

For LG Electronics suppliers

Guidelines for hazardous substance management in products

11th edition

December 30, 2019



Overview

We provide the guidelines for you to comply with global hazardous substances regulation proactively that are being expanded/strengthened and to get eco-friendly competitiveness of LG Electronics products. This guideline sets out requirements under the LGE's hazardous substances management standards (LG(10)-A-9023).

Based on this guideline, all partner companies shall be aware of eco-friendly policies of LG Electronics to comply with the management and operation standards for hazardous substances such as prohibited/restricted substances that cannot be used for products or parts currently in supply and manage hazardous materials.

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Dec. 30, 2019 / 11th Edition

LG Electronics Quality Management Center
Product Test Lab

Major revised contents

Revision	Date	Details
11th Edition	Dec. 30, 2019	1) Article 3. Definition of terms : Add the children's product 2) Article 5. Management standards for hazardous substances in products - Update the related regulations/laws - Update the substance criteria : formaldehyde, biocides, etc. - Strengthen the level of PCP : Level B-I → Level A-II 3) Article 6. Management standards for hazardous substances in packaging - Add the criteria of Arsenic compounds, PVC 4) Article 7. Management standards for hazardous substances in battery - Add the criteria of Pb 5) Appendix 1 : update exemptions list/Scope and dates of applicability 6) Appendix 2 : add the examples of substances and its compounds 7) Appendix 3 : update the biocidal substances list

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Article 1 (Objective)

The objective of this guide is to clarify the hazardous substance management standards to all product and parts suppliers which have transactions with LG Electronics (hereinafter “the Company”), enable them to comply with the global products’ environmental regulations, and contribute to the preservation of the global environment.

Article 2 (Scope of application)

The guide is applied to all products, parts, raw materials, packaging materials, batteries, etc. supplied by all suppliers who deal with the Company regardless of the sales area.

- 1) All product components
(including service parts, packaging materials, batteries, raw materials, and process materials)
- 2) All products for sale
 - Products (in-house) designed, produced, sold, and supplied by the Company
 - Products designed and produced by suppliers but supplied to the market bearing the trademark of the Company (ODM)
 - Products designed by the Company but produced by a supplier and supplied to the market bearing the trademark of the Company (OEM)

Article 3 (Definition of terms)

3.1 Classification of hazardous substances in products

- 1) Level A substance (prohibited/restricted substance)
Level A substance is defined as one currently prohibited from use for products by the regional and national regulations. Any intentional use of these substances is prohibited for any item supplied to the Company.
 - ① Level A-I : 10 kinds of prohibited hazardous substances designated by the RoHS Directive
 - ② Level A-II : Substances whose use is restricted by national laws or international agreements other than the RoHS Directive
- 2) Level B substance (voluntary use reduction/substances to observe)
Level B substance is defined as one which is suspected to be harmful to humans and the global environment and is expected to gradually become subject to prohibition of use in the future by regulations.
 - ① Level B-I: Substances that are voluntarily replaced within a certain period of time
 - ② Level B-II: Substances that are not currently prohibited for use but are expected to be so in the future

3.2 Maximum concentration limit (MCV)

This means the maximum concentration of hazardous substances in a component’s material that takes into account the impurities that are inevitably contained due to measurement errors of substance analysis equipment or limitations of the current refining technology and manufacturing technology, permitted under the premise that these hazardous substances are not used deliberately in the component.

3.3 Contain

This term means the state of a product including a foreign substance regardless of intention as a result of injection, charging, or mixing performed for the purpose of changing certain properties of the product’s components or materials or improving workability.

3.4 Impurity

This means a substance which technologies cannot completely remove or are incapable of removing in its natural purification processes or one which is generated from synthesis and cannot be completely removed by the present technologies.

3.5 Prohibition

This means that the harmful substances specified by the Company shall not be intentionally included in the materials or components in the manufacturing process. Impurities that are inevitably contained because their complete elimination is impossible due to limitations of the material refining technologies or technical limitations during synthesis shall be managed based on the maximum permissible concentration.

3.6 Exemption

Only exemptions acknowledged by EU RoHS or other applicable regulations shall be effective.

The term refers to a harmful substance that is allowed for use during a certain period of time as there is no alternative within the current technology level or there is a possibility of problem occurrence if substituted.

3.7 Homogeneous material

It is the minimum constituent unit of a component made of a single material. It is a material having a uniform composition that can no longer be disassembled into different materials by physical disassembling methods such as cutting, pulverizing, and grinding. For example, coating or coated components are not homogeneous and shall be disassembled into individual materials to determine presence of hazardous substances.

3.8 HSMS (Hazardous Substances Management System)

The Company's unique IT system for registering and managing the information of substances in parts and products

3.9 Material composition table

This is data that provides related information on the constituents of chemical substances in raw materials or homogeneous materials in the products or parts supplied to the Company, CAS No.(EC No.), and content and safety information. (e.g. Material Safety Data Sheet(MSDS), Mill Sheet, Material Declaration, etc.)

3.10 Test report

This is a report issued after a test conducted based on the ISO 17025 international standards at a laboratory certified by a registered institution.

3.11 SVHC (Candidate list of Substances of Very High Concern)

It is a substance that poses a concern of a very high risk from carcinogenicity/reproductive toxicity/mutagenic toxicity defined by the EU REACH regulation. If the toxic content exceeds 0.1% based on the part's weight, the information shall be disclosed and reported.

3.12 Non-use Certificate for Hazardous Substances (Warranty documents)

It is a certificate provided by a supplier proving that the subject product or part does not include hazardous substances specified by the Company.

3.13 Biocidal substance

It refers to a biocidal substance, biocidal product, or biocide-processed product. Only the biocides approved for use by the national regulatory authorities can be manufactured, imported, sold, or distributed.

- Biocidal substances : chemicals, natural substances, or microorganisms(e.g. PHMG, PGH, OIT, etc.) used for the function of removing, detoxifying, or suppressing harmful organisms
- Biocidal products : products of which the primary purpose is to remove harmful organisms or products that produce biocides(e.g. disinfectants, fungicides, preservatives, etc.)
- Treated article : products that treat biocidal substances or biocidal products (e.g. antibacterial filters, preservative-treated wood, etc.) for incidental purposes, such as removal of harmful organisms

3.14 Children's products

Children's product means a product, or accessories used as a component of a product, designed or intended primarily for use by or for children under 13 years of age or younger.

Especially, this applies to any product developed or promoted for use by children.

Article 4 (Operation and management standards)

4.1 Requirements for evidence documents of hazardous substances/materials

The supplier that deals with the Company shall register references requested by the Company via HSMS for demonstrating whether hazardous substances have been used for all newly approved components and raw materials or currently mass-produced products that will go through 4M. Materials where substance information is not approved via HSMS are prohibited from being warehoused by LG Electronics.

- 1) A RoHS test report shall be submitted during the parts approval stage. Level A-II, Level B-I, or II substance reports shall be submitted when requested by the Company business division.
- 2) The content information (CAS No., composition ratio, etc.) of chemicals in all parts and homogeneous materials shall be registered into HSMS, and evidential documents such as substance composition tables shall be attached.
- 3) Substances that cannot be disclosed for business purposes can be registered as Confidential, but a declaration of Certificate for the non-use of EU REACH SVHC substances shall be submitted and renewed periodically for SVHC substances which are added twice a year by the EU.
- 4) Information on biocidal materials used for antimicrobial/antiseptic/preservative functions shall not be registered as Confidential Business Information (CBI), where the application details shall be disclosed regardless of their contents. Substances that are not approved by the EU, US, or Korean regulatory authorities cannot be used for any purpose.

4.1.1 In the Case of New Approval and 4M Change*

- 1) Test report on RoHS-regulated substances (within 2 years from the date of report issuance)
 - Detailed analysis reports for non-RoHS substances shall be submitted upon the request of the Company business division (e.g. HBCDD, TCEP, TDCPP, etc.)
- 2) References of substance constituents (substance composition table, etc.)
- 3) Declaration of Certificate for the non-use of hazardous substances
- 4) Samples shall be required upon the request for evaluation by the Company business division

* 4M change : material change/addition/deletion, company change/addition, production site change (in case of material change only)

4.1.2 Periodic Evaluations for Mass-produced Products

- 1) Test results for hazardous substances (e.g. XRF, etc.)
- 2) Samples shall be required upon the request for evaluation by the Company business division

※ Requirements for the references based on the level of hazardous substances

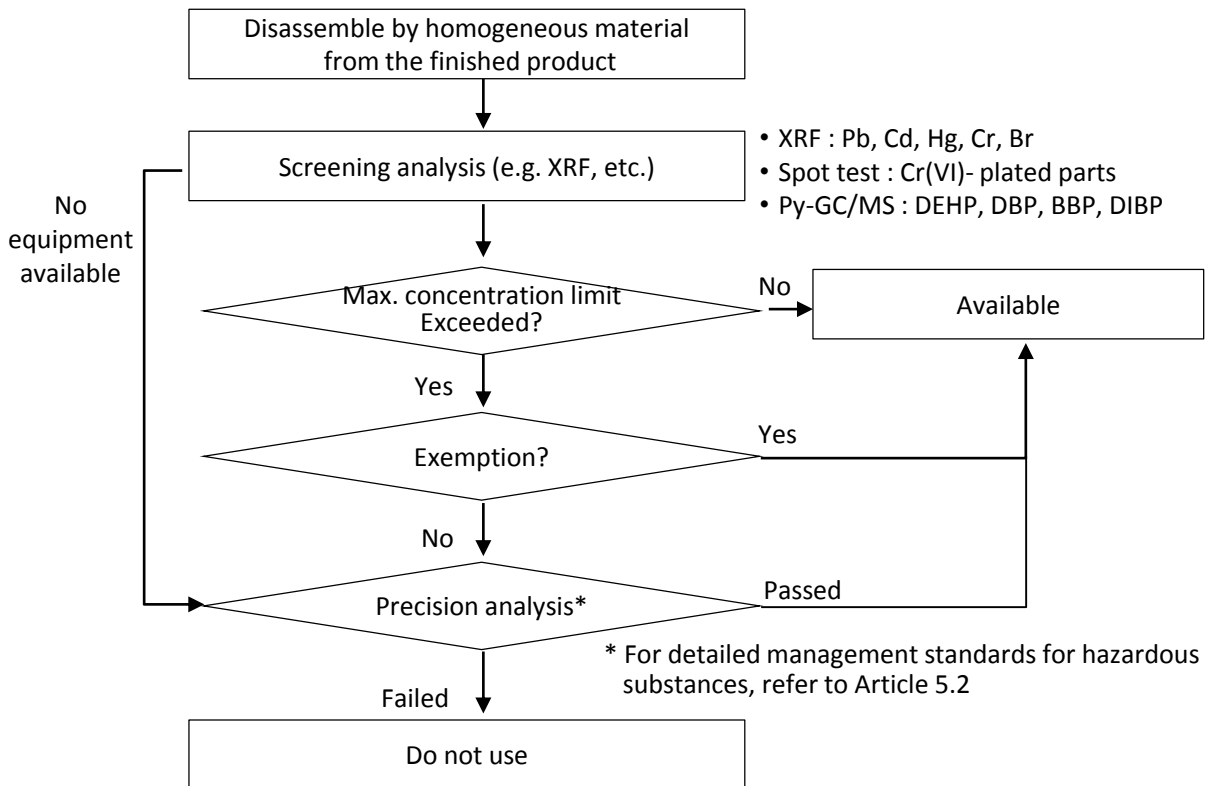
Level	Test Report	References for Material Composition	XRF Test Results
Level A-I	10 substances (Pb, Cd, Hg, Cr(VI), PBBs, PBDEs, DEHP, DBP, BBP, DIBP)	MSDS, Mill Sheet, etc.	5 substances (Pb, Cd, Hg, Cr, Br)
Level A-II, Level B-I / II	In case of request by Biz. Unit		In case of request by Biz. Unit
How to submit	HSMS	HSMS	PU-SCS

- Intentional use of Level A-I / II substances are prohibited, and the substance content shall not exceed the maximum concentration limit even when the substance is contained as an impurity. However, if a substance falls under the cases of exemption, the basis of determination shall be specified and the substance shall be registered as an exception in HSMS.
- Submission requirements for RoHS detailed analysis reports by material
 - ① Pb, Cd, Hg, Cr(VI) : all materials
 - ② PBBs, PBDEs, DEHP, DBP, BBP, DIBP : all materials except metal, metal plating, glass, and ceramic

4.2 The criteria of hazardous substance evaluation

- 1) The supplier shall disassemble all product parts into homogeneous material units and conduct a hazardous material evaluation.
- 2) The hazardous substance evaluation targets shall be finished products, and the inspection results for each substance shall meet the managed concentrations of the Company except for the ones that fall into the Appendix 1 exemption. (Refer to 5.2 Detailed management standards for hazardous substances)
If the Company business division proposes a separate managed concentration, the operation standard of the business division shall take precedence.
 - e.g. Solder on PCB assembly is separated from the PCB board for measurement
- 3) Phthalates such as DEHP, DBP, BBP, and DIBP are not measurable by XRF, and shall be examined and managed by other screening equipment or precise analytical tests.

4.2.1 Flow chart of hazardous substances evaluation



4.2.2 In the case of exceeding maximum concentration limits

When the maximum concentration limit of hazardous substances set forth in Article 5 (Management standards for hazardous substances in products) is exceeded,

- 1) Any of the 10 restricted substances of RoHS Directive fails the parts approval and import inspection tests, and the applicable part's dealing shall be terminated. The supplier shall prepare and submit an improvement plan and carry out the improvement according to the plan.
- 2) Any intended use of prohibited/restricted substances (Level A-I and Level A-II) are prohibited, and any proof of such use of the applicable part shall lead to termination of trade.

Article 5 (Management standards for hazardous substances in products)

This management standards are applied to homogeneous material units in products and parts.
The list of managed substances is as follows.

5.1 List of hazardous substance in products and related environmental regulation

1) Level A-I substances (prohibited/restricted substances)

Type	Substances	Related regulations/laws
Level A-I	Lead (Pb) and its compounds	EU RoHS, Battery Directive, Packaging Directive, EU REACH regulation, EU ELV, Ukraine RoHS, UAE RoHS, Vietnam RoHS, India RoHS, Singapore RoHS, Taiwan RoHS, China RoHS, China ELV, Korea RoHS, Japan J-MOSS, US/CA SB-20/50, US CPSIA, CA Proposition 65, US CPSC Public Law 110-314, Children's product, Minamata Convention on Mercury, etc.
	Cadmium (Cd) and its compounds	
	Mercury (Hg) and its compounds	
	Hexavalent chromium (Cr(VI)) and its compounds	
	PBBs (Polybrominated biphenyls)	EU RoHS, EU REACH Regulation, Ukraine RoHS, UAE RoHS, Vietnam RoHS, India RoHS, Singapore RoHS, Taiwan RoHS, China RoHS, China ELV, Korea RoHS, Japan J-MOSS, US states flame retardant, EU POPs Regulation, CA Proposition 65, etc.
	PBDEs (Polybrominated diphenyl ethers)	
	DEHP (Bis(2-ethylhexyl) phthalate)	EU RoHS, EU REACH Regulation, Ukraine RoHS, UAE RoHS, CA Proposition 65, Children's product, Korea RoHS, etc.
	DBP (Dibutyl phthalate)	
	BBP (Benzyl butyl phthalate)	
DIBP (Diisobutyl phthalate)		

2) Level A-II substances (prohibited/restricted substances)

Type	Substances	Related regulations/laws
Level A-II	PCBs (Polychlorinated biphenyls) PCNs (Polychlorinated naphthalenes) PCTs (Polychlorinated terphenyls)	OSPAR Priority Chemicals, EU REACH Regulation, EU POPs Regulation, CA Proposition 65, etc.
	SCCP (Short-chain chlorinated paraffin, C10-13)	EU POPs Regulation, CA Proposition 65, etc.
	PFOS (Perfluorooctane sulfonate)	EU POPs Regulation, CA Proposition 65, etc.
	Nickel (Ni) and its compounds	EU REACH Regulation, CA Proposition 65, etc.
	Asbestos	EU REACH Regulation, CA Proposition 65, etc.
	Azo compounds	EU REACH Regulation, CA Proposition 65, Children's product, etc.
	Ugilec 121, 141, DBBT	EU REACH Regulation, etc.
	Specified organic tin compounds	EU REACH Regulation, CA Proposition 65, Children's product, etc.
	Arsenic (As) and its compounds	EU REACH Regulation, CA Proposition 65, etc.
	Ozone layer depleting substances (ODS)	EU ODC Regulation, Montreal Protocol, Federal IRS Excise Taxes for Ozone Depleting Chemicals, etc.
	PAHs (Polycyclic aromatic hydrocarbons)	EU REACH Regulation, Germany GS mark
	Formaldehydes	Health-friendly housing construction standards, California ATCM, US TSCA Title VI, Germany/ Denmark/ Italy/ Austria/ Sweden Formaldehyde Regulation, EU REACH Regulation, etc.
	DMF (Dimethylfumarate)	Commission decision 2009/251/EC, EU REACH Regulation, etc.
	VOC (Volatile Organic Compounds)	Health-friendly housing construction standards, EU REACH Regulation, etc.
	HBCDD (Hexabromocyclododecane)	EU POPs Regulation, EU REACH Regulation, Norway Product regulation, etc.
	BPA (Bisphenol A)	EU REACH, France FCM, EU FCM, CA Proposition 65, etc.
	TCEP (Tris(2-chloroethyl)phosphate)	Washington D.C. Flame retardant regulation, CA Proposition 65, etc.
	TDCPP (Tris(1,3-dichloro-2-propyl)phosphate)	
	Biocidal substances (PHMG/PGH/PHMB/OIT/CMIT/MIT etc.)	EU BPR, US FIFRA, Korea BPR, Korea Environmental Law Notice. 2019-45
	PFOA (Perfluorooctanoic acid)	Norway Product Regulation, EU REACH Regulation, CA Proposition 65, EU POPs Regulation, etc.
PCP (Pentachlorophenol)	EU REACH Regulation, Children's product, CA Proposition 65, etc.	

3) Level B-I substances (voluntary use reduction substances)

Type	Substances
Level B-I	PVC (Poly vinyl chloride)
	Antimony and its compounds
	Beryllium and its compounds
	Other phthalates (excluded Level A substances)
	Other brominated flame retardants (excluded Level A substances)
	Other chlorinated flame retardants (excluded Level A substances)

※ The timing of prohibition of use shall proceed according to the implementation plan of each business unit.

4) Level B-II substances (substances to observe)

Type	Substances
Level B-I	Cobalt and its compounds, including alloy (Co)
	MCCP (Medium-chained chlorinated paraffin, C14-C17)
	InP (Indium phosphide)
	Musk xylene
	EU REACH SVHCs
	California Proposition 65 substances
	Phosphorus flame retardant (Sweden taxation)
	Radioactive substances (e.g. Radon/Uranium-238/Cesium-137, etc.)
	GHG (Green House Gases)

※ REACH SVHC candidates and US Proposition 65 substances are managed separately from these standards because they are continuously added.

- How to check the list of regulated substances

① SVHC : <https://echa.europa.eu/candidate-list-table>

② Proposition 65 : <https://oehha.ca.gov/proposition-65/proposition-65-list>

5.2 Detailed management standards for hazardous substances

The scope of application and maximum concentration limit (MCV) are decided based on any of national laws or international agreements, and we apply the strictest requirements of these regulations.

The suppliers should manage not to exceed the maximum concentration limit of restricted/prohibited hazardous substances. Basically, you have to comply with the guidelines of company-level, but if the business unit requires that you comply with the stricter standards than the company-level, you should follow the requirements of business unit.

5.2.1 Level A-I

1) Lead (Pb) and its compounds

Scope of application		Maximum concentration limit
All parts (except for children's product & Appendix 1)		800 mg/kg
Surface parts that come into contact with the skin of children or accessible parts which may be placed in the mouth by children		100 mg/kg
Paint, Coating, leather, or textile for children's products		90 mg/kg
Application	Rubber hardener, pigment, paint and varnish, lubricant, plastic stabilizer, free cutting brass/optics materials, soldering, plating material, alloy element, etc.	
Harmful effect	Central nerve damage, joint weakening, high blood pressure, brain damage, sterility and miscarriage, sperm reducing by tissue damage	
Test method	EN 62321:2009, IEC 62321-5, CPSC-CH-E1001-08.1, CPSC-CH-E1002-08.1, CPSC-CH-E1003-09.1, Korean children's product safety standard, etc.	
Test equipment	ICP-AES/OES, AAS, ICP-MS etc.	

2) Cadmium (Cd) and its compounds

Scope of application		Maximum concentration limit
All parts (except for children's product & Appendix 1)		80 mg/kg
<ul style="list-style-type: none"> • Surface parts that come into contact with the skin of children or accessible parts which may be placed in the mouth by children • Leather or textile for children's product 		75 mg/kg
Application	Corrosion-resisting surface treatment, optics materials, stabilizer, plating material, resin pigment, fluorescent material for optical glass, electrical contacts, etc.	
Harmful effect	Stomach cramps, the kidney damage, high blood pressure, serum ferritin reducing, the central nerve and brain damage	
Test method	EN 62321:2009, IEC 62321-5, Korean children's product safety standard, etc.	
Test equipment	ICP-AES/OES, AAS, ICP-MS etc.	

3) Mercury (Hg) and its compounds

Scope of application		Maximum concentration limit
All parts (except for Appendix 1)		800 mg/kg
Application	Fluorescent material, electrical contacts material, pigment, anti-corrosion preparation, high efficiency illuminant, antibiosis treatment, etc.	
Harmful effect	Vomiting, wheal, eye spasm, the kidney and brain damage, visually handicap, loss of eyesight, failing of memory	
Test method	EN 62321:2009, IEC 62321-4, etc.	
Test equipment	ICP-AES/OES, AAS, ICP-MS, TD-AAS, CV-AAS/AFS, etc.	

4) Hexavalent chromium (Cr(VI)) and its compounds

Scope of application		Maximum concentration limit
Plastic, rubber, painting, ink, non-plating parts as metal/plastic coating ¹⁾		800 mg/kg
Chrome surface treatment parts (screw, bolt, nut, plate etc.) and electroplating ²⁾		Negative (Precision analysis < 0.1 µg/cm ²)
Skin-contact natural leather or leather products		3 mg/kg by total dry weight
Soluble Cr(VI) of the cement		2 mg/kg by total dry weight
Application	Paints, pigment, ink, catalyzer, plating, corrosion protection surface treatment, dyes, pigment desiccant, surface treatment, chromate treatment, adhesion improvement for pigment	
Harmful effect	Sniff, sneeze, nose bleeding, tumor, convulsions, asthma, lung cancer, kidney and liver damage, sudden death	
Test method	EN 62321:2009, IEC 62321-7-1 (metal), IEC 62321-7-2 (polymer), ISO 17075 (leather), KS L 5221, etc.	
Test equipment	ICP-AES/OES, AAS, ICP-MS, TD-AAS, CV-AAS/AFS	

1) You can submit the total Cr test report instead of the precision analysis report of Cr(VI).

2) Hexavalent chromium shall not intentionally be used in all parts surface treated with Cr, including electroplating.

5) PBBs (Polybrominated biphenyls)

Scope of application		Maximum concentration limit
All plastics and polymers (rubber, tape, etc.)		800 mg/kg
Application	Flame retardants	
Harmful effect	Abnormal symptom on skin, loss of hair, weight losses, the central nerve, liver, kidney, thyroid gland, and immune system damage	
Test method	EN 62321:2009, IEC 62321-6, etc.	
Test equipment	GC-MS, GC-ECD, Py-GC-MS, etc.	

6) PBDEs (Polybrominated diphenylethers)

Scope of application		Maximum concentration limit
All plastics and polymers (rubber, tape, etc.)		800 mg/kg
Application	Flame retardants	
Harmful effect	Abnormal symptom on skin, loss of hair, weight losses, the central nerve, liver, kidney, thyroid gland, and immune system damage	
Test method	EN 62321:2009, IEC 62321-6, etc.	
Test equipment	GC-MS, GC-ECD, Py-GC-MS, etc.	

7) DEHP (Bis(2-ethylhexyl) phthalate)

Scope of application		Maximum concentration limit
All parts (except for metal, metal plating, glass, ceramic)		800 mg/kg
Application	Plasticizers	
Harmful effect	Endocrine disturbance, damage the liver, lungs, and reproductive system	
Test method	KS M 1991, ASTM D 3421, EPA 8061A, IEC 62321-8, etc.	
Test equipment	GC-MS, LC-MS, Py-GC-MS, etc.	

8) DBP (Dibutyl phthalate)

Scope of application		Maximum concentration limit
All parts (except for metal, metal plating, glass, ceramic)		800 mg/kg
Application	Plasticizer, resistance chip paste, coating adhesive, equipment cleaner, etc.	
Harmful effect	Endocrine disturbance, damage the liver, lungs, and reproductive system	
Test method	KS M 1991, ASTM D 3421, EPA 8061A, IEC 62321-8, etc.	
Test equipment	GC-MS, LC-MS, Py-GC-MS, etc.	

9) BBP (Benzyl butyl phthalate)

Scope of application		Maximum concentration limit
All parts (except for metal, metal plating, glass, ceramic)		800 mg/kg
Application	Plasticizer, coating adhesive, synthetic leather, etc.	
Harmful effect	Endocrine disturbance, damage the liver, lungs, and reproductive system	
Test method	KS M 1991, ASTM D 3421, EPA 8061A, IEC 62321-8, etc.	
Test equipment	GC-MS, LC-MS, Py-GC-MS, etc.	

10) DIBP (Diisobutyl phthalate)

Scope of application		Maximum concentration limit
All parts (except for metal, metal plating, glass, ceramic)		800 mg/kg
Application	Plasticizer, coating adhesive, synthetic leather, etc.	
Harmful effect	Endocrine disturbance, damage the liver, lungs, and reproductive system	
Test method	KS M 1991, ASTM D 3421, EPA 8061A, IEC 62321-8, etc.	
Test equipment	GC-MS, LC-MS, Py-GC-MS, etc.	

- ※ Especially, children's product including the leather/textile shall comply with the below criterion.
 - Total of 7 phthalates (DEHP, DBP, BBP, DIBP, DINP, DIDP, DnOP) < 0.1%

5.2.2 Level A-II

- 1) PCBs (Polychlorinated biphenyls), PCNs (Polychlorinated Naphthalenes),
 PCTs (Polychlorinated Terphenyls)

Scope of application		Maximum concentration limit
All parts		50 mg/kg
Application	<ul style="list-style-type: none"> • Plasticizer for insulating oil, specific lubricant, insulating properties, and heat-resisting insulation of transformer/condenser/paper condenser • Machine oil, copy paper as heat medium, which need heat like 200~400°C • Flame retardant pigment, Chlorinated Rubber pigment, pigment (weatherproofed, polish, insulation), printing ink 	
Harmful effect	Abnormal symptom on skin, loss of hair, weight losses, the central nerve, liver, kidney, thyroid gland, and immune system damage	
Test method	EPA 8082 etc.	
Test equipment	GC-MS, GC-ECD, etc.	

- 2) SCCP (Short-chain chlorinated paraffin, C10-C13)

Scope of application		Maximum concentration limit
All parts (except for metal, metal plating, glass, ceramic)		1,000 mg/kg
Application	PVC plasticizer, flame retardant	
Harmful effect	Cancer-causing, possible to generate dioxin by incineration	
Test method	EPA 3540C, 3550C, Solvent Extraction, etc.	
Test equipment	GC-MS, GC-ECD, etc.	

- 3) PFOS (Perfluorooctane sulfonate)

Scope of application		Maximum concentration limit
Substance and Preparation		50 mg/kg
Article / Assembly and parts		1,000 mg/kg
Textiles, coating material		1 µg/m ²
Application	Carpet, textiles, leather, paper packaging, Metal plating, Fire fighting foam	
Harmful effect	High persistent, Bioaccumulative, etc.	
Test method	KS M 9722, Solvent Extraction, etc.	
Test equipment	LC-MS-MS, etc.	

- ※ Excluded : photoresist or antireflective coating for photo plate process,
 mist suppressants for non-decorative chrome plating

4) Nickel (Ni) and its compounds

Scope of application		Maximum concentration limit
Surface-treated parts and exterior metal parts among parts that prolonged ¹⁾ contact with skin (e.g. earphone, headphone, handle, belt, mobile phone, etc.)		0.5 µg-Ni/cm ² per week
Application	Coating or alloy compounds, surface treatment(coating), bottom layer coating of parts, protecting coating, accessory coating	
Harmful effect	Allergy stimuli	
Test method	EN 1811, EN 12471, EN 12472, Korean children's product safety standard, etc.	
Test equipment	ICP-AES/OES, AAS, ICP-MS, etc.	

1) Prolonged contact with the skin : The skin contact time of 10 minutes on three or more occasions within two weeks, or 30 minutes on one or more occasions within two weeks

5) Asbestos

Scope of application		Maximum concentration limit
All parts (e.g. fire-resistant, lagging materials, heat insulator, etc.)		Not Detected
Application	Asbestos fibers, insulator, packing material, abrasive material, heat insulating material, fireproof material	
Harmful effect	Lung cancer, Asbestosis	
Test method	NIOSH 9000, NIOSH 9002, NIOSH 7402 etc.	
Test equipment	XRD, PLM, TEM, etc.	

6) Azo compounds

Scope of application		Maximum concentration limit
Leather or textile which are intended to come into direct and prolonged contact with the skin (e.g. belt, leather strap, earphone, headphone, shoulder pad, etc.)		30 mg/kg
Application	Paint, pigment, coloring agent for textiles and leather etc.	
Harmful effect	Azo dyes is absorbed into human body through sweat, etc.	
Test method	CEN ISO/TS 17234 (Leather), EN 14362-1-2 (Textile), Korean children's product safety standard, etc.	
Test equipment	GC-MS, HPLC, etc.	

7) Ugilec 121, 141, DBBT

Scope of application		Maximum concentration limit
All parts		Not Detected
Application	Transformer insulating oil, plasticizers, lubricants and excavators	
Harmful effect	In product persistent, dioxin, etc.	
Test method	EPA 3540C, Solvent Extraction, etc.	
Test equipment	GC-MS, GC-ECD, etc.	

8) Organic tin compounds (TBT/TPT/DBT/DOT etc.)

Scope of application		Maximum concentration limit	
All parts		1,000 mg/kg	
Leather or textile which are coated/printed in children's product		TBT	0.5 mg/kg
		DBT	1 mg/kg
Application	PVC stabilizer, antioxidant, antifungal, antipollution, Painting, ink, sterilizer, antiseptic, Antifoulant biocides		
Harmful effect	Obstacle destruction of the ecosystem of the wild, carcinogens etc.		
Test method	DIN 17353, DIN 38407, KS K 0737, Korean children's product safety standard, etc.		
Test equipment	GC-MS, etc.		

9) Arsenic (As) and its compounds

Scope of application		Maximum concentration limit	
Wooden products, totally or partly submerged parts		Not Detected	
Application	Paint, ink, sterilizer, wood preservative		
Harmful effect	Vomiting, skin browning/blackening, red blood cell reducing, loss of appetite, enlarged spleen, dry eruption		
Test method	EPA 3052, EPA 3050B, EN 1122 etc.		
Test equipment	ICP-AES/OES, AAS, ICP-MS, etc.		

10) ODC (Ozone layer depleting substances)

Scope of application		Maximum concentration limit	
All parts or manufacturing process materials		Not Detected	
Application	refrigerant, foaming agent, digestive, detergent		
Harmful effect	dermal cancer-causing etc.		
Test method	EPA 5021A, EPA 8260B, PNNL-16813, etc.		
Test equipment	GC-MS, GC-ECD, Headspace, etc.		

11) PAHs (Polycyclic aromatic hydrocarbons)

Scope of application		Maximum concentration limit	
Rubber or plastic parts that come into direct as well as prolonged or short-term repetitive contact with the human skin		1 mg/kg by each substances	
Rubber or plastic parts of children's product coming into contact with the skin		0.5 mg/kg by each substances	
Application	Cable, Plug, Plastic shaft, Plastic package, Strange smell plastic etc.		
Harmful effect	DNA change, harmful, mutation, cancer		
Test method	EPA 8100, EPA 3540C/8270D, ISO 187287, etc.		
Test equipment	GC-MS, etc.		

※ 8 PAHs on REACH restriction : Benzo[a]pyrene, Benzo[e]pyrene, Benzo[a]anthracene, Chrysen, Benzo[b]fluoranthene, Benzo[j]fluoranthene, Benzo[k]fluoranthene, Dibenzo[a,h]anthracene

12) Formaldehydes

Scope of application		Maximum concentration limit
All parts (adhesive, leather, textile etc.)		0.124 mg/m ³ (or 0.1 mg/kg)
Built-in household products		0.03 mg/m ³
Application	Adhesives, sterilizer, antiseptic, coating agent	
Harmful effect	Cancer-causing, promoting cancer-causing, atopic dermatitis, allergy	
Test method	ASTM E 1333, ASTM D 6007, EN 717-1, DIN EN 16516, VDA 275, ISO 16000-3, ISO/IEC 28360-1~2, KS X ISO/IEC 28360, Korean children's product safety standard	
Test equipment	HPLC, UV-VIS, etc.	

※ Products that the composite wood is included must comply the formaldehyde emission limit as below.
(except for wooden packaging such as pallet)

- North America region : EPA TSCA Title VI, ASTM E 1333 or ASTM D 6007 standard
(PB : 0.09 mg/kg, MDF : 0.11 mg/kg, Thin MDF : 0.13 mg/kg,
HWPW-CC : 0.05 mg/kg, Laminated product : 0.05 mg/kg etc.)
- Europe : EN 717-1 standard (e.g. 0.124 mg/m³)

13) DMF (Dimethylfumarate)

Scope of application		Maximum concentration limit
All parts (leather, insecticide treatment in wrapped fiber product or shall protection agent)		0.1 mg/kg
Application	Leather, insecticide treatment in wrapped fiber product, protection agent	
Harmful effect	Easily passing skin due to strong fat-solubility, strong stimulus into eyes etc.	
Test method	EPA 3540C, Solvent Extraction, etc.	
Test equipment	GC-MS, etc.	

14) VOC (Volatile Organic Compound)

Scope of application		Maximum concentration limit
Adhesive, paint		Toluene, Benzene : 1,000 mg/kg
Built-in household products		Total VOCs : 4 mg/m ³
Application	Solvent etc.	
Harmful effect	Atopic dermatitis, allergy, head ache, lethargic	
Test method	EPA 5012 A etc. (Toluene, Benzene), KS X ISO/IEC 28360 (emission for TVOC)	
Test equipment	TD-GC-MS, Headspace-GC-MS, etc.	

15) HBCDD (Hexaboromocyclododecane)

Scope of application		Maximum concentration limit
EPS packaging/parts, HIPS, etc		80 mg/kg
Application	Flame retardants of polystyrene material etc.	
Harmful effect	Atmospheric pollution, cancer etc.	
Test method	EPA 3540C, EPA 3550C, etc.	
Test equipment	GC-MS, GC-ECD, etc.	

16) BPA (Bisphenol A)

Scope of application		Maximum concentration limit
PC (polycarbonate) material of food contact parts and epoxy resin of varnish or coating materials		0.05 mg/kg
Thermal paper		200 mg/kg
Application	Vinyl chloride stabilizer, antioxidant	
Harmful effect	Endocrine, nerve developmental disability	
Test method	KS M 1997, EN13130-1, CEN/TS13130-13, Korean Food material standard, etc.	
Test equipment	HPLC, LC-MS, LC-MS-MS, etc.	

17) TCEP (Tris(2-chloroethyl)phosphate)

Scope of application		Maximum concentration limit
Children's products and all parts		1,000 mg/kg
Application	Flame retardants of polyurethane, coating product etc.	
Harmful effect	Carcinogenic, mutagenic and toxic to reproduction etc.	
Test method	EPA 3540CEPA 3550C, etc.	
Test equipment	GC-MS, GC-ECD, Py-GC-MS, etc.	

18) TDCPP (Tris(1,3-dichloro-2-propyl)phosphate)

Scope of application		Maximum concentration limit
Children's products and all parts		1,000 mg/kg
Application	Flame retardants of polyurethane, coating product etc.	
Harmful effect	Carcinogenic, mutagenic and toxic to reproduction etc.	
Test method	EPA 3540CEPA 3550C, etc.	
Test equipment	GC-MS, GC-ECD, Py-GC-MS, etc.	

19) Biocidal substances

Scope of application		Maximum concentration limit	
Antibacterial-functioning parts or products		No use besides approved usage	
<ul style="list-style-type: none"> Filters for air-conditioner/air-purifier Parts coming into contact with the drinking water 		PHMG, PGH, PHMB, CMIT, MIT, OIT, Triclosan	Not detected
Filters for air-conditioner/air-purifier		Emission limit by 7 substances	
		TiO ₂	1,000 mg
		SiO ₂	40 mg
		Cu and its compounds	70 mg
		ZnO	50 mg
		AgNO ₃	15 mg
		Zinc pyrithione	70 mg
	OTPA	2 mg	
Application	Self-protection of products, anti-microbial/sterilization functions		
Harmful effect	Carcinogenic, mutagenic and toxic to reproduction, deformity, death etc.		
Test method	EN71, ISO13365, Korean NIER law Notice 2018-71, etc.		
Test equipment	HPLC, LC-MS, LC-MS-MS, MALDI-TOF MS, etc.		

※ Excluded : Filters for air conditioning and water purification in buildings

20) PFOA (Perfluorooctyl acid) and its compounds

Scope of application		Maximum concentration limit	
All parts		0.025 mg/kg (Total PFOA compounds 0.1%)	
Application	Coating agents, water/oil-repellent agents, semiconductor cleaning agents		
Harmful effect	High persistent, Bioaccumulative, etc.		
Test method	KS M 9722, Solvent Extraction, etc.		
Test equipment	LC-MS-MS, etc.		

21) PCP (Pentachlorophenol) and its compounds

Scope of application		Maximum concentration limit	
Leather or textile		5 mg/kg	
Application	Preservatives, etc.		
Harmful effect	endocrine disruptor, etc.		
Test method	DIN 53313, US EPA 8270, etc.		
Test equipment	GC-MS, etc.		

5.2.3 Level B-I

1) PVC (Poly vinyl chloride)

Scope of application		Maximum concentration limit
All parts		900 mg/kg (Total Cl)
Application	Insulation, poly vinyl electric wire, tube, power supply code etc.	
Harmful effect	Plasticizer, stabilizer, filler, lubricant, and coloring agent are used on processing stage, and there are lots of hazardous substances which can cause nervous system damage, immune system abnormal condition, peripheral Vascular abnormal condition, liver cancer	
Test method	KS 0210 etc.	
Test equipment	Beilstein-Test or FT-IR	

2) Antimony (Sb) and its compounds

Scope of application		Maximum concentration limit
All parts including flame retardant		1,000 mg/kg
Application	Pigment, dye, catalyzer, flame retardant, stabilization, optical lens, solder, ink	
Harmful effect	Pneumoconiosis, physiology problem, premature birth, abortion	
Test method	EPA 3052, EPA 3050B etc.	
Test equipment	ICP-AES/OES, AAS, ICP-MS	

※ Excluded : Antimony that used to perform specific application besides flame retardants

3) Beryllium (Be) and its compounds, including alloy

Scope of application		Maximum concentration limit
All parts		1,000 mg/kg
Application	Ceramic materials, alloy, catalyzer, electrodes, molds, electrical contacts, spring materials, connectors etc.	
Harmful effect	Carcinogenity, mutagenicity, toxicity for reproduction etc.	
Test method	EPA 3052, EPA 3050B, ASTM E 3061-17, KS D 1966, KS D 1877, etc.	
Test equipment	ICP-AES/OES, AAS, ICP-MS, etc.	

※ Excluded : Beryllium alloy that used to perform specific application, such as connectors

4) Other phthalates (excluded Level A substances)

Scope of application		Maximum concentration limit
All parts (except for metal, metal plating, glass, ceramic)		1,000 mg/kg
Application	Plasticizer	
Harmful effect	lung, heart, blood harmful, deformed birth, genital generation repression etc.	
Test method	KS M 1991, ASTM D 3421, IEC 62321-8, EPA 3540C, US CPSC-CHC1001-09.1, etc.	
Test equipment	GC-MS, Py-GC-MS, etc.	

5) Other bromated flame retardants (excluded Level A substances)

Scope of application		Maximum concentration limit
All parts for flame retardant		900 mg/kg (Total Br)
Application	Flame retardants	
Harmful effect	EU regulated as potential hazardous substance, Possible to be decomposed into Endocrine disruptor etc.	
Test method	EPA 3540C, EPA 3550B etc. (Total Br : IEC62321-3-2, EN 50267-2-2, ASTM D 7359, KS M 0180, EN 14582 etc.)	
Test equipment	GC-MS, GC-ECD (Total Br : Combustion-IC, Oxygen Bomb-IC)	

6) Other chlorinated flame retardants (excluded Level A substances)

Scope of application		Maximum concentration limit
All parts for flame retardant		900 mg/kg (Total Cl)
Application	Flame retardants	
Harmful effect	EU regulated as potential hazardous substance, Possible to be decomposed into Endocrine disruptor etc.	
Test method	Solvent Extraction, etc. (Total Cl : IEC62321-3-2, ASTM D 7359, KS M 0180, EN 14582 etc.)	
Test equipment	GC-MS (Total Br : Combustion-IC, Oxygen Bomb-IC)	

Article 6 (Management standards for hazardous substances in packaging materials)

The packaging materials must be managed in accordance with the global packaging regulations, such as EU Packaging Directive 94/62/EC. Any hazardous substances not listed in the below table need to follow the management standards in Sections 5.2.1~5.2.3.

The labeling requirements for the packaging materials should meet the guide of the business unit.

Substance	Scope of application	Maximum concentration limit
Pb, Cd, Hg, Cr(VI)	All packaging materials which are delivered to the consumer	100 mg/kg (Total of 4 substances)
HBCDD	EPS foam	80 mg/kg
Arsenic compounds	Wooden packaging such as pallet	Not detected
PVC	Polyvinyl or wooden packaging such as pallet	Not detected

※ Excluded : Packaging materials made from lead crystal glass, packaging materials discarded from the manufacturing process

Article 7 (Management standards for hazardous substances in batteries)

The batteries which are provided to LG Electronics must be managed in accordance with the global battery regulations, such as EU Battery Directive 2006/66/EC. Any hazardous substances not listed in the below table need to follow the management standards in Sections 5.2.1~5.2.3.

The labeling requirements for the packaging materials should meet the guide of the business unit.

Substance	Scope of application	Maximum concentration limit
Cd and its compounds	All battery cell	20 mg/kg
Hg and its compounds	All battery cell	1 mg/kg
Pb and its compounds	Zinc-manganese battery cell	2,000 mg/kg
	All battery cell (except for lead acid battery and Zinc-manganese battery)	40 mg/kg

※ In addition to battery cells, homogenous materials for circuit parts shall be in accordance with 5.2.1.

Appendix 1 (Exemptions in electrical and electronic products of Level A-I)

Categories of EEE : 1 (Large household appliances), 2 (Small household appliances), 3 (IT and telecommunications equipment), 4 (Consumer equipment), 5 (Lighting equipment), 6 (Electrical and electronic tools), 7 (Toys, leisure and sports equipment), 8 (Medical devices), 9 (Monitoring and control instruments including industrial monitoring and control instruments), 10 (Automatic dispensers), 11 (Other EEE not covered by any of the categories above)

Exemption		Scope and dates of applicability	
1	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):		
1(a)	For general lighting purposes < 30 W: 5 mg	Expires on 31 December 2011; 3,5 mg may be used per burner after 31 December 2011 until 31 December 2012; 2,5 mg shall be used per burner after 31 December 2012	
1(b)	For general lighting purposes ≥ 30 W and < 50 W: 5 mg	Expires on 31 December 2011; 3,5 mg may be used per burner after 31 December 2011	
1(c)	For general lighting purposes ≥ 50 W and ≤ 150 W: 5 mg	No limitation	
1(d)	For general lighting purposes ≥ 150 W: 15 mg	No limitation	
1(e)	For general lighting purposes with circular or square structural shape and tube diameter <17 mm	No limitation of use until 31 December 2011; 7 mg may be used per burner after 31 December 2011	
1(f)	For special purposes: 5 mg	Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
1(g)	For general lighting purposes < 30 W with a lifetime equal or above 20 000 h: 3,5 mg	No limitation	
2(a)	Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):		
2(a)(1)	Tri-band phosphor with normal lifetime and a tube diameter > 9 mm (e.g. T2): 5 mg	Expires on 31 December 2011; 4 mg may be used per lamp after 31 December 2011	
2(a)(2)	Tri-band phosphor with normal lifetime and a tube diameter ≥ 9 mm and ≥ 17 mm (e.g. T5): 5 mg	Expires on 31 December 2011; 3 mg may be used per lamp after 31 December 2011	
2(a)(3)	Tri-band phosphor with normal lifetime and a tube diameter ≥ 17 mm and ≤ 28 mm (e.g. T8): 5 mg	Expires on 31 December 2011; 3,5 mg may be used per lamp after 31 December 2011	Hg
2(a)(4)	Tri-band phosphor with normal lifetime and a tube diameter > 28 mm (e.g. T12): 5 mg	Expires on 31 December 2012; 3,5 mg may be used per lamp after 31 December 2012	
2(a)(5)	Tri-band phosphor with long lifetime(≥ 25 000 h): 8 mg	Expires on 31 December 2011; 5 mg may be used per lamp after 31 December 2011	
2(b)	Mercury in other fluorescent lamps not exceeding (per lamp):		
2(b)(1)	Linear halophosphate lamps with tube > 28 mm (e.g. T10 and T12): 10 mg	Expires on 13 April 2012	
2(b)(2)	Non-linear halophosphate lamps (all diameters): 15 mg	Expires on 13 April 2016	
2(b)(3)	Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9)	No limitation of use until 31 December 2011; 15 mg may be used per lamp after 31 December 2011 Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
2(b)(4)	Lamps for other general lighting and special purposes (e.g. induction lamps)	No limitation of use until 31 December 2011; 15 mg may be used per lamp after 31 December 2011 Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	

Appendix 1 (Exemptions in electrical and electronic products of Level A-I)

Categories of EEE : 1 (Large household appliances), 2 (Small household appliances), 3 (IT and telecommunications equipment), 4 (Consumer equipment), 5 (Lighting equipment), 6 (Electrical and electronic tools), 7 (Toys, leisure and sports equipment), 8 (Medical devices), 9 (Monitoring and control instruments including industrial monitoring and control instruments), 10 (Automatic dispensers), 11 (Other EEE not covered by any of the categories above)

Exemption		Scope and dates of applicability
3	Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):	
3(a)	Short length (≥ 500 mm)	No limitation of use until 31 December 2011; 3,5 mg may be used per lamp after 31 December 2011 Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11
3(b)	Medium length (> 500 mm and $< 1\ 500$ mm)	No limitation of use until 31 Dec. 2011; 5 mg may be used per lamp after 31 Dec. 2011 Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11
3(c)	Long length ($> 1\ 500$ mm)	No limitation of use until 31 Dec. 2011; 13 mg may be used per lamp after 31 Dec. 2011 Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11
4(a)	Mercury in other low pressure discharge lamps (per lamp)	No limitation of use until 31 Dec. 2011; 15 mg may be used per lamp after 31 Dec. 2011 Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11
4(b)	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index $R_a > 60$:	
4(b)-I	$P < 155$ W	No limitation of use until 31 December 2011; 30 mg may be used per burner after 31 December 2011
4(b)-II	155 W $< P < 405$ W	No limitation of use until 31 Dec. 2011; 40 mg may be used per burner after 31 Dec. 2011
4(b)-III	$P > 405$ W	No limitation of use until 31 Dec. 2011; 40 mg may be used per burner after 31 Dec. 2011
4(c)	Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner):	
4(c)-I	$P \leq 155$ W	No limitation of use until 31 Dec. 2011; 25 mg may be used per burner after 31 Dec. 2011
4(c)-II	155 W $< P \leq 405$ W	No limitation of use until 31 Dec. 2011; 30 mg may be used per burner after 31 Dec. 2011
4(c)-III	$P > 405$ W	No limitation of use until 31 Dec. 2011; 40 mg may be used per burner after 31 Dec. 2011

Hg

Appendix 1 (Exemptions in electrical and electronic products of Level A-I)

Categories of EEE : 1 (Large household appliances), 2 (Small household appliances), 3 (IT and telecommunications equipment), 4 (Consumer equipment), 5 (Lighting equipment), 6 (Electrical and electronic tools), 7 (Toys, leisure and sports equipment), 8 (Medical devices), 9 (Monitoring and control instruments including industrial monitoring and control instruments), 10 (Automatic dispensers), 11 (Other EEE not covered by any of the categories above)

Exemption		Scope and dates of applicability	
4(d)	Mercury in High Pressure Mercury (vapour) lamps (HPMV)	Expires on 13 April 2015	Hg
4(e)	Mercury in metal halide lamps (MH)	Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
4(f)	Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex	Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
4(g)	Mercury in hand crafted luminous discharge tubes used for signs, decorative or architectural and specialist lighting and light-artwork, where the mercury content shall be limited as follows: (a) 20 mg per electrode pair + 0,3 mg per tube length in cm, but not more than 80 mg, for outdoor applications and indoor applications exposed to temperatures below 20 °C; (b) 15 mg per electrode pair + 0,24 mg per tube length in cm, but not more than 80 mg, for all other indoor applications.	Expires on 31 Dec. 2018	
5(a)	Lead in glass of cathode ray tubes	Expires on by category; - Expires on 21 July 2016 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Pb
5(b)	Lead in glass of fluorescent tubes not exceeding 0,2 % by weight	Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
6(a)	Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0,35 % lead by weight	Expires on by category; - Expires on 30 June 2019 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
6(a)-I	A: Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight	Expires on 21 July 2021 : 1-7 & 10	
	B : Lead as an alloying element in steel in batch hot dip galvanised steel components containing up to 0,2 % lead by weight	Expires on 21 July 2021 : 1-7 & 10	
6(b)	Lead as an alloying element in aluminium containing up to 0,4 % lead by weight	Expires on by category; - Expires on 30 June 2019 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	

Appendix 1 (Exemptions in electrical and electronic products of Level A-I)

Categories of EEE : 1 (Large household appliances), 2 (Small household appliances), 3 (IT and telecommunications equipment), 4 (Consumer equipment), 5 (Lighting equipment), 6 (Electrical and electronic tools), 7 (Toys, leisure and sports equipment), 8 (Medical devices), 9 (Monitoring and control instruments including industrial monitoring and control instruments), 10 (Automatic dispensers), 11 (Other EEE not covered by any of the categories above)

Exemption		Scope and dates of applicability	
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	Expires on 21 July 2021 : 1-7 & 10	
6(b)-II	Lead as an alloying element in aluminium for machining purposes with a lead content up to 0,4 % by weight	Expires on 18 May 2021 : 1-7 & 10	
6(c)	Copper alloy containing up to 4 % lead by weight	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
7(a)	Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead)	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
7(b)	Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission, and network management for telecommunications	Expires on by category; - Expires on 21 July 2016 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Pb
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	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
7(c)-II	Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
7(c)-III	Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V DC	Expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013	
7(c)-IV	Lead in PZT based dielectric ceramic materials for capacitors being part of integrated circuits or discrete semiconductors	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
8(a)	Cadmium and its compounds in one shot pellet type thermal cut-offs	Expires on 1 January 2012 and after that date may be used in spare parts for EEE placed on the market before 1 January 2012	
8(b)	Cadmium and its compounds in electrical contacts	Expires on by category; - 29 February 2020 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Cd

Appendix 1 (Exemptions in electrical and electronic products of Level A-I)

Categories of EEE : 1 (Large household appliances), 2 (Small household appliances), 3 (IT and telecommunications equipment), 4 (Consumer equipment), 5 (Lighting equipment), 6 (Electrical and electronic tools), 7 (Toys, leisure and sports equipment), 8 (Medical devices), 9 (Monitoring and control instruments including industrial monitoring and control instruments), 10 (Automatic dispensers), 11 (Other EEE not covered by any of the categories above)

Exemption		Scope and dates of applicability	
8(b)-I	Cadmium and its compounds in electrical contacts used in: - circuit breakers, - thermal sensing controls, - thermal motor protectors (excluding hermetic thermal motor protectors), - AC switches rated at: - 6 A and more at 250 V AC and more, or - 12 A and more at 125 V AC and more, - DC switches rated at 20 A and more at 18 V DC and more, and switches for use at voltage supply frequency \geq 200 Hz	Expires on 21 July 2021 : 1-7 & 10	Cd
9	Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators Up to 0,75 % by weight in the cooling solution	Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Cr (VI)
9(b)	Cadmium and its compounds in one shot pellet type thermal cut-offs	Expires on by category; - Expires on 5 July 2018 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Cd
9(b)-I	Lead in bearing shells and bushes for refrigerant-containing hermetic scroll compressors with a stated electrical power input equal or below 9 kW for heating, ventilation, air conditioning and refrigeration (HVACR) applications	Expires on 21 July 2019	
11(a)	Lead used in C-press compliant pin connector systems	May be used in spare parts for EEE placed on the market before 24 September 2010	
11(b)	Lead used in other than C-press compliant pin connector systems	Expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013	Pb
12	Lead as a coating material for the thermal conduction module C-ring	May be used in spare parts for EEE placed on the market before 24 September 2010	
13(a)	Lead in white glasses used for optical applications	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
13(b)	Cadmium and lead in filter glasses and glasses used for reflectance standards	Expires on by category; - Expires on 5 July 2018 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Pb, Cd
13(b)-I	Lead in ion coloured optical filter glass types	Expires on 21 July 2021 : 1-7 & 10	Pb
13(b)-II	Cadmium in striking optical filter glass types; excluding applications falling under point 39 of this Annex	Expires on 21 July 2021 : 1-7 & 10	Cd
13(b)-III	Cadmium and lead in glazes used for reflectance standards	Expires on 21 July 2021 : 1-7 & 10	Pb, Cd

Appendix 1 (Exemptions in electrical and electronic products of Level A-I)

Categories of EEE : 1 (Large household appliances), 2 (Small household appliances), 3 (IT and telecommunications equipment), 4 (Consumer equipment), 5 (Lighting equipment), 6 (Electrical and electronic tools), 7 (Toys, leisure and sports equipment), 8 (Medical devices), 9 (Monitoring and control instruments including industrial monitoring and control instruments), 10 (Automatic dispensers), 11 (Other EEE not covered by any of the categories above)

Exemption		Scope and dates of applicability	
14	Lead in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80 % and less than 85 % by weight	Expired on 1 January 2011 and after that date may be used in spare parts for EEE placed on the market before 1 January 2011	
15	Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages	Expires on by category; - 29 February 2020 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
16	Lead in linear incandescent lamps with silicate coated tubes	Expires on 1 September 2013	
17	Lead halide as radiant agent in high intensity discharge (HID) lamps used for professional reprography applications	Expires on by category; - Expires on 21 July 2016 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
18(a)	Lead as activator in the fluorescent powder (1 % lead by weight or less) of discharge lamps when used as speciality lamps for diazoprinting reprography, lithography, insect traps, photochemical and curing processes containing phosphors such as SMS ((Sr,Ba) 2 MgSi 2 O 7 :Pb)	Expired on 1 January 2011	Pb
18(b)	Lead as activator in the fluorescent powder (1 % lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP (BaSi 2 O 5 :Pb)	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
18(b)-I	Lead as activator in the fluorescent powder (1 % lead by weight or less) of discharge lamps containing phosphors such as BSP (BaSi2O5:Pb) when used in medical phototherapy equipment excluding applications covered by entry 34 of Annex IV)	Expires on 21 July 2021 : 5 & 8	
19	Lead with PbBiSn-Hg and PbInSn-Hg in specific compositions as main amalgam and with PbSn-Hg as auxiliary amalgam in very compact energy saving lamps (ESL)	Expires on 1 June 2011	
20	Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCDs)	Expires on 1 June 2011	
21	Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses		Pb, Cd
21(a)	Cadmium when used in colour printed glass to provide filtering functions, used as a component in lighting applications installed in displays and control panels of EEE	Expires on 21 July 2021 : 1-7 & 10	Cd
21(b)	Cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses	Expires on 21 July 2021 : 1-7 & 10	
21(c)	Lead in printing inks for the application of enamels on other than borosilicate glasses	Expires on 21 July 2021 : 1-7 & 10	Pb

Appendix 1 (Exemptions in electrical and electronic products of Level A-I)

Categories of EEE : 1 (Large household appliances), 2 (Small household appliances), 3 (IT and telecommunications equipment), 4 (Consumer equipment), 5 (Lighting equipment), 6 (Electrical and electronic tools), 7 (Toys, leisure and sports equipment), 8 (Medical devices), 9 (Monitoring and control instruments including industrial monitoring and control instruments), 10 (Automatic dispensers), 11 (Other EEE not covered by any of the categories above)

Exemption		Scope and dates of applicability	
23	Lead in finishes of fine pitch components other than connectors with a pitch of 0,65 mm and less	May be used in spare parts for EEE placed on the market before 24 September 2010	
24	Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
25	Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring	Expires on by category; - Expires on 21 July 2016 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Pb
26	Lead oxide in the glass envelope of black light blue lamps	Expires on 1 June 2011	
27	Lead alloys as solder for transducers used in high-powered (designated to operate for several hours at acoustic power levels of 125 dB SPL and above) loudspeakers	Expired on 24 September 2010	
29	Lead bound in crystal glass as defined in Annex I (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
30	Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more	Expires on by category; - Expires on 21 July 2016 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Cd
31	Lead in soldering materials in mercury free flat fluorescent lamps (which, e.g. are used for liquid crystal displays, design or industrial lighting)	Expires on by category; - Expires on 21 July 2016 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
32	Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Pb
33	Lead in solders for the soldering of thin copper wires of 100 µm diameter and less in power transformers	Expires on by category; - Expires on 21 July 2016 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	
34	Lead in cermet-based trimmer potentiometer elements	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	

Appendix 1 (Exemptions in electrical and electronic products of Level A-I)

Categories of EEE : 1 (Large household appliances), 2 (Small household appliances), 3 (IT and telecommunications equipment), 4 (Consumer equipment), 5 (Lighting equipment), 6 (Electrical and electronic tools), 7 (Toys, leisure and sports equipment), 8 (Medical devices), 9 (Monitoring and control instruments including industrial monitoring and control instruments), 10 (Automatic dispensers), 11 (Other EEE not covered by any of the categories above)

Exemption		Scope and dates of applicability	
36	Mercury used as a cathode sputtering inhibitor in DC plasma displays with a content up to 30 mg per display	Expired on 1 July 2010	Hg
37	Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body	Expires on by category; - 21 July 2021 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Pb
38	Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide	Expires on by category; - Expires on 21 July 2016 : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Cd
39	Cadmium in colour converting II-VI LEDs (< 10 µg Cd per mm ² of light-emitting area) for use in solid state illumination or display systems	Expired on 20 November 2018	
39(a)	Cadmium selenide in downshifting cadmium-based semiconductor nanocrystal quantum dots for use in display lighting applications (< 0,2 µg Cd per mm ² of display screen area)	No limitation	
40	Cadmium in photoresistors for analogue optocouplers	Expires on 31 December 2013	
41	Lead in solders and termination finishes of electrical and electronic components and finishes of printed circuit boards used in ignition modules and other electrical and electronic engine control systems, which for technical reasons shall be mounted directly on or in the crankcase or cylinder of hand-held combustion engines (classes SH:1, SH:2, SH:3 of Directive 97/68/EC of the European Parliament and of the Council)	Expires on by category; - No limitation : 1-7 & 10 - 21 July 2021 : 8 & 9 other than in vitro & industrial - 21 July 2023 : 8 (in vitro) - 21 July 2024 : 9 (industrial) & 11	Pb

Appendix 2 (Examples of substances and its compounds)

1) Lead (Pb) and its compounds

Name	Chemical symbol	CAS No.
Lead	Pb	7439-92-1
Lead(II) carbonate	PbCO ₃	598-63-0
Lead(IV) oxide	PbO ₂	1309-60-0
Lead(II,IV) oxide	Pb ₃ O ₄	1314-41-6
Lead(II) sulfide	PbS	1314-87-0
Lead azide	Pb(N ₃) ₂	13424-46-9
Lead(II) oxide	PbO	1317-36-8
Lead(II) fluoride	PbF ₂	7783-46-2
Lead(II) chloride	PbCl ₂	7758-95-4
Lead(IV) chloride	PbCl ₄	13463-30-4
Lead(II) carbonate basic	2PbCO ₃	1319-46-6
Lead(II) iodide	PbI ₂	10101-63-0
Lead hydroxycarbonate	(PbCO ₃) ₂ Pb(OH) ₂	1344-36-1
Lead(II) cyanide	Pb(CN) ₂	592-05-2
Lead(II) fluoroborate	Pb(BF ₄) ₂	13814-96-5
Lead(II) fluosilicate	PbSiF ₆	25808-74-6
Lead(II) sulfate	PbSO ₄	7446-14-2
Lead(II) phosphate	Pb ₃ (PO ₄) ₂	7446-27-7
Lead thiocyanate	Pb(SCN) ₂	592-87-0
Lead(II) chromate	PbCrO ₄	7758-97-6
Lead(II) titanate	PbTiO ₃	12060-00-3
Lead(II) acetate, trihydrate	Pb(CH ₃ COO) ₂ · 3H ₂ O	6080-56-4
Lead(II) acetate	Pb(CH ₃ COO) ₂	301-04-2
Lead(II) metaborate	Pb(BO ₂) ₂ · H ₂ O	10214-39-8
Lead metasilicate	PbSiO ₃	11120-22-2
Lead silicate	H ₂ O ₃ Si.xPb	22569-74-0
Lead antimonite	Pb(SbO ₄) ₃	13510-89-9
Lead hydrogen arsenate	PbHAsO ₄	7784-40-9
Lead(II) arsenite	Pb(AsO ₂) ₂	10031-13-7
Lead(IV) acetate / Lead tetraacetate	Pb(C ₂ H ₃ O ₂) ₄ / C ₈ H ₁₂ O ₈ Pb	546-67-8
Sulphuric acid, lead salt	PbSO ₄	15739-80-7
Lead sulfate, tribasic	Pb ₄ SO ₇ / PbSO ₄ (PbO) ₃	12202-17-4
Lead nitrate	Pb(NO ₃) ₂	10099-74-8
Lead sulfochromate yellow	-	1344-37-2
Lead oxide sulfate	Pb ₂ O(SO ₄)	12036-76-9
Lead molybdate	PbMoO ₄	10190-55-3
Tetramethyl lead	Pb(CH ₃) ₄	75-74-1
Tetraethyl lead	Pb(C ₂ H ₅) ₄	78-00-2
Lead selenide	PbSe	12069-00-0
Lead perchlorate ClHO4.1/2Pb	Pb(ClHO ₄) ₂	13637-76-8
Lead distearate	C ₃₆ H ₇₀ O ₄ Pb	1072-35-1
Lead stearate (stearic acid, lead salt)	C ₃₆ H ₇₀ O ₄ Pb	7428-48-0
Lead stearate, dibasic	2PbO / Pb(C ₁₇ H ₃₅ COO) ₂	56189-09-4
Other lead compounds	-	-

Appendix 2 (Examples of substances and its compounds)

2) Cadmium (Cd) and its compounds

Name	Chemical symbol	CAS No.
Cadmium	Cd	7440-43-9
Cadmium oxide	CdO	1306-19-0
Cadmium sulfide	CdS	1306-23-6
Cadmium zinc sulfide yellow	-	8048-07-5
Cadmium carbonate	CdCO ₃	513-78-0
Cadmium chloride	CdCl ₂	10108-64-2
Cadmium sulfate	CdSO ₄	10124-36-4
Cadmium nitrate	Cd(NO ₃) ₂	10325-94-7
Cadmium nitrate tetrahydrate	Cd(NO ₃) ₂ 4H ₂ O	10022-68-1
Cadmium stearate	Cd(C ₁₈ H ₃₅ O ₂) ₂	2223-93-0
Other cadmium compounds	-	-

3) Mercury and its compounds

Name	Chemical symbol	CAS No.
Mercury	Hg	7439-97-6
Mercury(I) chloride	Hg ₂ Cl ₂	10112-91-1
Mercury(II) chloride	HgCl ₂	7487-94-7
Mercury(I) oxide	Hg ₂ O	15829-53-5
Mercury(II) oxide	HgO	21908-53-2
Mercury(II) nitrate	Hg(NO ₃) ₂	10045-94-0
Mercury(I) sulfate	Hg ₂ (SO) ₄	7783-35-9
Mercury(II) fulminate	Hg(CNO) ₂	628-86-4
Mercury(II) acetate	Hg(CH ₃ COO) ₂	1600-27-7
Methylmercury salts	CH ₃ HgX (X: halogen)	-
Ethylmercury salts	C ₂ H ₅ HgX	-
Propylmercury salts	C ₃ H ₇ HgX	-
Methoxyethyl-mercury salts	CH ₃ OC ₂ H ₄ HgX	-
Diphenylmercury	(C ₆ H ₅) ₂ Hg	587-85-9
Dialkylmercury	R ₂ Hg(R: alkyl group)	-
Phenylmercury nitrate	C ₆ H ₅ HgNO ₃	55-68-5
Other mercury compounds	-	-

Appendix 2 (Examples of substances and its compounds)

4) Hexavalent chromium and its compounds

Name	Chemical symbol	CAS No.
Sodium dichromate	$\text{Na}_2\text{Cr}_2\text{O}_7$	10588-01-9
Sodium dichromate, dihydrate	$\text{Na}_2\text{Cr}_2\text{H}_2\text{O}_7$	7789-12-0
Chromium(VI) oxide / Chromium trioxide	CrO_3	1333-82-0
Calcium chromate	CaCrO_4	13765-19-0
Lead(II) chromate	PbCrO_4	7758-97-6
Potassium dichromate	$\text{K}_2\text{Cr}_2\text{O}_7$	7778-50-9
Potassium chromate	K_2CrO_7	7789-00-6
Lithium chromate	Li_2CrO_4	14307-35-8
Sodium chromate	Na_2CrO_4	7775-11-03
Potassium chlorochromate	$\text{K}[\text{CrO}_3\text{Cl}]$	16037-50-6
Ammonium chromate	$(\text{NH}_4)_2\text{CrO}_4$	7788-98-9
Copper chromate	CuCrO_4	13548-42-0
Magnesium chromate	MgCrO_4	13423-61-5
Strontium chromate	SrCrO_4	7789-06-02
Barium chromate	BaCrO_4	10294-40-3
Lead chromate (orange color)	PbCrO_4	1344-38-3
Lead chromate (yellow color)	$\text{PbCrO}_4+\text{PbSO}_4$	1344-37-2
Dichromium zinc tetraoxide	$\text{Cr}_2\text{O}_4\text{Zn}$	12018-19-8
Zinc chromate	ZnCrO_4	13530-65-9
Zinc dichromate	$\text{ZnCr}_2\text{H}_2\text{O}_7$	14018-95-2
Ammonium dichromate	$(\text{NH}_4)_2\text{Cr}_2\text{O}_7$	7789-09-05
Calcium dichromate	CaCr_2O_7	14307-33-6
Dichromic acid	$\text{H}_2\text{Cr}_2\text{O}_7$	13530-68-2
Copper chromite	CuCrO_3	12053-18-8
Other hexavalent chromium compounds	-	-

5) PBBs (Polybrominated biphenyls)

Name	Chemical symbol	CAS No.
Polybrominated biphenyl (PBB)	$\text{C}_{12}\text{HXBr}_{(10-x)}$	67774-32-7
2-bromodiphenyl	$\text{C}_{12}\text{H}_9\text{Br}$	2502-07-5
3-bromodiphenyl	$\text{C}_{12}\text{H}_9\text{Br}$	2113-57-7
4-bromodiphenyl	$\text{C}_{12}\text{H}_9\text{Br}$	92-66-0
4,4'-Dibromodiphenyl	$\text{C}_{12}\text{H}_8\text{Br}_2$	92-86-4
3,4,5-Tribromodiphenyl	$\text{C}_{12}\text{H}_7\text{Br}_3$	115245-08-4
2,4,6-Tribromodiphenyl	$\text{C}_{12}\text{H}_7\text{Br}_3$	59080-33-0
3,3',4,4',-tetrabromobiphenyl	$\text{C}_{12}\text{H}_6\text{Br}_4$	77102-82-0
2,2',4,5',-tetrabromobiphenyl	$\text{C}_{12}\text{H}_6\text{Br}_4$	60044-24-8
2,2',4,5',6-pentabromobiphenyl	$\text{C}_{12}\text{H}_5\text{Br}_5$	59080-39-6
3,3',4,4',5,5'-Hexabromodiphenyl	$\text{C}_{12}\text{H}_4\text{Br}_6$	60044-26-0
2,2',4,4',5,5'-Hexabromodiphenyl	$\text{C}_{12}\text{H}_4\text{Br}_6$	59080-40-9
2,2',3,3',4,5',6,6'-Octabromodiphenyl	$\text{C}_{12}\text{H}_2\text{Br}_8$	119264-60-7
2,2',3,3',4,4',5,5',6,6'-Decabromodiphenyl	$\text{C}_{12}\text{Br}_{10}$	13654-09-6
Other PBBs compounds	-	-

Appendix 2 (Examples of substances and its compounds)

6) PBDEs (Polybrominated diphenylethers)

Name	Chemical symbol	CAS No.
Polybrominated diphenyl ether(PBDE) Polybrominated diphenyl oxide(PBDO) Polybrominated byphenyl ethers(PBBE)	$C_{12}H_{(10-x)}Br_xO$	-
4-Bromophenyldiphenyl ether	$C_{12}H_9BrO$	101-55-3
4,4'-Dibromodiphenyl ether	$C_{12}H_8Br_2O$	2050-47-7
Tribromodiphenyl ether	$C_{12}H_7Br_3O$	49690-94-0
Tetrabromodiphenyl ether	$C_{12}H_6Br_4O$	40088-47-9
Pentabromodiphenyl ether	$C_{12}H_5Br_5O$	32534-81-9
Hexabromodiphenyl ether	$C_{12}H_4Br_6O$	36483-60-0
Heptabromodiphenyl ether	$C_{12}H_3Br_7O$	68928-80-3
Octabromodiphenyl ether	$C_{12}H_2Br_8O$	32536-52-0
Nonabromodiphenyl ether	$C_{12}HBr_9O$	63936-56-1
Decabromodiphenyl ether	$C_{12}Br_{10}O$	1163-19-5
Other PBDEs compounds	-	-

7) DEHP (Bis(2-ethylhexyl)phthalate)

Name	Chemical symbol	CAS No.
Bis(2-ethylhexyl)phthalate (DEHP)	$C_{24}H_{38}O_4$	117-81-7

8) DBP (Dibutyl phthalate)

Name	Chemical symbol	CAS No.
Dibutyl phthalate (DBP)	$C_{16}H_{22}O_4$	84-74-2

9) BBP (Benzyl butyl phthalate)

Name	Chemical symbol	CAS No.
Benzyl butyl phthalate (BBP)	$C_{19}H_{20}O_4$	85-68-7

10) DIBP (Diisobutyl phthalate)

Name	Chemical symbol	CAS No.
Diisobutyl phthalate (DIBP)	$C_{16}H_{22}O_4$	84-69-5

Appendix 2 (Examples of substances and its compounds)

11) Polychlorinated biphenyls (PCBs), Polychlorinated Naphthalenes (PCNs), Polychlorinated Terphenyls (PCTs)

Name	Chemical symbol	CAS No.
Polychlorinated biphenyls (PCBs)	$C_{12}H_{10-x}Cl_x$	1336-36-3
Polychlorinated terphenyls (PCTs)	$C_{18}H_{14-x}Cl_x$	61788-33-8
Polychlorinated naphthalenes (PCNs)	$C_{10}H_{8-x}Cl_x$	70776-03-3
Trichloronaphthalene	$C_{10}H_5Cl_3$	1321-65-9
Tetrachloronaphthalene	$C_{10}H_4Cl_4$	1335-88-2
Pentachloronaphthalene	$C_{10}H_3Cl_5$	1321-64-8
Octachloronaphthalene	$C_{10}Cl_8$	2234-13-1
Other PCBs, PCNs, PCTs compounds	-	-

12) SCCP ; Short Chain Chlorinated Paraffin

Name	Chemical symbol	CAS No.
Alkanes, C10~13, chloro (SCCP, Short Chain Chlorinated Paraffins)	-	85535-84-8
Alkanes, C6-18, chloro	-	68920-70-7
Alkanes, C12-13, chloro	-	71011-12-6
Alkanes, C12-14, chloro	-	85536-22-7
Alkanes, C10-14, chloro	-	85681-73-8
Alkanes, C10-12, chloro	-	108171-26-2
Alkanes, C10-21, chloro	-	84082-38-2
Alkanes, C10-26, chloro	-	97659-46-6
Alkanes, C10-32, chloro	-	84776-06-7
Other Alkane 10-13 Carbon chain compounds	-	-

13) PFOS (Perfluorooctane sulfonate)

Name	Chemical symbol	CAS No.
Ammonium heptadecafluorooctane sulfonate	$C_8H_4F_{17}NO_3S$	29081-56-9
Heptadecafluoro-1-octanesulfonic acid, compound with diethanolamine	$C_{12}H_{12}F_{17}NO_5S$	70225-14-8
Lithium perfluorooctane sulfonate	$C_8F_{17}LiO_3S$	29457-72-5
Heptadecafluorooctane sulfonic acid	$C_8HF_{17}O_3S$	1763-23-1
Potassium perfluorooctane sulfonate	$C_8F_{17}KO_3S$	2795-39-3
Perfluorooctane sulfonyl fluoride	$C_8F_{18}O_2S$	307-35-7
Heptadecafluorooctanesulfonic acid tetraethylammonium salt	$C_{16}H_{20}F_{17}NO_3S$	56773-42-3
Heptadecafluorooctanesulfonic acid sodium salt	$C_8F_{17}NaO_3S$	4021-47-0
Heptadecafluorooctanesulfonamide	$C_8H_2F_{17}NO_2S$	754-91-6
C ₈ F ₁₇ SO ₂ X (X=OH, metal salt, halide, amide and other derivatives including polymers)	-	-
Compounds that contain C ₈ F ₁₇ SO ₂ , C ₈ F ₁₇ SO ₃ or C ₈ F ₁₇ SO ₂ N moieties	-	-
Other PFOS compounds	-	-

Appendix 2 (Examples of substances and its compounds)

14) Nickel and its compounds

Name	Chemical symbol	CAS No.
Nickel	Ni	7440-02-0
Nickel(II) oxide	NiO	1313-99-1
Nickel sulfate	NiSO ₄	7786-81-4
Nickel carbonate	NiCO ₃	3333-67-3
Nickel chloride	NiCl ₂	7718-54-9
Dinickel trioxide	Ni ₂ O ₃	1314-06-3
Nickel dihydroxide	NiH ₂ O ₂	12054-48-7
Nickel acetate	NiC ₄ H ₆ O ₄	373-02-4
Nickel carbonyl	Ni(CO) ₄	13463-39-3
Other nickel compounds	-	-

15) Asbestos

Name	Chemical symbol	CAS No.
Actinolite	Ca ₂ (Mg,Fe) ₅ Si ₈ O ₂₂ (OH) ₂	77536-66-4
Amosite	(Mg,Fe) ₇ Si ₈ O ₂₂ (OH) ₂	12172-73-5
Anthophyllite	(Mg,Fe) ₇ Si ₈ O ₂₂ (OH) ₂	77536-67-5
Chrysotile	Mg ₃ Si ₂ O ₅ (OH) ₄	12001-29-5
Crocidolite	Na ₂ F ₅ Si ₈ O ₂₂ (OH) ₂	12001-28-4
Tremolite	Ca ₂ (Mg,Fe) ₅ Si ₈ O ₂₂ (OH) ₂	77536-68-6

16) Azo compounds

Name	Chemical symbol	CAS No.
2,4,5-Trimethylaniline	C ₉ H ₁₃ N	137-17-7
2,4-Diaminoanisole	C ₇ H ₁₀ N ₂ O	615-05-4
2,4-Toluediamine	C ₇ H ₁₀ N ₂	95-80-7
2-Amino-4-nitrotoluene	C ₇ H ₈ N ₂ O ₂	99-55-8
2-Naphthylamine	C ₁₀ H ₉ N	91-59-8
3,3'-Dichlorobenzidine	C ₁₂ H ₁₀ Cl ₂ N ₂	91-94-1
3,3'-Dimethoxybenzidine	C ₁₄ H ₁₆ N ₂ O ₂	119-90-4
3,3'-Dimethyl-4,4'diaminodiphenylmethane	C ₁₅ H ₁₈ N ₂	838-88-0
3,3'-Dimethylbenzidine	C ₁₄ H ₁₆ N ₂	119-93-7
4,4'-Diaminodiphenylmethane	C ₁₃ H ₁₄ N ₂	101-77-9
4,4'-Methylene-bis-(2-chloraniline)	C ₁₃ H ₁₂ Cl ₂ N ₂	101-14-4
4,4'-Oxydianiline	C ₁₂ H ₁₂ N ₂ O	101-80-4
4,4'-Thiodianiline	C ₁₂ H ₁₂ N ₂ S	139-65-1
4-amino azobenzene	C ₁₂ H ₁₁ N ₃	60-09-3
4-Aminodiphenyl	C ₁₂ H ₁₁ N	92-67-1
4-Chloro-o-toluidine	C ₇ H ₈ ClN	95-69-2
Benzidine	C ₁₂ H ₁₂ N ₂	92-87-5

Appendix 2 (Examples of substances and its compounds)

16) Azo compounds

Name	Chemical symbol	CAS No.
o-Aminoazotoluene	$C_{14}H_{15}N_3$	97-56-3
o-anisidine	C_7H_9NO	90-04-0
o-Toluidine	C_7H_9N	95-53-4
p-Chloroaniline	C_6H_6ClN	106-47-8
p-Cresidine	$C_8H_{11}NO$	120-71-8

17) Ugilec 121, 141, DBBT

Name	Chemical symbol	CAS No.
DBBT (Monomethyl dibromo diphenyl methane)	$C_{14}H_{12}Br_2$	99688-47-8
Ugilec 121 (Monomethyl dichloro diphenyl methane)	$C_{14}H_{12}Cl_2$	81161-70-8
Ugilec 141 (Monomethyl tetrachloro diphenyl methane)	$C_{14}H_{10}Cl_4$	76253-60-6

18) Organic tin compounds

Name	Chemical symbol	CAS No.
Bis(tri-n-butyltin) oxide	$O(Sn(C_4H_9)_3)_2$	56-35-9
Tributyltin(TBT)	$(C_4H_9)_3Sn$	56573-85-4
Triphenyltin (TPT)	$(C_6H_5)_3Sn$	668-34-8
Tributyltin bromide	$(C_4H_9)_3SnBr$	1461-23-0
Triphenyltin N,N'-dimethyldithiocarbamate	$(C_6H_5)_3Sn(CH_3)_2NCS_2$	1803-12-9
Triphenyltin fluoride	$(C_6H_5)_3SnF$	379-52-2
Triphenyltin acetate	$(C_6H_5)_3SnOCOCH_3$	900-95-8
Triphenyltin chloride	$(C_6H_5)_3SnCl$	639-58-7
Triphenyltin hydroxide	$(C_6H_5)_3SnOH$	76-87-9
Triphenyltin fatty acid salts (C=9~11)	-	47672-31-1
Triphenyltin chloroacetate	$(C_6H_5)_3SnOCOCH_2Cl$	7094-94-2
Tributyltin methacrylate	$(C_4H_9)_3SnC_4H_5O_2$	2155-70-6, 18380-71-7
Bis(tributyltin) fumarate	$C_2H_2(COO)_2((C_4H_9)_3Sn)_2$	6454-35-9
Tributyltin fluoride	$(C_4H_9)_3SnF$	1983-10-4
Bis(tributyltin) 2,3-dibromosuccinate	$((C_4H_9)_3Sn)_2C_2H_2(Br)_2(COO)_2$	31732-71-5
Tributyltin acetate	$(C_4H_9)_3SnOCOCH_3$	56-36-0
Tributyltin laurate	$(C_4H_9)_3SnC_{12}H_{23}O_2$	3090-36-6
Bis(tributyltin) phthalate	$C_6H_4(COO)_2((C_4H_9)_3Sn)_2$	4782-29-0
Copolymer of alkyl acrylate, methyl methacrylate and tributyltin methacrylate (alkyl; C=8)	-	-
Tributyltin sulfamate	$(C_4H_9)_3SnSO_3NH_2$	6517-25-5
Bis(tributyltin) maleate	$C_2H_2(COO)_2((C_4H_9)_3Sn)_2$	14275-57-1
Tributyltin chloride	$(C_4H_9)_3SnCl$	1461-22-9
Mixture of tributyltin cyclopentane-carboxylate and its analogs (Tributyltin rosin salts)	$(C_4H_9)_3SnSO_3C_5H_9$	26239-64-5

Appendix 2 (Examples of substances and its compounds)

18) Organic tin compounds

Name	Chemical symbol	CAS No.
Tributyltin naphthennate	$(C_4H_9)_3Sn(C_{10}H_8)$	85409-17-2
Dibutyltin	$C_8H_{20}Sn$	1002-53-5
Diocetyl tin	$C_{16}H_{36}Sn$	15231-44-4
Dibutyltin X	$C_8H_{20}SnX$	-
Diocetyl tin X	$C_{16}H_{36}SnX$	-
Other organotin compounds	-	-

19) Arsenic and its compounds

Name	Chemical symbol	CAS No.
Arsenic	As	7440-38-2
Triethyl arsenate	$C_6H_{15}AsO_4$	15606-95-8
Arsenic acid disodium salt, heptahydrate	$AsH_{15}Na_2O_{11}$	10048-95-0
Arsenic acid, calcium salt	$As_2Ca_3O_8$	7778-44-1
Arsenic acid, copper salt	$As_2Cu_3O_8$	10103-61-4
Arsenic acid, diammonium salt	$AsH_9N_2O_4$	7784-44-3
Arsenic acid, lead salt	$AsHO_4Pb$	7784-40-9
Arsenic acid, magnesium salt	$As_2Mg_3O_8$	10103-50-1
Arsenic pentoxide	As_2O_5	1303-28-2
Arsenic trichloride	$AsCl_3$	7784-34-1
Arsenic trihydride	AsH_3	7784-42-1
Arsenic trioxide	As_2O_3	1327-53-3
Arsenious acid, copper (II) salt	$AsCuHO_3$	10290-12-7
Gallium arsenide	$AsGa$	1303-00-0
Arsenious acid, potassium salt	$AsKO_2$	10124-50-2

20) ODCs (Ozone layer depleting substances)

Name	Chemical symbol	CAS No.
Chloroform	$CHCl_3$	67-66-3
1,1,2 Trichloroethane	$C_2H_3Cl_3$	79-00-5
1,1,1,2 Tetrachloroethane	$C_2H_2Cl_4$	79-34-5
1,1,1,2 Tetrachloroethane	$C_2H_2Cl_4$	630-20-6
Pentachloroethane	C_2HCl_5	76-01-7
1,1 Dichloroethylene	$C_2H_2Cl_2$	75-35-4
CFC 11	CCl_3F	75-69-4
CFC 111	C_2Cl_5F	354-56-3
CFC 112	$C_2Cl_4F_2$	76-12-0, 28605-74-5
CFC 113	$C_2Cl_3F_3$	76-13-1
CFC 114	$C_2Cl_2F_4$	76-14-2, 1320-37-2
CFC 115	C_2ClF_5	76-15-3

Appendix 2 (Examples of substances and its compounds)

20) ODCs (Ozone layer depleting substances)

Name	Chemical symbol	CAS No.
CFC 12	CCl_2F_2	75-71-8
CFC 13	CClF_3	75-72-9
CFC 211	$\text{C}_3\text{Cl}_7\text{F}$	422-78-6, 135401-87-5
CFC 212	$\text{C}_3\text{Cl}_6\text{F}_2$	3182-26-1
CFC 213	$\text{C}_3\text{Cl}_5\text{F}_3$	2354-06-5
CFC 214	$\text{C}_3\text{Cl}_4\text{F}_4$	2268-46-4
CFC 215	$\text{C}_3\text{Cl}_3\text{F}_5$	1652-81-9
CFC 216	$\text{C}_3\text{Cl}_2\text{F}_6$	661-97-2
CFC 217	C_3ClF_7	422-86-6
Halon 1211	CBrClF_2	353-59-3
Halon 1301	CBrF_3	75-63-8
Halon 2402	$\text{C}_2\text{Br}_2\text{F}_4$	124-73-2
bromochloromethane	CH_2BrCl	74-97-5
HBFC-121B4	C_2HFBr_4	306-80-9
HBFC-122B3	$\text{C}_2\text{HF}_2\text{Br}_3$	-
HBFC-123B2	$\text{C}_2\text{HF}_3\text{Br}_2$	354-04-1
HBFC-124B1	$\text{C}_2\text{HF}_4\text{Br}$	-
HBFC-131B3	$\text{C}_2\text{H}_2\text{FBr}_3$	-
HBFC-132B2	$\text{C}_2\text{H}_2\text{F}_2\text{Br}_2$	75-82-1
HBFC-141B2	$\text{C}_2\text{H}_3\text{FBr}_2$	358-97-4
HBFC-133B1	$\text{C}_2\text{H}_2\text{F}_3\text{Br}$	-
HBFC-142B1	$\text{C}_2\text{H}_3\text{F}_2\text{Br}$	-
HBFC-151B1	$\text{C}_2\text{H}_4\text{FBr}$	762-49-2
HBFC-21B2	CHFBr_2	-
HBFC-221B6	C_3HFBr_6	-
HBFC-222B5	$\text{C}_3\text{HF}_2\text{Br}_5$	-
HBFC-223B4	$\text{C}_3\text{HF}_3\text{Br}_4$	-
HBFC-224B3	$\text{C}_3\text{HF}_4\text{Br}_3$	-
HBFC-226B1	$\text{C}_3\text{HF}_6\text{Br}$	-
HBFC-225B2	$\text{C}_3\text{HF}_5\text{Br}_2$	431-78-7
HBFC-22B1	CHF_2Br	-
HBFC-231B5	$\text{C}_3\text{H}_2\text{FBr}_5$	-
HBFC-232B4	$\text{C}_3\text{H}_2\text{F}_2\text{Br}_4$	-
HBFC-233B3	$\text{C}_3\text{H}_2\text{F}_3\text{Br}_3$	
HBFC-234B2	$\text{C}_3\text{H}_2\text{F}_4\text{Br}_2$	-
HBFC-235B1	$\text{C}_3\text{H}_2\text{F}_5\text{Br}$	460-88-8
HBFC-242B3	$\text{C}_3\text{H}_3\text{F}_2\text{Br}_3$	70192-80-2
HBFC-241B4	$\text{C}_3\text{H}_3\text{FBr}_4$	-
HBFC-243B2	$\text{C}_3\text{H}_3\text{F}_3\text{Br}_2$	70192-83-5
HBFC-244B1	$\text{C}_3\text{H}_3\text{F}_4\text{Br}$	679-84-5
HBFC-251B3	$\text{C}_3\text{H}_4\text{FBr}_3$	75372-14-1

Appendix 2 (Examples of substances and its compounds)

20) ODCs (Ozone layer depleting substances)

Name	Chemical symbol	CAS No.
HBFC-253B1	C ₃ H ₄ F ₃ Br	421-46-5
HBFC-252B2	C ₃ H ₄ F ₂ Br ₂	460-25-3
HBFC-261B2	C ₃ H ₅ FBr ₂	51584-26-0
HBFC-262B1	C ₃ H ₅ F ₂ Br	-
HBFC-31B1	CH ₂ FBr	-
HBFC-271B1	C ₃ H ₆ FBr	352-91-0
HCFC-31	CH ₂ FCl	373-52-4
HCFC-121	C ₂ HFCl ₄	354-14-3
HCFC-122	C ₂ HF ₂ Cl ₃	354-21-2
HCFC-123	C ₂ HF ₃ Cl ₂	306-83-2
HCFC-124	C ₂ HF ₄ Cl	2837-89-0
HCFC-131	C ₂ H ₂ FCl ₃	134237-34-6
HCFC-132	C ₂ H ₂ F ₂ Cl ₂	25915-78-0
HCFC-133	C ₂ H ₂ F ₃ Cl	75-88-7
HCFC-141	C ₂ H ₃ FCl ₂	25167-88-8
HCFC-141b	C ₂ H ₃ FCl ₂	1717-00-6
HCFC-142	C ₂ H ₃ F ₂ Cl	25497-29-4
HCFC-142b	CH ₃ CF ₂ Cl	75-68-3
HCFC-151	C ₂ H ₄ FCl	1615-75-4
HCFC-21	CHFCl ₂	75-43-4
HCFC-22	CHF ₂ Cl	75-45-6
HCFC-221	C ₃ HFCl ₆	134237-35-7
HCFC-222	C ₃ HF ₂ Cl ₅	134237-36-8
HCFC-223	C ₃ HF ₃ Cl ₄	34237-37-9
HCFC-224	C ₃ HF ₄ Cl ₃	134237-38-0
HCFC-225	C ₃ HF ₅ Cl ₂	128903-21-9
HCFC-225ca	CF ₃ CF ₂ CHCl ₂	422-56-0
HCFC-225cb	CF ₂ ClCF ₂ CHClF	507-55-1
HCFC-226	C ₃ HF ₆ Cl	134308-72-8
HCFC-231	C ₃ H ₂ FCl ₅	134190-48-0
HCFC-232	C ₃ H ₂ F ₂ Cl ₄	134237-39-1
HCFC-233	C ₃ H ₂ F ₃ Cl ₃	134237-40-4
HCFC-234	C ₃ H ₂ F ₄ Cl ₂	127564-83-4
HCFC-235	C ₃ H ₂ F ₅ Cl	134237-41-5
HCFC-241	C ₃ H ₃ FCl ₄	134190-49-1
HCFC-242	C ₃ H ₃ F ₂ Cl ₃	134237-42-6
HCFC-243	C ₃ H ₃ F ₃ Cl ₂	134237-43-7
HCFC-244	C ₃ H ₃ F ₄ Cl	134190-50-4
HCFC-251	C ₃ H ₄ FCl ₃	134190-51-5
HCFC-252	C ₃ H ₄ F ₂ Cl ₂	134190-52-6
HCFC-253	C ₃ H ₄ F ₃ Cl	134237-44-8

Appendix 2 (Examples of substances and its compounds)

20) ODCs (Ozone layer depleting substances)

Name	Chemical symbol	CAS No.
HCFC-261	$C_3H_5FCl_2$	134237-45-9
HCFC-262	$C_3H_5F_2Cl$	134190-53-7
HCFC-271	C_3H_6FCl	134190-54-8
methyl bromide	CH_3Br	74-83-9
1,1,1-trichloroethane	$C_2H_3Cl_3$	71-55-6
Carbon tetrachloride	CCl_4	56-23-5
Trichloroethylene	C_2HCl_3	79-01-06
sulfur hexafluoride	F_6S	2551-62-4
HFCs	-	-
PFCs	-	-

21) PAHs (Polycyclic aromatic hydrocarbons)

Name	Chemical symbol	CAS No.
Naphthalene	$C_{10}H_8$	91-20-3
Acenaphthalene	$C_{12}H_8$	208-96-8
Acenaphthene	$C_{12}H_8$	83-32-9
Fluorene	$C_{13}H_{10}$	86-73-7
Phenanthrene	$C_{14}H_{10}$	85-01-8
Anthracene	$C_{14}H_{10}$	120-12-7
Pyrene	$C_{16}H_{10}$	129-00-0
Benzo[g,h,i]perylene	$C_{22}H_{12}$	129-24-2
Benzo(a)pyrene(BaP)	$C_{20}H_{12}$	50-32-8
Benzo(e)pyrene(BeP)	$C_{20}H_{12}$	192-97-2
Benzoanthracenepylene(BaA)	$C_{18}H_{12}$	56-55-3
Chrysen	$C_{18}H_{12}$	218-01-9
Benzofluoranthene(BbFA)	$C_{20}H_{12}$	205-99-2
Benzofluoranthene(BjFA)	$C_{20}H_{12}$	205-82-3
Benzofluoranthene(BkFA)	$C_{20}H_{12}$	207-08-9
Dibenzoanthracene(DBAaA)	$C_{22}H_{14}$	53-70-3

22) Formaldehydes

Name	Chemical symbol	CAS No.
Formaldehyde	HCHO	50-00-0

23) DMF (Dimethylfumarate)

Name	Chemical symbol	CAS No.
Dimethylfumarate	$C_6H_8O_4$	624-49-7

Appendix 2 (Examples of substances and its compounds)

24) VOCs (Volatile Organic Compounds)

Name	Chemical symbol	CAS No.
Benzene	C_6H_6	71-43-2
Toluene	C_7H_8	108-88-3
Ethylbenzene	$C_6H_5C_2H_5$	100-41-4
m-Xylene	$C_6H_4(CH_3)_2$	108-38-3
p-Xylene	$C_6H_4(CH_3)_2$	106-42-3
o-Xylene	$C_6H_4(CH_3)_2$	95-47-6
Styrene	C_8H_8	100-42-5
Other VOC compounds	-	-

25) HBCDD (Hexabromocyclododecane)

Name	Chemical symbol	CAS No.
Hexabromocyclododecane (HBCDD)	$C_{12}H_{18}Br_6$	25637-99-4
Alpha-hexabromocyclododecane	$\alpha-C_{12}H_{18}Br_6$	134237-50-6
Beta-hexabromocyclododecane	$\beta-C_{12}H_{18}Br_6$	134237-51-7
Gamma-hexabromocyclododecane	$\gamma-C_{12}H_{18}Br_6$	134237-52-8
1,2,5,6,9,10-hexabromocyclododecane	$C_{12}H_{18}Br_6$	3194-55-6

26) BPA (Bisphenol A)

Name	Chemical symbol	CAS No.
Bisphenol A	$C_{15}H_{16}O_2$	80-05-7

27) TCEP (Tris(2-chloroethyl) phosphate)

Name	Chemical symbol	CAS No.
Tris(2-chloroethyl) phosphate (TCEP)	$C_6H_{12}Cl_3O_4P$	115-96-8

28) TDCPP (Tris(1,3-dichloro-2-propyl)phosphate)

Name	Chemical symbol	CAS No.
Tris(1,3-dichloro-2-propyl)phosphate (TDCPP)	$C_9H_{15}Cl_6O_4P$	13674-87-8

29) PFOA (Perfluorooctanoic acid)

Name	Chemical symbol	CAS No.
Pentadecafluorooctanoic acid	$C_8HF_{15}O_2$	335-67-1
Perfluorooctanoic anhydride	$C_{16}F_{30}O_3$	33496-48-9
Perfluorooctanoic acid, ammonium salt	$C_8H_4F_{15}NO_2$	3825-26-1
Perfluorooctanoic acid sodium salt	$C_8F_{15}NaO_2$	335-95-5

Appendix 2 (Examples of substances and its compounds)**29) PFOA (Perfluorooctanoic acid)**

Name	Chemical symbol	CAS No.
Potassium perfluorooctanoate	$C_8H_2F_{15}KO_2$	2395-00-8
Silver perfluorooctanoate	$C_8AgF_{15}O_2$	335-93-3
Perfluorooctanoyl fluoride	$C_8F_{16}O$	335-66-0
Methyl perfluorooctanoate	$C_9H_3F_{15}O_2$	376-27-2
Ethyl perfluorooctanoate	$C_{10}H_5F_{15}O_2$	3108-24-5
Other Perfluorooctanoic acid compounds	-	-

30) PCP (Pentachlorophenol)

Name	Chemical symbol	CAS No.
2,3,4,5,6-Pentachlorophenol	C_6HCl_5O	87-86-5

31) PVC (Poly vinyl chloride)

Name	Chemical symbol	CAS No.
Poly vinyl chloride	$H(CH_2CHCl)_nH$	9002-86-2, 93050-82-9

32) Antimony compounds

Name	Chemical symbol	CAS No.
Antimony trioxide	Sb_2O_3	1309-64-4
Antimony pentaoxide	Sb_2O_5	1314-60-9
Antimony trisulfide	Sb_2S_3	1345-04-6
Antimony trichloride	$SbCl_3$	10025-91-9
Sodium antimonate	$NaSbO_3$	15432-85-6
Antimony pentachloride	$SbCl_5$	7647-18-9
Antimony tetroxide	Sb_2O_4	1332-81-6
Indium antimonide	$InSb$	1312-41-0
Other Antimony compounds	-	-

33) Beryllium and its compounds

Name	Chemical symbol	CAS No.
Beryllium	Be	7440-41-7
Beryllium carbonate	$Be_2CO_3(OH)_2$	66104-24-3
Beryllium chloride	$BeCl_2$	7787-47-5
Beryllium fluoride	BeF_2	7787-49-7
Beryllium hydroxide	BeH_2O_2	13327-32-7
Other Beryllium compounds	-	-

Appendix 2 (Examples of substances and its compounds)

34) Other phthalates

Name	Chemical symbol	CAS No.
Di-"isononyl" phthalate (DINP)	C ₂₆ H ₄₂ O ₄	28553-12-1, 68515-48-0
di-"isodecyl" phthalate (DIDP)	C ₂₈ H ₄₆ O ₄	26761-40-0, 68515-49-1
di-n-octyl phthalate (DnOP)	C ₂₄ H ₃₈ O ₄	117-84-0
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	-	68515-42-4
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	-	71888-89-6
1,2-Benzenedicarboxylic acid, dipentylester, branched and linear (DPP)	-	84777-06-0
Dimethyl phthalate (DMP)	C ₁₀ H ₁₀ O ₄	131-11-3
Diethyl phthalate (DEP)	C ₁₂ H ₁₄ O ₄	84-66-2
Di-n-hexyl phthalate (DnHP)	C ₂₀ H ₃₀ O ₄	84-75-3
Bis(2-methoxyethyl) phthalate (DMEP)	C ₁₄ H ₁₈ O ₆	117-82-8
Di-iso-pentyl phthalate (DIPP)	C ₁₃ H ₁₆ O ₄	605-50-5
n-Pentyl-isopentyl phthalate (nPIPP)	C ₁₈ H ₂₆ O ₄	776297-69-9
Di-n-pentyl phthalate (DnPP)	C ₁₈ H ₂₆ O ₄	131-18-0
Dicyclohexyl phthalate (DCHP)	C ₂₀ H ₂₆ O ₄	84-61-7
Other Phthalates compounds	-	-

35) Other Brominated Chlorinated flame retardants (BFRs)

Name	Chemical symbol	CAS No.
Tetrabromobisphenol A (TBBPA)	C ₁₅ H ₁₂ Br ₄ O ₂	79-94-7
Tetrabromobisphenol A dimethylether	C ₁₇ H ₁₆ Br ₄ O ₂	37853-61-5
Tetrabromobisphenol A dibromopropyl ether	C ₂₁ H ₂₀ Br ₈ O ₂	21850-44-2
Tetrabromobisphenol A bisallylether	C ₂₁ H ₂₀ Br ₄ O ₂	25327-89-3
Tetrabromobisphenol A bis(2-hydroxyethyl ether)	C ₁₉ H ₂₀ Br ₄ O ₄	4162-45-2
Tri(2, 3-dibromopropyl) phosphate	C ₉ H ₁₅ Br ₆ O ₄ P	126-72-7
Bis(2, 3-dibromopropyl) phosphate	C ₆ H ₁₁ Br ₄ O ₄ P	5412-25-9
Tetradecabromo (p-diphenoxybenzene)	C ₁₈ Br ₁₄ O ₂	58965-66-5
Bis(2, 4, 6-tribromophenyl) carbonate	C ₁₃ H ₄ Br ₆ O ₃	67990-32-3
2-Propenoic acid (pentabromophenylmethyl) ester, homopolymer	(C ₁₀ H ₅ Br ₅ O ₂) _n	59447-57-3
Polystyrene, brominated	(C ₈ H ₅ Br ₃) _n	88497-56-7
1,2-Bis (2,4,6-tribromophenoxy) ethane	C ₁₄ H ₈ Br ₆ O ₂	37853-59-1
Disodium tetrabromophthalate	C ₈ H ₂ Br ₄ O ₄ ·2Na	25357-79-3
TBBPA bis(2, 3-dibromopropyl) ether	C ₂₁ H ₂₀ Br ₈ O ₂	21850-44-2
1H-Isoindole-1, 3(2H)-dione-2,2'-(1,2-ethanediy)bis[4,5,6,7-tetrabromo]	C ₁₈ H ₄ Br ₈ N ₂ O ₄	32588-76-4
3,4,5,6-Tetrabromo-1,2-benzenedicarboxylic mixed esters acid, propylene with diethylene glycol and glycol	-	77098-07-8

Appendix 2 (Examples of substances and its compounds)

35) Other Brominated Chlorinated flame retardants (BFRs)

Name	Chemical symbol	CAS No.
Polymer of TBBPA, phosgene, and phenol	$(C_7H_5O_2) \cdot (C_{16}H_{10}Br_4O_3)_n \cdot (C_6H_5O)$	94334-64-2
Tris(tribromoneopentyl) phosphate	$C_{15}H_{24}Br_9O_4P$	19186-97-1
TBBPA, 2,2-bis[4-(2,3-epoxypropyloxy) dibromo Phenyl]propane polymer	$(C_{21}H_{20}Br_4O_4)_n \cdot (C_{15}H_{12}Br_4O_2)_n$	68928-70-1
Phosphoric acid, mixed 3-bromo-2,2-dimethylpropyl and 2-bromoethyl and 2-chloroethyl esters	-	125997-20-8
2,4,6-Tribromophenyl terminated carbonate oligomer	$(C_7H_2Br_3O_2) \cdot (C_{16}H_{10}Br_4O_3)_n \cdot (C_6H_2Br_3O)$	71342-77-3
Tetrabromocyclooctane	$C_8H_{12}Br_4$	31454-48-5
Brominated aliphatic compounds	-	-
Dibromoethyl dibromo cyclohexane	$C_8H_{12}Br_4$	3322-93-8
N,N-Ethylene-bis(tetrabromophthalimide)	$C_{18}H_4Br_8N_2O_4$	32588-76-4
Brominated polystyrene	$(C_8H_5Br_3)_n$	57137-10-7
Tetrabromophthalic anhydride	$C_8Br_4O_3$	632-79-1
Ethylenebis(Tetrabromophthalimide)	$C_{18}H_4Br_8N_2O_4$	32588-76-4
Brominated epoxy resin endcapped with tribromophenol	-	135229-48-0, 139638-58-7, 158725-44-1
FR-122P (polymer)	-	1195978-93-8
1,2,3-Tribromophenyl-allylether	-	26762-91-4
TBBA carbonate oligomer	-	28906-13-0
Brominated epoxy polymers	-	30496-13-0
2,4,6-Tribromophenyl-allylether	-	3278-89-5
Other BFRs compounds	-	-

36) Other Chlorinated flame retardants (CFRs)

Name	Chemical symbol	CAS No.
tris(1-chloro-2-propyl) phosphate (TCPP)	$C_9H_{18}Cl_3O_4P$	13674-84-5
Tetrakis(hydroxymethyl)-phosphonium chloride (THPC)	$C_4H_{12}ClO_4P$	124-64-1
Bis(hexachlorocyclopentadieno)Cyclooctane (Dechlorane A)	$C_{18}H_{12}Cl_{12}$	13560-89-9
Chloroprene	C_4H_5Cl	126-99-8
Medium-chain chlorinated paraffins, C14-C17 (MCCP)	$C_{14}H_{24}Cl_6$ $C_{17}H_{29}Cl_7$	85535-85-9
Chlorinated paraffins	-	85422-92-0
Chlorinated polymers and elastomers	-	184963-09-5
Tris(2-chloropropyl) phosphate	$C_9H_{18}Cl_3O_4P$	6145-73-9
Tetrachlorobisfenol A (TCBA)	$C_{15}H_{12}Cl_4O_2$	79-95-8
Tetrachlorophthalic anhydride (TCPA)	$C_8Cl_4O_3$	117-08-8
Dichloromethane	CH_2Cl_2	75-09-2
Trichloroethylene (TCE)	C_2HCl_3	79-01-6
Hexachlorobutadiene (HCBD)	C_4Cl_6	87-68-3
Other CFRs compounds	-	-

Appendix 2 (Examples of substances and its compounds)

37) Radioactive Substances, Radioactive Isotopes

Name	Chemical symbol	CAS No.
Uranium-238	U-238	7440-61-1
Radon	Rn	10043-92-2
Americium-241	Am-241	14596-10-2
Thorium-232	Th-232	7440-29-1
Cesium-137	Cs-137	10045-97-3
Strontium-90	Sr-90	10098-97-2
Other radioactive substances	-	-

Appendix 3 (List of biocidal substances in products)

The following list is the biocidal substances that are managed by LG Electronics, and they can or cannot be used depending on the purpose of use.

Therefore, you should check in advance whether the biocidal substance that you intend to use has been approved for that purpose by the national regulatory authorities.

- How to check the approval status
 - ① EU ECHA : <http://echa.europa.eu/web/guest/information-on-chemicals/biocidal-active-substances>
 - ② US EPA : <https://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1>
 - ③ Ministry of Environment of Korea: <https://chemp.me.go.kr/> (to be announced at the end of 2019)
- List of biocidal substances (as of 2019)



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ubstance list_2019