Guideline for Eco-Friendly SCM

– For distribution to suppliers (VER 9.0) –

LG Chem

Document History

Edition	Issued	Written by	Contents
1st Edition	2006. 6. 12	Sustainable management Part, LG Chem	**Preparation of Guideline for Eco-friendly Certification and distribution to Divisions/suppliers** Chapter 1. Outline of LG Chem environment-friendly certification system Chapter 2. Standard for management of hazardous substances Chapter 3. Standard for submitting analysis report of hazardous substances
	2006. 8. 16	Sustainable management Part, LG Chem	**Chapter 2. Standard for management of hazardous substances** 1. Identification of RoHS Compliance added
2nd Edition	2007. 7. 24	Environment & Safety Team (Eco-Product Part), LG Chem	**Chapter 2. Standard for management of hazardous substances** 1. Addition and change in hazardous substances 1) Substances added to Level 2 ① Newly added substances : PFOS, Ugilec 121 & 141, DBBT ② Substances moved from Level 3 to Level 2 : PVC, Other brominated flame retardants, Phthalates, Other chlorinated flame retardants 2) Substance added to Level 3 : Total Volatile Organic Compound(TVOC)
3rd Edition	2008. 03. 19	Environment & Safety Team (Eco-Product Part), LG Chem	**Chapter 1. Outline of LG Chem eco-friendly certification system** 1. Revision to " Eco-friendly Materials Supply Contract" (including compliance with REACH) 1) Appendix 2 **Chapter 2. Standard for management of hazardous substances** 1. Addition to hazardous substances 1) Substances added to Level 2 ① Norway PoHS (6 types) : MCCP, PFOA, Fragrance Substances, Surfactants, Bisphenol A, Triclosan, ② Customer and EU regulation (2 types) : Aliphatic CHCs, Nonyl Phenols and Nonylphenol Ethoxylates

4th Edition	2010. 01.25	Environment & Safety Team, LG Chem	**Chapter 2. Standard for management of Hazardous substances** 1. Addition to hazardous substances and change in thresholds 1) Threshold changed for Level 1 substance Cd (Cadmium) 10ppm => 5ppm 2) Substances added to/deleted from Level 2 ① Dimethyl fumarate (DMF) added ② PAHs added (18 types) ③ Level 3 substances => Level 2 substances (Antimony, Beryllium) ④ Surfactants deleted (3 types) 3) Substances added to Level 3 - REACH SVHC candidate list added 2. Clarification of terminology 3. Clarification of analysis methods of environmentally harmful substances**Chapter 3. Standard for submitting analysis reports on hazardous substances** 1. Changes to supplier forms/documents for submittal 1) Form for improvement plan no longer used
5th Edition	2011. 01.10	Environment/Climate Change Team, LG Chem	**Chapter 2. Standard for management of Hazardous substances** 1) Level 3 substances added - REACH SVHC candidate list added 2) Changes to required documents submitted by supplier - LG Chem Material Composition Survey
6th Edition	2011.12.21	Environment/Climate Change Team, LG Chem	**Chapter 2. Standard for management of Hazardous substances** 1) Level 3 substances added - REACH SVHC candidate list added

7th Edition	**2012. 06.28**	**Environment/Climate Change Team, LG Chem**	**Title: changed to 'Guideline for Eco-friendly SCM '** **Chapter 1. Outline of Eco-friendly material management** **3.1 Clarify supplier's obligation of Material composition survey submission** **5.1 Document required if hazardous material allowable maximum exceeded** **4. Changed to 'Eco-friendly evaluation for suppliers'** **Chapter 2. Detailed standard of hazardous substance management** **3.1 New material added** **5. Substance analyzing method changed** **Appendix form 1. Material composition survey(Web-base)** **6.32 SVHC List ; 13 substances added** **Appendix form 2. Eco-friendly Materials Supply Certification** **Appendix form 4: Explanatory Statement for Exceeding Hazardous Materials' Maximum Allowable Limit**
8th Edition	**2013. 08.13**	**Environment&Safety Team, LG Chem**	**Chapter 2. Standard for management of Hazardous substances** **4. LG Chem standard for management of hazardous substances** **4.5 Conflict Minerals are added to the List of Level 2 Substances (Petrochemicals Company)** **4.7 Change of the Identification of RoHS Compliance** **5. Detailed standard management of hazardous substances** **5.1 Common particulars** **4) Deletion of the process of acceptance for hazardous materials that exceed allowable limit and Appendix form4** **5.16 Change of the allowable limit of Nickel and its compounds** **5.24 Change of the allowable limit of Halogen compounds** **5.35 Change of the allowable limit of hazardous substances in packaging materials** **6. List of hazardous substances** **6.32 SVHC list: updated the latest list**

9th Edition	**2016.07.05**	**Safety&Environment Team, LG Chem**	**Chapter 2. Standard for management of Hazardous substances 4. LG Chem standard for management of hazardous substances 4.4 List of Level 1, 2, 3 Substances (Information & Electronic Materials Company, Batteries Company) - Halogen compounds: category changed from Level 2 to Level 3 5. Detailed standard for management of hazardous substances 5.30 Antimony and its compounds Change in maximum allowable value 6. List of hazardous substances 6.32 SVHC Candidate List: updated the latest list(16.06.20)**

Regarding the distribution guideline for cooperating suppliers

The Environmental Management Division of LG Chem is based on the philosophy that economic prosperity and environmental responsibility must occur in tandem.

Beyond simply responding to regulations, LG Chem strives to implement further measures to protect the environment while maintaining its market competitive stature. In particular, we intend to develop and supply eco-friendly products by reinforcing the control system of hazardous substances starting from the product development stage. Thus, LG Chem creates a stronger reputation as a competitive company, which customers trust not only because of the quality of our products, but also for our strong environmental contributions which protect the Earth.

To develop eco-friendly products, we have established a standard for management of hazardous substances, for the approval and purchasing of material groups that may contain hazardous substances, which would be distributed to LG Chem's suppliers through this guideline. This is our attempt to rapidly respond to the regulations regarding hazardous substances initiating from the E.U. standard and currently expanding into major markets such as the U.S., Japan and China.

This is a great opportunity to reinforce environmentally-conscious competitiveness and jointly work in the replacement activities of environment-related substances with cooperating suppliers. We would like to courteously ask for the proactive participation and cooperation from all our suppliers, since a clear understanding of this manual's thorough activities for the environmental regulation of products is essential for LG Chem and our cooperating suppliers to maintain competitiveness.

June 2006

LG Chem.

Table of Contents

Chapter 1.Outline of LG Chem Eco-Friendly SCM(Supply Chain Management)

1. Purpose

The Eco-friendly certification system of LG Chem is designed to ensure the production of eco-friendly products and to build LG Chem's capacity to effectively respond to international environmental regulations, such as the RoHS (Restriction of Hazardous Substances) Directives and REACH (acronym for Registration, Evaluation, Authorization, and restriction of Chemicals) enforced by the EU, by implementing an environmentally friendly quality assurance system across all suppliers that provide LG Chem with material groups (including packaging materials, parts, materials and substances).

2. Scope

This guideline is to be applied to all suppliers that directly supply material groups (including packaging materials, parts, materials and substances) to LG Chem (with the exception of the tier two and tier three vendors to LG Chem) as well as OEM suppliers that manufacture and supply LG Chem with semi-finished and finished products.

3. Obligations of Suppliers

3.1 Submission of Material composition Survey

All LG Chem suppliers are asked to submit a Material composition survey for their material groups (including packaging materials, parts, materials and substances) that contain chemicals or have potential to emit chemicals.

3.2 Implementation and operation of eco-friendly quality assurance system

All LG Chem suppliers are asked to establish and manage an eco-friendly quality assurance system at their respective sites to ensure adequate management of harmful substances in line with the threshold levels defined by LG Chem.

3.3 Obtaining and retaining relevant data, such as certificates of analysis on hazardous substances from certified labs

Every LG Chem supplier is expected to obtain and retain relevant data, such as officially recognized certificates of analysis on hazardous substances for all material groups (including packaging materials, parts, materials and substances) currently supplied to LG Chem. The suppliers need to prepare and submit the relevant data following LG Chem's format.

3.4 Submission of an Eco-friendly Materials Supply certification

All suppliers of LG Chem, when entering into contract agreement with LG Chem, must submit an eco-friendly materials supply contract (Appendix 1 _ form 2) to assure their comprehensive responsibility in ensuring reliability and accuracy of data submitted to LG Chem.

4. Eco-friendly evaluation for suppliers

4.1 Targets of evaluation

The targets of evaluation are selected at the below lists

1) The critical raw material suppliers
2) Suppliers who need to increase document credibility or those who are suspicious of forgery or falsely completing the material composition survey
3) Suppliers with high portion of non-disclosed information or those that did not submit the material composition survey

4.2 Criteria of evaluation

LG Chem select between suppliers self-evaluation and LG Chem on site evaluation.

1) Suppliers' self-evaluation

This self-assessment, document review process is carried out by the suppliers using a checklist (Appendix 1_Form 3. Checklist for Eco-friendly evaluation) to assess the level of their conformity to their respective organization and system (i.e., eco-friendly management system) set up to manage environmentally hazardous materials.

2) LG Chem on-site evaluation

A multi-disciplinary assessment team is organized with personnel from purchase, quality guarantee and development and environment & safety divisions of LG Chem to visit the suppliers and conduct an on-site verification and assessment.

4.3 Detailed evaluation criteria for eco-friendly suppliers

Classification		Marks allotted	Marks allotted (For mandatory categories)-
Category	1. Environmental Management System	37	13
	2. Supplier and Subcontractor Management	15	6
	3. Process Control	21	9
	4. Change Management	12	6

	5. Non-conforming product management	15	6
Certification threshold	70 marks or higher (32 marks or higher needed for mandatory categories)		
Evaluation	Each category is evaluated on three levels [3 point, 1.5 point, and 1point] depending on documented procedures and implementation		

Chapter 2. Standard for management of hazardous substances

1. Purpose

This standard has been established to restrict environmentally harmful substances contained in material groups (including packaging materials, parts, materials and substances) produced by suppliers and subcontractors and supplied to LG Chem from exceeding the maximum allowable concentration value as specified by LG Chem and to drive compliance and improvement across the supplier network, with a view to ultimately prevent environmental accidents and enhance environmental sustainability across product portfolios.

2. Scope

2.1 This standard is to be applied to such activities pertaining to substance testing, analysis, content level testing and verification of environmentally hazardous substances contained in all material group (including packaging materials, parts, materials and substance) which are produced and supplied by the registered suppliers of LG Chem. The scope of applicability of this standard is defined separately for different hazardous substances.

2.2 As for the semi-finished and finished products manufactured from overseas sites, the timing of implementation and applicable standards need to be brought into alignment with the corporate standards of LG Chem.

3. Definition of terminology

3.1 Classification of environmentally hazardous substances

1) Level 1 & 2 substances (restricted to use)

Level 1 & 2 substances are those considered harmful to the human body and the environment, thus restricted of use in products by law at a national and regional level. Intentional use of these substances is restricted in all items supplied to LG Chem.

① **Level 1**: Referring to 6 varieties of environmentally harmful substances as specified in RoHS Directives, they are restricted from use in products when their content level in each homogenous material of the products exceeds the maximum allowable concentration value as designated by LG Chem.

② **Level 2:** Referring to environmentally hazardous substances restricted of use by national laws or international conventions other than RoHS Directives. If the substances concentrations are over **the maximum allowable concentration value of LG Chem**, they are restricted from use in all components of products of LG Chem.

2) Level 3 substances (to be supervised and reduced)

Level 3 substances refer to substances suspected of causing harm to human beings and the environment and are not restricted of use at present, but scheduled to be phased out in the future.

3) Exemptions

Defined as Level 1 & 2 substances, they are accepted as exemptions due to current limitations in available technologies and thus not subject to restriction or restriction of use

3.2 Maximum allowable concentration value (ppm)

Maximum allowable concentration value refers to the maximum permitted level of hazardous substances with consideration to the error in hazardous substance analysis and naturally existing impurity content, etc.

3.3 Contained

The term 'contained' refers to the state of both intentionally or unintentionally adding, blending and adhering a third substance to/into the materials or products.

3.4 Intentional Addition

This refers to an act of intentionally adding a specific substance to products to give a specific characteristic, appearance or to sustain quality of products. Any catalysts used for specific processes should always be considered as intentionally added substances.

3.5 Impurity

Generated in the process of purification and synthesis, these substances cannot be completely removed owing to the limitations in currently available technologies.

3.6 Substance

A chemical element & its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used

3.7 New Chemicals

Chemicals that are not listed in each country's existing substances list.

3.8 Material

The term 'material' refers to all the parts, materials and substances to create a product. A 'material' is composed of one or more homogeneous material.

3.9 Parts

The term 'parts' refers to all the parts, materials and used in the manufacturing of a product. These 'parts' are composed of one or more material substance and have a specific exterior appearance and design.

3.10 Packaging materials

The term 'packaging materials' refer to the materials used in the storage, preservation, disposal and transportation of a product.

3.11 Material Group

The term 'material group' refers to all the parts, materials and substances, etc. from suppliers.

3.12 Homogeneous material

Referring to the minimum constituting unit of parts defined by the EU TAC (Technical Assistance Cooperation), homogenous materials include ceramics, glass, metals, alloy, paper, board, resins and coated materials, etc. They cannot be separated by applying mechanical methods, e.g., unraveling, cutting, pulverizing, grinding, polishing, etc. Therefore, certificates of analysis on hazardous substances from officially recognized laboratories are required at the homogenous material level.

3.13 RoHS: Restriction of Hazardous Substances

This refers to the guidelines for the limiting the usage of hazardous substances within electrical and electronic equipment.

3.14 PoHS (Prohibition on Certain Hazardous Substances in Consumer Products)

PoHS is the Norwegian consumer product regulation restricting the usage of hazardous substances such as, Arsenic, Bisphenol A, Musk xylene, Lead, Cadmium, Chlorinated paraffin, PFOA, Triclosan, PCP and HBCDD, etc.

3.15 REACH (Registration, Evaluation, Authorization, and restriction of Chemicals)

REACH is a regulation within the EU that addresses the manufacturing and use of chemical substances. It requires all manufactured or imported chemicals into the EU in quantities of one tonne or more per year to be used after registration, through assessment and evaluation of potential risks to the human body and the environment.

3.16 SVHC: Substances of Very High Concern

'SVHC' refers to substances that are specified by ECHA under the REACH Regulation (Regulation (EC) No 1907/2006).

① **CMR** (Carcinogenic, Mutagenic or toxic to Reproduction).

② **PBT** (Persistent, Bio-accumulative and Toxic substances).

③ **vPvB** (Very Persistent and very Bio-accumulative substances).

3.17 Supplier

The term refers to companies or OEMs that supply material groups (packing materials, parts, materials and substances) for the production of any product.

3.18 Eco-SCM (Eco-Supply Chains Management)

'Eco-SCM' is an environmentally friendly supply chain management technique performed throughout the obtainment of material groups to consumer consumption process. It assesses and evaluates the eco-friendliness, reduces and improves the environmental risks to prevent the negative impacts on the environment.

3.19 Restriction of use

Environmentally harmful substances regulated by LG Chem must not be intentionally introduced to the manufacturing process of products. However, a certain level of impurities is allowed when they cannot be completely removed with the currently available material purification technology or compounding process, and are thus inevitably contained in the products.

3.20 Precision Analysis

Precision analysis is a test performed using equipment with high precision and accuracy, different from screening tests (XRF analysis) that examine approximate concentration of certain substances. Analysis for inorganic compounds is carried out with ICP, IC and UV/VIS, and GC/MS is used for analysis of organic compounds,

3.21 Inductively Coupled Plasmas Spectrometry (ICP)

ICP is an atomic emission spectrometry to analyze heavy metal content in test samples. Test samples are introduced to plasma energy generated by argon gas and changed into excited state. Then, the rays and strength of luminescence emitted when excited atoms change to ground state are measured for quantitative and qualitative analysis of elements. This method is subject to errors depending on the type of acid chosen for pretreatment. As such, pretreatment method suitable to each test sample should be applied.

3.22 Ion Chromatography (IC)

IC is an analysis method to separate positive and negative ions for quantification using liquid chromatography (LC). LC separates the constituents of a compound contained in a solution through selective absorption

3.23 Ultra Violet / Visible Spectrometry (UV/VIS)

UV/VIS is used to measure molecules, inorganic ions or compounds of solutions to compute the degree of absorbance (or transmittance) displayed by the wavelength of sample molecules within the range of ultra violet and visible rays for quantitative and qualitative analysis.

3.24 Gas Chromatography Mass (GC-MS)

GC-MS is an analysis methodology for quantification where gas separates a substance using the differences in distribution or degree of absorbance between compounds in mobile and stationary state.

4. LG Chem Standard for management of hazardous substances

4.1 This standard is to be applied to all domestic and overseas production sites and products of LG Chem, and can be applied in consideration of specific business needs of each division (e.g., specific requests from suppliers and customers).

4.2 Environmentally hazardous substances that LG Chem regulates are classified into Level 1 and Level 2 substances which are restricted from use and Level 3 for substances that are to be reduced.

4.3 Level 1 and 2 substances are restricted of intentional use in all material group (including packaging materials, parts, materials and substance) supplied to LG Chem. For impurities that cannot be completely removed due to technical problems, the maximum allowable concentration value has been set forth in Chapter 2.5 "Detailed standard for management of hazardous substances".

4.4 List of Level 1, 2, 3 Substances (Information & Electronic Materials Company, Batteries Company)

1) Level 1 Substances List

Classification	Substances	Regulation	Chapter Number
Level 1	Lead(Pb) and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive US California.Proposition 65	2.5.2
	Cadmium(Cd) and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive	2.5.3
	Mercury(Hg) and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive	2.5.4
	Hexavalent chromium(Cr+6) and its compounds	EU RoHS Directive EU Packaging Directive	2.5.5
	PBB(Polybrominated biphenyls)	EU RoHS Directive	2.5.6
	PBDE(Polybrominated diphenyl ethers)	EU RoHS Directive	2.5.7

2) Level 2 Substances List

Classification	Substances	Regulation	Chapter Number
Level 2	Polychlorinated biphenyls(PCBs)	EU REACH Regulation OSPAR Priority chemicals	2.5.8
	Polychlorinated naphthalenes(PCN)		2.5.9
	Polychloroterphenyls(PCTs)		2.5.10
	Pentachlorophenol(PCPs)	EU REACH Regulation	2.5.11
	Chlorinated paraffin: SCCP C10~13, MCCP C14~17)	EU REACH Regulation OSPAR Priority chemicals Norway Product Regulation (PoHS)	2.5.12
	Asbestos and its compounds	EU REACH Regulation	2.5.13
	Organic tin and its compounds	EU REACH Regulation	2.5.14
	Formaldehydes	Chem G(Germany)	2.5.15
	Nickel(Ni) and its compounds	EU REACH Regulation	2.5.16
	Arsenic(As) and its compounds	EU REACH Regulation	2.5.17
	Specific azo compounds	EU REACH Regulation	2.5.18
	Ozone layer depleting	Montreal/Kyoto Protocol	2.5.19
	Perfluorinated compounds: PFOS, PFOA	EU REACH RegulationNorway Product Regulation(PoHS)	2.5.20
	Ugilec 121, Ugilec 141, DBBT(monomethyl Dibromo biphenyl methane)	EU REACH Regulation	2.5.21
	PVC (Polyvinyl chloride)		2.5.22
	Phthalates	EU REACH Regulation	2.5.23
	Fragrance Substances (Musk Xylene, Musk Ketone)	Norway Product Regulation (PoHS)	2.5.24
	Bisphenol A	Norway Product Regulation (PoHS)	2.5.25

	Triclosan	Norway Product Regulation (PoHS)	2.5.26
	Aliphatic CHCs	EU REACH Regulation	2.5.27
	Nonylphenols and Nonylphenol Ethoxylates	EU REACH Regulation	2.5.28
	PAHs (Polycyclic aromatic hydrocarbons)	EU REACH Regulation Germany GS mark	2.5.29
	Antimony(Sb)and its compounds	EU REACH Regulation	2.5.30
	Beryllium(Be) and its compounds	EU REACH Regulation	2.5.31
	Dimethyl fumarate (DMF)	EU Directive 2009/251/EC	2.5.32
	Conflict Minerals (tin, tantalum, tungsten and gold)	Dodd-Frank Wall Street Reform and Consumer Protection Act (US)	2.5.33

3) Level 3 Substances List

Classification	Substances
Level 3	Substance of very high concern (SVHC substance)
	Selenium(Se) and its compounds
	Palladium(Pd) and its compound
	Bismuth(Bi) and its compounds
	Magnesium
	Radioactive substances
	Barium(Ba)/its compounds
	Chromium(Cr) and its compound (exception : Hexavalent chromium(Cr+6) and its compound)
	Cobalt(Co)/its compounds
	Manganese(Mn)/its compounds
	Tellurium(Te)/its compounds
	Thallium(Tl)/its compounds
	Ethylene glycol monoethyl ether
	Ethylene glycol monoethyl ether acetate
	Ethylene glycol monomethyl ether)
	Ethylene glycol monomethyl ether acetate)
	Cyanides
	Ethylene oxide
	Methyl Iodide
	Benzene
	Acrylamide
	Acrylonitrile
	Volatile Organic Compounds

	Halogen Compounds

4.5 List of Level 1, 2 Substances (Basic Materials & Chemicals Company)

1) Level 1 Substances List

Classification	Substances	Regulation	Section Number
Level 1	Lead(Pb) and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive US California.Proposition 65	2.5.2
	Cadmium(Cd) and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive	2.5.3
	Mercury(Hg) and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive	2.5.4
	Hexavalent chromium(Cr+6) and its compounds	EU RoHS Directive EU Packaging Directive	2.5.5
	PBB(Polybrominated biphenyls)	EU RoHS Directive	2.5.6
	PBDE(Polybrominated diphenyl ethers)	EU RoHS Directive	2.5.7

2) Level 2 Substances List

Classification	Substances	Regulation	Section Number
Level 2	Polychlorinated biphenyls(PCBs)	EU REACH Regulation OSPAR Priority chemicals	2.5.8
	Polychlorinated naphthalenes(PCN)		2.5.9
	Polychloroterphenyls(PCTs)		2.5.10
	Pentachlorophenol(PCPs)		2.5.11
	Chlorinated paraffin: SCCP C10~13, MCCP C14~17)	EU REACH Regulation OSPAR Priority chemicals Norway Product Regulation (PoHS)	2.5.12
	Asbestos and its compounds	EU REACH Regulation	2.5.13
	Organic tin and its compounds	EU REACH Regulation	2.5.14
	Tributyl Tin Oxide(TBTO)	EU REACH Regulation	-----
	Arsenic(As) and its compounds	EU REACH Regulation	2.5.17
	Ozone layer depleting : CFCs, HCFCs, HBFCs, HFC, PFC, Halons, Tetrachloroethylene etc	Montreal/Kyoto Protocol	2.5.19
	Perfluorinated compounds: PFOS, PFOA)	EU REACH Regulation Norway Product Regulation (PoHS)	2.5.20

	Ugilec 121, Ugilec 141, DBBT(monomethyl Dibromo biphenyl methane)	EU REACH Regulation	2.5.21
	Fragrance Substances: Musk Xylene, Musk Ketone)	Norway Product Regulation (PoHS)	2.5.24
	Triclosan	Norway Product Regulation (PoHS)	2.5.26
	PAHs (Polycyclic aromatic hydrocarbons)	EU Directive 2005/69/EC Germany GS mark	2.5.29
	Dimethyl fumarate (DMF)	EU Directive 2009/251/EC	2.5.32
	Conflict Minerals (tin, tantalum, tungsten and gold)	Dodd-Frank Wall Street Reform and Consumer Protection Act (US)	2.5.33

3) Level 3 List

Classification	Substances
Level 3	SVHC substance (Substance of very high concern)

4.6 Explanation of Regulation

Regulation	Comment
EU RoHS Directive	EU Directive of restriction of the use of certain hazardous substances in electrical and electronic equipment
EU Battery Directive	EU Directive of batteries and accumulators and waste batteries and accumulators
EU Packaging Directive	EU Directive of packaging and packaging waste
US California.Proposition 65	Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)
EU REACH Regulation	The European Community Regulation on chemicals and their safe use (EC 1907/2006)
OSPAR Priority chemicals	The Protection of the marine environment of the north east Atrantic
Norway Product Regulation (PoHS)	Prohibition on Certain Hazardous Substances in Consumer Products in Norway
Chem G (Germany)	Act on the Protection Against Hazardous Substances in Germany
Montreal/Kyoto Protocol	International agreement on the reduction of greenhouse gas emissions
EU Directive 94/60/EC	EU directive amending for the 14th time Council Directive 76/769/EEC
EU Directive 2003/53/EC	EU directive amending for the 26th time Council Directive 76/769/EEC
EU Directive 2005/69/EC	EU directive amending for the 27th time Council Directive 76/769/EEC
GS mark (Germany)	Regulation Based on German Safety Law

EU Directive 2009/251/EC	EU Commission Decision : Products containing the biocide dimethylfumarate are not placed or made available on the market
Dodd-Frank Wall Street Reform and Consumer Protection Act (US)	U.S. federal law “Conflict Material” originating from the Democratic Republic of the Congo or adjoining countries

4.7 Identification of RoHS Compliance

Packaging and OEM Suppliers must supply LG Chem with packaging materials and products attached the identification mark illustrated in below in order to recognize whether finished products comply to RoHS Directives of the EU or not.

<table>
<tr><td>RoHS Compliant
Mark Design</td><td colspan="2"> 


</td></tr>
<tr><td rowspan="4">Specification</td><td>RoHS</td><td>- Font : Verdana
- Size : 26
- Color tone : Black
- Secular surname : Underline</td></tr>
<tr><td>Compliant
Compliant</td><td>- Font : Times
- Size : 32
- Color tone : Green or Black
- Secular surname : inclination</td></tr>
<tr><td>EU Directive 2011/65/EU</td><td>- Font : Verdana
- Size : 16
- Color tone : Gray</td></tr>
<tr><td>  </td><td>- Thickness : 2 pt
- Color tone : Black</td></tr>
<tr><td>Application</td><td colspan="2">RoHS Complaint Mark is applicable to various sizes
if it is made in the proportion of crosswise 3 : lengthwise 1</td></tr>
</table>

5. Detailed standard for management of hazardous substances

5.1 Common particulars

1) A hazardous substance analysis report and material composition survey, etc. from certified labs must be submitted for all material groups (including packaging materials, parts, materials and substances) supplied to LG Chem, in order to check the content of Level 1 substances (the 6 hazardous substances restricted by RoHS) specified below.

2) For Level 2 and Level 3 materials, the submission of a material composition survey to verify the content of hazardous substances is mandatory. The submission of other certificates from certified labs are necessary if there is any additional request from LG Chem.
3) Restriction of use refers to restricting intentional use of the substances concerned. The level of content, which is inevitably contained as impurities, must satisfy the Maximum Allowable Concentration Value.

5.2 Lead (Pb) and its compounds

1) Restriction of content level and use

① All products and material group (including packaging materials, parts, materials and substances)

2) Maximum allowable concentration value

Classification per Substances and Materials	Max. Allowable value	Analysis standard
① Lead in rubber, plastic, paints, inks, plastic plating, metal/ plastic coats and cable covers	Less than 100 ppm	IEC62321 Ed.1.0 EPA3052 EPA3050B ASTM E350 etc
② Lead in solders (bar/wire/cream solder, solder ball) and part lead- wire plating	Less than 800 ppm	
③ Lead in metal plating, ceramics, glass and ferrite cores, etc.	Less than 100 ppm	

3) Exception

When the Max. Allowable value is exceeded, suppliers have to prove through technical or legal aspects.

5.3 Cd, Cadmium and Its compounds

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Cadmium in rubber, plastic, paints, inks, metal/ plastic plating and plastic plating	Less than 5 ppm	IEC62321 Ed.1.0 EPA3052 EPA3050B EN1122 etc.
② Cadmium in metal plating (Ex.: Brass and zinc die-casting, etc.), ceramics, glass and ferrite cores	Less than 75 ppm	

3) Exception

When the Max. Allowable value is exceeded, suppliers have to prove through technical or legal aspects.

5.4 Hg, Mercury and Its compounds

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Mercury content in internal/ external plastic parts, pigments, inks, coating/ plating agents, wattmeter, electronic contact (relays, switches and sensors) and packaging materials, etc.	Less than 100 ppm	IEC62321 Ed.1.0 EPA3052 EPA7473 etc.

5.5 Cr^{+6}, Hexavalent Chromium and Its compounds

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Hexavalent chromium in plastic, rubber, paints, inks and metal/ plastic plating	Less than 100 ppm	IEC62321 Ed.1.0 EPA3060A ISO3613 etc.
② Hexavalent chromium in metal plating and plastic plating	Not Detected	
③ Hexavalent chromium in Chromate plating	Less than 100 ppm	

3) Exception

When the Max. Allowable value is exceeded, suppliers have to prove through technical or legal aspects.

5.6 Polybrominated Biphenyls (PBB)

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① PBB in plastic, rubber, paints, inks and metal/ plastic plating	Less than 100 ppm	IEC62321 Ed.1.0 EPA3540C EPA8270C etc.

5.7 Polybrominated Biphenyl ethers (PBDE)

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① PBDE in plastic, rubber, paints, inks and metal/ plastic plating	Less than 100 ppm	IEC62321 Ed.1.0 EPA3540C EPA8270C etc.

5.8 Polychlorinated Biphenyls (PCBs)

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① PCBs substances used in plastic, rubber, paints, inks and metal/ plastic plated parts	Less than 50 ppm	EPA 8082 etc.

5.9 Polychlorinated Naphthalenes (PCNs)

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① PCNs substances used in lubricants or paints	Less than 50 ppm	US EPA 3545 US EPA 8082 US EPA 3540C
② PCNs substances used in plastic, rubber, paints, inks and metal/ plastic plated parts	Less than 50 ppm	

5.10 Polychlorinated Terphenyls (PCTs)

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① PCTs substances used in transformers, capacitors and PCB	Less than 50 ppm	US EPA 3545 US EPA 8082 US EPA 3540C
② PCTs substances used in plastic, rubber, paints, inks and metal/ plastic plating parts	Less than 50 ppm	

5.11 Pentachlorophenol (PCPs)

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Pentachlorophenol contained in entire parts	Less than 5 ppm	DIN 53313 etc.

5.12 Chlorinated paraffin (SCCP: C10~13, MCCP: C14~17)

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① SCCP substances in external plastic parts and printed wiring board (PWB)	Less than 100 ppm	EPA3540C EPA 3550C etc.
② MCCP substances in external plastic parts and printed wiring board (PWB)	Less than 1,000 ppm	

5.13 Asbestos and its compounds

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Asbestos and compounds used in parts and packaging materials, such as of insulating materials, filling agents, abrasives and adiabatic materials	Not Detected	NIOSH 9000 NIOSH 9002 NIOSH 7402 etc.

5.14 Organic tin compounds

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Organic tin compounds used in paints, inks, disinfectants,antiseptics and metal/ plastic coated parts, etc.	Not Detected	EPA0280 DIN 38407 DIN 17353 KS K 0737 etc.

5.15 Formaldehydes

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Formaldehydes contained in products using wood, adhesives, disinfectants, antiseptics and coating agents, etc.	Less than 0.1ppm (or 0.15 mg/㎥) within the air of test chamber	VDA 275 DIN 53315 ISO16000 etc.

* Measuring Condition: To be measured in a closed chamber of 20L

5.16 Nickel and its compounds

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Parts with constant contact with skin surface (Ex.: Earphones and headsets, etc.) ② Surface finish and anti-corrosion surface treatment ③ External plating of external chassis/case parts	Emission of less than 0.28 ㎍-Ni/㎠/week	EN 1811 EN 12471 EN 12472 etc.

5.17 Arsenic and its compounds

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Arsenic and compounds used in paints, inks, disinfectants and antiseptics, etc.	Not Detected	EPA 3052 etc.

5.18 Azo compounds (Nitrogen compounds)

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① External parts of fiber and leather in constant contact with human skin	Less than 30 ppm	EN 14362-1,2 CEN ISO/TS 17234 etc.

5.19 Ozone layer depleting/global warming substances

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① CFCs, HCFCs, HFC, PFC, halons and tetrachloroethylene	Not Detected	EPA 5021A EPA 8021B etc.

5.20 Perfluorinated compounds: PFOS, PFOA)

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Perfluorooctane Sulfonates contained in entire parts	Less than 1,000 ppm (1 ㎍/㎡ for textiles and coating)	Solvent Extraction (LC-MS)
② Perfluorootyl acid and individual salts and esters of PFOA contained in entire parts	Less than 50 ppm (1 ㎍/㎡ for textiles and coating)	

5.21 Ugilec 121, 141, DBBT (Monomethyl Dibromo biphenyl methane)

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Ugilec 121, 141, DBBT contained in entire parts	Not Detected	Solvent Extraction (GC/MS)

5.22 Poly vinyl chloride (PVC)

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Poly vinyl chloride used in external plastics, electric wire tube contained in battery packs	Not Detected	FT-IR & Beilstein etc.

5.23 Phthalates

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Phthalates contained in entire plastic parts supplied to Information & Electronic Materials Company (Phthalates: DEHP, DBP, BBP, DINP, DIDP, DNOP 등)	Less than 1,000 ppm	EPA 8161A ASTM D 3421-75, KS M 1991 etc.

5.24 Fragrance Substances

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Musk Xylene, Musk Ketone contained in entire parts	Less than 500 ppm	EPA 3540C etc.

5.25 Bisphenol A

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Bisphenol A contained in entire parts supplied to Information & Electronic Materials Company	Less than 25 ppm	EPA 3540C etc.

5.26 Triclosan

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Triclosan contained in entire parts	Less than 10 ppm	EPA 3540C etc.

5.27 Aliphatic CHCs

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Aliphatic CHCs contained in entire parts supplied to Information & Electronic Materials Company	Less than 1000 ppm	EPA 3540C EPA8270D EPA5021A etc.

5.28 Nonylphenols and Nonylphenol Ethoxylates

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Nonylphenols and Nonylphenol Ethoxylates contained in Textile, Leather, Metal, Pulp and Paper parts	Not Detected	Solvent Extraction (GC/MS)

5.29 PAHs (Polycyclic aromatic hydrocarbons)

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① PAHs contained in entire parts	Not Detection	EPA 3540C/8270D EPA 8100 ISO 187287 etc.

5.30 Antimony(Sb) and its compounds

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Antimony(Sb) and its compounds contained in entire parts	Less than 800ppm	EPA 3052 EPA 3050B

5.31 Beryllium(Be) and its compounds

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Beryllium(Be) and its compounds contained in entire parts	Not Detected	EPA 3052 etc.

5.32 Dimethyl fumarate (DMF)

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Dimethyl fumarate contained in entire parts	Not Detected	EPA3540C etc.

5.33 Conflict Minerals (tin, tantalum, tungsten and gold)

1) Restriction of use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Conflict Minerals (tin, tantalum, tungsten and gold) contained in entire parts	Not Detected	EPA3052 etc.

5.34 Management standard for hazardous substance content in packaging materials

1) Restriction of content level and use

①. Lead, cadmium, mercury and hexavalent chromium in packaging materials (product and part packaging)

* Applicable Packaging Materials: Handles, reels, bags, cushions, staples, sheets, wraps, paints, inks, tapes, labels, magazine sticks (including stoppers), corrugated cardboard, wooden frames, vinyl ties, cushioning materials, bulk cases, and foil or trays

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Lead, cadmium, mercury and hexavalent chromium content in all packaging materials placed in market	Less than 80 ppm Note 1) (Less than 50 ppm, Cd)	IEC62321 Ed.1.0 EPA 3052 EPA 3060A etc.

Note 1) Based on the total weight of the 4 varieties of hazardous substances (lead, cadmium, mercury and hexavalent chromium)

5.35 Management standard for hazardous substance content in batteries and battery packs

1) Restriction of content level and use

① Lead in batteries and battery packs

② Cadmium in batteries and battery packs

③ Mercury in batteries and battery packs

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Lead in batteries and battery packs	Less than 40 ppm	IEC62321 Ed.1.0 EPA3052 EPA3050B etc.
② Cadmium in batteries and battery packs	Less than 20 ppm	
③ Mercury in batteries and battery packs	Less than 5 ppm	

5.36 Halogen Compounds

1) Restriction of content level and use

①Material group (packaging materials, parts, material and substance, etc.)

2) Maximum allowable concentration value

Classification per Substance and Material	Max. Allowable value	Analysis standard
① Halogen compounds contained in entire plastic parts supplied to Information & Electronic Materials	According to customers' requirements	EN 14582, EN 50267-2-2, KS M 0180 etc.

6. List of hazardous substances

6.1 Pb, Lead and its compounds

Substance	CAS No.
Lead	7439-92-1
Lead(II) carbonate	598-63-0
Lead(IV) oxide	1309-60-0
Lead(II,IV) oxide	1314-41-6
Lead(II) sulfide	1314-87-0
Lead azide	13424-46-9
Lead(II) oxide	1317-36-8
Lead(II) fluoride	7783-46-2
Lead(II) chloride	7758-95-4
Lead(IV) chloride	13463-30-4
Lead(II) carbonate basic	1319-46-6
Lead(II) iodide	10101-63-0
Lead hydroxycarbonate	1344-36-1
Lead(II) cyanide	592-05-2
Lead(II) fluoroborate	13814-96-5
Lead(II) fluosilicate	25808-74-6
Lead(II) sulfate	7446-14-2 / 15739-80-7
Lead(II) phosphate	7446-27-7
Lead thiocyanate	592-87-0
Lead(II) chromate	7758-97-6
Lead(II) titanate	12060-00-3
Lead(II) acetate, trihydrate	6080-56-4
Lead(II) acetate	301-04-2
Lead(II) metaborate	10214-39-8
Lead metasilicate	11120-22-2 / 22569-74-0
Lead antimonite	13510-89-9
Lead arsenate (1:1)	7784-40-9
Lead(II) arsenite	10031-13-7
Lead(IV) acetate	546-67-8
Lead sulfate, sulphuric acid, lead salt	15739-80-7
Lead sulfate, tribasic	12202-17-4
Lead nitrate	10099-74-8
Lead chromate; chrome yellow	1344-37-2
Lead oxide sulfate	12202-17-4
Lead molybdate	10190-55-3
Tetramethyl lead	75-74-1
Tetraethyl lead	78-00-2
Lead oleate	546-67-8
Lead hydrocarbonate	1319-46-6
Lead selenide	12069-00-0

Lead perchlorate	13637-76-8
Lead stearate	1072-35-1, 7428-48-0
Lead stearate, dibasic	56189-09-4
Other lead compounds	-

6.2 Cd, Cadmium and its compounds

Substance	CAS No.
Cadmium	7440-43-9
Cadmium oxide	1306-19-0
Cadmium sulfide	1306-23-6 / 8048-07-5
Cadmium carbonate	513-78-0
Cadmium chloride	10108-64-2
Cadmium sulfate	10124-36-4
Cadmium nitrate	10325-94-7
Cadmium nitrate tetrahydrate	10022-68-1
Cadmium stearate	2223-93-0
Other cadmium compounds	-

6.3 Hg, Mercury and its compounds

Substance	CAS No.
Mercury	7439-97-6
Mercury(I) chloride	10112-91-1
Mercury(II) chloride	7487-94-7
Mercury(I) oxide	15829-53-5
Mercury(II) oxide	21908-53-2
Mercury(II) nitrate	10045-94-0
Mercury(I) sulfate	7783-35-9
Mercury(II) fulminate	628-86-4
Mercury(II) acetate	1600-27-7
MERCURIPHENYL NITRATE	55-68-5
Other mercury compounds	-

6.4 Cr^{+6}, Hexavalent chromium and its compounds

Substance	CAS No.
Sodium dichromate	10588-01-9
Chromium(VI) oxide	1333-82-0
Calcium chromate	13765-19-0
Lead(II) chromate	7758-97-6
Potassium dichromate	7778-50-9
Potassium chromate	7789-00-6
Chromium trioxide	1333-82-0
Lithium chromate	14307-35-8
Sodium chromate	7775-11-03
Potassium chlorochromate	16037-50-6
Ammonium chromate	7788-98-9
Copper chromate	13548-42-0
Magnesium chromate	13423-61-5
Strontium chromate	7789-06-02

Barium chromate	10294-40-3
Lead chromate (orange color)	1344-38-3
Lead chromate (yellow color)	1344-37-2
Zinc chromate	12018-19-8 13530-65-9 14018-95-2
Ammonium dichromate	7789-09-05
Calcium dichromate	14307-33-6
Dichromic acid	13530-68-2
Copper chromite	12053-18-8
Zinc dichromate	14018-95-2
Other hexavalent chromium compounds	-

6.5 PBBs

Substance	CAS No.
Polybrominated Biphenyls	59536-65-1
Dibromobiphenyl	92-86-4
2-Bromobiphenyl	2052-07-05
3-Bromobiphenyl	2113-57-7
4-Bromobiphenyl	92-66-0
Tribromobiphenyl	59080-34-1
Tetrabromobiphenyl	40088-45-7
Pentabrphenyl	56307-79-0
Hexabromobiphenyl	59080-40-9
hexabromo-1,1-biphenyl	36355-01-8
Firemaster FF-1	67774-32-7
Heptabromobiphenyl	35194-78-6
Octabromobiphenyl	61288-13-9
Nonabiphenyl	27753-52-2
Decabromobiphenyl	13654-09-6
Other PBBs and its compounds	-

6.6 PBDEs

Substance	CAS No.
Bromodiphenyl ether	101-55-3
Dibromodiphenyl ethers	2050-47-7
Tribromodiphenyl ether	49690-94-0
Tetrabromodiphenyl ethers	40088-47-9
Pentabromodidphenyl ether (note: Commercially available PeBDPO is a complex reaction mixture containing a variety of brominated diphenyloxides.	32534-81-9 (CAS number used for commercial grades of PeBDPO)
Hexabromodiphenyl ether	36483-60-0
Heptabromodiphenylether	68928-80-3
Octabromodiphenyl ether	32536-52-0
Nonabromodiphenylether	63936-56-1
Decabromodiphenyl ether	1163-19-5
Other PBDEs and its compounds	-

6.7 PCBs, PCTs, PCNs

Substance	CAS No.
Polychlorinated biphenyls (PCB)	1336-36-3
Polychlorinated terphenyls (PCT)	61788-33-8
Polychlorinated naphthalenes (PCN)	70776-03-3
Trichloronaphthalenes	1321-65-9
Tetrachloronaphthalenes	1335-88-2
Pentachloronaphthalenes	1321-64-8
Octachloronaphthalenes	2234-13-1
Other PCBs, PCTs, PCNs and its compounds	-

6.8 Pentachlorophenol

Substance	CAS No.
Pentachlorophenol	87-86-5

6.9 SCCP/MCCP

Substance	CAS No.
Short-chain Chlorinated paraffine (C10~13)	85535-84-8
Medium-chained chlorinated paraffins, C14-C17 (MCCP)	85535-85-9

6.10 Asbestos and its compounds

Substance	CAS No.
Actinolite	77536-66-4
Amosite	12172-73-5
Anthophylite	77536-67-5
Chrysotile	12001-29-5
Crocidolite	12001-28-4
Tremolite	77536-68-6

6.11 Organic tin compounds

Substance	CAS No.
Bis(tri-n-butyltin) oxide	56-35-9
Tributyltin(TBT)	56573-85-4
Triphenyltin (TPT)	668-34-8
Tributyltin bromide	1461-23-0
Triphenyltin N,N'-dimethyldithiocarbamate	1803-12-9
Triphenyltin fluoride	379-52-2
Triphenyltin acetate	900-95-8
Triphenyltin chloride	639-58-7
Triphenyltin hydroxide	76-87-9
Triphenyltin fatty acid salts (C=9~11)	47672-31-1
Triphenyltin chloroacetate	7094-94-2
Tributyltin methacrylate	2155-70-6, 18380-71-7
Bis(tributyltin) fumarate	6454-35-9
Tributyltin fluoride	1983-10-4
Bis(tributyltin) 2,3-dibromosuccinate	31732-71-5
Tributyltin acetate	56-36-0
Tributyltin laurate	3090-36-6
Bis(tributyltin) phthalate	4782-29-0

Copolymer of alkyl acrylate, methyl methacrylate and tributyltin methacrylate (alkyl; C=8)	67772-01-4
Tributyltin sulfamate	6517-25-5
Bis(tributyltin) maleate	14275-57-1
Tributyltin chloride	1461-22-9
Mixture of tributyltin cyclopentane-carboxylate and its analogs (Tributyltin rosin salts)	26239-64-5
Tributyltin naphthennate	85409-17-2
Other tributyltins & triphenyltins	-

6.12 Formaldehydes

Substance	CAS No.
Formaldehyde	50-00-0
Formaldehyde, reaction products with butylphenol	91673-30-2
FORMALDEHYDE, POLYMER WITH BROMOPHENOL AND (CHLOROMETHYL)OXIRANE	68541-56-0

6.13 Nickel and its compounds

Substance	CAS No.
NICKEL	7440-02-0
NICKEL CARBONATE	3333-67-3
NICKEL DIOXIDE	12035-36-8
NICKEL HYDROXIDE	11113-74-9
NICKEL MONOXIDE	1313-99-1
NICKEL SUBSULPHIDE TRINICKEL DISULPHIDE	12035-72-2
NICKEL SULPHATE	7786-81-4
NICKEL SULPHIDE	11113-75-0
Trinickel tetrasulfide	12137-12-1
NICKEL TETRACARBONYL	13463-39-3
NICKEL(II) HYDROXIDE	12054-48-7
Dinickel trioxide	1314-06-03

6.14 Arsenic(As) and its compounds

Substance	CAS No.
ARSENIC	7440-38-2
ARSENIC ACID DISODIUM SALT, HEPTAHYDRATE	10048-95-0
ARSENIC ACID, CALCIUM SALT	7778-44-1
ARSENIC ACID, COPPER SALT	10103-61-4
ARSENIC ACID, DIAMMONIUM SALT	7784-44-3
ARSENIC ACID, LEAD SALT	7784-40-9
ARSENIC ACID, MAGNESIUM SALT	10103-50-1
ARSENIC PENTOXIDE	1303-28-2
ARSENIC TRICHLORIDE	7784-34-1

ARSENIC TRIHYDRIDE	7784-42-1
ARSENIC TRIOXIDE	1327-53-3
ARSENIOUS ACID, COPPER (II) SALT	10290-12-7
ARSENIOUS ACID, POTASSIUM SALT	10124-50-2

6.15 Azo compounds (Nitrogen compounds)

Substance	CAS No.
2,4,5-Trimethylaniline	137-17-7
2,4-Diaminoanisole	615-05-4
2,4-Toluenediamine	95-80-7
2-Amino-4-nitrotoluene	99-55-8
2-Naphthylamine	91-59-8
3,3'-Dichlorobenzidine	91-94-1
3,3'-Dimethoxybenzidine	119-90-4
3,3'-Dimethyl-4,4'diaminodiphenylmethane	838-88-0
3,3'-Dimethylbenzidine	119-93-7
4,4'-Diaminodiphenylmethane	101-77-9
4,4'-Methylene-bis-(2-chloraniline)	101-14-4
4,4'-Oxydianiline	101-80-4
4,4'-Thiodianiline	139-65-1
4-amino azobenzene	60-09-3
4-Aminodiphenyl	92-67-1
4-Chloro-o-toluidine	95-69-2
Benzidine	92-87-5
o-Aminoazotoluene	97-56-3
o-anisidine	90-04-0
o-Toluidine	95-53-4
p-Chloroaniline	106-47-8
p-Cresidine	120-71-8

6.16 Ozone Depleting Substances

Substance	CAS No.
CFC-11	75-69-4
CFC-12	75-71-8
CFC-113	76-13-1
CFC-114	1320-37-2
CFC-115	76-15-3
Halon 1211	353-59-3
Halon 1301	75-63-8
Halon 2402	124-73-2
CFC-13	75-72-9
CFC-111	354-56-3
CFC-112	28605-74-5
CFC-211	135401-87-5
CFC-212	3182-26-1
CFC-213	2354-06-05
CFC-214	2268-46-4
CFC-215	1652-81-9

CFC-216	661-97-2
CFC-217	422-86-6
Carbon tetrachloride	56-23-5
1,1,1 -Trichloroethane	71-55-6
ChloroBromomethane	74-97-5
Methyl Bromide	74-83-9.
Dibromofluoromethane	1868-53-7
Bromodifluoromethane	1511-62-2
Bromofluoromethane	373-52-4
Tetrabromofluoroethane	306-80-9
Tribromodifluoroethane	No CAS number assigned
Dibromotrifluoroethane	354-04-1
Bromotetrafluoroethane	124-72-1
Tribromofluoroethane	No CAS number assigned
Dibromodifluoroethane	75-82-1
Bromotrifluoroethane	421-06-7
Dibromofluoroethane	358-97-4
Bromodifluoroethane	420-47-3
Bromofluoroethane	762-49-2
Hexabromofluoropropane	No CAS number assigned
Pentabromodifluoropropane	No CAS number assigned
Tetrabromotrifluoropropane	No CAS number assigned
Tribromotetrafluoropropane	No CAS number assigned
Dibromopentafluoropropane	431-78-7
Bromohexafluoropropane	2252-78-0
Pentabromofluoropropane	No CAS number assigned
Tetrabromodifluoropropane	No CAS number assigned
Tribromotrifluoropropane	No CAS number assigned
Dibromotetrafluoropropane	No CAS number assigned
Bromopentafluoropropane	460-88-8
Tetrabromofluoropropane	No CAS number assigned
Tribromodifluoropropane	70192-80-2
Dibromotrifluoropropane	431-21-0
Bromotetrafluoropropane	679-84-5
Tribromofluoropropane	75372-14-4
Dibromodifluoropropane	460-25-3
Bromotrifluoropropane	421-46-5
Dibromofluoropropane	51584-26-0
Bromodifluoropropane	No CAS number assigned
Bromofluoropropane	352-91-0
HCFC-21	75-43-4
HCFC-22	75-45-6
HCFC-31	593-70-4
HCFC-121	354-14-3
HCFC-122	354-21-2
HCFC-123	306-83-2

HCFC-124	2837-89-0
HCFC-131	134237-34-6
HCFC-132	25915-78-0
HCFC-133	75-88-7
HCFC-141	25167-88-8
HCFC-141b	1717-00-6
HCFC-142	25497-29-4
HCFC-142b	75-68-3
HCFC-151	1615-75-4
HCFC-221	134237-35-7
HCFC-222	134237-36-8
HCFC-223	134237-37-9
HCFC-224	134237-38-0
HCFC-225	128903-21-9
HCFC-225ca	422-56-0
HCFC-225cb	507-55-1
HCFC-226	134308-72-8
HCFC-231	134190-48-0
HCFC-232	134237-39-1
HCFC-233	134237-40-4
HCFC-234	127564-83-4
HCFC-235	134237-41-5
HCFC-241	134190-49-1
HCFC-242	134237-42-6
HCFC-243	134237-43-7
HCFC-244	134190-50-4
HCFC-251	134190-51-5
HCFC-252	134190-52-6
HCFC-253	134237-44-8
HCFC-261	134237-45-9
HCFC-262	134190-53-7
HCFC-271	134190-54-8

6.17 Perfluorooctane sulfonic acid : PFOS / Pentadecafluorooctanoic acid : PFOA

Substance	CAS No.
PERFLUOROOCTANOIC ACID	335-67-1
AMMONIUM PERFLUOROOCTANOATE	3825-26-1
SODIUM PERFLUOROOCTANOATE	335-95-5
POTASSIUM PERFLUOROOCTANOATE	2395-00-8
SILVER PERFLUOROOCTANOATE	335-93-3
PENTADECAFLUOROOCTANOYL FLUORIDE	335-66-0
METHYL PERFLUOROOCTANOATE	376-27-2
ETHYL PERFLUOROOCTANOATE	3108-24-5
AMMONIUM HEPTADECAFLUOROOCTANESULPHONATE	29081-56-9
HEPTADECAFLUORO-1-OCTANESULFONIC ACID, COMPD. WITH DIETHANOLAMINE	70225-14-8

LITHIUM PERFLUOROOCTANE SULFONATE	29457-72-5
PERFLUOROOCTANE SULFONIC ACID	1763-23-1
PERFLUOROOCTANE SULFONYL FLUORIDE	307-35-7
POTASSIUM PERFLUOROOCTANESULFONATE	2795-39-3

6.18 Ugilec 121, 141, DBBT (Monomethyl Dibromo biphenyl methane)

Substance	CAS No.
DBBT(Monomethyl bibromo biphenyl methane)	99688-47-8
Ugilec 121(Monomethyl bichloro biphenyl methane)	81161-70-8
Ugilec 141(Monomethyl tetrachloro biphenyl methane)	76253-60-6

6.19 Poly vinyl chloride : PVC

Substance	CAS No.
Poly vinyl chloride	9002-86-2

6.20 Phthalates

Substance	CAS No.
Dimethyl phthalate (DMP)	131-11-3
Diethyl phthalate (DEP)	84-66-2
Bis(2-ethyl-hexyl) phthalate(DEHP)	117-81-7
Dibutyl phthalate(DBP)	84-74-2
Benzyl butyl phthalate(BBP)	85-68-7
Di-“isononyl” phthalate(DINP)	28553-12-1 & 68515-48-0
di-“isodecyl” phthalate(DIDP)	26761-40-0 & 68515-49-1
di-n-octyl phthalate(DNOP)	117-84-0

6.21 Halogen compounds

Substance	CAS No.
Hexachlorobenzene	118-74-1
Dichloromethane	75-09-2
Dichloroethane	1300-21-6
1,2-dichloroethane	107-06-2
1,2-dichloroethylene	540-59-0
cis-1,2-dichloroethylene	156-59-2
1,1,2-trichloroethane	79-00-5
Trichloroethylene	79-01-6
Tetrachloroethylene	127-18-4
1,3-dichloropropene	542-75-6
Pentachlorophenol	87-86-5
Sodium pentachlorophenate	131-52-2.
Tris(2-chloroisopropyl phosphate (TCPP)	13674-84-5
Tris(2-chloroethyl) phosphate (TCEP)	115-96-8
Tetrabromobisphenol A dimethylether	37853-61-5
Tetrabromobisphenol A dibromopropylether	21850-44-2
Tetrabromobisphenol A bisallylether	25327-89-3
Tetrabromobisphenol A bis(2-hydroxyethyl ether)	4162-45-2
Tri(2,3-dibromopropyl) phosphate	126-72-7
Bis(2,3-dibromopropyl) phosphate	5412-25-9
Tetradecabromo(p-diphenoxybenzene)	5895-66-5

Bis(2,4,6-tribromophenyl) carbonate	67990-32-3
2-Propenoic acid(pentabromophenylmethyl) ester homopolymer	59447-57-3
1,2-bis(2,4,6-tribromophenoxy) ethane	37853-59-1
Disodium tetrabromophthalate	25357-79-3
TBBPA bis(2,3-dibromopropyl) ether	21850-44-2
1H-Isoindole-1,3(2h)-dione 2,2'-(1,2-ethanediyl) bis[4,5,6,7-tetrabromo]	32588-76-4
Hexabromocyclododecane(HBCDD)	25637-99-4
3,4,5,6-Tetrabromo-1,2-benzenedicarboylic mixed esters acid, propylene with diethylene glycol and glycol	77098-07-8
Polymer of TBBPA, phosgene, and phenol	94334-64-2
Tris(tribromoneophetyl) phosphate	19186-97-1
Phosphoic acid, mixed 3-bromo-2, 2-dimethylpropyl and 2-bromoethyl and 2-chloroethyl esters	125997-20-8
TBBPA 2,2-bis[4-(2,3epoxypropyloxy)dibromo Phenyl]propane polymer	68928-70-1
2,4,6-Tribromophenyl terminated carbonate oligomer	71342-77-3
Tetrabromocyclooctane	31454-48-5
Brominated aliphatic Compound	-
Dibromoethyl dibromo cyclohexane	3322-93-8
Ethylene bis (tertrabromophthalimide)	32588-76-4
Brominated polystylene	88497-56-7
Tetrabromophthalic anhydride	632-79-1
Tetrabromophthalimide	26040-45-9
Other Bromine compound	-
Other Chlorine compound	-

6.22 Fragrance Substances

Substance	CAS No.
musk xylene	81-15-2
musk ketone	81-14-1

6.23 Bisphenol A

Substance	CAS No.
Bisphenol A (4,4'-Isopropylidendiphenol)	80-05-07
Tetrabromo bisphenol A and related compounds	79-94-7

6.24 Triclosan

Substance	CAS No.
5-chloro-2-(2,4-dichlorophenoxy)phenol)	3380-34-5

6.25 Aliphatic CHCs

Substance	CAS No.
Tetrachlormethane	56-23-5
1,1,2,2 – Tetrachloroethane	79-34-5
1,1,1,2 – Tetrachloroethane	630-20-6
Pentachloroethane	76-01-7
Trichlormethane(Chloroform)	67-66-3

1,1,2 – Trichloroethane	79-00-5
1,1 – Dichloroethylene	75-35-4
1,1,1 – Trichloroethane	71-5-6

6.26 Nonylphenols and Nonylphenol Ethoxylates

Substance	CAS No.
2-(P-Nonylphenoxy) Ethanol	104-35-8
Ethanol, 2-(2(Nonylphenoxy)ethoxy)	27176-93-8
Ethoxynonyl-Benzene	28679-13-2
N-Nonylphenol(Mixed Isomers)	25154-52-3
Nonylphenol	104-40-5
Nonylphenol Ethoxylate	37340-60-6
Nonylphenol Ethoxylate	68412-53-3
Nonylphenol Hepta(Oxyethylene) Ethanol	27177-08-8
Nonylphenol Nona(Oxyethylene) Ethanol	27177-08-8
Nonylphenol Polyethylene Glycol Ether	9016-45-9
Nonylphenol, Industrial	84852-15-3
Nonylphenoxy Ethanol	27986-36-3
Oxyrane, Methyl-Polymer with oxirane, mono(nonylphenyl) Ether	37251-69-7
Phenol, Nonyl-phosphite	26523-78-4
P-Nonylphenol Polyethylene Glycol Ether	26027-38-3
Poly(oxy-1,2-ethanediyl), Alpha-(2-nonylphenyl)-Omega-Hydroxy	51938-25-1
Poly(oxy-1,2-ethanediyl), Alpha-(Isononylphenyl)-Omega-Hydroxy	37205-87-1
Poly(oxy-1,2-ethanediyl), Alpha-(Nonylphenyl)-Omega-Hydroxy, Branched	68412-54-4
Poly(oxy-1,2-ethanediyl), Alpha-(Nonylphenyl)-Omega-Hydroxy, Branched	127087-87-0

6.27 PAHs

Substance	CAS No.
NAPHTHALENE	91-20-3
ACENAPHTHYLENE	208-96-8
ACENAPHTHENE	83-32-9
FLUORENE	86-73-7
PHENANTHRENE	85-01-8
ANTHRACENE	120-12-7
FLUORANTHENE	206-44-0
INDENO[c,d]PYRENE	193-39-5
PYRENE	129-00-0
BENZO[g,h,i]PERYLENE	191-24-2
Benzo(a)pyrene(BaP)	50-32-8
Benzo(e)pyrene(BeP)	192-97-2
Benzoanthracenepyrene(BaA)	56-55-3
Chrysen	218-01-9
Benzofluoranthene(BbFA)	205-99-2
Benzofluoranthene(BjFA)	205-82-3
Benzofluoranthene(BkFA)	207-08-9
Dibenzoanthracene(DBAhA)	53-70-3

6.28 Antimony (Sb)and its compounds

Substance	CAS No.
ANTIMONY TRIOXIDE	1309-64-4
Antimony (metallic)	7440-36-0
Antimony trioxide	1309-64-4
Antimony pentoxide	1314-60-9
Antimony trichloride	10025-91-9
Sodium antimonate	15432-85-6
Other Antimony compounds	

6.29 Beryllium (Be)and its compounds

Substance	CAS No.
BERYLLIUM	7440-41-7
BERYLLIUM CARBONATE	66104-24-3
BERYLLIUM CHLORIDE	7787-47-5
BERYLLIUM FLUORIDE	7787-49-7
BERYLLIUM HYDROXIDE	13327-32-7
BERYLLIUM NITRATE	13597-99-4
BERYLLIUM PHOSPHATE	13598-15-7
BERYLLIUM SULFATE	13510-49-1
BERYLLIUM SULPHATE TETRAHYDRATE	7787-56-6
BERYLLIUM-ALUMINUM ALLOY	12770-50-2
BeO	1304-56-9
Other BERYLLIUM compounds	

6.30 Dimethyl fumarate (DMF)

Substance	CAS No.
Dimethyl fumarate	624-49-7

6.31 Conflict Material

Substance	CAS No.
Tin	7440-31-5
Tantalum	7440-25-7
Tungsten	7440-33-7
Gold	7440-57-5

6.32 SVHC Candidate List

SVHC Candidate list is updated irregularly. Please check the latest SVHC Candidate List on the website of ECHA (European Chemicals Agency). http://echa.europa.eu/web/guest/candidate-list-table

(last updated June 20th, 2016)

Substance	CAS No.
Benzo[def]chrysene	50-32-8
1,3-propanesultone	1120-71-4
2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327)	3864-99-1
2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3
Nitrobenzene	98-95-3
Perfluorononan-1-oic-acid and its sodium and ammonium salts	

Ammonium salts of perfluorononan-1-oic-acid	4149-60-4
Perfluorononan-1-oic-acid	375-95-1
Sodium salts of perfluorononan-1-oic-acid	21049-39-8
1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters	
1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters	68515-51-5
1,2-Benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters	68648-93-1
5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2]	
5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane	
5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane	
2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1
2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7
2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1
Cadmium fluoride	7790-79-6
Cadmium sulphate	10124-36-4, 31119-53-6
Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE)	
1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4
Cadmium chloride	10108-64-2
Sodium perborate, perboric acid, sodium salt	
Perboric acid, sodium salt	11138-47-9
Sodium perborate	15120-21-5
Sodium peroxometaborate	7632-04-4
Cadmium sulphide	1306-23-6
Dihexyl phthalate	84-75-3
Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)	573-58-0
Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7
Imidazolidine-2-thione (2-imidazoline-2-thiol)	96-45-7
Lead di(acetate)	301-04-2
Trixylyl phosphate	25155-23-1
4-Nonylphenol, branched and linear, ethoxylated	
Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
Cadmium	7440-43-9
Cadmium oxide	1306-19-0
Dipentyl phthalate (DPP)	131-18-0
Pentadecafluorooctanoic acid (PFOA)	335-67-1
1,2-Benzenedicarboxylic acid, dipentyl ester, branched and linear	84777-06-0
1,2-diethoxyethane	629-14-1
1-bromopropane (n-propyl bromide)	106-94-5
3-ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2
4,4'-methylenedi-o-toluidine	838-88-0
4,4'-oxydianiline and its salts	
4,4'-oxydianiline	101-80-4
4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated	
4-aminoazobenzene	60-09-3
4-methyl-m-phenylenediamine (toluene-2,4-diamine)	95-80-7
4-Nonylphenol, branched and linear	
6-methoxy-m-toluidine (p-cresidine)	120-71-8

[Phthalato(2-)]dioxotrilead	69011-06-9
Acetic acid, lead salt, basic	51404-69-4
Biphenyl-4-ylamine	92-67-1
Bis(pentabromophenyl) ether (decabromodiphenyl ether) (DecaBDE)	1163-19-5
Cyclohexane-1,2-dicarboxylic anhydride	
cis-cyclohexane-1,2-dicarboxylic anhydride	13149-00-3
Cyclohexane-1,2-dicarboxylic anhydride	85-42-7
trans-cyclohexane-1,2-dicarboxylic anhydride	14166-21-3
Diazene-1,2-dicarboxamide (C,C'-azodi(formamide)) (ADCA)	123-77-3
Dibutyltin dichloride (DBTC)	683-18-1
Diethyl sulphate	64-67-5
Diisopentyl phthalate	605-50-5
Dimethyl sulphate	77-78-1
Dinoseb (6-sec-butyl-2,4-dinitrophenol)	88-85-7
Dioxobis(stearato)trilead	12578-12-0
Fatty acids, C16-18, lead salts	91031-62-8
Furan	110-00-9
Henicosafluoroundecanoic acid	2058-94-8
Heptacosafluorotetradecanoic acid	376-06-7
Hexahydromethylphthalic anhydride	
Hexahydro-4-methylphthalic anhydride	19438-60-9
Hexahydromethylphthalic anhydride	25550-51-0
Hexahydro-1-methylphthalic anhydride	48122-14-1
Hexahydro-3-methylphthalic anhydride	57110-29-9
Lead bis(tetrafluoroborate)	13814-96-5
Lead cyanamidate	20837-86-9
Lead dinitrate	10099-74-8
Lead monoxide (lead oxide)	1317-36-8
Lead oxide sulfate	12036-76-9
Lead titanium trioxide	12060-00-3
Lead titanium zirconium oxide	12626-81-2
Methoxyacetic acid	625-45-6
Methyloxirane (Propylene oxide)	75-56-9
N,N-dimethylformamide	68-12-2
N-methylacetamide	79-16-3
N-pentyl-isopentylphthalate	776297-69-9
o-aminoazotoluene	97-56-3
o-toluidine	95-53-4
Orange lead (lead tetroxide)	1314-41-6
Pentacosafluorotridecanoic acid	72629-94-8
Pentalead tetraoxide sulphate	12065-90-6
Pyrochlore, antimony lead yellow	8012-00-8
Silicic acid ($H_2Si_2O_5$), barium salt (1:1), lead-doped	68784-75-8
Silicic acid, lead salt	11120-22-2
Sulfurous acid, lead salt, dibasic	62229-08-7
Tetraethyllead	78-00-2
Tetralead trioxide sulphate	12202-17-4
Tricosafluorododecanoic acid	307-55-1
Trilead bis(carbonate) dihydroxide	1319-46-6
Trilead dioxide phosphonate	12141-20-7
1,2-bis(2-methoxyethoxy)ethane (TEGDME,triglyme)	112-49-2
1,2-dimethoxyethane,ethylene glycol dimethyl ether (EGDME)	110-71-4
1,3,5-Tris(oxiran-2-ylmethyl)-1,3,5-triazinane-2,4,6-trione (TGIC)	2451-62-9

1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione (β-TGIC)	59653-74-6
4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol	561-41-1
4,4'-bis(dimethylamino)benzophenone (Michler's ketone)	90-94-8
[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)	548-62-9
[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26)	2580-56-5
Diboron trioxide	1303-86-2
Formamide	75-12-7
Lead(II) bis(methanesulfonate)	17570-76-2
N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1
α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4)	6786-83-0
1,2-dichloroethane	107-06-2
2,2'-dichloro-4,4'-methylenedianiline	101-14-4
2-Methoxyaniline, o-Anisidine	90-04-0
4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9
Aluminosilicate Refractory Ceramic Fibres	
Arsenic acid	7778-39-4
Bis(2-methoxyethyl) ether	111-96-6
Bis(2-methoxyethyl) phthalate	117-82-8
Calcium arsenate	7778-44-1
Dichromium tris(chromate)	24613-89-6
Formaldehyde, oligomeric reaction products with aniline	25214-70-4
Lead diazide, Lead azide	13424-46-9
Lead dipicrate	6477-64-1
Lead styphnate	15245-44-0
N,N-dimethylacetamide	127-19-5
Pentazinc chromate octahydroxide	49663-84-5
Phenolphthalein	77-09-8
Potassium hydroxyoctaoxodizincatedichromate	11103-86-9
Trilead diarsenate	3687-31-8
Zirconia Aluminosilicate Refractory Ceramic Fibres	
1,2,3-trichloropropane	96-18-4
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4
1-Methyl-2-pyrrolidone (NMP)	872-50-4
2-ethoxyethyl acetate	111-15-9
Hydrazine	302-01-2, 7803-57-8
Strontium chromate	7789-06-2
2-ethoxyethanol	110-80-5
2-methoxyethanol	109-86-4
Acids generated from chromium trioxide and their oligomers	
Oligomers of chromic acid and dichromic acid	
Chromic acid	13530-68-2
Dichromic acid	7738-94-5
Chromium trioxide	1333-82-0
Cobalt(II) carbonate	513-79-1
Cobalt(II) diacetate	71-48-7
Cobalt(II) dinitrate	10141-05-6
Cobalt(II) sulphate	10124-43-3
Ammonium dichromate	7789-09-5
Boric acid	

Boric acid, crude natural	11113-50-1
Boric acid	10043-35-3
Disodium tetraborate, anhydrous	12179-04-3, 1303-96-4, 1330-43-4
Potassium chromate	7789-00-6
Potassium dichromate	7778-50-9
Sodium chromate	7775-11-3
Tetraboron disodium heptaoxide, hydrate	12267-73-1
Trichloroethylene	79-01-6
Acrylamide	79-06-1
2,4-dinitrotoluene	121-14-2
Anthracene oil	90640-80-5
Anthracene oil, anthracene paste	90640-81-6
Anthracene oil, anthracene paste, anthracene fraction	91995-15-2
Anthracene oil, anthracene paste, distn. lights	91995-17-4
Anthracene oil, anthracene-low	90640-82-7
Diisobutyl phthalate	84-69-5
Lead chromate	7758-97-6
Lead chromate molybdate sulphate red (C.I. Pigment Red 104)	12656-85-8
Lead sulfochromate yellow (C.I. Pigment Yellow 34)	1344-37-2
Pitch, coal tar, high-temp.	65996-93-2
Tris(2-chloroethyl) phosphate	115-96-8
4,4'- Diaminodiphenylmethane (MDA)	101-77-9
5-tert-butyl-2,4,6-trinitro-m-xylene (Musk xylene)	81-15-2
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8
Anthracene	120-12-7
Benzyl butyl phthalate (BBP)	85-68-7
Bis (2-ethylhexyl)phthalate (DEHP)	117-81-7
Bis(tributyltin) oxide (TBTO)	56-35-9
Cobalt dichloride	7646-79-9
Diarsenic pentaoxide	1303-28-2
Diarsenic trioxide	1327-53-3
Dibutyl phthalate (DBP)	84-74-2
Hexabromocyclododecane (HBCDD)	
1,2,5,6,9,10-hexabromocyclodecane	3194-55-6
Hexabromocyclododecane	25637-99-4
alpha-hexabromocyclododecane	134237-50-6
beta-hexabromocyclododecane	134237-51-7
gamma-hexabromocyclododecane	134237-52-8
Lead hydrogen arsenate	7784-40-9
Sodium dichromate	10588-01-9, 7789-12-0
Triethyl arsenate	15606-95-8

6.33 VOCs(Volatile Organic Compounds)

Substance	CAS No.
Toluene	108-88-3
Benzene	71-43-2
Trichlorobenzene	120-82-1
Trichloroethylene	79-01-6

1,2,3-trichloropropane	96-18-4
1,2-dichloropropane	78-87-5
Ethylbenzene	100-41-4
m-Xylene/p-Xylene/o-Xylene	108-38-3/106-42-3/95-47-6
1,2,4-Trimethylbenzene	95-63-6
1,4-dichlorobenzene	106-46-7
VinylChloride	75-01-4
EthylChloride	75-00-3

7. Organization and method for analysis of hazardous substances

7.1 In relations to environment-related substance analysis reports, all certified reports produced by officially certified organizations, both domestic and overseas, are accepted. (Including supplier's own analysis report, that complies with certified analysis methods, with LG Chem's prior consultation).

7.2 Analysis methods

1) Fundamentally, analysis must be carried out in accordance with the specifications listed in test and analysis standard as recommended by LG Chem. When using a method other than that recommended by LG Chem, it must be verified that the method employed is an internationally certified analysis and test method.

<Table-1. RoHS analysis method recognized by LG Chem >

Material	Pb	Cd	Cr^{6+}	Hg	PBB/PBDEs
Polymer & Electronics	IEC62321 Ed.1.0 EPA3052 EPA3050B	IEC62321 Ed.1.0 EPA3052 EPA3050B EN1122	IEC62321 Ed.1.0 EPA3060B EPA7196A	IEC62321 Ed.1.0 EPA3052 EPA7473	IEC62321 Ed.1.0 EPA3540C EPA8270C
Metal	IEC62321 Ed.1.0 EPA3050B ASTM E350	IEC62321 Ed.1.0 EPA3050B	IEC62321 Ed.1.0 ISO3613	IEC62321 Ed.1.0 EPA3052 EPA7473	

<Table-2. Halogen analysis method recognized by LG Chem>

Material	Halogen (Br, Cl)
Polymer & Electronics	EN 14582, EN 50267-2-2, IEC754-1, KS M 0180

* Refer to Chapter 2.5“ Detailed standard for management of hazardous substances”.

2) Analysis must be carried out by selecting analysis and test equipments of ICP-AES, ICP-MS (inductively coupled plasma mass spectrometer), IC (ion chromatograph), AAS (atomic absorption analyzer), UV/VIS (UV/ VIS Spectrophotometer), GC-MS (Gas chromatography mass spectrometer), etc. per each variety of hazardous substance. When using other equipments, it must be verified that the method adopted is an internationally certified analysis and test method.

Chapter 3. Standard for submitting reports

1. Purpose

In order to facilitate an errorless process when submitting hazardous substance analysis reports to LG Chem, the assessment of supplier conformity to LG Chem's hazardous substance management standard is facilitated prior to all delivery of initial samples, and approval of supply for material group (including packaging materials, parts, materials and substances).

2. Scope

This standard is to be applied to such activities pertaining to substance testing, analysis, content level testing and verification of environmentally hazardous substances contained in all material group (including packaging materials, parts, material and substances) which are produced and supplied by the registered suppliers of LG Chem, and covers all domestic and overseas production sites of LG Chem as well as suppliers.

3. Document descriptions

3.1 Material composition Survey

This refers to information on physical composition of materials which helps identify the make-up of the materials that are supplied to LG Chem, and includes documents that identify whether harmful substances (Level 1,2,3 substances) designated by LG Chem have been contained or used.

3.2 Certificate of analysis

This refers to a certificate of analysis from officially recognized laboratories in Korea or abroad, as measured by test standards using methods specified by LG Chem.

3.3 Eco-friendly Materials Supply Certification

This refers to a Certification defining eco-friendly materials supplied from LG Chem's suppliers and their comprehensive responsibilities for assuring reliability and accuracy in data submitted to LG Chem.

3.4 Material Safety Data Sheet (MSDS)

This refers to a set of documents containing material safety information, including material name, physical and chemical properties, toxicity, preventive and contingency measures for explosion and fire, and environmental impact, etc.

3.5 Certificate

This refers to the certified document received from the supplier verifying the chemical name and components. In addition, whether or not the final product, which may contain confidential components, contains hazardous substances and complies with chemical regulations (REACH, RoHS, etc.).

4. Detailed standard for document submittal

4.1 Duty to data submittal

Suppliers must verify that they adhere to the LG Chem standards for hazardous substances and submit relevant data. Apart from basic data requirements, suppliers must be ready to submit any other relevant data immediately at the request of LG Chem . The suppliers must keep the relevant evidence of the data at all times.

4.2 Assurance of data accuracy

Documents submitted to LG Chem by suppliers should be created with accuracy based on evidence and in good faith without forgery or false statement. The suppliers must guarantee the accuracy of such documents.

4.3 Validity of data

In case of certificates of analysis for hazardous substances, the certificates issued within 2 years must be submitted (and certificates submitted by tier two and/or tier three suppliers that provide materials of parts must also remain valid, but its validity requirement is subject to change depending on division-specific criteria). If there are any alterations to the make-up of materials presently supplied to LG Chem or to its manufacturing process, then the analysis for hazardous substance must be redone and a new certificate of analysis submitted.

4.4 Documents required for submittal

1) For initial approval of materials or when changes occur in 4M (Appendix 1)

① Material Composition Survey
② Certificate of analysis
③ Eco-friendly Materials Supply Certification
④ Material Safety Data Sheet (MSDS)

Note 1) For suppliers that deliver packaging materials, they are asked to submit only supplier’s general information, certificate of analysis on environmentally harmful substances (Pb, Hg, Cr6+, Cd : Total less than 100ppm) from certified labs,

environmentally friendly materials supply contract and audit checklist for eco-friendly certification.

5. Standard for documentation

5.1 Material composition Survey

LG Chem suppliers should obtain MSDS or MILL Sheets from their respective suppliers, organize information according to material and homogenous material levels, and produce data on the composition of the substances. The suppliers are required to create a material composition table of environmentally harmful substances (Level 1,2,3) per parts, based on material composition tables from their material suppliers and certificates of analysis from certified labs. (Appendix 1_ Form 1)

5.2 Certificates of analysis on hazardous materials from certified laboratories

Suppliers are required to submit the certificates of analysis on RoHS-regulated materials (lead, cadmium, mercury, hexa-valent chromium, PBB, PBDE) and halogen (Cl, Br) from officially recognized laboratories. However, if officially approved testing methods have been used for analysis, then the certificates of analysis issued by the suppliers can also be recognized and accepted with consent from LG Chem.
(Validity of data: Two years from the date of issuance)

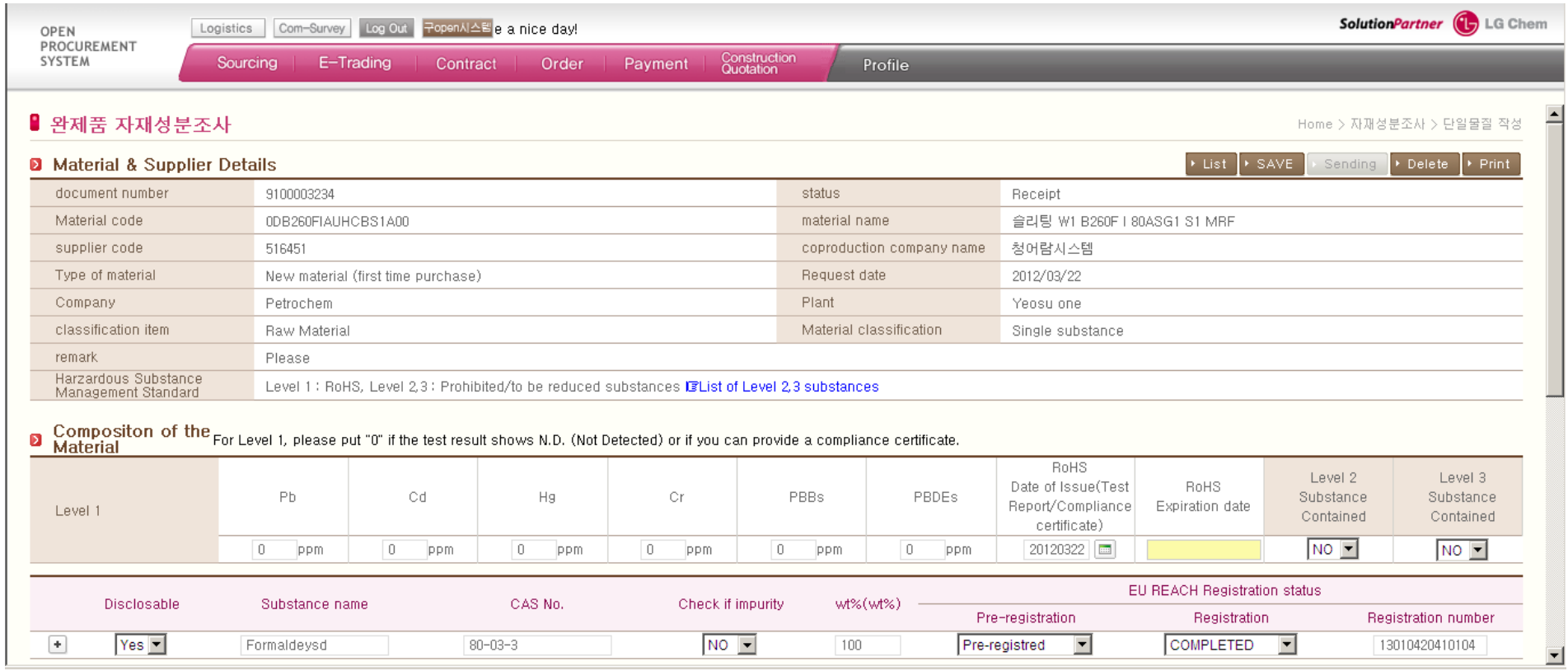
Appendix 1. Forms of documents, which have to be submitted

Form 1. Material Composition Survey

Form 2. Eco-friendly Materials Supply Certification

Form 3. Checklist for Eco-friendly Evaluation

Appendix 1 _ Form 1. Material Composition Survey



OPEN PROCUREMENT SYSTEM

Logistics | Com-Survey | Log Out | 구OpenAI스템e a nice day!

SolutionPartner LG Chem

Sourcing | E-Trading | Contract | Order | Payment | Construction Quotation | Profile

완제품 자재성분조사

Home > 자재성분조사 > 단일물질 작성

Material & Supplier Details

List | SAVE | Sending | Delete | Print

document number	9100003234	status	Receipt
Material code	0DB260FIAUHCBS1A00	material name	슬리팅 W1 B260F I 80ASG1 S1 MRF
supplier code	516451	coproduction company name	청어람시스템
Type of material	New material (first time purchase)	Request date	2012/03/22
Company	Petrochem	Plant	Yeosu one
classification item	Raw Material	Material classification	Single substance
remark	Please		
Harzardous Substance Management Standard	Level 1 : RoHS, Level 2,3 : Prohibited/to be reduced substances ☞List of Level 2,3 substances		

Compositon of the Material

For Level 1, please put "0" if the test result shows N.D. (Not Detected) or if you can provide a compliance certificate.

Level 1	Pb	Cd	Hg	Cr	PBBs	PBDEs	RoHS Date of Issue(Test Report/Compliance certificate)	RoHS Expiration date	Level 2 Substance Contained	Level 3 Substance Contained
	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	20120322		NO	NO

	Disclosable	Substance name	CAS No.	Check if impurity	wt%(wt%)	EU REACH Registration status		
						Pre-registration	Registration	Registration number
+	Yes	Formaldeysd	80-03-3	NO	100	Pre-registred	COMPLETED	13010420410104

Compliance Confirmation

Undisclosed substances	☞ Click to make confirmation
Regulated substances	☞ Click to make confirmation

File Attachments

GHS MSDS	File Attachments	0	* Must be attached, except in the case of article type products
RoHS Test Report/Compliance Certificate	File Attachments	0	* Must be attached, except in the case of products NOT intended for use as raw materials of LG Chem products
Other	File Attachments	0	
Signature	File Attachments	0	I hereby certify that the information provided on this material composition survey is all true within the knowledge of our company.

Contact Person (LG Chem Procurement team)

person's name in charge	Kisik ma	Tel.	3773-0991
E-Mail	photoma@lgchem.com		

Contact Person (LG Chem Environment team)

person's name in charge	Chiwan Ku	Tel.	680-1063
E-Mail	chiwanku@lgchem.com		

Appendix 1 _ Form 2. Eco-friendly Materials Supply Certification

Eco-friendly Materials Supply Certification

We(hereinafter referred to as “B”) certify as per the following relating with the supply materials to LG Chem, Ltd, (hereinafter referred to as “A”)

- The following -

Article 1. Purpose

This Certification is intended to ensure that “B” comply with eco-friendly development, supply and related laws and also define the details regarding the treatment of claims and the limitations of responsibilities

Article 2. Compliance with Laws and Guidelines

1. B shall strictly comply with Laws relevant to Materials..
2. B shall strictly comply with the “A”’s self guideline for Eco-friendly Material Management

Article 3. Implementation and Verification

1. B shall perform any and all activities required to execute this Certification effectively, such as, but not limited to, the development and production of Materials, the purchasing and use of Materials and parts, the maintenance and operation of the measuring system, testing results in store, and the set-up and implementation of improvements and execution of the criteria used for controlling the use of hazardous substances.
2. Upon A’s request, B shall perform the execution activities set forth in Article 2 and Article 3.1. Wherever deemed necessary by A, A may visit B’s business office or factory and investigate B’s production activities.
3. In the event that A is concerned that any Materials may have an adverse effect on the environment or on the human body, A shall be entitled to request B to correct said adverse effects, and B shall duly comply with such said request/s unless there is a justifiable reason not to do so.
4. B is required to submit a Material Composition Survey to A before supplying any materials, and shall warrant that the data provided to A is factual.

Article 4. Responsibility for Warranty and Limitations of Responsibility

1. Both parties hereto shall make an effort to perform environmentally friendly product production and work to reduce the risks of environmental

accidents caused by the Materials.

2. Where a claim arises or damage is suffered by A or any third party as a result of any breach of this Certification by B, B shall treat such a claim or damage as B's own responsibility and bear all related expenses. A shall not be held liable for any causes resulting in claim/s and/or damage/s. In this event, A may suspend the transaction with B, in whole or in part, or terminate this Contract.
3. In the event of any of the following, B shall not be required to assume responsibility as provided for in the foregoing Clause 2:
    A. Where A modifies or alters Materials provided by B at A's sole discretion without B's written consent, and problems arise as a result;
    B. Where, despite B having identified possible defects due to a proposed alteration in specifications, A requests B to alter or modify the specifications of Materials, B complies with said request, and problems arise as a result.

Article 5. Validity

1. This Certification shall enter into effect from the date it is signed and shall remain effective until the expiry or termination of the Basic Transaction Contract. Notwithstanding, the provision regarding B's responsibility of Materials supply shall survive the expiry or termination thereof.

We hereby sign this Certification as a authorized representative.

Date: , , 20

Company name :

Business registration number :

Signature :

Appendix 1 _ Form 3. Checklist for Eco-friendly Evaluation

Checklist for Eco- friendly evaluation

LG Chem

1. Company Profile

Company Name				Representative				
Code No.				Type of Business				
Evaluation Premises	Factory 1			Tel. No.		Fax No		
	Factory 2			Tel. No.		Fax No		
	Overseas Factory			Tel. No.		Fax No		
Certification Acquisition	Acquisition Date	Certificate Authority	Certificate No.	Essential Requirements for Suppliers	Submission	No Submission	Submission Date	
ISO 9001				Contract of environment-friendly warranty				
ISO 14001				Test Report (ICP Data etc.)				
OHSAS/KOSHA 18001				Material composition Table				
SamSung E/LGE/Sony Partner								

2. Basic Particulars of Evaluation

[New□, Follow-up□, Renewal□]

Company Name		Auditing Division		Contact	Tel.
Auditor		Audit Place		Audit Date	200 . . .

3. Summary Sheet of Evaluation Result

1. Evaluation Mark			2. Acquisition Score		2. Evaluation Result		
Evaluation Item	Total Score	Essential Score	Total Score	Essential Score	Section	Total Score	Essential Score
1. Environmental Management System	37	13	/ 37	/ 13	Certification Criteria	FAIL < 70 Point	FAIL < 32 Point
2. Supplier and Sub-contractor Management	15	6	/ 15	/ 6			
3. Mass Production Process	21	9	/ 21	/ 9	Result	0	0
4. Change Management	12	6	/ 12	/ 6			
5. Treatment for the Defect	15	6	/ 15	/ 6			
Total	100	40	/ 100	/ 40			

4. Comments of Evaluation Result

Satisfied Examples

Unsatisfied Examples

5. Evaluation Checklist

Classification		No.	Questionnaires	Point			MUST Describe Process, Document Number, Responsible Organization
				Good (3)	Weak (1.5)	Poor (0)	
1. Environmental Management System		1.1	Have you set an environmental policy approved by the top management?				
	Mandatory	1.2	Do you have people and organization for environmental management and do responsible staff have clearly defined roles & responsibilities and authority?				
		1.3	Do you have realistic goals and actions plans linked to environmental policy which are regularly monitored for implementation?				
	Mandatory	1.4	Have you submitted all relevant documents for eco-friendly certification to LG Chem, including signed and sealed supply contract for eco-friendly materials and certificates of analysis from certified laboratories? (Good : 4 Points)				
		1.5	Do you have a defined control list for hazardous substances which includes specified hazardous substances (level 1, 2, 3) regulated by LG Chem?				
	Mandatory	1.6	Do you upgrade your hazardous substances list in a timely manner to reflect any changes in applicable laws and regulations, as well as customer requirements?				
		1.7	Does the information on environmentally sensitive materials get communicated and control guidelines shared across your internal organization, all sales sites and factories as well as affiliates?				
		1.8	Do you have documented standards and procedures for internal audit, and implement them in line with the procedures?				
		1.9	Are internal audits performed by qualified auditors and the outcomes of the audits reported to the top management?				
	Mandatory	1.1	Do you verify and validate the implementation of corrective actions taken to address the findings from the internal audit?				
		1.11	Do you establish plans for and implement hazardous substance management trainings for all executives and staffs in your organization?				
		1.12	Do you maintain records and measurements pertaining to hazardous substances control for over a 4-year period?				
	Mandatory	2.1	Do you have clearly defined criteria for selecting suppliers and are you selecting only those suppliers who satisfy the LG Chem standards for hazardous substance management?				
		2.2	Are you sharing hazardous substance management standards of LG Chem with your own suppliers?				

2. Supplier and Subcontractor Management		2.3	Do you clearly specify regulated hazardous materials in your material specifications for your parts suppliers?				
	Mandatory	2.4	Do you obtain from your suppliers material composition tables and officially recognized certificates of analysis on hazardous materials and control them as accordingly?				
		2.5	Do you have plans established for supplier environmental audit with environmental aspects included as criteria of the audit and checked as accordingly?				
3. Process control	Mandatory	3.1	Do you have defined inspection standards for hazardous substance content in your purchased raw materials/parts and are inspections performend in accordance with the standards?				
		3.2	Do you have a register that shows clear track/history of an end-to-end process from parts/feedstock to finished products?				
		3.3	Do you have records for hazardous substances in regards to their name, quantity, usage and storage place?				
		3.4	Do you have defined job sequence for using hazardous materials to prevent contamination?				
	Mandatory	3.5	Do you regularly request certified labs to analyze the hazardous substance content in finished products for verification?				
		3.6	Do you take appropirate actions to reflect any changes in environmental laws, regulations and customer requirements to your existing inventories?				
	Mandatory	3.7	Are all materials, subsidiary materials and parts used in the factory RoHS-free?				
4. Change Management	Mandatory	4.1	Do you have clearly defined change management regulations which address environemntal management aspects?				
		4.2	Do you verify the effects of environemntally hazardous substances prior to any change?				
		4.3	Do you verify the conformity to LG Chem's hazardous substance management standards through test analysis (e.g ICP analysis) when a change occurs?				
	Mandatory	4.4	Do you submit certificates of analysis and MSDS to LG Chem when raw/subsidiary materials and/or parts in supplied products are changed?				
	Mandatory	5.1	Do you have defined rules and procedures for handling non-conforming proudcts?				
		5.2	Do you clearly identify rejected and accepted lots and ensure their traceability?				

5. Non-conforming product management		5.3	Do you segregate non-conforming products and document the history of their handling for traceability?				
		5.4	Do you establish root cause analysis and corrective actions to address non-conformity and ensure prevention?				
	Mandatory	5.5	Do you inform/report to LG Chem and take proper action as necessary when non-conforming and/or potentially defective products have been shipped to LG Chem?				