

3.0rd Edition

Manual for Preparation Environmental Regulations

-For distribution to
Cooperating suppliers

LG
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GREEN

2006. 7. 11



LG Electronics

Document Introduction

This manual for environmental regulation countermeasure is a means to secure environmentally friendly product competitiveness by actively responding to the environment-friendly product regulations spreading throughout the world, such as in EU nations, the US and China, etc. This manual has been prepared in order to support the cooperating suppliers of LG Electronics through uplifting the capacity to guarantee environmentally friendly product quality from the stage of parts manufacturing carried out by cooperating suppliers and through securing environmentally friendly product quality in parts, raw materials, packaging materials and subsidiary materials, etc. traded between LG Electronics and our cooperating suppliers.

Through this manual, the cooperating suppliers of LG Electronics can obtain understanding on the environment-friendly policy and principle adopted by LG Electronics, substances, the use of which is prohibited and inspected in parts, raw materials, packaging materials and subsidiary materials, etc. currently being supplied to LG Electronics, management and operation standards of LG Electronics on the environment-related substances and standards of environment-related substance analysis result submission as employed by LG Electronics, etc. This manual also enables the cooperating suppliers to check on detailed information of our environment-friendly certification system, which is administered to uplift the capacity to guarantee environmentally friendly product quality.

In tune with the expansion and increase of environment-friendly regulations, the contents of this manual will be revised and supplemented on a regular basis. The revised and supplemented edition will be distributed to the cooperating suppliers without delay.

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Document History

Edition	Issued	Written by	Contents
1 st Edition	Nov. 18, 2004	Quality Management Team, LG Electronics	The very first preparation of manual throughout the company/ Division/ Distribution to cooperating suppliers 1. Standard of environment-related substance management and operation 2. Standard of environment-related substance analysis result submission

2 nd Edition	Mar. 10, 2005	Quality Management Team, LG Electronics	<p>Outline of environment-friendly certification system (LG Green ship) added</p> <p>Modification in environment-related substance classification and management standard</p> <ol style="list-style-type: none"> 1. Particulars of environment-friendly certification system promotion added 2. Evaluation check list for environment-friendly certification system of cooperating suppliers added 3. Environment-related substance classification redefined and management standard reorganized 4. Permitted limit of cadmium content in zinc die-cast parts and of hexavalent chromium content in chromate plate parts redefined 5. Particulars of exemption from the recently confirmed RoHS regulation reflected
3 rd Edition	Jul. 11, 2006	Quality/Supply Management Team, LG Electronics	<p>Main Change</p> <ol style="list-style-type: none"> 1. LGE Green Program retitled 2. Maximum Allowable Concentration Value revised 3. Submitted documents and effective term added for mass production items guarantee 4. RoHS Free Mark revised 5. Organization and method for analysis updated

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Upon Distributing the Revised Edition of Manual for Environmental Regulation Countermeasure

I would like to express my gratitude to the cooperating suppliers for their participation and cooperation in the activities of LG Electronics to improve replacing of environment-related substances, which are carried out in order to respond to the environment-friendly product regulations spread and reinforced throughout the world.

LG Electronics intends to administer environment-friendly certification system upon our cooperating suppliers as a systematic means to cut off the primary inflow of environmentally environment-related substances from the stages of parts manufacturing and raw materials warehousing. In addition, we are redefining permitted limits of the 6 environment-related substance contents in products as specified by RoHS. Through this, we are endeavoring to achieve further effectiveness in our current activities of replacing and improving on environment-related substance utilization.

At this, we are distributing the 2nd edition of LG Electronics' manual for environmental regulation countermeasure, which have been reflected with the contents listed above.

Based on clear understanding of the import and contents of this revised edition, LG Electronics requests active participation and cooperation of our cooperating suppliers and their staff members so that we can perform more effective activities of environmental regulation countermeasures.

June 2006

Chief of Quality/Supply Management Team, LG Electronics
Vice President, Jong Sik, Kim



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Chapter 1 Outline of LGE Green Program Certification System

1. Definition

The environment-friendly certification system of LG Electronics (LGE Green Program) is a system to certify cooperating partners' abilities to guarantee environment-friendly quality of products, so that to ultimately secure environmentally friendly product competitiveness of LG Electronics by securing raw materials from all cooperating suppliers providing LG Electronics with parts, raw materials, packaging materials and subsidiary materials, etc., by providing guidance and assistance so that related organizations and management system can be achieved to apply appropriate management of environment-related substances for which supervision is required or use is prohibited in products per each course of production and forwarding processes as specified by specifications of environment-friendly regulations, such as of RoHS Directives of EU and by securing capacity to guarantee environmental friendliness in product quality.

2. Purpose

The purpose of this manual is to achieve complete countermeasure capacities against international regulations of environmentally friendly product qualities, such as of RoHS Directives of EU through implementing environment-friendly quality guarantee system in all cooperating suppliers providing LG Electronics with parts, raw materials, packaging materials and subsidiary materials, etc.

3. Scope

The specifications of this manual are applied to all cooperating suppliers directly providing LG Electronics with parts, raw materials, packaging materials and subsidiary materials, etc. (with exception of the secondary and tertiary vendors on the basis of LG Electronics trading standard) and OEM companies manufacturing and supplying LG Electronics with semi-finished products and completed products.

4. Policy

LG Electronics (including domestic premises and overseas production corporations) carries out LGE Green Program certification examination for all cooperating suppliers. For cooperating suppliers satisfying requirements of LGE green program certification after deliberation and resolution by environment-friendly certification council, LG Electronics vests LGE green program Certification and guarantees continuous business transaction under the name of the C.E.O. of LG Electronics. For cooperating suppliers not obtaining certification, LG Electronics stops transactions in principle.

5. Requirement

Fundamentally, the environment-related substance contents in parts, raw materials, packaging materials and subsidiary materials currently supplied to LG Electronics must satisfy the permitted level specified in environment-related substance management and operation standard of LG Electronics (Chapter 3 of Manual for Environmental Regulation Countermeasure). Certification process is carried out through evaluating written documents using a checklist in relations to appropriate organization and system formation (environment-friendly management system) to apply management on environment-related substances.

Classification	Evaluation Category			Effective Term	
	Environmental Management System	Environment-related Substance Management System	Materials and Product Management	Post-management	Renewal Examination
Full Mark	30	40	30	-	-
Certification Requirement	80 marks or higher (42 marks or higher from essential categories)			1 year	2 years

6. Process

6.1 Distribution of Check List and Self-evaluation of Cooperating Suppliers

Classification	Evaluation Category	Mark Allotted (for essential categories)
1. Environmental Management System (30 marks)	1.1 Policy and strategy	10 (4)
	1.2 Internal inspection	10 (4)
	1.3 Training	5
	1.4 Information sharing	5 (2)
2. Environment-related Substance Management System (40 marks)	2.1 Improvement plan	11 (8)
	2.2 Management of inappropriate parts	11 (5)
	2.3 Management of modified particulars	8 (7)
	2.4 Management of sub-contracted suppliers	10 (5)
3. Material and Product Management (30 marks)	3.1 Part recognition and warehousing inspection	12 (6)
	3.2 Material and process management	7 (3)
	3.3 Forwarding management	11 (6)

Each category is evaluated in three levels of [outstanding, ordinary and insufficient].

6.2 Confirming Self-evaluation Result of Cooperating Suppliers and Confirmation by Visitation to Cooperating Suppliers

An evaluation team is organized with specialized personnel who, among those of purchase, quality guarantee, development, production and environment-friendly management divisions of LG Electronics, have completed the training of environment-friendly certification system examiners to administer onsite confirmation and evaluation by visiting the cooperating suppliers.

6.3 Deliberation and Resolution by Environment-friendly Certification Deliberation Committee

To achieve fairness in the evaluation result, results of evaluation carried out by evaluation team are placed under composite reviewing process performed by company-wide environment-friendly certification deliberation committee, thus are to be used in determining certificate granting to and continuous transaction with the supplier concerned.

7. Supplier's Preparation

7.1 Analysis and Improvement of Environmentally Environment-related Substances in Currently Supplied Parts, Raw Materials, Packaging Materials and Subsidiary Materials

All cooperating suppliers of LG Electronics are to check the status of environment-related substance content in all parts, raw materials, packaging materials and subsidiary materials currently supplied, thus are to administer improvement to satisfy maximum allowable concentration value as specified by LG Electronics.

7.2 Implementation and Operation of Environment-friendly Quality Guarantee System

All cooperating suppliers of LG Electronics are to implement and operate environment-friendly quality guarantee system in order to achieve appropriate management so that the contents of environment-related substances as designated by both domestic and overseas regulations, such as of RoHS Directives of EU, etc., in all parts and products currently supplied do not exceed the allowable level designated by LG Electronics per each stage of part and product manufacturing.

7.3 Self-evaluation and Supplementing Weaknesses based on Environment-friendly Certification System Evaluation Checklist

All cooperating suppliers of LG Electronics are to perform internal evaluation in accordance with the evaluation checklist of environment-friendly certification distributed by LG Electronics, thus are to make supplement to the insufficient or unsatisfactory areas.

7.4 Securing and Maintaining Related Data, such as Environment-related Substance Analysis Report, etc.

All cooperating suppliers of LG Electronics, are to secure and maintain related data, such as of environment-related substance analysis report prepared for all parts, raw materials, packaging materials and subsidiary materials currently supplied to LG Electronics. Upon request from LG Electronics, all cooperating suppliers must be able to submit such documents at all times.

7.5 Entry of environment-related substance analysis information and preparation/ submission of data required by LG Electronics

All cooperating suppliers of LG Electronics are to enter analysis results of environment—related substance contents in all parts, raw materials, packaging materials and subsidiary materials currently supplied in CPC system developed by LG Electronics and used in cooperating suppliers. In addition, all cooperating suppliers are to prepare and submit related data to suit the formations designated by LG Electronics (Chapter 3 of Manual for Environmental Regulation Countermeasure).

Appendix 1. Evaluation Check List for LG Green Partnership Certification

I. Company General Status

II. Basic Particulars of Evaluation

III. Summary Sheet of Evaluation Result

IV. Comments of Evaluation Result

V. Other Requirements

VI. Evaluation Check List

1. Environmental Management System

2. Environment-related Substance Management System

3. Material and Product Management

Evaluation Check List for Environment-friendly Certification System of Cooperating Suppliers



I . Company General Status

Evaluation Premises	Address (English & Local Language)		Major Product	Tel. No.	Person	Tel.	LGE Certificate No.	LGE Certificate Acquisition Date
	Headquarter							
	Factory 1							
	Factory 2							
	Overseas Factory 1							
	Overseas Factory 2							
Establishment Date			Date of Business with LGE					
Company Scale	Land			Floorage				
Total Sales	2003	Plan of 2004		Plan of 2005				
Sales from LGE	2003	Plan of 2004		Plan of 2005				
LGE sales of Total Sales (%)	2003	Plan of 2004		Plan of 2005				
Certificate Acquisition	Acquisition Date	Certificate Authority	Certificate No.	Customer Certification	Acquisition Date	Customer	Certificate No.	
ISO 9000								
ISO 14001								
No. of Employees	Total:	Direct Employees:		Indirect Employees:		Quality Management Personnel:		
Production Status (2005)	Major Production Items		Overall Sales/ year			Sales of LG Electronics/ year		
Evaluation	First		Second		Third			
Inspected by (Principal)	(Signature)		(Signature)		(Signature)			
Inspected by (Assistant)	(Signature)		(Signature)		(Signature)			
Evaluated by (Principal)	(Signature)		(Signature)		(Signature)			
Evaluated by (Assistant)	(Signature)		(Signature)		(Signature)			
Evaluation Date								
Evaluation Location								

II. Basic Particulars of Evaluation

				(New <input type="checkbox"/> , Follow-up Visit <input type="checkbox"/> , Renewal <input type="checkbox"/>)			
Company Name		Auditing Division		Auditing Date	200		
Examinee		Auditor		Auditing Period	1 time / year		

III. Summary Sheet of Evaluation Result

1. Environmental Management System							2. Substance Management System							3. Material and Product Management						
Evaluation Item	Item No.		Mark		Average Mark		Evaluation Item	Item No.		Mark		Average Mark		Evaluation Item	Item No.		Mark		Average Mark	
	Total	Essential	Total	Essential	Total	Essential		Total	Essential	Total	Essential	Total	Essential		Total	Essential	Total	Essential	Total	Essential
1-1.Policy and Strategy	5	2	10	4			2-1. Improvement Plan	6	4	11	8			3-1. Part Inspection	8	3	12	6		
1-2.Internal Inspection	5	2	10	4			2-2. Management of Inappropriate Parts	6	2	11	5			3-2. Process Management	4	1	7	3		
1-3.Training	3	0	5	0			2-3.Management of Modified Particulars	4	3	8	7			3-3. Forwarding Management	8	4	11	6		
1-4. Information Sharing	4	1	5	2			2-4. Management for sub-contracted suppliers	5	2	10	5			Total	20	8	30	15	0	0
Total	17	5	30	10	0	0	Total	21	11	40	25	0	0	Total Sum	58	24	100	50	0	0

*** Special Note**
 - Exemption of evaluation on environmental management systems of companies certified with ISO 14001 (full mark: 30)
 - Failure in evaluation when marks of essential items are less than 42

IV. Comments of Evaluation Result

Satisfied Examples
Unsatisfied Examples

V. Other Requirements

V-1. Conclusion of a warranty contract.	<input type="checkbox"/> Signed	<input type="checkbox"/> No Signed	(Comment)
V-2. Observation of the LGE's process	<input type="checkbox"/> Yes	<input type="checkbox"/> No	(Comment)
V-3. Restriction of the use the hazardous substances	Inappropriate parts detected 2 consecutive times among mass production parts of the same variety (2006~)		<input type="checkbox"/> No <input type="checkbox"/> Yes (Comment) Satisfying the maximum concentration <input type="checkbox"/> Yes <input type="checkbox"/> No
	Inappropriate parts detected the total of 3 times per year among mass production parts of the same variety (2006~)		<input type="checkbox"/> No <input type="checkbox"/> Yes (Comment) Satisfying the maximum concentration <input type="checkbox"/> Yes <input type="checkbox"/> No

*** Special Note**
 - Contract conclusion and operation process observation to be completed
 - No occurrence of inappropriateness as described above to satisfy environment-related substance management standard observation status

VI. Evaluation Check List

1. Environmental Management System

Classification	Check-point	Essential	Mark	Average	Comment
1-1. Policy and Strategy	1. Is there the company's environmental policy endorsed by top management board?		2		
	2. Are there strategies based on environmental policy and action plans to meet your objectives and targets?	○	2		
	3. Is your register of environmental legislation and regulations kept up-to-date and revised when necessary? (e.g. NGO and customer requests)	○	2		
	4. Is there manpower or an organization, which has specialty focusing on the management of hazardous substances with environmental impacts?		2		
	5. Has CEO designated specific management representative(s) and defined their responsibility(ies) and authorities in relation to the EMS?		2		
			10		
1-2. Internal Inspection	1. Do you have the register include internal auditing regulations, audit and inspection plans?		2		
	2. Does the register have clearly environmental legislation and LGE's requirements? And did audit program(s) carry out regular EMS audits?	○	2		
	3. Does the register have any other auditing regulations defined your company, and does the audit program(s) carry out regularly	○	2		
	4. Are your audits conducted by qualified people with appropriate training and experience in the areas being audited?		2		
	5. Does your specific management representative make report your audit results to CEO?		2		
			10		
1-3. Training	1. Do you have standardized programme(s) for environmental education or training of personnel at all levels of operation?		2		
	2. Have you ensured that all personnel have received relevant training for the development, implementation and maintenance of the EMS?		2		
	3. Have you operated expert programme(s) for the environmental personnel within company?		1		
			5		
1-4. Information Sharing	1. Have you established and do you maintain a procedure for receiving, documenting and responding to internal and external communication from relevant interested parties concerning your substances with significant environment related aspects and impacts?		1		
	2. Have the environmental requests from LGE reported to the top management representative(s) and communicated to relevant departments?	○	2		
	3. Have you ensured that all information collected in the headquarters is delivered to all company sites including overseas plants?		1		
	4. Are All of your personnel aware of their roles and responsibilities in meeting the commitments of your environmental policy, objectives and the requirements of the environment-associated issues?		1		
			5		
Note. Each category is evaluated in three levels of [outstanding --> ordinary --> insufficiency]		Total	30		
Example : 3 marks (3 -> 1.5 -> 0), 2 marks (2 -> 1 -> 0), 1 mark (1 -> 0.5 -> 0)		Essential	10		

2. Environment-related Substance Management System

Classification	Check-point	Essential	Mark	Average	Comment
2-1. Improvement Plan	1. Is there the list of substances with environmental impacts managed by LGE?	<input type="radio"/>	2		
	2. Have you developed corrective plans to comply with LGE plans (Level A-I , Level A-II, Level-B)?	<input type="radio"/>	2		
	3. Do the corrective action plans meet the deadlines notified by LGE?.	<input type="radio"/>	1		
	4. Has top management designated specific management representative(s) to propel corrective activities, and are the plans making progress?		1		
	5. Are there analysis report for each component?		2		
	6. Have you ensured that the analysis data (e.g. ICP analysis results) submitted to LGE?	<input type="radio"/>	3		
			11		
2-2. Management of Inappropriate Parts	1. When supplied items are disqualified, are the object lots are traced accurately and disposed adequately?	<input type="radio"/>	3		
	2. Do you have a procedure for reporting to the environmental management representative(s), when supplied items are disqualified?		1		
	3. Have you ensured that the passed and failed items are classified and managed separately?		2		
	4. Have you ensured that the history of failure is documented and managed for availability?		1		
	5. Do you have a procedure for preventing failure and improving quality, when supplied items are disqualified?		2		
	6. Do you notify and report to LGE, when you find errors of the supplied items after delivery?	<input type="radio"/>	2		
			11		
2-3. Management Of Modified Particulars	1. Do you notify to LGE, when modifications of an items are made? Are the operating procedures of modified items based on LGE's manual for products environmental regulations?	<input type="radio"/>	3		
	2. Do you submit required information or documents, when the material composition of an item is changed?	<input type="radio"/>	2		
	3. Do you classify and manage the lots accurately, when materials, components, parts are changed or modified?	<input type="radio"/>	2		
	4. Are the history of modifications on supplied items are documented and managed?		1		
			8		
2-4. Management Of Sub- contracted Suppliers	1. Are you contracting with vendors whose supplies comply with LGE requirements?	<input type="radio"/>	2		
	2. Have you ensured that the analysis data of the substances with environmental impacts are collected from vendors?	<input type="radio"/>	3		
	3. Do you have the checklist of the substances with environmental impacts on the material composition guidelines for components and parts?		2		
	4. Are there plans and procedures which evaluate and audit vendors periodically for compliance of the environment related standards?		2		
	5. Are there environmental education and training programme(s) for vendors?		1		
			10		
Note. Each category is evaluated in three levels of [outstanding --> ordinary --> insufficiency] Example : 3 marks (3 -> 1.5 -> 0), 2 marks (2 -> 1 -> 0), 1 mark (1 -> 0.5 -> 0)		Total	40		
		Essential	25		

3. Material and Product Management

Classification	Check-point	Essential	Mark	Average	Comment
3-1. Part Recognition and Warehousing Inspection	1. Are your inspections conducted by qualified people with appropriate licenses, training and experience?		1		
	2. Do your inspection procedures include a clearly defined standard and method for qualification of materials and parts?	○	2		
	3. Do your management inspections follow the established standard procedures of the substances with environmental impacts?		1		
	4. Are your instruments such as XRF maintained properly, and the detection limits checked before measurements?		1		
	5. Are the analysis of he substances with environmental impacts performed and reported by certified laboratory?	○	1		
	6. Do your register include mil sheets of supplied items form vendors?	○	3		
	7. Are the disqualified materials and parts isolated and managed separately in warehouse?		2		
	8. Do you have a procedure formreporting to the environmental management representative(s), when materials and parts are disqualified?		1		
			12		
3-2. Material and Process Management	1. Do you have a marking for separate and manage the items compliance with LGE requirments, and are there classified and managed separately?	○	3		
	2. Do your register include the name, quantity, and application of the substances with environmental impacts?		1		
	3. Do you have operating procedures to prevent the contaminations of the substances with environmental impacts when used?		1		
	4. Have you established and do you maintain procedures to apporpriately respond, to and minimize the impact of accident and emergency situations?		1		
	5. Are the devices and equipments in manufacturing inspected regularly to verify contaminations?		1		
			7		
3-3. Forwarding Management	1. Are your shipment management conducted by qualified people with appropriate licenses, training and experience?		1		
	2. Do your register include the process of production from material to products?	○	2		
	3. Do your shipment procedures have a clearly defined standard and method for the qualification of products?	○	2		
	4. Do the shipment inspections proceed according to the established inspection criteria on the substances with environmental impacts?		2		
	5. Are the analysis of he substances with environmental impacts performed and reported by certified laboratory?		1		
	6. Are the records of the lots are managed for product tracking?		1		
	7. Do you have a procedure for reporting to the environmental management representative(s), when delivered products are disqualified with the standards for the substances with environmental impacts?	○	1		
	8. Do you submit the documents or informatipn compliance with LGE process (e.g. IPDS-CPC, Non-use certificate, Composition table, etc)?	○	1		
			11		
Note. Each category is evaluated in three levels of [outstanding --> ordinary --> insufficient] Example : 3 marks (3 -> 1.5 -> 0), 2 marks (2 -> 1 -> 0), 1 mark (1 -> 0.5 -> 0)		Total	30		
		Essential	15		

Chapter 2. Standard for management of hazardous substances

1. Purpose

This standard has been established to prohibit content level of environment-related substances contained in all parts, raw materials, packaging materials and batteries, etc. produced and supplied to LG Electronics by its cooperating suppliers from exceeding the maximum allowable level specified by LG Electronics and to serve as a common foundation of operation in environment-related substance testing, analysis, content level inspection and verification processes so that to maintain the content level of environment-related substances below the maximum allowable level.

2. Scope

This standard is to be applied to the activities of environment-related substance testing, analysis, content level testing and verification processes performed on all parts, raw materials, packaging materials and batteries, etc. produced and supplied by the registered cooperating suppliers of LG Electronics. This standard is to be used by all domestic and overseas production premises (overseas production corporations included) and cooperating suppliers of LG Electronics.

2.1 This standard is applied to the following parts supplied to LG Electronics.

1) Semi-finished products

Module parts, function-unit board assemblies and other assembly parts

2) Parts

Electrical/ electronic parts, steel/ plastic parts, semiconductor elements, PWBs, recording media, packaging substances and packaging parts

3) Screws

4) Accessories

5) Subsidiary substances required in part and product composition

Adhesives, adhesive tapes and soldering substances, etc.

6) Product manual

7) Packaging substances

8) Plastic and plastic constituting substances

2.2 This standard is applied to the following products transacted with LG Electronics.

1) All products designed, produced, sold and supplied by LG Electronics

2) Products designed and produced by cooperating suppliers, but supplied to market with the trademark of LG Electronics attached

3) Products designed by LG Electronics, produced by cooperating suppliers and supplied to market with the trademark of LG Electronics attached.

3. Definition of terms

3.1 Classification of Environmentally Environment-related Substances

1) Level A Substances (prohibited to use)

Level A substances are those considered harmful to human body and environment of the earth, thus are prohibited to use in products by law per each region and country. Intentional use of these substances is prohibited in all items supplied to LG Electronics. For Level A-I substance, suppliers must submit an analysis report issued by a certified organization or a composition table per each substance variety issued and confirmed by raw material supplier as required in part approval to check environment-related substances contained as impurities in parts.

① Level A-I : Level A-I substances are the 6 varieties of environment-related substances specified in RoHS Directives. Delivery or use of parts supplied is prohibited when concentration level of these substances in each part of the products supplied exceeds the maximum allowable level designated by LG Electronics.

② Level A-II : Level A-II substances are environmentally environment-related substances restricted of use by laws or international conventions other than RoHS Directives. These substances are prohibited of use in all parts constituting products of LG Electronics.

2) Level B Substances (to be supervised and reduced)

Level B Substances refer to substances considered harmful to human being and environment of the earth that are not currently prohibited of use, but are scheduled for step-by-step prohibition process in the future.

3.2 Maximum Allowable Concentration Value

Maximum allowable concentration value refers to the maximum permitted level of hazardous substance of material in constituting parts considering impurities existing in the nature and containing unavoidably by limitation of current manufacturing and refining techniques and measurement errors of analysis test equipments, assumption intentionally. It reflects the permitted limit decided by international environment regulations, regions, or nations. It is recorded by % weight or parts per million (ppm).

3.3 Non-use Certificate

Non-use certificate is used by cooperating suppliers to verify that environment-related substances specified by LG Electronics are not contained in products or parts supplied with the means of submitting verification data, such as of environment-related substance test result and MSDS (material safety data sheet), to check the information of substance composition.

3.4 Contained

The term 'contained' refers to all operations of both intentionally or unintentionally adding, blending, filling or adhering a third substance into the parts or constituting materials used in products prior to, after or in the course of operation processes for the purpose of administering changes in the specific qualities of them.

3.5 Impurity

The term 'impurity' refers to substances, which cannot be completely removed in the process of natural material purification due to technical difficulties or substances, which are generated in the course of substance compounding and cannot be completely removed with the currently available technologies.

3.6 Prohibition of Use

Prohibition of use means that environment-related substances specified by LG Electronics must not be intentionally contained in raw materials and parts in the courses of manufacturing. Impurities which are inevitably contained in raw materials or parts due to limitation in raw material purification technology or technical difficulty in the course of substance compounding, therefore, cannot be completely removed, are managed by setting maximum concentration value.

3.7 Exceptions of Regulation Application

Exceptions of regulation application refers to the cases in which use of a fixed level of environment-related substance is intentionally allowed because it is considered that alternative items are not possible with the currently available technologies, or social impact by the occurrence of an accident after alternation is expected too big.

3.8 Plastics

The term 'plastics' refers to the substances constituting compound high polymers, such as plasticizers, resins, films, adhesives, adhesive tapes, molded products, products made of synthetic rubber and plastic made from raw materials of plant origin, etc. Substances created by resin in the natural state compounded with the above listed substances are also considered varieties of plastics.

3.9 Composition Table

Composition table is the basic analysis data on raw materials and substances of parts and products supplied to LG Electronics, of which checking of constituting elements and environment-related substance contents in the natural state is possible. Composition table is secured and managed by cooperating suppliers. Upon request from LG Electronics, cooperating suppliers are to submit this document (Ex.: MSDS or MILL sheet, etc.).

3.10 ICP (Inductively Coupled Plasmas Spectrometry)

ICP is an atomic emission spectrometry to perform heavy metal analysis of 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 is measured to perform quantitative and qualitative analysis of elements. This method is subject to error occurrence in accordance with the variety of acid used for pretreatment. Therefore, pretreatment suitable to each test sample is to be applied.

3.11 XRF (X-Ray Fluorescence Spectrometry)

As a non-destructive analysis method, XRF enables prompt analysis and multiple elements analysis of inorganic substances. Strong voltage (50kV) or radioactive rays are projected on to the test sample. Then, wavelength unique to the heavy metals emitted from the test sample is detected to perform quantitative and qualitative measuring of the elements. Although there is the advantage of short measuring time, this method produces significant errors in analysis. Therefore, XRF is recommended for monitoring purpose.

3.12 IC (Ion Chromatography)

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

3.13 UV/VIS (Ultra Violet / Visible Spectrometry)

UV/ VIS is a method to measure the degree of extinction (or of transmission) displayed by the wavelength of sample molecules within the range of ultra violet and visible rays, thus to perform quantitative and qualitative analysis. Molecules, inorganic ions or compounds of solutions are measured.

3.14 GC-MS (Gas Chromatography Mass)

GC-MS is an analysis method to quantify substances through separating them by using the differences in distribution or degree of absorption between compounds moving and those stationary.

3.15 Homogeneous Material

Referring to the minimum constituting unit of parts made with the same material, homogenous materials cannot be separated into different substances by mechanical methods of unfastening screws, cutting, crushing, pulverizing and grinding, etc. Paints and painted parts are not homogeneous materials and are to be considered different from each other. Therefore, concentration of environment-related substances in painted and plated layers must be analyzed by measuring the weight of these payers.

4. Standard for management of hazardous substances

4.1 Level A (Substances prohibited to use)

1) List of Level A-I substances (The six hazardous substances specified in RoHS)

Classification	Substance	Regulation
Heavy Metals	Lead and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive US California. Proposition 65
	Cadmium and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive
	Mercury and its compounds	EU RoHS Directive EU Battery Directive EU Packaging Directive
	Hexavalent chromium and its compounds	EU RoHS Directive EU Packaging Directive
Brominated Flame Retardant	PBB (Polybrominated biphenyls)	EU RoHS Directive
	PBDE (Polybrominated diphenyl ethers)	EU RoHS Directive

2) List of Level A-II substances

Classification	Substance	Regulation
Chlorinated Organic Compounds	Polychlorinated biphenyls (PCB) Polychlorinated naphthalenes (PCN) ① Polychlorinated terphenyls (PCT)	EU Directive 76/769/EEC OSPAR Priority Chemicals
	Short-chain chlorinated paraffin (SCCP) (C10-13) ②	
Asbestos		EU Directive 76/769/EEC
Specified Organic Tin Compounds	③	EU Directive 76/769/EEC
Formaldehydes		ChemG (Germany), Formalin Act (Denmark)
Nickel and Its Compounds	④	EU Directive 76/769/EEC
Arsenic and Its Compounds		EU Directive 76/769/EEC
Specific Azo Compounds	⑤	EU Directive 76/769/EEC
Ozone Layer Depleting/ Global Warming Substances	⑥	Montreal/Kyoto Protocol

Note.

Level A substances are prohibited of intentional use in all products, parts, raw materials, subsidiary materials and packaging materials supplied from cooperating suppliers to LG Electronics. For impurities, which cannot be completely removed due to technical problems, the maximum allowable concentration level has been suggested in “5. Detailed Standard of Environment-related Substance Management”.

- ① Polychloronaphthalence (PCN) is prohibited to use when there are 4 or more of chlorine elements.

- ② Short-chain chlorinated paraffin (SCCP) refers to the substances, which contain 48% or more of C10 ~ 13 chlorine (Cl).
- ③ Specific organic tin compounds refer to substances of Alkane 10 ~ 13 carbon chain, which are tributyltin(TBT) compounds and triphenyltin(TPT) compounds.
- ④ Nickel compounds are prohibited to use in parts, materials and surface treating agents, which are in direct contact with human skin.
- ⑤ Specific azo compounds refer to the following substances.

CAS No.	Substance
60-09-3	4-aminoazobenzen
90-04-0	o-anisidine
91-59-8	2-naphthylamine
91-94-1	3,3-dichlorobenzidine
92-67-1	4-aminodiphenyl
92-87-5	Benzidine
95-53-4	ortho-toluidine
95-69-2	4-chloro-o-toluidine
95-80-7	2,4-toluenediamine
97-56-3	ortho-aminoazotoluene
99-55-8	5-nitro-o-toluidine
101-14-4	4,4-methylene-bis-(2-chloroaniline)
101-77-9	4,4-diaminodiphenylmethane
101-80-4	4,4-oxydianiline
106-47-8	p-chloroaniline
119-90-4	3,3-dimethoxybenzidine
119-93-7	3,3-dimethylbenzidine
120-71-8	p-cresidine
137-17-7	2,4,5-trimethylaniline
139-65-1	4,4-thiodianiline
615-05-4	2,4-diaminoanisole
838-88-0	3,3-dimethyl-4,4-diaminodiphenylmethane

- ⑥ Ozone layer depleting/ global warming substances refer to CFCs, HCFCs, HFC, PFC.

4.2 List of Level B substances (to be supervised and reduced)

Classification	Substance
Substances to be Supervised and Reduced	PVC, Polyvinyl chloride
	Phthalates
	Beryllium and its compounds, including alloy
	Antimony and its compounds, including alloy
	Selenium and its compounds, including alloy
	Palladium and its Compounds
	Bismuth and its compounds, including alloy
	Other chlorinated flame retardants
	Other brominated flame retardants (PBB and PBDE excluded) (Ex.: TBBP-A, etc.

4.3 Submission of environment-related substance analysis data

Cooperating suppliers are to submit the following documentations so that to check the status of prohibited substance content in all constituting parts of a product at the time of new product approval, modification of constituting parts in mass production items and warehousing the initial quantity of mass production lot.

1) At the time of new approval and modification of constituting parts in mass production items

- ① Environment-related substance analysis report ^(Note)
- ② Environment-related substance analysis table
- ③ Non-use certificate
- ④ Composition table
- ⑤ Environment-related substance control list
- ⑥ Improvement plan (only when environment-related substance concentration level fails to satisfy the management standard of LG Electronics)
- ⑦ Sample submission (more than 5, raw material condition when necessary)

Note.

- a. In case of global cooperating suppliers, which are objectively recognized of their environment-friendly quality guarantee capacities through securing and operation of management and improvement system on the 6 environment-related substance contents in their supplying parts, environment-related substance analysis report can be replaced by certified letter of guarantee, etc. signed and submitted by officers of the cooperating suppliers in charge of environment-friendly product quality management.
- b. The corresponding division is to identify and administer business transaction with global cooperating suppliers.

2) At the time of warehousing initial quantity of mass production lot

- ① Non-use certificate
- ② Environment-related substance management list

3) Periodical guarantee of parts for mass production

- ① Environment-related substance analysis report
- ② Non-use certificate

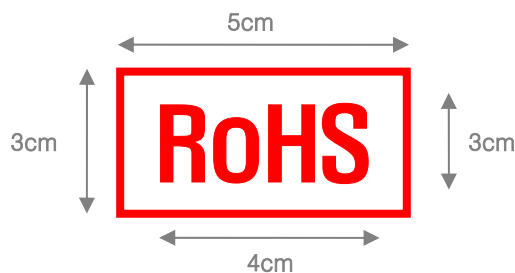
Note.

- a. Report about mass production parts should be the updated report.
(Analysis report using an analysis equipment of cooperating suppliers (such as XRF) can be similarly acknowledged as analysis report from certified analysis organization under judgment by Division. Refer to 6.4, analysis method)
- b. Data submission period of mass production parts
 - ※ reference: XRF test period by Division (include corporation) is managed separately with data submission period of cooperating suppliers by Division. (Division standard)
 - High-concern materials or materials that contained environment-related substance in the past (High Risk): 3 months
 - Sample that can be separated from the equipment using ordinary tools: 6 months

- Sample that can not be mechanically separated anymore: 12 months
(This submission period can be shorter or longer as the results of business of cooperating suppliers.)

4.4 Identification of RoHS free mass production parts

The parts satisfied with detailed standard of Level A-I, environment-related substance management of LG Electronics should be basically provided with identification mark like figure 1 on packaging materials such as packaging box for special management, at the time of warehousing materials of mass production lot and initial quantity for mass production. But, it is possible to use different identification mark by prior consultation with LG Electronics.



- ① Size
 - self-decision well-recognizably
 - the above size is recommended for large packaging
 - smaller size is possible for small packaging and reel
- ② Color
 - red color is basically recommended for letter and boundary
 - black color is allowed for printed marking on label
- ③ Marking position and attaching method
 - Well-recognizable shape outside packaging (printing/stamp/label etc.)
 - Attach up to small packaging and reel for small circuits like IC and Chip

4.5 In case content level of environment-related substances exceeds the maximum allowable concentration level specified in “5. Detailed Standard of Environment-related Substance Management”

- 1) Products and parts containing the 6 environment-related substances specified in RoHS Directives (Level A-1 substances) are to be rejected in importation test and parts approval process as well as to be suspended of transaction as of Apr. 1, 2005. Cooperating suppliers are to prepare and submit an improvement plan for the parts concerned, thus are to administer improvement in accordance with the presented schedule.
- 2) Substances prohibited to use (Level A-II) other than the 6 environment-related substances specified in RoHS Directives must not be used in parts and products. Upon detection of such substances used, supply of the parts and products concerned must be suspended immediately.
- 3) In case the maximum allowable concentration level is not specified and the content level is indicated as ‘No Detection’, the cooperating suppliers are to verify that the corresponding substances are not used in parts/ products, packaging materials and

batteries supplied (non-use certificate: MIL-Sheet, MSDS, or Raw material certificate etc.).

4.6 Supervised and reduced Substances (Level B)

Restriction measures for the used quantity at the current point in time are not administered. However, these substances require continuous monitoring and management upon their current status of use.

4.7 Units of part separation and analysis

- 1) Analysis of environment-related substances must be performed by separating the substances down to their minimum constituting units, such as the homogeneous materials unit.
- 2) When coated on the same materials, analysis must be carried out per each case.

5. Detailed standard for managing of environment-related substances

[Common Particulars]

- 1) For all parts, raw materials, packaging materials, batteries and semi-finished parts (module parts), etc. supplied to LG Electronics, a environment-related substance analysis report and composition table, etc. must be submitted with which the content of Level A-I substances (the 6 environment-related substances restricted by RoHS) specified below can be checked.
- 2) Although an analysis report or composition table, etc. is not required for Level A-II substances at the stage of part approval, such document must be submitted upon separate request by LG Electronics.
- 3) It is prohibited intentional use of the substances concerned in raw materials and parts. The level of content, which is inevitably contained as impurities, must satisfy the Maximum Allowable Concentration Level.
- 4) Fundamentally, the joint standards specified below must be observed. In case separate standards are requested by Division currently supplied with parts and products, Division standard must be observed with priority.

5.1 Pb, Lead and Its Compounds

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum Allowable Concentration Level

Classification by substance and material	Maximum Allowable Concentration Level	
	ICP analysis	XRF analysis
① plastic, rubber, painting, ink, coating	100 ppm	200 ppm
② Solder (bar/wire/cream solder, Solder ball), Pb inside of lead-wire plating of parts	800 ppm	800 ppm
③ all parts except ① and ②	500 ppm	500ppm
Main concentration example. : rubber hardener, pigment, paint and varnish, lubricant, plastic stabilizer, battery material, free cutting brass/carbon steel, optics materials, soldering, rubber vulcanizing agent, derivative material, resin stabilizer, plating material, alloy element, resin additives		

b. Exceptions of regulation application

- Solders of high melting point to contain 85wt% or more of lead
- Lead contained in electronic ceramic parts
*Applicable Parts: Piezoelectric materials, dielectric materials, magnetic materials and ferrites
- Lead contained in optical glass and filter glass
- Batteries and battery packs containing 0.4wt% or less of lead
- Metallic alloys containing 0.35 wt% or less of lead
- Aluminum alloys containing 0.4 wt% or less of lead
- Copper alloys (brass and fluorescent bronze alloys included) containing 4 wt% or less of lead

- Lead contained in solders used for serve, storage and storage array system
- Lead contained in solders of communication-related network devices, switching devices, signaling devices and transmission-related network infrastructures
- Lead contained in cathode-ray tubes, electrical parts and fluorescent tubes, etc.
- Lead contained in compliant-pin VHDM (Very High Density Medium) connector system
- Lead used as coating materials in thermal conduction module c-ring
- 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.
- Solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip packages.
- Lead in linear incandescent lamps with silicate coated tubes
- Lead halide as radiant agent in High Discharge (HID) lamps used for professional reprography applications
- 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 ($\text{BaSi}_2\text{O}_5:\text{Pb}$) as well as when used as special lamps for diazo-printing reprography, lithography, insect traps, photochemical and processes containing phosphors such as SMS ($(\text{Sr},\text{Ba})_2\text{MgSi}_2\text{O}_7:\text{Pb}$)
- 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)
- Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCD)
- Lead in printing inks for application of enamels on borosilicate glass
- Lead in finishes of fine pitch components other than connectors with a pitch of 0.65 mm or less with NiFe lead frames and lead in finishes if fine pitch components other than connectors with a pitch of 0.65 mm or less with copper lead-frames.
- Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors.
- Lead oxide in plasma display panels (PDP) and surface conduction electron emitter displays (SED) used in structural elements; notably in the front and rear glass dielectric layer, the bus electrode, the black stripe, the address electrode, the barrier ribs, the seal frit and frit ring as well as in print pastes.
- Lead oxide in the glass envelope of Black Light Blue (BLB) lamps
- 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
- Lead bound in crystal glass as defined in Annex I (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC

5.2 Cd, Cadmium and Its Compounds

* For list of compounds, refer to appendix 3 lists of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
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	ICP analysis	XRF analysis
① rubber, plastic, paints, inks, and plastic surface treatment	10 ppm	50 ppm
② all parts except ①	75 ppm	75 ppm
Main concentration example. : pigment, corrosion-resisting surface treatment, electric/electronic materials, optics materials, stabilizer, plating material, resin pigment, fluorescent material for optical glass, electrode, soldering materials, electrical contacts		

b. Exceptions of regulation application

- ①. In case substituting materials do not exist for electronic contact plating to require high degree of safety standard and reliability in electric/ electronic and mechanical devices
- ②. Cadmium contained in filter glass and optical glass
- ③. Cadmium in printing inks for application of enamels on borosilicate glass

5.3 Hg, Mercury and Its compounds

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level	
	ICP analysis	XRF analysis
Interior and exterior plastic, paint and varnish, ink, coating/soldering, wattmeter, electrical contacts (relay, switch, sensor)	500 ppm	500 ppm
Main concentration example. : fluorescent material, electrical contacts material, pigment, anti-corrosion preparation, high efficiency illuminant, antibiosis treatment		

b. Exceptions of regulation application

- Lamps other than small-sized and straight-tube varieties (Ex.: High-pressure mercury lamp)
- Small-sized fluorescent lamps containing less than 5 mg (per lamp) of mercury
- Straight-tube fluorescent lamps containing less than 5 mg (per lamp) of mercury
 - * Halophosphate 10mg/lamp, triphosphate 5mg/lamp of average lifespan, triphosphate 8mg/lamp of long-term lifespan, straight fluorescent lamps for special purpose
- Coin cell batteries containing less than 2 wt% (per each one) of mercury
- Batteries (coin cell batteries excluded) and battery packs containing less than 5 wt% (per each one) of mercury

5.4 Cr⁺⁶, Hexavalent Chromium and Its Compounds

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level	
	IC, UV/VIS analysis	XRF analysis
① plastic, rubber, painting, ink, non-plating parts as metal/plastic coating	500 ppm	500 ppm (total amount of Cr)
② hexavalent chromium surface treatment parts ¹⁾ (Screw, Bolt, Nut, plate etc.) and electroplating	Not Detected	Spot test
Main concentration example. : paints, pigment, ink, catalyzer, plating, corrosion protection surface treatment, dyes, pigment desiccant, surface treatment, chromate treatment, adhesion improvement for pigment		

1) It is prohibited intentional use and must not detected hexavalent chromium as impurity in case of electroplating. The meaning of "Not detected" is 3ppm with verification analysis as parts level.

b. Exceptions of regulation application

- ◆ When used as corrosion preventative agent for carbon steel refrigeration system in combined refrigeration devices
- ◆ Hexavalent chromium in corrosive preventive coatings of unpainted metal sheetings and fasteners used for corrosion protection and Electromagnetic Interference Shielding in equipment falling under category three of Directive 2002/96/EC (IT and telecommunications equipment). Exemption granted until 1 July 2007

5.5 Polybrominated Biphenyls (PBB)

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level	
	GC-MS analysis	XRF analysis
All parts like plastic	500 ppm	500 ppm (total amount of Br)
Main concentration example. : flame retardants		

5.6 Polybrominated Biphenylethers (PBDE)

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level	
	GC-MS analysis	XRF analysis
All parts like plastic	500 ppm	500 ppm (total amount of Br)

Main concentration example. : flame retardants

5.7 Polychlorinated Biphenyls (PCBs)

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
All parts like plastic, rubber, painting, ink, metal/plastic coating	50 ppm
Main concentration example. : flame retardants	

5.8 Polychlorinated Naphthalenes (PCNs)

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
All parts like lubricant, plastic, painting	50 ppm

5.9 Polychlorinated Terphenyls (PCTs)

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
All parts like Transformers, Capacitors, PCB components, plastic	50 ppm

5.10 Short-chain Chlorinated Paraffin (SCCP)

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
All parts like plastic products, painting, cable, metalworking, PWB	100 ppm

5.11 Ozone Layer Depleting/ Global Warming Substances

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
CFCs, HCFCs, HFC, PFC, Halons, Tetrachloroethylene	Not Detected

5.12 Asbestos and Its Compounds

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
parts like insulating material, Filler, abradant, insulating material; and asbestos and compound used for packaging	Not Detected

5.13 Azo Compounds (Nitrogen Compounds)

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
Exterior parts like fiber and leather among parts in constant contact with human body	Within 30 ppm

b. Exception of regulation application

- ① Parts not constantly contact with human body
(Ex.: Cushions, mice, remote controllers and carrying bags)

5.14 Nickel and Its Compounds

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
① Nickel for surface treatment (plating etc.) of parts contact with customer body	Not Detected
② Nickel for plating substrate layer of parts	Release less than 0.2 $\mu\text{g-Ni}/\text{cm}^2/\text{week}$

5.15 Organic Tin Compounds

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
Painting, ink, sterilizer, antiseptic, organotin compounds for metal/plastic coating part	Not Detected

5.16 Arsenic and Its Compounds

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
Arsenic and Its Compounds for painting, ink, sterilizer, antiseptic	Not Detected

5.17 Formaldehydes

* For list of compounds, refer to appendix 3 list of environment-related substances and compounds.

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
Formaldehydes contained in wooden product, adhesives, sterilizer, antiseptic, coating	within 0.1 ppm (or 0.15 mg/m ³) in test chamber air

* Measuring Condition: To be measured in a closed chamber of 12 m³, 1 m³, 0.0225 m³

5.18 Management Standard for Environment-related Substance Content in Packaging Materials

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
Lead, cadmium, mercury and hexavalent chromium in all packaging materials put on the market	within 100 ppm on sum of Pb ⁺ , Cd ⁺ , Hg ⁺ , and Cr ⁺⁶ (managing Cd separately less than 50ppm)

b. Exception of regulation application

- ①. Packaging totally consisted of Lead crystal glass

5.19 Management standard for environment-related substance content in batteries and battery packs

a. Maximum allowable concentration level

Classification by substance and material	Maximum Allowable Concentration Level
① Lead in batteries and battery packs	Less than 4000 ppm
② Cadmium in batteries and battery packs	Less than 250 ppm
③ Mercury in batteries and battery packs	Less than 5 ppm

* Above Spec. is a regulation for battery cell. Mechanic/circuit parts inside of battery pack is conformed to the regulated value of 5.1~5.6.

6. Organization and method for analysis of environment-related substances

6.1 In relations to environment-related substance analysis report, all reports produced by officially certified organizations both at home and overseas are accepted. Certified organizations of analysis recognized by LG Electronics are as of the following.

6.2 Domestic Authorized Organizations for Analysis

- ① Korea Testing and Research Institute for Chemical Industry (KOTRIC)
(<http://www.kotric.or.kr>)
- ② SGS Korea (<http://www.kr.sgs.com>)
- ③ Korea Apparel Testing & Research Institute (KATRI) (<http://www.katri.re.kr>)
- ④ FITI Testing Institute (<http://www.fiti.re.kr>)
- ⑤ Korea Testing Laboratory (KTL) (<http://www.ktl.re.kr>)
- ⑥ E. Service Korea (<http://www.eskltd.com>)

6.3 International Authorized Organizations for Analysis

- ① SGS (<http://www.sgs.com>)
- ② UL (<http://www.ul.com/rscs>)
- ③ TÜV (<http://www.tuv.com>)
- ④ ITS (<http://www.intertek-labtest.com>)

6.4 Analysis Methods

- 1) Analysis should be carried out with applying IEC 62321(standardization date will be March, 2007) as test standard. When using other method, it must be verified that the method employed should be appropriate for the material, and be an internationally certified analysis and test method. The same KS standard as IEC 62321 is KS M 1061~1068.
- 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 environment-related substance. When using other equipments, it must be verified that the method adopted is an internationally certified analysis and test method.
- 3) When a substance analysis is carried out using precision equipments and XRF operated by cooperating suppliers, the result of such analysis is to be acknowledged under judgment by Division. When LG Electronics requires proficiency test for reliability test of the result of analysis, the result of analysis about reliability test should be submitted within the period. Especially in the case of precision analysis, the test report should be result by test standard and equipment authorized by LG Electronics, at the laboratory operated by ISO 17025.

Appendix 2. Standard and method for management of environmental-related substances by composed substances of parts

Hazardous Substances	Plastic ^{㉞1)} , Rubber	Coating, Paint, Ink	Solder, Parts lead, Solder ball ^{㉞2)}	Metal, Glass, Ceramic, Ferrite Core	Plating ^{㉞3)} (Surface treatment, Electroplating)	Wrapping Material	Battery (Cell type)	Other
Lead (Pb)	1. Analysis Report 2. 100 ppm 3. ICP, AAS *XRF 200ppm	^{㉞4)} ^{㉞5)}	1. Analysis Report 2. 800 ppm 3. ICP, AAS *XRF 800ppm	1. Analysis Report 2. 500 ppm 3. ICP, AAS *XRF 500ppm		1. Analysis Report 2. less than 100 ppm of the sum total of Pb, Cd, Hg, Cr+6 content, less than 50ppm of Cd 3. Follow standard by substances	1. Analysis Report 2. 4000 ppm 3. ICP, AAS	0. Bond, Grease 1. Composition table 2. 500 ppm
Cadmium (Cd)	1. Analysis Report 2. 10 ppm 3. ICP, AAS *XRF 50ppm		1. Analysis Report 2. 75 ppm 3. ICP, AAS *XRF 75ppm	1. Analysis Report 2. 75 ppm 3. ICP, AAS *XRF 75ppm			1. Analysis Report 2. 250 ppm 3. ICP, AAS	
Mercury (Hg)	1. Analysis Report 2. 500 ppm 3. ICP, AAS * XRF 500ppm						1. Analysis Report 2. 5 ppm * Exception: Button cell 2% 3. ICP, AAS	0. Lamp 1. Composition table
Hexavalent Chromium (Cr+6)	1. Analysis Report 2. 500 ppm 3. IC, UV/VIS, * XRF 500ppm(Cr)				1. Analysis Report 2. Not detected 3. IC, UV/VIS			
PBB	1. Analysis Report 2. 500 ppm 3. GC-MS * XRF 500ppm(Br)							
PBDE	1. Analysis Report 2. 500 ppm 3. GC-MS * XRF 500ppm(Br)							

Note.

Note1) Plastic Parts: Plastic parts, plastic molding parts, cable covers, such as for electric wire, etc., PCB (printed circuit board), adhesives, tapes and labels, etc.

Note2) Solder: Cream solders, bar solders and wire solders, etc.

Solder Ball: BGA and CSP chips of solder balls

Part Lead Plating: Solder plating on lead terminals of electronics components

Note3) Parts of Inorganic Substance: Metallic parts, ceramic parts, glass and ferrite cores, etc. It is prohibited intentional use and must not detected hexavalent chromium as impurity in case of electroplating. The meaning of "Not detected " is 3ppm with verification analysis as parts level.

Note4) Metal Plating: Plating on metallic substances other than plating on bipolar lead of parts

Note5) Signifying numbers (0: Parts/ materials concerned, 1: Submission documents, 2: Max. tolerance of impurity content, 3: Test and analysis equipment)

Appendix 3. List of environment-related substances and compounds

1. Pb, Lead and Its Compounds

Substance	Chemical Sign	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		13424-46-9
Lead(II) oxide	PbO	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	2PbCO ₃ / Pb(OH) ₂	1319-46-6
Lead(II) iodide		10101-63-0
Lead hydroxycarbonate	2PbCO ₃ / Pb(OH) ₂	1344-36-1
Lead(II) cyanide		592-05-2
Lead(II) fluoroborate		13814-96-5
Lead(II) fluosilicate		25808-74-6
Lead(II) sulfate	PbSO ₄	7446-14-2 / 15739-80-7
Lead(II) phosphate	Pb ₃ (PO ₄) ₂	7446-27-7
Lead thiocyanate		592-87-0
Lead(II) chromate	PbCrO ₄	7758-97-6
Lead(II) titanate	PbTiO ₃	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	Pb _x SO ₄	15739-80-7
Lead sulfate, tribasic	PbSO ₄ / H ₂ O	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	Pb(C ₁₇ H ₃₅ COO) ₂	1072-35-1, 7428-48-0
Lead stearate, dibasic	2PbO / Pb(C ₁₇ H ₃₅ COO) ₂	56189-09-4
Other lead compounds		

2. Cd, Cadmium and Its Compounds

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

3. Cr⁺⁶, Hexavalent Chromium and Its Compounds

Substance	Chemical Sign	CAS No.
Sodium dichromate	Na ₂ Cr ₂ O ₇	10588-01-9
Chromium(VI) oxide	CrO ₃	1333-82-0
Calcium chromate	CaCrO ₄	13765-19-0
Lead(II) chromate	PbCrO ₄	7758-97-6
Potassium dichromate	K ₂ Cr ₂ O ₇	7778-50-9
Potassium chromate	K ₂ CrO ₇	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		
Other hexavalent chromium compounds		

4. Hg, Mercury and Its Compounds

Substance	Chemical Sign	CAS No.
Mercury	Hg	7439-97-6
Mercury(I) chloride		10112-91-1
Mercury(II) chloride	HgCl ₂	7487-94-7
Mercury(I) oxide		15829-53-5
Mercury(II) oxide	HgO	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
Methylmercury salts		
Ethylmercury salts		
Propylmercury salts		
Methoxyethyl-mercury salts		
Diphenylmercury		
Dialkylmercury		
Phenylemercury salts		
Other mercury compounds		

5. PBBs, PBDEs and Its Compounds

Substance	Chemical Sign	CAS No.
Polybrominated biphenyls (PBBs)	C ₁₂ H _x Br _(10-x)	67774-32-7
Other Polybrominated biphenyls		
Polybrominated diphenyl ethers (PBDEs)	C ₁₂ H _x Br _(10-x) O	
Polybrominated diphenyl ether		
Decabromodiphenyl ether (DBDPE)		1163-19-5
Decabromodiphenyl oxide (DBDPO)		
Octabromodiphenyl ether		32536-52-0
Octabromodiphenyl oxide		
Hexabromodiphenyl ether		36483-60-0
Hexabromodiphenyl oxide		
Pentabromodiphenyl ether		32534-81-9
Pentabromodiphenyl oxide		
Other Polybrominated diphenyl ethers		

6. PCBs, PCTs, PCNs and Its Compounds

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

7. Ozone Layer Depleting Substances

Substance	Chemical Sign	CAS No.
CFC-11	CFCl_3	75-69-4
CFC-12	CF_2Cl_2	75-71-8
CFC-113	$\text{C}_2\text{F}_3\text{Cl}_3$	76-13-1
CFC-114	$\text{C}_2\text{F}_4\text{Cl}_2$	1320-37-2
CFC-115	$\text{C}_2\text{F}_5\text{Cl}$	76-15-3
Halon 1211	CF_2BrCl	353-59-3
Halon 1301	CF_3Br	75-63-8
Halon 2402	$\text{C}_2\text{F}_4\text{Br}_2$	124-73-2
CFC-13	CF_3Cl	75-729
CFC-111	C_2FCl_5	354-56-3
CFC-112	$\text{C}_2\text{F}_2\text{Cl}_4$	28605-74-5
CFC-211	C_3FCl_7	135401-87-5
CFC-212	$\text{C}_3\text{F}_2\text{Cl}_6$	3182-26-1
CFC-213	$\text{C}_3\text{F}_3\text{Cl}_5$	2354-06-05
CFC-214	$\text{C}_3\text{F}_4\text{Cl}_4$	2268-46-4
CFC-215	$\text{C}_3\text{F}_5\text{Cl}_3$	1652-81-9
CFC-216	$\text{C}_3\text{F}_6\text{Cl}_2$	662-97-2
CFC-217	$\text{C}_3\text{F}_7\text{Cl}$	422-86-6
Carbon tetrachloride	CCl_4	56-23-5
1,1,1 -Trichloroethane	$\text{C}_2\text{H}_3\text{Cl}_3$	71-55-6
ChloroBromomethane	CH_2BrCl	
Methyl Bromide	CH_3Br	
Dibromofluoromethane	CHBr_2	1868-53-7
Bromodifluoromethane	CHF_2Br	1511-62-2
Bromofluoromethane	CH_2FBr	373-52-4
Tetrabromofluoroethane	C_2HBr_4	306-80-9
Tribromodifluoroethane	$\text{C}_2\text{HF}_2\text{Br}_3$	
Dibromotrifluoroethane	$\text{C}_2\text{HF}_3\text{Br}_2$	354-04-1
Bromotetrafluoroethane	$\text{C}_2\text{HF}_4\text{Br}$	124-72-1
Tribromofluoroethane	$\text{C}_2\text{H}_2\text{FBr}_3$	
Dibromodifluoroethane	$\text{C}_2\text{H}_2\text{F}_2\text{Br}_2$	75-82-1
Bromotrifluoroethane	$\text{C}_2\text{H}_2\text{F}_3\text{Br}$	421-06-7
Dibromofluoroethane	$\text{C}_2\text{H}_3\text{FBr}_2$	358-97-4
Bromodifluoroethane	$\text{C}_2\text{H}_3\text{F}_2\text{Br}$	
Bromofluoroethane	$\text{C}_2\text{H}_4\text{FBr}$	762-49-2
Hexabromofluoropropane	C_3HBr_6	
Pentabromodifluoropropane	$\text{C}_3\text{HF}_2\text{Br}_5$	
Tetrabromotrifluoropropane	$\text{C}_3\text{HF}_3\text{Br}_4$	
Tribromotetrafluoropropane	$\text{C}_3\text{HF}_4\text{Br}_3$	
Dibromopentafluoropropane	$\text{C}_3\text{HF}_5\text{Br}_2$	431-78-7
Bromohexafluoropropane	$\text{C}_3\text{HF}_6\text{Br}$	
Pentabromofluoropropane	$\text{C}_3\text{H}_2\text{FBr}_5$	
Tetrabromodifluoropropane	$\text{C}_3\text{H}_2\text{F}_2\text{Br}_4$	
Tribromotrifluoropropane	$\text{C}_3\text{H}_2\text{F}_3\text{Br}_3$	
Dibromotetrafluoropropane	$\text{C}_3\text{H}_2\text{F}_4\text{Br}_2$	
Bromopentafluoropropane	$\text{C}_3\text{H}_2\text{F}_5\text{Br}$	460-88-8
Tetrabromofluoropropane	$\text{C}_3\text{H}_3\text{FBr}_4$	
Tribromodifluoropropane	$\text{C}_3\text{H}_3\text{F}_2\text{Br}_3$	70192-80-2
Dibromotrifluoropropane	$\text{C}_3\text{H}_3\text{F}_3\text{Br}_2$	70192-83-5
Bromotetrafluoropropane	$\text{C}_3\text{H}_3\text{F}_4\text{Br}$	679-84-5
Tribromofluoropropane	$\text{C}_3\text{H}_4\text{FBr}_3$	75372-14-4
Dibromodifluoropropane	$\text{C}_3\text{H}_4\text{F}_2\text{Br}_2$	460-25-3
Bromotrifluoropropane	$\text{C}_3\text{H}_4\text{F}_3\text{Br}$	421-46-5
Dibromofluoropropane	$\text{C}_3\text{H}_5\text{FBr}_2$	51584-26-0
Bromodifluoropropane	$\text{C}_3\text{H}_5\text{F}_2\text{Br}$	
Bromofluoropropane	$\text{C}_3\text{H}_6\text{FBr}$	352-91-0
HCFC-21	CHFCl_2	75-43-4

HCFC-22	CHF ₂ Cl	75-45-6
HCFC-31	CH ₂ FCl	593-70-4
HCFC-121	C ₂ HFCl ₄	354-14-3
HCFC-122	C ₂ H ₂ F ₂ Cl ₂	354-21-2
HCFC-123	C ₂ HF ₂ Cl ₃	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	CH ₃ CFCl 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-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	134237-37-9
HCFC-224	C ₂ 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 CICF ₂ CHCIF	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
HCFC-261	C ₃ H ₅ FCl ₂	134237-45-9
HCFC-262	C ₃ H ₅ F ₂ Cl	134190-53-7
HCFC-271	C ₃ H ₆ FCl	134190-54-8

8. Asbestos and Its Compounds

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

9. SCCP, Short-chain Chlorinated Paraffin

Substance	Chemical Sign	CAS No.
Chlorinated paraffin (C10~13)		85535-84-8
Other short chain chlorinated paraffins		

10. Azo Compounds (Nitrogen Compounds)

Substance	Chemical Sign	CAS No.
4-aminoazobenzene	C ₁₂ H ₁₁ N ₃	60-09-03
<i>o</i> -anisidine	C ₇ H ₉ NO	90-04-0
2-naphthylamine	C ₁₀ H ₉ N	91-59-8
3,3-dichlorobenzidine	C ₁₂ H ₁₀ Cl ₂ N ₂	91-94-1
biphenyl-4-ylamine	C ₁₂ H ₁₁ N	92-67-1
Benzidine	C ₁₂ H ₁₂ N ₂	92-87-5
<i>o</i> -toluidine	C ₇ H ₉ N	95-53-4
4-chloro- <i>o</i> -toluidine	C ₇ H ₈ ClN	95-69-2
2,4-toluenediamine	C ₇ H ₁₀ N ₂	95-80-7
<i>o</i> -aminoazotoluene	C ₁₄ H ₁₅ N ₃	97-56-3
5-nitro- <i>o</i> -toluidine	C ₇ H ₈ N ₂ O ₂	99-55-8
3,3'-dichloro-4,4'-diamino diphenylmethane	C ₁₃ H ₁₂ Cl ₂ N ₂	101-14-4
4,4'-methylenedianiline	C ₁₃ H ₁₄ N ₂	101-77-9
4,4'-diaminodiphenylether	C ₁₂ H ₁₂ N ₂ O	101-80-4
<i>r</i> -chloroaniline	C ₆ H ₆ ClN	106-47-8
3,3'-dimethoxybenzidine	C ₁₄ H ₁₆ N ₂ O ₂	119-90-4
3,3'-dimethylbenzidine	C ₁₄ H ₁₆ N ₂	119-93-7
2-methoxy-5-methyl aniline	C ₈ H ₁₁ NO	120-71-8
2,4,5-trimethylaniline	C ₉ H ₁₃ N	137-17-7
4,4'-thiodianiline	C ₁₂ H ₁₂ N ₂ S	139-65-1
4-methoxy- <i>m</i> -phenylenediamine	C ₇ H ₁₀ N ₂ O	615-05-4
4,4'-methylenedi- <i>o</i> -toluidine	C ₁₅ H ₁₈ N ₂	838-88-0

11. Nickel and Its Compounds

Substance	Chemical Sign	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
Other nickel compounds		

12. Formaldehydes

Substance	Chemical Sign	CAS No.
Formaldehyde		
Formain		
Formic aldehyde		50-00-0
Formol		

13. Organic Tin and Its Compounds

Substance	Chemical Sign	CAS No.
Bis(tri-n-butyltin) oxide	$O(Sn(C_4H_9)_3)_2$	56-35-9
Tributyltin(TBT)		56573-85-4
Triphenyltin (TPT)		668-34-8
Tributyltin bromide		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	$(C_6H_5)_3SnOCOCH_3Cl$	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
Tributyltin naphthennate		85409-17-2
Other tributyltins & triphenyltins		

Chapter 3. Standards for submitting analysis report of hazardous substances

1. Objective

These standards are established to use as common standards for flawless processing when cooperating partners submit the analysis results of environment-related substances to LG Electronics prior when delivering the first products. They exist to confirm that suppliers are meeting the control standards of environment-related substances as established by LG Electronics when dealing with new approval cases and the first product delivery transactions of all parts, raw materials, wrapping materials, battery, etc.

2. Application

These standards will be applied to such activities as test, analysis, examination, and verification processes of the content of environment-related substances contained in all parts, raw materials, wrapping materials, battery, etc. that cooperating partners registered to LG Electronics manufacture and supply. They apply to both domestic and overseas production sites of LG Electronics, as well as to cooperating suppliers.

3. Document Descriptions

3.1 Analysis report of environment-related substances

This refers to test reports of domestic or overseas certified analysis institutes, as measured by test standards using methods specified by LG Electronics, and to test reports in accordance with test methods based on either international test standards or test methods recommended by LG Electronics when cooperating partners have their own ICP or fine analysis devices.

3.2 Composition table of environment-related substances

This refers to detailed information about parts, including statements about product information, material information, and analysis data regarding the environment-related substances of products.

3.3 Non-use certificate

This refers to a certificate, which verifies that parts or products provided from cooperating suppliers to LG Electronics to not contain or use harmful substances (Level A-I substances) designated by LG Electronics.

3.4 Plan for improvement

This refers to a certificate detailing the improvement plans of cooperating partners when environment-related harmful substances are found in products/ parts that cooperating suppliers provide to LG Electronics.

3.5 Control list of environment-related substances

This refers to a list showing whether products or parts supplied to LG Electronics by cooperating suppliers contain or use environment-related substances (of Level A, Level B) as designated by LG Electronics.

3.6 Composition table of raw material

This is a basic data per raw material used in parts or products supplied to LG Electronics, and cooperating suppliers should keep and manage this data, and be prepared to submit it to LG Electronics whenever requested (for example, MSDS or MILL Sheet, etc.).

4. Principles for submitting documents

4.1 Duty to submitting data

Cooperating partners should verify that they are adhering to the LG Electronics standards for environment-related substances and submitting relevant data. Apart from the required basic data, cooperating partners must be ready to submit any other data immediately if requested by LG Electronics. Cooperating suppliers must keep the relevant evidence of those data all the time.

4.2 Guaranteeing Accuracy of data

Documents submitted to LG Electronics by cooperating suppliers should be created in accordance with relevant evidences without errors. Cooperating suppliers must guarantee accurateness of such documents.

4.3 Validity of data

1) At the Time of New Part

In case of analysis report of environment-related substances, the report issued within 2 years from the time of analysis report issuance date must be submitted (report submitted by the secondary and tertiary suppliers to provide raw materials of parts are also valid).

2) At the Time of Approval and modification of constituting parts in mass production items

Even for a part, of which is currently in the process of trading, environment-related substance analysis must be performed again to submit a new report in case changes occur in raw material or the courses of manufacturing or processing. (report submitted by the secondary and tertiary suppliers to provide raw materials of parts are also valid)

3) At the Time of quality guarantee of parts for mass production

For a part, of which is currently in the process of trading, environment-related substance analysis must be performed again to submit a new report in case of changes occur in raw material in definite submission period of LG Electronics. At this time, the report should be updated, and sample for analysis must be extracted from same lot as parts for mass production.

(Recommendation: describe Lot tracing feasible contents such as the date of manufacture of analysis sample on analysis report)

5. Standards for data creation

5.1 Non-use certificate of environment-related substances

This is aimed at demonstrating that supplied products and parts do not contain or use environment-related substances, and were created per product or per unit of parts. (cf. Appendix Form 1)

5.2 Plan for improvement

If the content of Level A-I substances is found to exceed the control standards, cooperating suppliers must create plans for improvement. (cf. Appendix Form 2)

5.3 Control list of environment-related substances

Cooperating suppliers should create a control list of environment-related substances per parts, based on composition table from the sub-supplier of raw materials.(cf. Appendix Form 3)

5.4 Analysis table of environment-related substance

Prepare analysis data according to the analysis results obtained from certified analysis organizations. Cooperating suppliers can enter information of environment-related substances contained in parts by using CPC (collaborative product commerce) system. When necessary, this information must be written in paper and submitted to LG Electronics. (cf. Appendix Form 4)

5.5 Analysis report

Attach an analysis report produced by a nationally certified analysis institute without addition or deduction of the testing marks. (cf. Appendix Form 5)

5.6 Composition table per raw material

Regarding confirmed material through raw material analysis per parts, cooperating suppliers should get MILL sheet or MSDS from sub-suppliers of raw materials to control for the quality of each part, and they should ready to submitting them immediately to LG Electronics if requested.

6. Meaning of each item in analysis table of environment-related substances

Detailed information should be written and recorded regarding product information, material information, analysis data, etc. about environment-related substances, according to the definitions stated below.

6.1 Class Name

Mark the name of the part or product (part name, product name, name of part)

6.2 LG Electronics Part Number

Mark part name or control number of product. In this case, DA, DD, and DM companies mean part number for parts supplied to subordinate divisions, and item number for parts supplied to subordinate divisions of MC Project Headquarters.

6.3 Maker Part Number

This is a control number for parts assigned by parts manufacturer or vendor, and its primary goal is to notated the control number of the maker

6.4 Maker Name (Eng)

Mark the name of the maker in English.

6.5 Maker Name (Kor)

Mark the name of the maker in Korean.

6.6 Maker Code

Mark the registration number of the part's maker registered to LG Electronics.

6.7 Vendor Name (Eng)

Write the name of the part supplier or other business in English. (All makers', suppliers', and agents' names can be included.)

6.8 Vendor Name(Kor)

Mark the name of the parts supplier or other businesses in Korean. (All makers', suppliers', and agents' names can be included.)

6.9 Vendor Code

Mark the registration control number of the part supplier or other businesses registered to LG Electronics.

6.10 Weight of parts (g)

Mark the weight of each unit part in the case of a single product, and the entire weight of the assembly in the case of assembly. (This means the weight of the part number unit under the control of LG Electronics.)

6.11 Sub Name

Mark the name of composition items in the case of a single product, and if possible, mark the names according to category 1 and 2 levels. In the case of assembly parts, mark a single item name on Level 1 that contributes to assembly, and mark the name of the composition part in Level 2. If there is another sub-level, mark it by adding another Level.

6.12 Sub P/No

Mark Part Number of sub name (with no distinction between Level 1 and 2). If there is no P/No of sub name, marking is not needed.

6.13 Unit weight(g)

Mark the weight of the sub name. If it is both Level 1 and 2, just mark the weight of Level 2, and if it is only Level 1, then mark the weight as Level 1 only.

6.14 Composition Material

Record the material of the sub name. If it is both Level 1 and 2, just mark the weight of Level 2, and if it is only Level 1, then mark the weight as Level 1 only.

6.15 Ratio of Material Weight

Mark the composition ratio of composition materials.

6.16 Content of Environment-related Substances

Mark it by ppm. If it is wt%, calculate according to $1\text{wt}\%=10,000\text{ppm}$ and then mark it.

6.17 RoHS Exemptions

If the content of environment-related substances exceed the maximum allowable concentration level as established by LG electronics and fall within the categories of RoHS exemption, indicate that such substances are exempted items.

Appendix 4. Forms of documents which have to be submitted

Form 1. Non-use certificate

Form 2. Plan for improvement

Form 3. Control list of environment-related substances

Form 4. Analysis report of environment-related substances

Form 5. Submitting time per data created

Form 1. Non-use certificate

Non-use certificate

Description	For approval / For mass production	Submitting date	20 . . .
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Cooperating suppliers				
Company name		Approval	Person in charge	Head of Quarter
Contact	Tel	Name		
e-mail		Signature		

LG Electronics Part No.		Part production date	
Maker Part No.		Production plant	
Part name		Delivery volume	

This is to certify that materials used and contained in the materials and products that we supply to your company, meet the standards of the checked items listed below.

-below-

- We meet the standards of LG Electronics for six major substances (Pb, Cd, Cr+6, Hg, PBB, PBDE) as designated by RoHS for control.
- Maximum heat-resisting temperature and time
 Maximum heat-resisting temperature: _____℃ Maximum heat-resisting time: _____Sec
 ※Records are requested if they are chip parts to be actually installed on the PCB (Printed Circuit Board)
- Pb-Free soldering (all solder cream, bars and wires included) is available to apply.

Note.

1. All the contents written on these documents must be created on the basis of facts, and cooperating suppliers must submit the data immediately whenever LG Electronics requests.
2. In the case that these documents are used for approval purposes, cooperating suppliers must submit the sample on the request. For the purpose of mass production, it must be submitted at the time of delivering the first product.

Form 2. Plan for improvement

Plan for Improvement

Submitting date: _____

Here we submit a plan for improvement since materials used for production and products supplied to your company have been found to exceed the control standards of environment-related substances as outlined by your company. We promise hereby that the submitted schedule will be strictly observed.

Cooperating suppliers				
Company name		Approval	Person in charge	Head of Quarter
Contact	Tel:	Name		
e-mail		Signature		

LGE Part No.		Part production date	
Maker Part No.		Production plant	
Part name		Production Quantity	

Before			After		
Problem part	Problem substance		Plans for Improvement		Delivery Schedule
	Substance	Measured concentration (ppm)	Improved material	Date to complete the improvement	

Note.

1. All the contents on these documents must be created on the basis of the facts only, and cooperating suppliers must submit related data immediately whenever LG Electronics request them.
2. Company-wide protocols are applied to writing the standards for control substances. If there is a request from a division that has established separate control standards of its own, the request from that division has first priority.

Form 3. Control list of environment-related substances

Control list of environment-related substances

Description	Substances	Contained	
		Yes	No
Level A-I	Lead and its compounds		
	Cadmium and its compounds		
	Mercury and its compounds		
	Hexavalent chromium and its compounds		
	Polybrominated biphenyls		
	Polybrominated diphenylethers		
Level A-II	Polychlorinated biphenyls (PCB)		
	Polychlorinated naphthalenes (PCN)		
	Polychlorinated terphenyls (PCT)		
	Short-chain Chlorinated paraffins (SCCP)		
	Asbestos and its compounds		
	Ozone Depleting Substances		
	Azo compounds		
	Nickel and its compounds		
	Specific Organic tin compounds		
	Arsenic and its compounds		
	Formaldehydes		
Level B	Polyvinyl chloride, (PVC)		
	Phthalates		
	Beryllium and its compounds		
	Antimony and its compounds		
	Selenium and its compounds		
	Palladium and its compounds		
	Bismuth and its compounds		
	Other chlorinated flame retardants		
Other brominated flame retardants			

Note.

1. Basically, the company-wide standards are applied to implementation. If there is a request from a division suggesting a separate control list of environment-related substances, which reflects requests from partners including buyers, the control list of division has first priority in creating the standards.
2. Confirm and check the status that the cooperating suppliers do not currently use the substances concerned.

Form 4. Analysis report of environment-related substances

1. General information

Class Name		Recorded by		Date of record	
LGE Part No.		Tel. No.		Division of LGE	
Maker Part No.		E-mail Address		Unit Weight(gram)	
Maker Name (Eng.)		Maker Name (Kor.)		Maker Code	
Vendor Name (Eng.)		Vendor Name (Kor.)		Vendor Code	

2. Analysis information

Sub P/No.	Sub Part Name	Weight (g)	Material	Weight Ratio(%)	Substance Content (ppm)						RoHS Exception Item	Decision Standard
					Pb	Cd	Cr 6+	Hg	PBB	PBDE		

Note.

- 1) Establish it in accordance with the company-wise standards, but if there is a separate request from division, the request should be reflected as priority.
- 2) The same format applies when cooperating suppliers utilizes CPC system to directly enter information of harmful substances.

Form 5. Submitting period per data created

Classification	Preparation Unit	Environment-related Substances	At the Time of New Part Approval	At the Time of Initial Delivery of Mass Production	At the Time of 4M Modification ³⁾	At the Time of Mass Production Delivery ¹⁾	Comments
Analysis report of environment-related substances ²⁾	Per part	Level A-I	Submit (5 samples)	Not necessary	Submit	Submit	1. Analysis report from certified organization 2. Analysis report on equipments held by cooperating suppliers 3. Analysis report of the representative parts applicable as the overall report of entire series parts
Composition table of environment-related substances	Per part	Level A-I	Submit	Not necessary	Submit	Not necessary	1. To be prepared and submitted per part maker and part number
Non-use certificate	Per part	Level A-I	Submit	Submit	Submit	Submit	1. To be prepared and submitted per part maker and part number
Composition table	Per part	Level A-I	Submit	Not necessary	Submit	Not necessary	1. Document issued and confirmed by companies supplying raw materials
Control list of environment-related substances	Per part	Level A-I, Level A-II, Level B	Submit	Submit	Submit	Not necessary	1. Status of use to be checked per each unit of cooperating supplier
Improvement plan	Per part	Level A-I	Not necessary (to be submitted for inappropriate parts only)				1. To be submitted for parts not satisfying environment-related substance control standard of LG electronics

Note.

- 1) It should be submitted according to the definite period of time fixed by LG Electronics when LG Electronics requires.
- 2) The available period of analysis report
 - In case of analysis report of environment-related substances, the report issued within 2 years from the time of analysis report issuance date must be submitted (report submitted by the secondary and tertiary suppliers to provide raw materials of parts are also valid).
 - At the Time of Mass Production Delivery: the report should be updated, and sample for analysis must be extracted from same lot as parts for mass production.
- 3) Change of material (include all of raw material/ sub material/ additive) or machine (or commercial firms addition or change, or OEM addition or change) should obtain approval by submitting required data. Change of size or shape without change of material or machine does not have to submit.