriction	Scope	Reference	Application Examples
≤ 10 ppm	Preparations	EU/850/2004, EU/757/2010, Norway FOR-2004-06-01-922	Surfactant

3.23 Perfluorooctanoic Acid (PFOA)

Perfluorooctanoic acid having a molecular formula $C_8F_{15}O_2H$ (CAS No. 335-67-1) is subject to the restriction in the following table for all materials except textiles, coated materials, and preparations.

Restriction	Scope	Reference	Application Examples
≤ 1000 ppm	All materials, except textiles, coated materials, and preparations	REACH 1907/2006 and amendments, Norway FOR-2004-06-01-922	Surfactant

Textiles or coated materials must meet the following restriction:

Restriction	Scope	Reference	Application Examples
≤ 1µg/m^2 coated area	Textiles and other coated materials	REACH 1907/2006 and amendments, Norway FOR-2004-06-01-922	Surfactant, impregnation agent in textiles

Preparations must meet the following restriction:

Restriction	Scope	Reference	Application Examples
≤ 10 ppm	Preparations	REACH 1907/2006 and amendments, Norway FOR-2004-06-01-922	Surfactant

3.24 Phenol, n-methyl-

The restriction is applicable to the following substances:

- Phenol, methyl (CAS No. 95-48-7)
- Phenol, 2-methyl (CAS No. 106-44-5)
- Phenol, 3-methyl (CAS No. 108-39-4)
- Phenol, 4-methyl (CAS No. 1319-77-3)

Restriction	Reference	Application Examples
≤ 10 ppm	Canadian Environmental Protection Act, 1999	Cleaning compound, adhesives, resin, coatings

3.25 Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-

The restriction is applicable to 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-phenol (CAS No. 3846-71-7):

Restriction	Reference	Application Examples
≤ 5 ppm	REACH 1907/2006 and amendments, Japanese Chemical Substances Control Law	Adhesives, paints, printing inks, plastics

3.26 Phthalates

The restriction is applicable to the following phthalates:

- 1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP), CAS No. 71888-89-6
- 1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP), CAS No. 68515-42-4
- 1,2-Benzenedicarboxylic acid, dipentylester, branched and linear (DPP), CAS No. 84777-06-0
- Benzyl butyl phthalate (BBP), CAS No. 85-68-7
- Bis(2-ethylhexyl)phthalate (DEHP), CAS No. 117-81-7
- Bis(2-methoxyethyl) phthalate (DMEP), CAS No. 117-82-8
- Di-iso-pentyl phthalate (DIPP), CAS No. 605-50-5
- Di-isodecyl phthalate (DIDP), CAS Nos. 68515-49-1 and 26761-40-0
- Di-n-hexyl phthalate (DnHP), CAS No. 84-75-3
- Di-n-octyl phthalate (DnOP), CAS No. 117-84-0
- Di-n-pentyl phthalate (DnPP), CAS No. 131-18-0
- Dibutyl phthalate (DBP), CAS Nos. 84-74-2 and 201-557-4
- Diethyl phthalate (DEP), CAS No. 84-66-2
- Diisobutyl phthalate (DIBP), CAS No. 84-69-5
- Diisononyl phthalate (DINP), CAS Nos. 68515-48-0 and 28553-12-0
- Dimethyl phthalate (DMP), CAS No. 131-11-3
- n-Pentyl-isopentyl phthalate (nPIPP), CAS No. 776297-69-9

Restriction	Reference	Application Examples
≤ 1000 ppm	CA Proposition 65, REACH 1907/2006 and amendments	Plasticizer

3.27 Polycyclic Aromatic Hydrocarbons (PAH)

Apple restricts the use of the following polycyclic aromatic hydrocarbons:

- Acenaphthene (CAS No. 83-32-9)
- Acenaphthylene (CAS No. 208-96-8)
- Anthracene (CAS No. 120-12-7)
- Benzo[a]anthracene (CAS No. 56-55-3)
- Benzo[a]phenanthrene or chrysene (CAS No. 218-01-9)
- Benzo[a]pyrene (CAS No. 50-32-8)
- Benzo[b]fluoranthene (CAS No. 205-99-2)
- Benzo[e]pyrene (CAS No. 192-97-2)
- Benzo[g,h,i]perylene (CAS No. 191-24-2)
- Benzo[j,k]fluorene or fluoranthene (CAS No. 206-44-0)
- Benzo[j]fluoranthene (CAS No. 205-82-3)
- Benzo[k]fluoranthene (CAS No. 207-08-9)
- Dibenzo[a,h]anthracene (CAS No. 53-70-3)
- Fluorene (CAS No. 86-73-7)
- Indeno[1,2,3-cd]pyrene (CAS No. 193-39-5)
- Naphthalene (CAS No. 91-20-3)
- Phenanthrene (CAS No. 85-01-8)
- Pyrene (CAS No. 129-00-0)

Restrictions differ depending on whether or not the part containing PAHs is in prolonged contact with the end-user's skin. The following restrictions apply for parts that are anticipated to be in contact with the user's skin for periods greater than 30 seconds.

Restriction	Scope	Reference	Application Examples
≤ 1 ppm for each of the following PAHs: • Benzo[a]anthracene • Benzo[a]pyrene • Benzo[b]fluoranthene • Benzo[e]pyrene • Benzo[j]fluoranthene • Benzo[k]fluoranthene • Chrysene • Dibenzo[a,h]anthracene	Parts expected to be in contact with the end-user's skin for > 30 seconds	German GS Mark	Carbon black, plastics, dyes, combustion by-products
≤ 10 ppm for sum of PAH compounds listed in the bulleted list above			

The following restrictions apply for parts that are anticipated to be in contact with the user's skin for periods of 30 seconds or less, or parts with no contact with a user's skin.

Restriction	Scope	Reference	Application Examples
≤ 10 ppm for Benzo(a)pyrene	Parts expected to be in contact with the end-user's skin for ≤ 30 seconds or to have no user contact.	German GS Mark	Carbon black, plastics, dyes, combustion by-products
≤ 200 ppm for sum of PAH compounds listed in previous bullet items			

3.28 Polybrominated Biphenyls (PBB)

Restrictions on bromine specified in Section 3.8 apply in addition to the restriction below:

Restriction	Reference	Application Examples
≤ 1000 ppm for total PBB	2011/65/EU	Flame retardant

3.29 Polybrominated Diphenyl Ethers (PBDE)

Restrictions apply to all polybrominated diphenyl ethers including decabromodiphenyl ether (decaBDE, CAS No. 1163-19-5), regardless of exemptions in 2011/65/EU. In addition, restrictions on bromine specified in Section 3.8 apply.

Restriction	Reference	Application Examples
≤ 1000 ppm for total PBDE	2011/65/EU	Flame retardant

3.30 Polychlorinated Biphenyl (PCB)

Apple's restriction on PCB (CAS No. 1336-36-3) is stricter than the regulatory limit.

Restriction	Reference	Application Examples
≤ 5 ppm	85/467/EEC, Apple specification	Capacitor, transformer, heat transfer fluids, lubricants

3.31 Polychlorinated Naphthalene (PCN)

Apple's restriction on PCN (CAS No. 70776-03-3) is stricter than the regulatory limit.

Restriction	Reference	Application Examples
≤ 5 ppm	Apple specification	Lubricants, paint, cable insulation, wood preservatives, electroplating masking compounds, feedstock for dye production, dye carriers, capacitor fluids, flameproofing, preservatives, moisture-proofing sealant, temporary binders for ceramic component manufacturing, casting material for alloys

3.32 Polychlorinated Terphenyl (PCT)

Apple's restriction on PCT (CAS No. 61788-33-8) is stricter than the regulatory limit.

Restriction	Reference	Application Examples
≤ 5 ppm	85/467/EEC, REACH 1907/2006 and amendments, Apple specification	Capacitor, transformer, heat transfer fluids, lubricants

3.33 Polyvinyl Chloride (PVC)

Materials are required to be compliant with the Apple specifications on the restriction of bromine and chlorine. The CAS No. for PVC is 9002-86-2.

Restriction	Reference	Application Examples
≤ 900 ppm Chlorine	Apple specification	Electrical insulator, wire, tape, tubing, cable enclosure, vibration dampener, films
≤ 1500 ppm Bromine + Chlorine cumulative		

3.34 REACH Annex XVII

Annex XVII of the European Community Regulation EC 1907/2006 sets out the list of restrictions on the manufacture, placing on the market, and use of certain dangerous chemical substances, mixtures, and articles. The Annex XVII can be found at the following link:

REACH Annex XVII

The Annex contains the restrictions of the marketing and use of dangerous substances adopted since 1976 in the framework of Directive 76/769/EEC, as well as subsequent restrictions adopted under REACH.

3.35 Tetrabromobisphenyl A (TBBA, TBBPA)

Materials are required to be compliant with Apple specifications on the restriction of bromine and chlorine. The CAS No. for TBBPA is 79-94-7.

Restriction	Reference	Application Examples
≤ 900 ppm Bromine	Apple specification	Flame retardant for electrical insulator, wire, tape, tubing, cable enclosure, vibration dampener
≤ 1500 ppm Bromine + Chlorine cumulative		

4.0 Reportable Substances in Products

Suppliers are required to report the use of substances listed in Section 4.0 in any homogeneous materials used in Apple products, accessories, and packaging as shipped to Apple's end-customers. In some cases, reporting is required if the substances exceed a defined permissible limit. Suppliers are encouraged to report in the form of a full material declaration. While these substances are currently not restricted for use, restrictions may be added in the future.

4.1 Bisphenol A (BPA)

Suppliers are required to report the amount of unpolymerized Bisphenol A (CAS No. 80-05-7) by contacting Apple. See Section 3.7 for restrictions on Bisphenol A in thermal paper.

Reporting Requirement	Reference	Application Examples
Unpolymerized Bisphenol A	Apple policy	Polycarbonate, polycarbonate alloys, and adhesives

4.2 Cobalt and Its Alloys and Compounds

Suppliers are required to report the use of cobalt (CAS No. 7440-48-4) or cobalt-containing substances above 1000 ppm by contacting Apple.

Reporting Requirement	Reference	Application Examples
> 1000 ppm	REACH 1907/2006 and amendments, Canadian Environmental Protection Act, 1999	Moisture indicator, additive in rubber

4.3 Diphenylamine, Substituted (SDPA)

Suppliers are required to report the use of diphenylamine, substituted (SDPA). To report the use of SDPA for evaluation, contact Apple.

- Benzenamine, 2-ethyl-N-(2-ethylphenyl)-, (tripropenyl) derivatives (CAS No. 68608-77-5)
- Benzenamine, 4-(1-methyl-1-phenylethyl)-N-[4-(1-methyl-1-phenylethyl)phenyl]- (CAS No. 10081-67-1)
- Benzenamine, 4-(1,1,3,3-tetramethylbutyl)-N-[4-(1,1,3,3-tetramethylbutyl)phenyl]- (CAS No. 15721-78-5)
- Benzenamine, 4-nonyl-N-(4-nonylphenyl)- (CAS No. 24925-59-5)
- Benzenamine, 4-octyl-N-(4-octylphenyl)- (CAS No. 101-67-7)
- Benzenamine, 4-octyl-N-phenyl- (CAS No. 4175-37-5)
- Benzenamine, ar-nonyl-N-(nonylphenyl)- (CAS No. 36878-20-3)
- Benzenamine, ar-nonyl-N-phenyl- (CAS No. 27177-41-9)
- Benzenamine, ar-octyl-N-(octylphenyl)- (CAS No. 26603-23-6)
- Benzenamine, N-phenyl-, (tripropenyl) derivatives (CAS No. 68608-79-7)
- Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene (CAS No. 68411-46-1)
- Benzenamine, N-phenyl-, reaction products with isobutylene and 2,4,4-trimethylpentene (CAS No. 184378-08-3)
- Benzenamine, N-phenyl-, styrenated (CAS No. 68442-68-2)

Reporting Requirement	Reference	Application Examples
Report use of substance	Canadian Environmental Protection Act, 1999	Anti-oxidants used in adhesives, resins, and polymer coating, paper products

4.4 Ethanol, 2-[(2-aminoethyl)amino]-

Suppliers are required to report the use of 2-[(2-aminoethyl)amino]-ethanol (CAS No. 111-41-1). To report the use of 2-[(2-aminoethyl)amino]-ethanol, contact Apple.

Reporting Requirement	Reference	Application Examples
Report use of substance	Canadian Environmental Protection Act, 1999	Paints, lacquers, varnishes, textiles, corrosion inhibitors

4.5 Nanomaterials

Suppliers are required to report the use of nanomaterials. Nanomaterials are defined as engineered materials that contain particles, in an unbound state or as an aggregate or an agglomerate, and where, for 50 percent or more of the particles in the number size distribution, one or more external dimensions are in the size range 1–100 nanometer (nm). In addition, this includes materials intentionally produced and with at least one primary dimension less than 100 nm. To report the use of nanomaterials, contact Apple.

Reporting Requirement	Reference	Application Examples
Report use of substance	France Decree No. 2012-232, Environmental Code Article L. 523-4—Annual declaration of substances in nanoparticle	Silver nanoparticles, carbon nanotubes and graphene, nanoscale cerium dioxide, nano titanium dioxide, nanoscale iron, and nanometer-size copper particles

4.6 n-Propyl Bromide (nPB)/1-Bromopropane

Suppliers are required to report the use of nPB (CAS No. 106-94-5) if used in the manufacturing of Apple parts and products. To report the use of nPB, contact Apple.

Reporting Requirement	Reference	Application Examples
Report use of substance	Apple policy	Cleaning solvent

4.7 Radioactive Substances

Supplier must report the presence of radioactive substances in parts, components, materials, and products to Apple. Reporting is required if the ionized radiation is above the regional background levels. Restrictions under the Japanese Laws for the Regulation of Nuclear Source Material, Nuclear Fuel Material, and Reactors, 1986, may be applicable. To report the use of radioactive substances, contact Apple.

Reporting Requirement	Reference	Application Examples
Ionized radiation detected in parts, components, materials, and products above regional background levels	Japanese Laws for the Regulation of Nuclear Source Material, Nuclear Fuel Material, and Reactors, 1986	Electrical sensor, phosphorescent ink

4.8 REACH Substances of Very High Concern (SVHCs)

The use of SVHCs greater than 1000 ppm is subject to reporting requirements under the European Community Regulation EC 1907/2006. Suppliers are required to report the use of SVHCs greater than 1000 ppm. The most current list of REACH SVHCs can be found at the following link:

REACH SVHCs

If the use of an SVHC above 1000 ppm is required, notify Apple of its use. Note that certain SVHCs may be further restricted under REACH 1907/2006 or other regulations and standards. In such cases, the stricter restriction will apply. Appendix 1 includes the latest SVHCs as of the publication date of this specification, and organized by the dates of inclusion in REACH.

5.0 Restrictions on Manufacturing Processes

Restrictions in Section 5.0 apply to manufacturing processes used to create components or materials for Apple products. Per the Apple Supplier Code of Conduct, suppliers shall identify, evaluate, and manage occupational health and safety hazards through a prioritized process of hazard elimination, engineering controls, and/or administrative controls. Suppliers shall provide workers with job-related, appropriately maintained personal protective equipment and instruction on its proper use.

5.1 Benzene

Benzene used as cleaning agents or degreasers is prohibited from use in all final assembly manufacturing processes. All other applications of benzene-containing preparations must comply with the following restriction:

Restriction	Reference	Application Examples
Breathing zone < 0.32 mg/m^3 (0.1 ppm)	NIOSH	Cleaning agents, solvents, degreasers, demolder solutions, carrier solvents in adhesives, and carrier solvents in paints and inks

All suppliers subject to breathing zone restrictions are encouraged to eliminate the use of benzene in cleaning agents or degreasers, as safer alternatives exist. Contact Apple if support is required to identify or assess alternatives.

5.2 Beryllium Dust and Fumes

Suppliers with manufacturing facilities working with beryllium and beryllium compounds in any form are required to establish engineering controls and a personal protection equipment program for all workers to minimize exposure to beryllium dust.

Restriction	Reference	Application Examples
Breathing zone < 0.0005 mg/m^3	GBZ 2.1 2007	Connector contacts, EMI finger (beryllium-copper alloys), transceivers (beryllium oxide)

5.3 Chlorinated Organic Solvents

Chlorinated organic solvents used as cleaning agents or degreasers are prohibited from use in all manufacturing processes in concentrations greater than 0.1% (1000 ppm) or total chlorine content greater than 900 ppm. Examples of chlorinated organic solvents include but are not limited to the following:

Chlorinated Solvents	CAS Number
1,1-Dichloroethylene	75-35-4
1,1,1-Trichloroethane	71-55-6
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2-Trichloroethane	79-00-5
1,1,2,2-Tetrachloroethane	79-34-5
Carbon Tetrachloride	56-23-5
Chloroform	67-66-3
Methylene Chloride	75-09-2
Pentachloroethane	76-01-7
Tetrachloroethylene	127-18-4
Trichloroethylene	79-01-6

5.4 n-Hexane

n-hexane used as cleaning agents or degreasers is prohibited from use in all final assembly manufacturing processes. All other applications of n-hexane-containing preparations must comply with the following restriction:

Restriction	Reference	Application Examples
Breathing zone $< 100\ mg/m^3$ (28 ppm)	ACGIH, GBZ 2.1 2007	Cleaning agent, degreaser

All suppliers subject to breathing zone restrictions are encouraged to eliminate the use of n-hexane in cleaning agents or degreasers, as safer alternatives exist. Contact Apple if support is required to identify or assess alternatives.

5.5 Ozone Depleting Chemicals (ODC)

Ozone depleting chemicals cited by the Montreal Protocol are prohibited from use in manufacturing processes; they are listed in Appendix 2.

Restriction	Reference	Application Examples
No intentional use of ODC substances	Montreal Protocol, EC No. 2037/2000	Plastic foaming agent

6.0 Supplementary Specifications

All Apple products must comply with the restrictions listed in the Regulated Substances Specification. In cases where new restrictions are introduced during a transition period, Apple may release supplementary specifications to the Regulated Substances Specification referencing those specific restrictions. Drawings, fabrication notes, or product specifications will reference the supplementary specification if those restrictions apply. These supplementary specifications are available to qualified suppliers and vendors upon request by contacting Apple.

7.0 Demonstrating Compliance

Apple requires test reports from certified labs as proof of compliance for the following:

All materials	Cadmium (Cd) Hexavalent chromium (Cr^{6+}) Lead (Pb) Mercury (Hg) Polybrominated biphenyl (PBB) Polybrominated diphenyl ether (PBDE)
All materials except metals and ceramics	Bromine (Br) Chlorine (Cl)
Inks and paints	PFOS PFOA
Glass	Arsenic (As)
Cleaning agents and degreasers used in final assembly manufacturing	Benzene n-hexane Chlorinated organic solvents (or total chlorine)

All test reports must meet the following requirements:

- Test reports must be no more than two years old from the date submitted to Apple or Apple's manufacturing partners. In some cases, manufacturing partners will impose a one-year limit on the age of test reports; suppliers are expected to comply with limits imposed by Apple's manufacturing partners. Materials tested must be homogeneous. Test reports that are not at a homogeneous level (e.g., modules made up of several homogeneous materials tested after grinding the entire subassembly) are not acceptable.
- A nationally or internationally certified laboratory must issue the test report. Supplier-owned laboratories are acceptable if they are independently certified. One example of international certification is ISO 17025.
- Testing for substances restricted by RoHS should be performed using methods referenced in IEC 62321, or others preapproved by Apple. Testing for bromine and chlorine must be performed according to method EN 14582:2007, EPA SW-846 5050/9056, or others preapproved by Apple. Test reports based on X-ray fluorescence (XRF) spectroscopy are not acceptable forms of compliance documentation.

In addition, test reports do not need to be renewed unless specifically requested by Apple or Apple's manufacturing partners. Test reports are valid for the life of the component provided the component part number and constituent materials have not changed; if the component part number or constituent materials change, it is the supplier's responsibility to notify Apple or Apple's manufacturing partners and submit new test reports.

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 records-keeping process. Digital formats are acceptable unless otherwise noted.

Suppliers are expected to cooperate with Apple's or Apple's manufacturing partners' requests for test reports, and if requested, material content declarations and other documentation required by Apple's manufacturing partners, using a submission process defined by Apple or Apple's manufacturing partners (e.g., Agile declaration). It is the supplier's responsibility to provide test reports at its expense.

For substances that are restricted or regulated and have been replaced with an alternative substance, the supplier is required to ensure the alternative substance is an environmentally responsible substitution. Substitutions should be selected based on minimizing unintended consequences that might occur in phasing out a potentially hazardous substance. Suppliers shall conduct alternatives assessments or obtain these assessments from their raw materials suppliers prior to making a replacement. Contact Apple for more information on conducting alternatives assessments.

Suppliers are also expected to have compliance assurance processes and systems to control and maintain compliance.

All cleaning agents and degreasers used at final assembly process facilities for the manufacturing of Apple products shall be tested for benzene, n-hexane, and chlorinated organic solvent content at a certified lab prior to use in production. In lieu of testing for specific chlorinated solvents, these solvents can be tested for total chlorine content.

Questions relating to test requirements may be directed to Apple Global Supply Managers (GSM), or contact Apple.

8.0 Waiver Process

Suppliers that are seeking an exemption or waiver to restrictions in the Apple Regulated Substances Specification must make the request to Apple in writing. Apple will review the request and provide its decision via email to the requester. Contact Apple for more information on this process.

9.0 References

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

2002/95/EC: 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.

2006/66/EC: 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.

2010/153/EC: Prolonging the validity of Commission Decision 2009/251/EC of 17 March 2009 requiring Member States to ensure that products containing the biocide dimethylfumarate are not placed or made available on the market.

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.

2011/65/EU: The restriction of the use of certain hazardous substances in electrical and electronic equipment ("RoHS Recast").

ACGIH: American Conference of Governmental Industrial Hygienists (ACGIH), Guide to Occupational Exposure Values, 2014.

Bedarfsgegenstande Verordnung: German National Law (consumer article regulation).

California Proposition 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.

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

ChemVerbotsV: Chemical Prohibition Ordinance, Germany.

China RoHS: Management Methods for Controlling Pollution by Electronic Information Products, Ministry of Information Industry Order #39, February 28, 2006.

Clean Production Action (CPA): GreenScreen® for Safer Chemicals, 2014.

CLP Regulation (Classification, Labelling, and Packaging) Regulation (EC) No. 1272/2008: Complements REACH Directive and replaces the Dangerous Substances Directive (67/548/EEC) and the Dangerous Preparations Directive (1999/45/EC).

DIN EN ISO 17075:2008: Leather—Chemical Tests—Determination of chromium(VI) content (ISO 17075:2007).

(EC) No. 2037/2000: Regulation (EC) No. 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer.

EN 1811:2011: 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. Replaces BS EN 1811:1998+ A1:2008.

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

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).

Commission Regulation (EU) No. 757/2010 of 24 August 2010: Amending Regulation (EC) No. 850/2004 of the European Parliament and of the Council on persistent organic pollutants (perfluorooctane sulfonates).

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

GB 18401: Chinese National General Safety Technical Code for Textile Products—GB 18401–2003.

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

German GS Mark: Geprüfte Sicherheit (German safety standard).

IATA: IATA Dangerous Goods Regulations, Chapter 4.4, Special Provisions A69.

IEC 62321: Electrotechnical products—Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers). IEC, 2008.

IEEE 1680: IEEE STD 1380-2006, IEEE Standard for Environmental Assessment of Personal Computer Products, Including Laptop Personal Computers, Desktop Personal Computers, and Personal Computer Monitors, IEEE, 2006.

Korean Separate Discharge Mark: Korean Packaging Law, Korea Ministry of Environment.

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).

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

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

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

OSPAR: OSPAR List of Chemicals for Priority Action, OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, 2004.

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

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, Authorisation, and Restriction of Chemicals (REACH). This Annex replaces the following directives:

- **76/769/EEC** (Azocolorants, Arsenic)
- **85/467/EEC** (PCB/PCT)
- **91/659/EEC** (Asbestos)
- **94/27/EC** (Nickel)
- **2002/45/EEC** (Short-Chained Chlorinated Paraffins)
- **2002/61/EC** (Azocolorants)
- **2002/62/EC** (Organostannic Compounds)
- **2003/3/EC** (Blue Azocolorants)

Regulation on Mercury Content Limitation: Regulation on Mercury Content Limitation for Batteries, Light Industry General Bureau, China, 1997.

US DOT: US Department of Transportation, 49 CFR 173.162(c).

10.0 Appendices

Appendix 1: REACH SVHCs

REACH SVHC	CAS Number
Inclusion date October 28, 2008 (ED/67/2008)	
4,4'- Diaminodiphenylmethane (MDA)	101-77-9
5-Tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	81-15-2
Alkanes, C_{10} – C_{13}, chloro (Short-Chain Chlorinated Paraffins)	85535-84-8
Anthracene	120-12-7
Benzyl butyl phthalate (BBP)	85-68-7
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7
Bis(tributyltin)oxide (TBTO)	56-35-9
Diarsenic pentaoxide	1303-28-2
Diarsenic trioxide	1327-53-3
Dibutyl phthalate (DBP)	84-74-2
Hexabromocyclododecane (HBCDD)	25637-99-4, 3194-55-6, 134237-50-6, 134237-51-7, 134237-52-8
Lead hydrogen arsenate	7784-40-9
Sodium dichromate	7789-12-0, 10588-01-9
Triethyl arsenate	15606-95-8
Inclusion date January 13, 2010 (ED/68/2009)	
2,4-Dinitrotoluene	121-14-2
Anthracene oil	90640-80-5
Anthracene oil, anthracene-low	90640-82-7
Anthracene oil, anthracene paste	90640-81-6
Anthracene oil, anthracene paste, anthracene fraction	91995-15-2
Anthracene oil, anthracene paste, distillation lights	91995-17-4
Diisobutyl phthalate	84-69-5
Lead chromate	7758-97-6
Lead chromate molybdate sulphate red (C.I. Pigment Red 104)	12656-85-8
Lead sulfochromate yellow (C.I. Pigment Yellow 34)	1344-37-2
Pitch, coal tar, high temp.	65996-93-2
Tris(2-chloroethyl)phosphate	115-96-8
Inclusion date March 30, 2010 (ED/68/2009)	
Acrylamide	79-06-1
Inclusion date June 18, 2010 (ED/30/2010)	
Ammonium dichromate	7789-09-5
Boric acid	10043-35-3, 11113-50-1
Disodium tetraborate, anhydrous	1303-96-4, 1330-43-4, 12179-04-3
Potassium chromate	7789-00-6
Potassium dichromate	7778-50-9
Sodium chromate	7775-11-3
Tetraboron disodium heptaoxide, hydrate	12267-73-1
Trichloroethylene	79-01-6
Inclusion date December 15, 2010 (ED/95/2010)	
2-Ethoxyethanol	110-80-5
2-Methoxyethanol	109-86-4
Chromic and dichromic acids	7738-94-5, 13530-68-2
Chromium trioxide	1333-82-0

REACH SVHC	CAS Number
Cobalt(II) carbonate	513-79-1
Cobalt(II) diacetate	71-48-7
Cobalt(II) dinitrate	10141-05-6
Cobalt(II) sulphate	10124-43-3
Inclusion date June 20, 2011 (ED/31/2011)	
1-Methyl-2-pyrrolidone	872-50-4
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4
1,2,3-Trichloropropane	96-18-4
2-Ethoxyethyl acetate	111-15-9
Cobalt dichloride	7646-79-9
Hydrazine	302-01-2, 7803-57-8
Strontium chromate	7789-06-2
Inclusion date December 19, 2011 (ED/77/2011)	
1,2-Dichloroethane	107-06-2
2,2'-Dichloro-4,4'-methylenedianiline	101-14-4
2-Methoxyaniline o-Anisidine	90-04-0
4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9
Aluminosilicate refractory ceramic fibres	–
Arsenic acid	7778-39-4
Bis(2-methoxyethyl) ether	111-96-6
Bis(2-methoxyethyl) phthalate	117-82-8
Calcium arsenate	7778-44-1
Dichromium tris(chromate)	24613-89-6
Formaldehyde	25214-70-4
Lead diazide, lead azide	13424-46-9
Lead dipicrate	6477-64-1
Lead styphnate	15245-44-0
N,N-dimethylacetamide	127-19-5
Pentazinc chromate octahydroxide	49663-84-5
Phenolphthalein	77-09-8
Potassium hydroxyoctaoxodizincatedichromate	11103-86-9
Trilead diarsenate	3687-31-8
Zirconia aluminosilicate refractory ceramic fibres	–
Inclusion date June 18, 2012 (ED/87/2012)	
1,2-Bis(2-Methoxyethoxy)ethane (TEGDME triglyme)	112-49-2
1,2-Dimethoxyethane ethylene glycol dimethyl ether (EGDME)	110-71-4
1,3,5-Tris(oxiran-2-ylmethyl)-1,3,5-triazinane-2,4,6-trione (TGIC)	2451-62-9
1,3,5-Tris[(2S and 2R)-2,3-Epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione (ß-TGIC)	59653-74-6
4,4'-Bis(dimethylamino)-4''-(methylamino)trityl alcohol	561-41-1
[4-[[4Anilino-1-naphthyl][4-(dimethylamino)phenyl] methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride	2580-56-5
[4-[4,4'-Bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride	548-62-9
a,a-Bis[4-(dimethylamino)phenyl]-4 (phenylamino) naphthalene-1-methanol	6786-83-0

REACH SVHC	CAS Number
Diboron trioxide	1303-86-2
Formamide	75-12-7
Lead(II) bis(methanesulfonate)	17570-76-2
N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1
Inclusion date December 19, 2012 (ED/169/2012)	
[Phthalato(2-)]dioxotrilead	69011-06-9
1-Bromopropane (n-propyl bromide)	106-94-5
1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0
1,2-Diethoxyethane	629-14-1
3-Ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2
4-(1,1,3,3-Tetramethylbutyl)phenol, ethoxylated	–
4-Aminoazobenzene	60-09-3
4-Methyl-m-phenylenediamine (toluene-2,4-diamine)	95-80-7
4-Nonylphenol, branched and linear	–
4,4'-Methylenedi-o-toluidine	838-88-0
4,4'-Oxydianiline and its salts	101-80-4
6-Methoxy-m-toluidine (p-cresidine)	120-71-8
Acetic acid, lead salt, basic	51404-69-4
Biphenyl-4-ylamine	92-67-1
Bis(pentabromophenyl) ether (decabromodiphenyl ether, DecaBDE)	1163-19-5
Cyclohexane-1,2-dicarboxylic anhydride and isomers	85-42-7, 13149-00-3, 14166-21-3
Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))	123-77-3
Dibutyltin dichloride (DBTC)	683-18-1
Diethyl sulphate	64-67-5
Diisopentylphthalate	605-50-5
Dimethyl sulphate	77-78-1
Dinoseb (6-sec-butyl-2,4-dinitrophenol)	88-85-7
Dioxobis(stearato)trilead	12578-12-0
Fatty acids, C16-18, lead salts	91031-62-8
Furan	110-00-9
Henicosafluoroundecanoic acid	2058-94-8
Heptacosafluorotetradecanoic acid	376-06-7
Hexahydromethylphthalic anhydride and isomers	25550-51-0, 19438-60-9, 48122-14-1, 57110-29-9
Lead bis(tetrafluoroborate)	13814-96-5
Lead cyanamidate	20837-86-9
Lead dinitrate	10099-74-8
Lead monoxide (lead oxide)	1317-36-8
Lead oxide sulfate	12036-76-9
Lead titanium trioxide	12060-00-3
Lead titanium zirconium oxide	12626-81-2
Methoxyacetic acid	625-45-6
Methyloxirane (propylene oxide)	75-56-9
N-methylacetamide	79-16-3
N-pentyl-isopentylphthalate	776297-69-9
N,N-dimethylformamide	68-12-2
o-Aminoazotoluene	97-56-3
o-Toluidine	95-53-4
Orange lead (lead tetroxide)	1314-41-6

REACH SVHC	CAS Number
Pentacosafluorotridecanoic acid	72629-94-8
Pentalead tetraoxide sulphate	12065-90-6
Pyrochlore, antimony lead yellow	8012-00-8
Silicic acid $(H_2Si_2O_5)$, barium salt (1:1), lead-doped	68784-75-8
Silicic acid, lead salt	11120-22-2
Sulfurous acid, lead salt, dibasic	62229-08-7
Tetraethyllead	78-00-2
Tetralead trioxide sulphate	12202-17-4
Tricosafluorododecanoic acid	307-55-1
Trilead bis(carbonate)dihydroxide	1319-46-6
Trilead dioxide phosphonate	12141-20-7
Inclusion date June 20, 2013 (ED/69/2013)	
4-Nonylphenol ethoxylate (branched and linear)	–
Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
Cadmium	7440-43-9
Cadmium oxide	1306-19-0
Dipentyl phthalate (DPP)	131-18-0
Pentadecafluorooctanoic acid (PFOA)	335-67-1
Inclusion date December 12, 2013 (ED/121/2013)	
Cadmium sulphide	1306-23-6
Dihexyl phthalate	84-75-3
Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)	573-58-0
Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo) naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7
Imidazolidine-2-thione (2-imidazoline-2-thiol)	96-45-7
Lead di(acetate)	301-04-2
Trixylyl phosphate	25155-23-1

Appendix 2: Ozone Depleting Chemicals (ODC)

Ozone Depleting Substances/Isomers	CAS Number
1-Bromopropane (n-propyl bromide)	106-94-5 (reportable only)
1,1,1-Trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane	71-55-6
Bromochlorodifluoromethane (Halon-1211)	353-59-3
Bromochloromethane	74-97-5
Bromodifluoroethane	420-47-3
Bromodifluoromethane	1511-62-2
Bromodifluoropropane	–
Bromoethane (ethyl bromide)	74-96-4
Bromofluoroethane	762-49-2
Bromofluoromethane	373-52-4
Bromofluoropropane	1871-72-3
Bromohexafluoropropane	2252-78-0
Bromomethane (methyl bromide)	74-83-9
Bromopentafluoropropane	460-88-8
Bromotetrafluoroethane	124-72-1
Bromotetrafluoropropane	679-84-5
Bromotrifluoroethane	421-06-7
Bromotrifluoromethane (Halon-1301)	75-63-8
Bromotrifluoropropane	421-46-5
Chloromethane (methyl chloride)	74-87-3
Chlorotrifluoromethane (CFC-13)	75-72-9
Dibromodifluoroethane	75-82-1
Dibromodifluoromethane (Halon-1202)	75-61-6
Dibromodifluoropropane	460-25-3
Dibromofluoroethane	358-97-4
Dibromofluoromethane	1868-53-7
Dibromofluoropropane	51584-26-0
Dibromopentafluoropropane	431-78-7
Dibromotetrafluoroethane (Halon-2402)	124-73-2
Dibromotetrafluoropropane	–
Dibromotrifluoroethane	354-04-1
Dibromotrifluoropropane	431-21-0
Dichlorodifluoromethane (CFC-12)	75-71-8
Dichlorohexafluoropropane (CFC-216)	661-97-2
Dichlorotetrafluoroethane (CFC-114)	76-14-2
Heptachlorofluoropropane (CFC-211) 1,1,1,2,2,3,3-Heptachloro-3-fluoropropane (CFC-211aa) 1,1,1,2,3,3,3-Heptachloro-2-fluoropropane (CFC-211ba)	422-78-6, 135401-87-5 422-78-6 422-81-1
Hexabromofluoropropane	–
Hexachlorodifluoropropane (CFC-212)	3182-26-1
Monochloroheptafluoropropane (CFC-217)	422-86-6, 76-18-6
Monochloropentafluoroethane (CFC-115)	76-15-3
Pentabromodifluoropropane	–
Pentabromofluoropropane	–
Pentachlorofluoroethane (CFC-111)	354-56-3
Pentachlorotrifluoropropane (CFC-213)	2354-06-5, 134237-31-3
Sulfur hexafluoride	2551-62-4
Tetrabromodifluoropropane	–

Ozone Depleting Substances/Isomers	CAS Number
Tetrabromofluoroethane	306-80-9
Tetrabromofluoropropane	–
Tetrabromotrifluoropropane	–
Tetrachlorodifluoroethane (CFC-112) 1,1,2,2-Tetrachloro-1,2-difluoroethane (CFC-112) 1,1,1,2-Tetrachloro-2,2-difluoroethane (CFC-112a)	76-12-0 76-12-0 76-11-9
Tetrachloromethane (carbon tetrachloride)	56-23-5
Tetrachlorotetrafluoropropane (CFC-214) 1,2,2,3-Tetrachloro-1,1,3,3-tetrafluoropropane (CFC-214aa) 1,1,1,3-Tetrachloro-2,2,3,3-tetrafluoropropane (CFC-214cb)	29255-31-0 2268-46-4 –
Tribromodifluoroethane	–
Tribromodifluoropropane	70192-80-2
Tribromofluoroethane	–
Tribromofluoropropane	75372-14-4
Tribromotetrafluoropropane	–
Tribromotrifluoropropane	–
Trichlorofluoromethane (CFC-11)	75-69-4
Trichloropentafluoropropane (CFC-215) 1,2,2-Trichloropentafluoropropane (CFC-215aa) 1,2,3-Trichloropentafluoropropane (CFC-215ba) 1,1,2-Trichloropentafluoropropane (CFC-215bb) 1,1,3-Trichloropentafluoropropane (CFC-215ca) 1,1,1-Trichloropentafluoropropane (CFC-215cb)	1599-41-3 1599-41-3 76-17-5 – – 4259-43-2
Trichlorotrifluoroethane (CFC-113) 1,1,2-Trichloro-1,2,2 trifluoroethane (CFC-113) 1,1,1-Trichloro-2,2,2 trifluoroethane (CFC-113a)	76-13-1 76-13-1 354-58-5
Trifluoroiodomethane (trifluoromethyl iodide)	2314-97-8

Restricted hydrochlorofluorocarbons:

Hydrochlorofluorocarbons	CAS Number
Chlorodifluoroethane (HCFC-142) 2-Chloro-1,1-difluoroethane (HCFC-142) 1-Chloro-1,1-difluoroethane (HCFC-142b) 1-Chloro-1,2-difluoroethane (HCFC-142a)	25497-29-4 338-65-8 75-68-3 338-64-7
Chlorodifluoromethane (HCFC-22)	75-45-6
Chlorodifluoropropane (HCFC-262) 1-Chloro-2,2-difluoropropane (HCFC-262ca) 2-Chloro-1,3-difluoropropane (HCFC-262da) 1-Chloro-1,1-difluoropropane (HCFC-262fc)	134190-53-7 420-99-5 102738-79-4 421-02-3
Chlorofluoroethane (HCFC-151) 1-Chloro-2-fluoroethane (HCFC-151) 1-Chloro-1-fluoroethane (HCFC-151a)	110587-14-9 762-50-5 1615-75-4
Chlorofluoromethane (HCFC-31)	593-70-4
Chlorofluoropropane (HCFC-271) 2-Chloro-2-fluoropropane (HCFC-271ba) 1-Chloro-1-fluoropropane (HCFC-271fb)	134190-54-8 420-44-0 430-55-7
Chlorohexafluoropropane (HCFC-226) 2-Chloro-1,1,1,3,3,3-hexafluoro-propane (HCFC-226da)	134308-72-8 431-87-8
Chloropentafluoropropane (HCFC 235) 1-Chloro-1,1,3,3,3-pentafluoropropane (HCFC-235fa)	134237-41-5 460-92-4
Chlorotetrafluoroethane (HCFC-124) 2-Chloro-1,1,1,2-tetrafluoroethane 1-Chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	63938-10-3 2837-89-0 354-25-6
Chlorotetrafluoropropane (HCFC-244) 3-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244ca) 1-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244cc)	134190-50-4 679-85-6 421-75-0

Hydrochlorofluorocarbons	CAS Number
Chlorotrifluoroethane (HCFC-133) 1-Chloro-1,2,2-trifluoroethane (HCFC-133) 2-Chloro-1,1,1-trifluoroethane (HCFC-133a) 1-Chloro-1,1,2-trifluoroethane (HCFC-133b)	1330-45-6, 431-07-2 1330-45-6 75-88-7 421-04-5
Chlorotrifluoropropane (HCFC-253) 3-Chloro-1,1,1-trifluoropropane (HCFC-253fb)	134237-44-8 460-35-5
Dichlorodifluoroethane (HCFC-132) 1,2-Dichloro-1,2-difluoroethane (HCFC-132) 1,1-Dichloro-2,2-difluoroethane (HCFC-132a) 1,2-Dichloro-1,1-difluoroethane (HCFC-132b) 1,1-Dichloro-1,2-difluoroethane (HCFC-132c)	25915-78-0 431-06-1 471-43-2 1649-08-7 1842-05-3
Dichlorodifluoropropane (HCFC-252) 1,3-Dicloro-1,1-difluoropropane (HCFC-252fb)	134190-52-6 819-00-1
Dichlorofluoroethane(HCFC-141) 1,2-Dichloro-1-fluoroethane (HCFC-141) 1,1-Dichloro-2-fluoroethane (HCFC-141a) 1,1-Dichloro-1-fluoroethane (HCFC-141b)	1717-00-6, 25167-88-8 430-57-9 430-53-5 1717-00-6
Dichlorofluoromethane (HCFC-21)	75-43-4
Dichlorofluoropropane (HCFC-261) 1,1-Dichloro-1-fluoropropane (HCFC-261fc) 1,2-Dichloro-2-fluoro-propane (HCFC-261ba)	134237-45-9 7799-56-6 420-97-3
Dichloropentafluoropropane, (HCFC-225) 2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa) 2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba) 1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225bb) 3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca) 1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb) 1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC-225cc) 1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC-225da) 1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225ea) 1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC-225eb)	127564-92-5 128903-21-9 422-48-0 422-44-6 422-56-0 507-55-1 13474-88-9 431-86-7 136013-79-1 111512-56-2
Dichlorotetrafluoropropane (HCFC-234) 1,2-Dichloro-1,2,3,3-tetrafluoropropane (HCFC-234db)	127564-83-4 425-94-5
Dichlorotrifluoroethane (HCFC-123) Dichloro-1,1,2-trifluoroethane 2,2-Dichloro-1,1,1-trifluroethane 1,2-Dichloro-1,1,2-trifluroethane (HCFC-123a) 1,1-Dichloro-1,2,2-trifluroethane (HCFC-123b) 2,2-Dichloro-1,1,2-trifluroethane (HCFC-123b)	34077-87-7 90454-18-5 306-83-2 354-23-4 812-04-4 812-04-4
Dichlorotrifluoropropane (HCFC-243) 1,1-Dichloro-1,2,2-trifluoropropane 2,3-Dichloro-1,1,1-trifluoropropane 3,3-Dichloro-1,1,1-trifluoropropane	134237-43-7 7125-99-7 338-75-0 460-69-5
Hexachlorofluoropropane (HCFC-221) 1,1,1,2,2,3-Hexachloro-3-fluoropropane (HCFC-221ab)	134237-35-7, 29470-94-8 422-26-4
Pentachlorodifluoropropane (HCFC-222) 1,1,1,3,3-Pentachloro-2,2-difluoropropane (HCFC-222ca) 1,2,2,3,3-Pentachloro-1,1-difluoropropane (HCFC-222aa)	134237-36-8 422-49-1 422-30-0
Pentachlorofluoropropane (HCFC-231) 1,1,1,2,3-Pentachloro-2-fluoro-propane (HCFC-231bb)	134190-48-0 421-94-3
Tetrachlorodifluoropropane (HCFC-232) 1,1,1,3-Tetrachloro-3,3-difluoropropane (HCFC-232fc)	134237-39-1 460-89-9
Tetrachlorofluoroethane (HCFC-121) 1,1,2,2-Tetrachloro-1-fluoroethane (HCFC-121) 1,1,1,2-Tetrachloro-2-fluoroethane (HCFC-121a)	134237-32-4 354-14-3 354-11-0
Tetrachlorofluoropropane (HCFC-241) 1,1,2,3-Tetrachloro-1-fluoropropane (HCFC-241db)	134190-49-1 666-27-3

Hydrochlorofluorocarbons	CAS Number
Tetrachlorotrifluoropropane (HCFC-223) 1,1,3,3-Tetrachloro-1,2,2-trifluoropropane (HCFC-223ca) 1,1,1,3-Tetrachloro-2,2,3-trifluoropropane s(HCFC-223cb)	134237-37-9 422-52-6 422-50-4
Trichlorodifluoroethane (HCFC-122) 1,2,2-Trichloro-1,1-difluoroethane (HCFC-122) 1,1,2-Trichloro-1,2-difluoroethane (HCFC-122a) 1,1,1-Trichloro-2,2-difluoroethane (HCFC-122b)	41834-16-6 354-21-2 354-15-4 354-12-1
Trichlorodifluoropropane (HCFC-242) 1,3,3,Trichloro-1,1-difluoropropane (HCFC-242fa)	134237-42-6 460-63-9
Trichlorofluoroethane (HCFC-131) 1-Fluoro-1,2,2-trichloroethane 1,1,2-Trichloro-1-fluoroethane (HCFC-131a) 1,1,1-Trichloro-2-fluoroethane (HCFC-131b)	27154-33-2, 134237-34-6 359-28-4 811-95-0 2366-36-1
Trichlorofluoropropane (HCFC-251) 1,1,3-Trichloro-1-fluoropropane (HCFC-251fb) 1,1,2-Trichloro-1-fluoropropane (HCFC-251dc)	134190-51-5 818-99-5 421-41-0
Trichlorotetrafluoropropane (HCFC-224) 1,3,3-Trichloro-1,1,2,2-tetrafluoropropane (HCFC-224ca) 1,1,3-Trichloro-1,2,2,3-tetrafluoropropane (HCFC-224cb) (HCFC-224cc)	134237-38-0 422-54-8 422-53-7 422-51-5
Trichlorotrifluoropropane (HCFC-233) 1,1,1-Trichloro-3,3,3-trifluoropropane (HCFC-233fb)	134237-40-4 7125-84-0, 7125-83-9