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Before the Main Contents

This guide is a method to execute the Material and Structure Improvement Directive of Electrical and Electronic Equipment (hereinafter referred to as Material and Structure Improvement Directive), explaining the group standards for Material and Structure Assessment Method established by Korea Electronics Association (hereinafter referred to as KEA) in 2008. It includes the details that are required for manufacturers and importers to easily understand and execute the Material and Structure Improvement Directive, and it was prepared by Material and Structure Improvement Standardization Committee by referring to the 2009 assessment result of the Material and Structure Improvement Directive and published with the review from KEA, Ministry of Environment, and Ministry of Knowledge and Economy.

This guide is for executing the Material and Structure Improvement Directive, analyzing and evaluating various environmental effects generated during the disposal stage of the electrical and electronic equipments by manufacturers and importers voluntarily, and helping to build the management system to sustain these activities as a final goal. The first version of the Material and Structure Assessment Guidance focuses on providing various management standards required for recycling design of the products and management items of the manufacturers required for evaluating suitability and the explanation of the assessment details and assessment standard of Assessment Method Standard (KEA-3300).

Before trying to understand the assessment method group standard and Material and Structure Improvement Directive through this guide for the manufacturers and importers, we want to make sure the following few items in order to avoid the unnecessary misunderstanding and confusion and to help easier understanding of the guide.

1. The examples and explanations on assessment standard provided in this guide do not guarantee or confirm legally, and this guide is considered as a reference to understand the Material and Structure Improvement Directive and assessment standard for manufacturers and importers.

2. Suitability of the evaluation standard of material and structure assessment standard shall be determined voluntarily by the manufacturers and importers, and this guide presented minimum preparation methods required for the standard for decision.

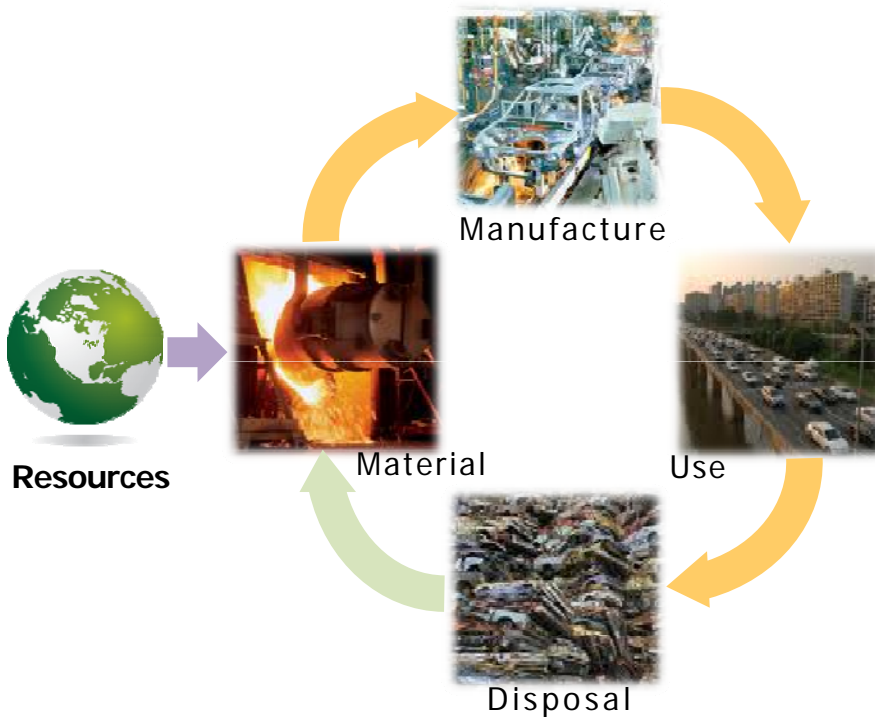
3. All forms and types mentioned in this guide are provided as generally useable examples, and they are separate from the contents of the related of guides and standards.

You can contact www.ecoe.or.kr Help Desk for questions or other opinions related to the Material and Structure Assessment Standard and guide.

About Resource Recycling Law

This law was established and executed from Jan. 1st, 2008 for the purpose of contributing to the preservation of the environments and to the healthy development of the national economy as building the resource recycling system by using the resources more efficiently through proper recycling of the waste items, manufacturing for easier recycling, and restricting the usage of harmful substances in order to promote the recycling of the electrical and electronic equipment and automobiles.

Overview of Materials and Structure Assessment



Contents

1.1 About Material and Structure Assessment

1.1.1 Background

1.1.2 Purpose

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1.3.1 Environmental Regulations

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1.1 About Material and Structure Improvement Assessment

1.1.1 Background

Materials and Structure Assessment of electrical and electronic equipment (hereinafter referred to as Material and Structure Assessment) is executed in accordance with the **【 Materials and Structure Assessment for Electrical and Electronic Equipment (Jan. 29, 2008 Ministry of Environment Notification No. 2008-17, Ministry of Knowledge and Economy No. 2008-7) 】, (hereinafter referred to as Material and Structure Assessment) based on the Article 10, point 1 of 【 Law about the Resource Recycling of Electrical and Electronic Equipment and Automobiles 】, (hereinafter referred to as Resource Recycling Law).**

Subjects of valuation¹⁾ shall make efforts to adapt the material and structure improvement for promoting recycling in accordance with the Material and Structure Improvement Directive from the product design stage, shall select and evaluate the representative models for each type for manufactured and imported products depending on the selection standard and evaluation method established by the President of KEA, and shall submit the evaluation reports as in the Annex of the Material and Structure Improvement Directive notification to the President of KEA by the end of Jan. every year.

【 Group Standard on Material and Structure Assessment Method, KEA CE-3300 】, provides the details on the evaluation method determined by KEA, and the subjects of valuation shall carry out the duties specified in Material and Structure Improvement Directive through this standard.



1) Manufacturers or importers for 10 products families specified in the Resource Recycling Law.

1.1.2 Purpose

The purpose of the Material and Structure Assessment of Electrical and Electronic Equipment (or Material and Structure Assessment) is to request the voluntary efforts from the design stage to promote the recycling of the products at the end of the life cycle of the products to manufacturers and importers (or producers, subjects of valuation) who produce or sell electrical and electronic equipment in domestic market. Material and structure Improvements of Electrical and Electronic equipment have positive effects on improving the possibility of recycling.

Few important examples of material improvement items for increasing the recyclability during disposal stage include the prohibition of the use of harmful substance, simplification of the type of the material and use of the plastic that can be recycled, and markings of the material type. The structure improvements include improvement of structure and assembly method for easier separation and disassembly of the components that can be recycled or require separate processing, increasing the efficiency of the recycling process by reducing number of recycling processes, and securing the safety and health of the workers during disposal stage.



And there are other various environmental sides and design methods to promote the recycling, and the purpose is for manufacturers to establish and evaluate the target values and lead the improvement of the products by selectively applying the evaluation contents and standards that have higher environmental performance depending on the degree of improvement while the evaluation items and standards provided by the Material and Structure Assessment Standards are achievable, and it is not intended to use it as a standard for simple comparison of the environmental level of the evaluating products with other products.

In order to achieve the purpose of Material and Structure Assessment, the most important requirements are the sufficient information for Material and Structure Assessment and active participation to the valuation deliberation by the manufacturers and importers. The results from the products evaluation and deliberation evaluation will be used to support the product design improvement for promoting recycling through the design guide for recycling, evaluation method, and development providing design tools.

1.2 Activities for Assessment Standardization

1.2.1 Standardization Committee

Materials and Structure Assessment Method Group Standard (or KEA CE-3300, Assessment Method Standard) was established as group standard of KEA in Aug. 2008 for the purpose of supporting Materials and Structure Improvement Directive, and the group standard was established through the numerous meetings and advanced researches and investigations by having ‘Materials and Structure Improvement Standardization Committee’ consisting of the people from the companies representing the product families of each group, related institutes, associations, and related government departments.

The purpose of the standardization committee is to achieve the goal of Material and Structure Improvement Directive and Assessment Method Standards, to help manufacturers fully implement the regulations by supporting the evaluation standard of Material and Structure Improvement Directive, and to research various methods for promoting the recycling through the free evaluation method and standard from the viewpoint of producers. And the Assessment Method Standard has also been prepared from this perspective.

In order to prepare the detailed evaluation items, contents, and standards for the Assessment Method Standard, we have considered the systems that are executed to evaluate the recyclability of electrical and electronic equipment, voluntary agreement standard, and basic legal items including Environmental Label System (Type I), Green Purchase Standard, International Standards (ISO, IEC, ECMA, etc.), and related legal requirements for recycling of each countries.

Legal requirement	Environmental Label	Green purchase / Standard	Miscellaneous
Korean Resource Recycling Law	Korean Environment Mark	EPEAT (USA)	Related standards in each company Consumer products evaluation manual (Japan)
EU WEEE Directive	EU Eco Flower	-IEEE 1680	
Japanese 3R Basic Law	Blue angel	ECMA 370	
⋮	TCO	ECMA 341	
⋮	Nordic Swan	⋮	
⋮	Eco Mark (Japan)	⋮	
⋮	⋮	⋮	

【 Reference standard for Material and Structure Assessment 】

In addition, we prepared Material and Structure Assessment Guidance version 1.0 as a means of supporting Material and Structure Improvement Guide and Assessment Standard, and we are executing the research on the standard for calculating the recycling rate of the parts and materials as well as standardization research to calculate the recyclability of the product in relation to the research on the method to improve the recycling rate by visiting domestic recycling centers. In the future, we will provide the design guides that producers can consider during the disposal stage/ by exploring additional BAT(Best Available Technology) the design area for easy recycling, trend of the related regulations, and technological level of the electrical and electronic products recycling.

1.2.2 Evaluation Deliberation Committee

When the Material and Structure Assessment was first executed in 2009, 134 of evaluation results were submitted for 516 items for 10 electrical and electronic equipment specified in the Resource Recycling Law, and the deliberation was carried out for two days through the deliberation committee composed of third party experts members from related government organizations, universities, and specialized organization for 53 cases of pre-deliberation and 49 cases of main deliberation.

Material and Structure Assessment deliberation is not for simple reporting of verification for the improvement items for manufacturers and importers or comparison evaluation between the products for the material and structure improvement by manufacturers and importers. The focus is to provide the direction and recommendation for improvement to promote the recycling depending on the social responsibility and technological level of the manufacturers and importers.

And the excellent cases and items to be improved from the result or the process of deliberation will be used for the data for the material and structure improvement project of the future products, system improvements, and establishing the support method.

Classification	Major Deliberation Items
Material Improvement Items	<ul style="list-style-type: none"> ① Simplification of the material type for plastic parts ② Extended use of plastic material that can be recycled. ③ Marking of the material code for plastic parts ④ Other material improvement items required for promoting recycling
Structure Improvement Items	<ul style="list-style-type: none"> ① To improve the structure so that various recyclable materials can be separated easily ② To improve to the structure that can be easily disassembled ③ To use single material for the structures that more than two materials are glued together. ④ To reduce the weight of the products ⑤ Other structural improvements required for promoting recycling


1.3 Environmental Regulations and Standard during Disposal Stage

1.3.1 Environmental Regulations

Electrical and electronic equipment affects the environment throughout the entire life cycles of the products¹⁾, and many countries are executing or planning the laws, regulations, and systems to reduce the effects to the environment.

In Korea, the typical case would be “Resource Recycling Law for Electrical and Electronic Equipment and Automobiles” for more efficient use of resource and removing the harmful environmental effects, “Law of Reasonable Use of Energy” for saving the energy from the perspectives of customers or users of the products, and “Law of Resource Saving and Promotion of Recycling” and “Producers Responsible Recycling System” for resource savings and recycling.

In case of other countries, countries around Europe, North and South America, and Asia have established and are operating the regulations related to the recycling and ecodesign for electrical and electronic equipment.

Classification	EU	Japan	Korea	USA (California)
Regulations	EU WEEE Directive (2002/95/EC)	Japan Home Appliance Recycle Law	Resource Recycle Law	SB20, 50
Target Products	10 Type of electrical and electronic equipment such as large and small household appliances (plan to include electronic medical equipment)	TV, refrigerator, washing machine, air conditioner	10 product types including TV, air conditioner, washing machine, and etc.	Display products with bigger than 4 inches such as TV and Laptop Computers
Execution date	Aug. 13, 2005	Apr. 2001	Jan. 1, 2008	Jan. 1, 2005
Major contents	<ul style="list-style-type: none"> • Takeback and Treatment of waste electrical and electronic equipment • Recycling rate (50~75%) • Recovery rate (70~80%) (plan to increase by 5%) 	<ul style="list-style-type: none"> • Takeback and Treatment of waste electrical and electronic equipment • Recycling rate (50~60%) • Customers pay the expense of recycling 	<ul style="list-style-type: none"> • Takeback and Treatment of waste electrical and electronic equipment. • Comply with mandatory recycling standard • Providing recycling information 	<ul style="list-style-type: none"> • Customers pay the expense of recycling • Products that include four harmful substances cannot be sold.
Miscellaneous	Marking requirement 	-	-	-

As these legal requirements are similar but not same, the voluntary efforts are required for producer to handle the individual requirements or to manage and comply with all requirements in unified system. Therefore, Material and Structure Assessment is necessary for checking and improving the capability to meet the legal requirements, the system requirements, and the requirements of interested parties at the products disposal stage, and we will continuously maintain it in accordance with the technological and legal trend.

1) Resource collection → Production → Transportation of Products → Use of Product → Disposal

1.3.2 Related Standards

There are few domestic or international example standards that can be considered during the disposal stage of the electrical and electronic products, and the those few standards that can be utilized for the recycle design or that is under the process of individual standardization for specific items will provide the methods and guides for product recyclability evaluation and design improvement. The following table shows few useful example standards.

Items to consider	Standard code	Title of standard	Note
Making method	KSMISO 11469	Plastics – Generic identification and marking of plastics products	
	KSMISO 1043-1	Plastics – Symbols and abbreviated terms – Part 1: Basic polymers and their special characteristics	
	KSMISO 1043-1	Plastics – Symbols and abbreviated terms – Part 2 : Fillers and reinforcing materials	
	KSMISO 1043-1	Plastics – Symbols and abbreviated terms – Part 3 : Plasticizers	
	KSMISO 1043-1	Plastics – Symbols and abbreviated terms – Part 4 : Flame retardants	
	JISC 9912:2007	Identification and markings for plastic parts in electrical and electronic parts	
Recyclability	KSMXXX:2009	Method of calculating recoverability and recyclability of electrical and electronic equipment	KS currently under notification
	KSMISO 22628	Road vehicles – Recyclability and recoverability Calculation method	For automobiles
	IEC 62635	Method of calculating recoverability and recyclability of electrical and electronic equipment	EC TC111 under processing
Recycle information markings	KSMXXX:2009	Providing recycle information for electrical and electronic equipment	KS currently under notification
	IEC 62650	Providing recycle information for electrical and electronic equipment	EC TC111 under processing
	ECTA, CECED, AeA Europe and EEPRA Joint position guidance		
Recycle material	EN 15342-15348	Recyclable plastic: PS, PE, PP, PVC, PET	
Misc	KSMISO 15270	Plastics – Guidelines for recovery	

And other standards related to recycling (example: EN13432: Requirements of recyclable packing materials through the mixing and bio decomposition) are established or planned to be established, and it may be worthwhile to consider the reference standards cited in the abovementioned standards. And also you can refer to Environmental Label (Type I, etc.) and Green Purchase Standard that are executed by each region or country for preparing the evaluation and standards for recyclability of electrical and electronic equipment.

About Material and Structure Assessment

It is an evaluation system according to Material and Structure Improvement Directive to achieve the recycling target rate each year through the activities of improving materials and structures such as using easily recyclable materials, simplification of materials, material information marking, and separability and disassembly in order to make the recycling of electrical and electronic products and automobiles easier.

Chapter 2

Understanding Material and Structure Assessment

Contents

2.1 Evaluation procedures

2.1.1 Selection representative models

2.1.2 Evaluating products

2.2 Explanation of terms

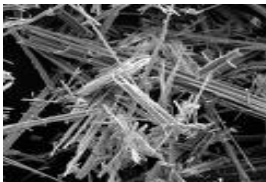
2.3 Explanation on pre-evaluation items and standards

2.3.1 Designs considering the easy separation

2.3.2 Designs considering the material recycling

2.3.3 Management system

2.3.4 Miscellaneous



2.1 Evaluation procedure

2.1.1 Selection representative models

Manufacturers and importer shall select the representative models to evaluate for the Material and Structure Assessment Method Standards. The method of selecting the representative models is to choose more one item from the product family regardless of the manufactured year, size, capacity, price, structure, or use, and representative model shall be selected by choosing the model that large quantity were shipped in the evaluating year¹⁾ as a general rule.

No.	Product family	Note
1	Television	Devices that provide video functions regardless of the type of display (CRT TV, LCD TV, PDP TV, etc.)
2	Refrigerator	Devices that has refrigeration and freezing function regardless of the use such as regular refrigerator, Kimchi refrigerator, or cosmetics refrigerator
3	Washing machine	Devices that has washing function regardless of the functions such as with or without dry function. (limited to home use only)
4	Air conditioner	Devices that have indoor room cooling function regardless of the additional functions such as air cleaning and structures such as wall mounting or standing.
5	Personal computer	Devices with logical computational functions including both desktop and laptop (including monitors and keyboards)
6	Audio	Devices that has sound functions. (excluding portable devices)
7	Mobile phone	Devices that have telephone function with other land line subscribers or mobile subscribes using wireless base stations. (including the batteries and chargers)
8	Printer	Inkjet or Laser type printers including the combinational function devices (copying and fax functions). (including the replacing ink cartridge and toner cartridge)
9	Copier	Copy machine including color and diazo type including combination functions devices (printer and fax functions). (including the replacing ink cartridge and toner cartridge)
10	Fax machine	Devices that can convert the static image to electric signal and transmit over the communication channel including combination function devices (printer and copy functions). (including the replacing ink cartridge and toner cartridge)

1) Evaluating year : It is the year that manufacturers and importers evaluate the products, and the evaluation results shall be submitted by Jan. next year. For example, 2010 deliberation evaluation is for evaluating year 2009.

2.1.2 Executing assessment

① Select the reference model (or existing model) that can compare the improvements of the representative model. If the application of the reference model is difficult (e.g. new product developments, etc.), then establish the target value and reference value for the evaluation contents.¹⁾

② Evaluate the representative model in accordance with the Material and Structure Improvement Contents and Standards.

③ Improvement of the representative model is evaluated through the established target values and reference value, or result of reference models.

④ Based on the evaluation result, prepare the evaluation report about the Material and Structure Assessment Contents.

⑤ Evaluation report shall be recorded and stored in accordance with the related procedures so that the contents are adapted to the future product development and design and the measure can be established.

⑥ Evaluation report and related documents shall be submitted to KEA with the following schedules.

2.2 Evaluation report submission and deliberation schedule

Order	Procedure	Details	Schedule
1	Request of evaluation report submission	Official letter is sent to make the request of evaluation report submission	During Dec. of the evaluating year
2	Submit evaluation documents	Evaluation report, evaluation results, and evidence documents	Within Jan. next year
3	Set up deliberation committee	Select deliberation committee members, plan and confirm the deliberation schedule	Within Jan. next year
4	Pre-deliberation	First review of submitted documents. Select the deliberation products	Within Feb. next year
5	Deliberation request	Send official letter to request attending the deliberation committee and additional documents	Before March 5th of the next year
6	Hold deliberation committee	Result of deliberation, individual improvement project	Before March 15th, next year
7	Report to government	Deliberation report	Before March, next year
8	Hold evaluation committee	Evaluating year deliberation result analysis, establish the direction to improve, and revise the standard and evaluation guide (if necessary)	Within the first half of next year
9	Public hearing	Present the evaluating year standard revision contents (if necessary)	Within Sep, next year

1) Evaluation of the existing model or reference model is not mandatory, but internal comparison and improvement evaluation are required for the evaluation of degree of improvement and achievement as the main purpose of the Material and Structure Improvement Directive is to evaluate and deliberate the efforts and results of the improvements about the material and structure of the products.

2.3 Definition of Terms

Terms used in the Material and Structure Assessment Method Standards can be explained and referred as followings.

No.	Terms	Reference
1	Producer	: Article 8, point 1 of Enforcement Ordinance of Resource Recycling Law
	Manufacturers and Importer Note] Manufacturers means a natural person or corporation that produces the products specified in this standard, and the Importer means a natural person or corporation that imports the product from other countries and sells into domestic market.	
2	Electrical and Electronic Equipment	: Article 2 of Resource Recycle Law
	Equipment which is dependent on electric currents or electromagnetic fields in order to work properly	
3	General Tools	
	Tools generally used to separate the pre-separated parts and materials, or economical parts and materials from the main body of the waste product during the disposal stage.	
4	Pre-separated parts and materials	
	Part and materials that contain harmful substances or that are dangerous to the safety of the workers during the disposal stage.	
5	Economical parts and materials	
	Parts and materials to be separated from the waste products before the shredding process for economical reasons during the disposal stage.	
6	Single material	
	Single substance, combination of more than two single substances that do not interact each other or with their mixture group.	
7	Accessibility	
	Design characteristics that provide identification of the joint parts during the product disassembly and using general tools is not obstructed.	
8	Separability	
	Design characteristics that enable the separation of pre-separated parts and materials during the product disassembly stage and that do not generate the unnecessary human or physical forces.	

No.	Terms	Reference
9	Recycling	
	the reprocessing in a production process of the waste materials for the original purpose or for other purposes (but, excluding energy recovery)	
10	Environmental burden	KS A ISO14001:2004, Definition 3.7
	any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects	
11	Housing	
	Frame made of plastic or metal material covering the exterior of the products for protecting and combining the parts functioning inside the product.	
12	Plastic	KSMISO 11469, KSMISO1043-1~4
	Plastic refers to a polymer, copolymer, polymer blend, or polymer alloy, and it has the same meaning as synthetic resin. Note) When filling material, enforcing material, temporary material, or flame retardant material are used with the plastic materials, they are considered as plastic materials.	
13	Packing materials	KSA 1006_2002 Packing -Definition
	Materials or container that is appropriate for protecting the value and the states of the products during transportation, storage, handling, and use. Note) Only unit packing is to be considered.	
14	Unit packing material	KSA1006_2002 Packing - Definition
	Material or container that is used for increasing the value of the product by packing individual product separately or for protecting individual product Note) Packing materials for accessories, spare parts, or repair parts that are not required to execute the intended function of the product are excluded.	

2.3 Assessment Items and Explanation of Standards

1 – Design considering easy separation

#	Evaluation Item	Evaluation Standard
1.1	Easy parts separation	Whether parts and materials that include harmful substances or dangerous substance for the safety of the workers, that can be recycled, and that have economic values can be easily separated during the disposal stage.
1.2	Use of general tools	Whether general tools can be used to separate the pre-separation parts and materials from the product.
1.3	Assembly type	Whether number of assembly types is minimized in order to improve the disassembling process of the pre-separation parts and materials.

2 – Designs considering Material Recycling

#	Evaluation Item	Evaluation Standard
2.1	Number of type of plastic materials	Whether the number of type of plastic material used for the product housing is minimized.
2.2	Separation of labels and stickers	Whether the labels and stickers made of other material attached to the housing of the product can be separated. (The labels and stickers to be considered seriously for the safety, danger, and use of the users shall be excluded.)
2.3	Plastic material marking	Plastic material used in the product (weight bigger than 25g and the area of the flat surface bigger than 200mm ²) shall be marked in accordance with ISO KS M 11469. (Abbreviations for the markings of the plastic material shall follow the ISO1043-1~4. And the reference weight of material marking for mobile phones shall be over 5g.)
2.4	Use of recycled plastic	Use of recycled plastic material among the plastic material used in the product. (Recycled materials used during the manufacturing process are excluded)
2.5	Use of recyclable plastic	PVC is not allowed for plastic parts of over 25g.
2.6	Use of synthetic resin for packing material	Weight reduction of the synthetic resin materials used for the packing materials

3 – Management System

#	Evaluation Item	Evaluation Standard
3.1	Technology development efforts to promote recycling	Building infrastructure for environmentally friendly takeback and recycling and continuous efforts to make the recycling easier
3.2	Ecodesign process	Establishment of the product development procedure considering the environmental effects including easiness of disassembly and recycling
3.3	Consideration of environmental burden	Development of environmentally friendly products considering the environmental burden caused by the products
3.4	Record management	Establishment of management system for the record and storage of the documents for the results of environmentally friendly products development activities
3.5	Recycling information provision	Establishment of internal system to provide the recycling information of the product to the recyclers and the interested parties when requested
3.6	Improvement on the recommendation	Review and application to the design for the improvement request and recommendations on the material and structure of the equipment from the recyclers

4 – Miscellaneous

#	Evaluation Item	Evaluation Standard
4.1	Products environmental performance	Other ecodesign of the evaluating models

2.3.1 Design considering easy separation (1)

Evaluation Item	Evaluation Standard	Evaluation Result
Easy separation	Is easy separation considered in the design for pre-separation parts and materials that include harmful and dangerous substances to the safety of the works during the disposal stage and the recyclable parts and materials that have economic values?	Yes / No

(1) Purpose of Evaluation


Electrical and Electronic Equipment are reused, recycled, thermally recovered, and processed through other environmentally friendly method during the disposal stage, and the reuse and recycle would be the most efficient ways of environmentally friendly methods. And how much of reusable and recyclable parts and materials can be separated economically before the shredding of the electrical and electronic equipment (through the manual works) must be considered first.¹⁾

Pre-separation items are divided into parts and materials specified in the regulations, parts and materials that included harmful and dangerous substances to the safety of the workers during the recycling process, and parts and materials that have high recycling or economical values. Whether pre-separation items used in the evaluation items can be separated before shredding and whether they can be separated without the damage considering the safety of the workers and environmental pollution will be checked.

(2) Type and pre-separation parts and materials ²⁾






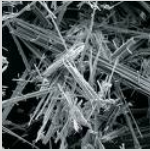


(A) Legal selective processing parts and materials







Legal selective processing parts and materials are specified in the domestic Resource Recycling Law and Annex II of EU WEEE directive.

#	Legal selective processing parts and materials	Example
1	Rechargeable batteries containing PCB according to the deliberation regulations 96/59/EC dated Sep. 17, 1996 about the disposal of PCB and PCT.	

1) In general, parts and materials separated before shredding have higher economical values than the parts and materials separated after the shredding








2) Each company can include the other types of pre-separation parts and materials that are not presented in this guide.

#	Legal selective processing parts and materials	Example
2	Switches or backlight lamps including mercury	
3	Battery (electric cell) * for mobile phone – Resource Recycling Law	
4	Printed-circuit board of the mobile phones and Printed-circuit board with the surface area over 10 cm ² from other devices. * Printed-circuit board of personal computers and mobile phones – Resource Recycling Law	
5	Parts containing toner cartridge, color toner, and liquid	
6	Bromated flame retardant materials containing plastic materials	
7	Asbestos wastes and parts containing asbestos	
8	Cathode-ray tube (CRT)	
9	CFC, HCFC, HFC, HC * Coolants (excluding the material that has no effects to the destruction of ozone layer) for the refrigerators such as CPC must be recovered separately and safely – Resource Recycling Law	

#	Legal selective processing parts and materials	Example
10	Gas discharge lamp	
11	LCD (including proper covering material) with the surface area of over 100 cm ² and devices illuminated by gas discharge lamp	
12	External electric cable	
13	Parts containing heat resistant ceramic fiber explained in the Dec. 5, 1997 Committee Regulations 97/69/EC that was revised for the technological development of Deliberation Committee Regulation 67/548/EEC in relation to the classification, packing, and marking of harmful substances	
14	Configuration elements containing radioactive substances excluding the components that be below boundary line of the exemption specified in and Article 3 in May 13, 1996 <u>Annex I</u> of Deliberation Regulations 96/29/ Euratom , which specifies the basic safety standard to protect the health of workers and general public people from the danger caused by ionized radioactive materials	
15	Electrolyte condenser (height > 25 mm, diameter > 25 mm, or similar size) that contains hazardous materials	

(B) Pre-separation parts and materials before shredding

- 1) Parts and materials that can have harmful effects to the working environments (safety, danger), or recycling process or equipment.

#	Parts and materials	Example	Description
1	Motor		Motors cannot be cut or disassembled by cutter of the shredding equipment
2	Compressor		Compressors cannot be cut or disassembled by the cutter of the shredding equipment, and there is a danger of explosion or fire during shredding due to the remaining coolant (example: R600a)
3	Glass		Reinforced glass cannot be recycled, and the separation of the shredded glass is (technically) difficult and it may accelerate the degradation of the cutter blade
4	Freezing oil, salt water, other liquids		Liquids such as freezing oil of the compressor and salt water inside the rotating drum balancer of the washing machine may cause corrosion of the shredding equipments and other recycling equipment
5	Soft magnetic material		Permanent magnet used in the speaker and door packing of the refrigerators (ferrite rubber, magnet, magnetic sheet) can disturb the selection process of other metals and stick to metal parts of the shredding and selection equipments
6	Stainless steel (non-magnetic)		Non-magnetic materials among the stainless steel materials used mainly for parts for assembly such as bolt, piece, and screw, parts of exterior decoration, or water tank (Example: SUS 304) are difficult to separate after shredding with selection equipment
7	PS plastic materials		PS that is widely used in electrical and electronic equipment such as refrigerator shelf is difficult to isolate since its specific gravity is similar to ABS after shredding
8	Misc		Other materials that degrade the recycling efficiency are classified into rubber, magnets, asbestos, wood, soft PVC, and PP-glass

② Recyclable parts and materials that have economical value

– Parts and materials that have bigger values if separated before shredding

#	Parts and materials	Example	Description
1	Motor, Compressor		Irons and coppers contained in motors and compressors are over 80% and 10% respectively to the total weight, the value of recycled materials is high and they also have high value as recycled products
2	Heat exchanger (evaporator)		Heat exchanger used in refrigerators and air conditioners contains high purity aluminum and they have good recycling value and recycled products
3	Single material plastic		When the single materials of ABS, PP, PC, and PS from the waste products are recycled, the value can be 80% of the new product and they can be sold again.
4	CRT		CRT has high recycling value as it contains high purity materials such as glass (panel, funnel) and nickel that can not be isolated easily after shredding
5	Miscellaneous		Purity of the cooper pipes used in air conditioner is high and they have high economical value

(3) Items to consider before evaluation

Considering the possibility of the separation of pre-separation parts and materials increases the recycling rate of the waste products by reducing the number series of process and steps during the separation process safely at the product disposal stage. For this purpose, producers need to make an effort to understand the basic properties of the pre-separation parts and materials, and to separate or disassemble the pre separation parts and materials in easier and safer ways.

The followings are items to consider before evaluation to improve the evaluation items.

■ Check the information of pre-separation parts and materials

It is important to check how much and where the parts and materials are for pre-separation used in order to consider the separability. The types of information required for efficient management are list, quantity, and location information of the parts and materials¹⁾.

■ Establishment and execution of separability control standard and control procedure

The standard on the determining separability depends on product type and manufacturers, and the same evaluation method and tools cannot always be applied. Therefore, the standard for determining separability is not included in this standard, but it must be executed according to the internal control item and standard, evaluation method, and procedures of the manufacturers as a general rule.

Therefore, it is desired to establish the internal control standard and method for the separability and execute continuously to determine this requirement.

■ Continuous improvement of the product

Product improvement is based on the comparative evaluation with the existing model (or existing model, target value) in accordance with the established control items, standard, and related procedure, and the improvement items shall be investigated and reflected to the design through benchmarking, documents, and design guide.

1) Disassembly manual including the disassembly method, assembly type and quantity, and disassembly tool information can be considered for location information

2.3.1 Design considering easy separation (2)

Evaluation Item	Evaluation Standard	Evaluation Result
Use of general tools	Only general tools can be used to isolate the pre-separation parts and materials? If “No”, then write the name of the required tools and reasons	Yes / No

(1) Evaluation purpose

Manual disassembly method can be different for each recyclers depending on the recycling rate, economic efficiency, and facilities. The manual disassembly works requires the largest number of process steps throughout the recycling process and recyclers are making lots of efforts to reduce these steps.

Various disassembling equipments and tools are prepared in recycling process as it is impossible to handle the products with different structures from different manufacturers with the same method even when the recyclers have the separate facilities for different product families. Therefore, using general tools for disassembly means shorter tool replacement time and easier separation.

And the result of the disassembly tool requirements can be useful for determining the specifications of the tools for the recyclers or preparing the introduction of special equipments for products disassembly process when necessary.

(2) Disassembling Tools

Disassembling tools can be defined in various ways by the manufacturers and recyclers.




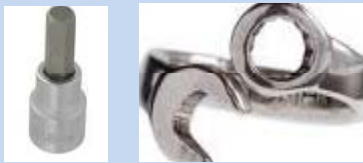
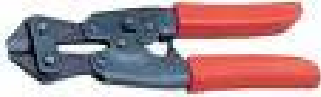

The scope of “general tools” in the evaluation means the tools used from the view point of recyclers, and customers should be able to buy those tools in the market.

(A) Separation/disassembly tools during recycling steps

Tools used by domestic recyclers can be presented as the following table¹⁾.

1) There might be tools not proper for disassembly tools for mobile phones. It is recommended that manufacturers of the mobile phones submit the information of all assembly and disassembly equipment and tools used in the production.





① General tools used in the recycling process¹⁾

#	Name of tool	Description	Picture
1	Hammer	To hit the joint where manual disassembly is difficult	
2	Screw driver	To separate the screws (+/-) (Impact type, electric motor type, and pneumatic type) generally	
3	Scissors ²⁾	To cut the relatively soft materials such as wires	
4	Hex wrench	To disassemble the joints with hex nuts/bolts	
5	Cutter	To cut the metal materials such as copper tubes	
6	Scraper	To separate the labels and stickers	

1) Disassembly works using hands shall not be considered as general tools

2) Pliers, wire cutter, and nipper can be considered together.

② Special tools and equipments used in the recycling process

#	Name of tool	Description	Picture
1	Hook	To separate the parts and materials (exterior cover products) that have large volumes and sizes after removing the joints	
2	Air saw	To remove or cut the waste metal parts	
3	Coolant / coolant oil sucking equipment	Equipment to suck the coolant and coolant oil of the compressors in refrigerators and air conditioners	
4	Plasma cutter	To cut the parts and materials having the structures that cannot be cut by general tools such as compressors	
5	Presser	Equipments to disassembly with strong compression force when internal devices are not separated such clutches or insulators	

(3) Items to consider before evaluation

Use of general tools enables easy disassembly or dismantling of pre-separation parts and materials inside waste electrical and electronic equipment, and this is one of the ways of reducing the environmental burden and enhancing the recyclability of the products.

One of the important factors in the requirement of general tools you need to keep in mind is that the tools used in assembly process are not necessarily same as the tools for disassembly. Therefore, the evaluators must check whether general tools can be used through the result of actual product disassembly .

The followings are items to consider before evaluation to improve the evaluation items.

■ Product disassembly information

It is recommended for evaluators to check the general tools used for disassembly in person and keep the records. Recoding and maintaining the name and information (including photos) of the disassembly method and disassembly tools for pre-separation parts and materials will be useful for future improvement evaluation.

■ Continuous improvement of the product

Product improvement is based on the comparative evaluation with the reference model (or existing model, target value) in accordance with the established control items, standard, and related procedure, and the improvement items shall be investigated and reflected to the design through benchmarking, documents, and design guide.

2.3.1 Design considering easy separation (3)

Evaluation item	Evaluation standard	Evaluation result
Joint type	Whether the design considers minimizing the type of joints to improve the degree of easy separation? * Mark for the corresponding joint	A. Bolt () B. Screw () C. Nut () D. Pin () E. Washer () F. Rivet () G. Snap fit () H. Pressure welding, soldering, welding () I. Natural inorganic adhesive () J. Synthetic inorganic adhesive () K. Miscellaneous ()

(1) Evaluation purpose




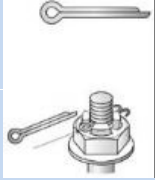

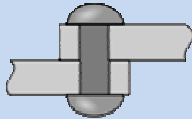
The purpose of this evaluation item is to evaluate the degree of easy disassembly as the 'Use of the general tools'. General joint assembly methods (example: screw, snap fit) are used in electrical and electronic equipment, but the methods differ for each manufacturer for the reliability standard and for the convenience of repair and maintenance. Using multiple types of joints in one product can be costly for manual disassembly, and sometimes pre-separation parts and materials cannot be separated if the joint type is difficult to disassemble. On the other hand, proper joint type can be disassembled easily.




But the trade-off (when conflicting each other) in changing joint type and improvement for the durability perspective must be fully considered in measuring and evaluating this item. Therefore, manufacturers should not make unreasonable changes in design to produce the better evaluation results, and the products shall be evaluated while the products fully meet the durability(reliability) requirements.

(2) Joint type

The joint types used in electrical and electronic equipment presented in the Assessment Method Standard are as followings¹⁾

1) Commonly used joint methods for electrical and electronic equipment are presented in the evaluation item, but there might be other types for the manual disassembly during the disposal stage.

#	Joint Name	Description	Picture
1	Bolt	Threaded cylinder shape rod with a head (hex, rectangle, cylinder, dish type) including through bolt, tap bolt, and stud bolt	
2	Screw	Grooves are made along the thread lines, and more than two components are fastened together. Male screw has the threads on the surface of the cylinder and the female screw has the threads on the inner surface. Screws are divided into right screw or left screw depending on the direction of fastening. (General screws are right screws)	
3	Nut	Female screws to mount the mechanical parts to be fastened to the bolt, male screw. (hex, rectangle, octagon, butterfly but, etc) including hex nut, cap nut, butterfly nut, ring but, etc.	
4	Pin	Joint with a pint through holes through the parts to assemble including taper pin, parallel pin, joint pin, and separating pin.	
5	Washer	Round and thin metal plate to be inserted between the bolt and nut to prevent the scratches or when the surface is not flat. Generally washers are metals like nuts including parallel washer, spring washer, toothed washer, etc.	
6	Rivet	Rod shape element for permanent joint made of steel plate or section steel including round head type, dish head type, and flat head type depending on the shape of the head	

#	Joint Name	Description	Picture
7	Snap fit	Parts can be assembled without additional components or joint elements, and it can be made in various shapes depending on the purpose of the joints	
8	Pressure welding, soldering, and welding	Method of putting two solid materials together by applying heat and pressure between the same type or different type of metals as the states of the metal (solid, liquid) in joint might be different depending on the application of the pressure, including arc welding and gas welding.	
9	Glue (natural, synthetic)	Materials to put two object together, usually polymer that is liquid in initial phase and turns to solid when applied between tow objects.	
10	Miscellaneous	There are other various joint methods including ultrasonic fusion, tape, special screws (polygon – star), slide, and etc.	

(3) Items to consider before evaluation

Joint type inside the product is an important environmental factor in reducing the potential environmental effects for degree of easy separation of pre-separation parts and materials along with the usage of general tools. Especially the joint types that workers cannot easily remove the parts that contain the environmental burden substances and that require dismantling during disassembly may cause unnecessary environmental pollution and safety accident.

One thing to note while checking the joint type requirements is that the assembly method is not necessary same as the disassembly method.¹⁾

1) Sometimes manual disassembly is difficult if many snap fits are used inside the parts.

The following contents are items to consider before the evaluation to improve the evaluation item.

■ Information of joint type inside the product

Evaluators need to clarify the relationship between the joint part and joint method of the pre-separation parts and materials according to the disassembly sequence of the products to check this requirement, and it is recommended to keep the record from the view points of disassembly not the joint parts for the joints used in the actual product disassembly. Maintaining the list of pre-separation parts and materials, the record on the disassembly method, and name and information of joint type (example: photos) will be useful for the future improvement evaluation.

■ Continuous improvement of the product

Product improvement is based on the comparative evaluation with the reference model (or existing model, target value) in accordance with the established control items, standard, and related procedure, and the improvement items shall be investigated and reflected to the design through benchmarking, documents, and design guide.

2.3.2 Designs considering Material Recycling (1)

Evaluation item	Evaluation standard	Evaluation result
Number of material type	How many types of plastics are used for the plastic housing with the weight over 25g. (In case of mobile phones, plastic housing with the weight over 5g shall be considered)	() types

(1) Evaluation purpose

The use of the plastic material for electrical and electronic equipment has been increasing sharply as it has superior economic efficiency and productivity compared to metals. Many new plastic materials has been developed and applied to the products by supplementing the characteristics of the existing plastics to meet the various requirements of the customers and product types, and the number of types is getting increased.

But the increases in the type and usage of the plastics can drop the efficiency of the separation works for each plastic material even with the sufficient information exchange with the recycling centers.

The purpose of this evaluation item is to lead to the selection of materials from the design stage that are helpful in recycling stage such as reducing the number of plastic type inside the individual product from this view point, securing the compatibility between materials when using multiple plastic materials, and reducing the number of multiple materials that have similar physical properties(specific gravity) for easy separation of plastics.

(2) Compatibility of the plastic materials

The compatibility of the plastic material is the degree of interfusion due to the difference of surface tension and physical properties of plastics when making plastic products with the target physical properties by mixing the recycles resins with similar properties in proper ratio.

Therefore it is required to separate the plastics with similar properties only or exclude the plastics with low compatibility in addition to reducing the number of plastic material types in order to recycle the plastic materials of multiple types with different physical properties.

In order to achieve the purpose of this evaluation item, it is desirable to consider the product structure design that each plastic material can be isolated separately when multiple types are used or that minimizes the number of plastic material types used in the parts.

		Excess component																		
		ABS	ASA	PA	PBT	PBT+PC	PC	PC+ABS	PC+PBT	PE	PET	PMMA	POM	PP	PPO	PPE+PS	PS	PVC	SAN	TPU
Mixture component	ABS	+	+	@	+	+	+	+	+	@	@	+	@	@	@	@	@	+	+	+
	ASA	+	+	@	+	+	+	+	+	@	@	+	@	@	@	@	@	+	+	+
	PA	@	@	+	@	@				@	@	@	@	@		@	@		@	+
	PBT	+	+	@	+	+	+	+	+	@	@	@	@	@	@	@	@		+	@
	PBT+PC	+	+	@	+	+	+	+	+	@	@	@		@	@	@	@		+	+
	PC	+	+		+	+	+	+	+	@	+	+		@	@	@	@		+	@
	PC+ABS	+	+	@	+	+	+	+	+	@	+	+	@	@	@	@	@		+	+
	PC+PBT	+	+		+	+	+	+	+	@	+	+	@	@	@	@	@		+	+
	PE			@			@			+				+		@		@		@
	PET	+	+	@	+	+	+	+	+	@	+	@	@	@	@	@	@	@	@	@
	PMMA	+	+	@			+	+	+	@	@	+	@	@	@	@	@	@	@	@
	POM	@	@	@	@	@				@	@		+	@	@	@	@	@	@	@
	PP			@						@				+		@		@		@
	PPE	@	@	@	@	@	@	@	@	@	@	@	@	@	+	+	+		@	@
	PPE+PS	@	@	+	@	@	@	@	@	@	@	@	@	@	+	+	+		@	@
	PS	@	@	@	@	@	@	@	@	@	@	@	@	@	@	+	+	@	@	@
	PVC	+	+							@		+	+	@		@	@	+	+	+
	SAN	+	+	@	+	+	+	+	+	@	@	+	@	@	@	@	@	+	+	@
	TPU	+	+	+		+	+	+	+	@	+	+	+	@	@	@	@	+	+	+

- + Good compatibility in wide range of mixtures
- @ Limited compatibility for the small excess components
- Inappropriate

【 Compatibility of heat plasticity resin plastic 】 ¹⁾

(3) Physical properties of plastic materials

For recycling of the plastic, shredding and cutting are carried out during the material selection process, and various methods including magnetic force (separating with ferrous metals), wind power, specific gravity, and vibration are used to isolate the shredded plastic particles, and the difference of specific gravities between the products is most commonly used for the separation.

1) Electrical and Electronic Equipment Material and Structure Assessment Method Group Standard Annex IV, ECMA 341 Annex C

Plastic and metal can be almost perfectly separated as they have quite different specific gravities, but it is impossible to isolate different type of plastic materials when the specific gravities are not much different. Theoretically, they can be separated as each plastic materials has its unique specific gravity, but it is very difficult to get the accurate specific gravity because the plastic parts used in electrical and electronic products contains may additives. (Example: The specific gravity of PP is 0.91, but it can be changed up to 1.50 depending on the use).

It is impossible for recyclers to check the physical properties of waste plastics. Therefore, it is desirable for product designers to understand the characteristics of the recycling process, check the physical properties while selecting the plastic material, and apply it to the design.

Material	Specific Gravity (g/cm ³)	2. Separable 1. Partially separable 0. Inseparable																	
		ABS	PA	PBT	PC	PC+ABS	PC+PBT	PE	PEI	PET	PMMA	POM	PP	PPE+PS	PPE+PA	PPS	PS	PVC	TEEE
ABS	1.06																		
PA	1.13	2																	
PBT	1.30	2	2																
PC	1.20	2	2	2															
PC+ABS	1.15	1	0	2	1														
PC+PBT	1.22	2	2	2	0	1													
PE	0.95	2	2	2	2	2	2												
PEI	1.30	2	2	0	2	2	2	2											
PET	1.34	2	2	0	2	2	2	2	0										
PMMA	1.18	2	0	2	0	0	0	2	2	2									
POM	1.41	2	2	2	2	2	2	2	2	1	2								
PP	0.90	2	2	2	2	2	2	1	2	2	2	2							
PPE+PS	1.06	0	2	2	2	2	2	2	2	2	2	2	2						
PPE+PA	1.10	0	0	2	2	1	2	2	2	2	2	2	2	0					
PPS	1.35	2	2	0	2	2	2	2	0	0	2	1	2	2	2				
PS	1.05	0	2	2	2	2	2	2	2	2	2	2	2	0	0	2			
PVC	1.40	2	2	2	2	2	2	2	2	1	2	0	2	2	2	1	2		
TEEE	1.20	2	2	2	0	1	0	2	2	2	0	2	2	2	2	2	2	2	2

【 Source : Ford, Worldwide Design Standard ¹⁾ 】

1) The difference of the specific gravity between different plastic materials must be over 0.04 in case of “Hydro-separation process”. But the standard of difference in specific gravity for each material type can be different depending on the structure of the recycling system.

(3) Items to consider before evaluation

Comparing electrical and electronic equipment with other product families, products with more complicated structure and bigger size use more varieties of plastic materials, and it is not an easy task to unify or reduce the number of plastic material types due to the reasons of functions, use, and safety of the product.

And it is impossible to separate all plastic materials used in the product during single material separation process for recycling plastic materials. Therefore, it is desirable to make efforts to unify the material and to put markings of plastic materials as minimum.

The followings are items to consider before evaluation to improve the evaluation items.

■ Check the information of plastic parts in the product

Evaluators must understand the plastic materials used in the product firstly in order to unify the plastic materials. Items to manage include weight information for each plastic part and material, and it is desirable to manage the usage information for the substances added to the plastic in addition to the weight to grasp the environmental effects.

■ Continuous product improvement

It is desirable to conduct comparative evaluation with the reference model (or existing model, target value) in accordance with the established control items, standard, and related procedure for product improvement and the additional items to consider for improving this evaluation item is to check the characteristics of the plastic parts and materials.

As unifying the material is not easy due to the reasons other than environmental effects such as design, quality, and durability of electrical and electronic products, works compatibility and physical properties between the different type of plastic materials must be fully considered in order to make the resource recycling process easier during the disposal stage if the different types of materials have to be used, and separate management of the information on compatibility between different type of plastic materials and specific gravities is required for improvement.

2.3.2 Designs considering Material Recycling (2)

Evaluation item	Evaluation standard	Evaluation result
Use of labels and stickers	Can labels and stickers using different materials attached on the product be easily removed? (The labels and stickers to be considered seriously for the safety, danger, and usage of the users shall be excluded.)	Yes / No Or Not applicable

(1) Evaluation purpose

Labels and stickers for electrical and electronic products are usually attached to the exterior of the product and housing of the parts, and they are used to show the product characteristics information, usage information, and legally mandatory items. However, they lower the value of economic value of the recycled products or make the recycling difficult as they become foreign substances during the recycling process.

For this reason, examples for ecodesign by companies and environment label standard executed by few countries require using labels and stickers made of same material as the plastic materials that labels are attached to, or separation of the label and stickers to increase the recycling rate of the plastic materials.

The purpose of this evaluation item is to review the various environmentally friendly application example on using labels and stickers for manufacturers about the labels and stickers used in electrical and electronic products, to choose the most reasonable methods to increase the recycling rate of the products, and to provide a means of increasing the recycling rate of the plastic materials.

(2) Separability of the labels and stickers

“Separability of the labels and stickers” in this evaluation standard has at least the following meanings.

1. Same material as the product housing
2. If not the same material, then the compatibility and the housing material is at least +, @¹⁾
3. Labels and stickers are replaced by injection molding or mechanical engraving
4. And they can be completely removed from the product housing as followings

1) Refer to page 36 – Compatibility of heat plasticity plastic

- ① Glue is not use. (Labels or stickers are inserted.)
- ② Glue is used, but they are designed to be easily removable.
- ③ Glue is used, and they are strongly attached so that they can be removed by tools such as putty knife
- ④ Labels and stickers can be removed by other methods. (Detailed description to be included)

However, mandatory markings required for safety of the users, harmful substances, and other regulatory and certificate system and other labels and stickers for recommendations required for product users and recyclers such as environmentally friendly use and disposal shall be excluded.

(3) Items to consider before evaluation

Separability of the labels and stickers can increase the yield and quality of the raw materials in recycling single material plastic and additional process steps required for separation and removal of the labels and stickers can be reduced. Therefore, it is required to select the method of easy separation of materials to avoid the steps of separation of labels and stickers attached to the product housing.

The followings are items to consider before evaluation to improve the evaluation item.

■ Check the usage information of the product housing and labels and stickers

The most efficient way for the separability of the labels and stickers would be using the same materials or considering the compatibility between the materials. Therefore, it is required to check the material of labels and stickers and understanding material information of labels and stickers, and compatibility of the material.

■ Check the separability of labels and stickers

When the same material cannot be used, consider a method to remove them easily. As the objective standard cannot be established since the removal process depends on the level of skills and used tools, it is desirable for evaluators to manage the separation and removal method (name of required tools) and attachment method of labels and stickers (whether glue is used, type and adhesive force of glue) in advance.

And also as suggested in this evaluation item, labels and stickers that should be considered seriously for the safety, danger, and usage of the users shall be classified separately before the improvement evaluation due to the reasons that they should not be easily removed.

■ Continuous improvement of the product

Product improvement is based on the comparative evaluation with the reference model (or existing model, target value) in accordance with the established control items, standard, and related procedure, and the improvement items shall be and reflected to the design through benchmarking, documents, and design guide.

2.3.2 Designs considering Material Recycling (3)

Evaluation item	Evaluation standard	Evaluation result
Plastic material marking	Plastic material used in the product (weight over 25g and the area of the flat surface is bigger than 200 mm ²) shall be marked in accordance with ISO KS M 11469. (Abbreviations for the markings of the plastic material shall follow the ISO1043-1~4. And the reference weight of material marking for mobile phones shall be over 5g.) (When the marking causes the problems in design or functions, then it is excluded.)	Yes / No

(1) Evaluation purpose

Plastic materials used in electrical and electronic equipment are increasing every year and the importance of the recyclability of the plastic materials is being emphasized during the disposal stage. The most important factor in recycling plastic material is to meet the reliability and quality of the products with the purpose of recycling. For this reason, manual disassembly and separation by the type of materials during the separation stage of the waste plastics is important, and the efficient method for this purpose is to mark the material type on the plastic parts.

Currently most of the products have proper marking as there is higher recognition on the importance of the markings for more efficient recycling and also through the legal requirements from domestic Resource Recycling Law, but still large number of plastic materials don't have proper markings so that they are disposed rather than separated for recycling. Therefore material marking is absolutely necessary to improve the efficiency of the recycling works and reliability of material separation.

Law	<p>Article 12 (Provision of Recycling information and improvement suggestions on materials and structure, etc.)</p> <p>The recycling information has to be provided within the range determined by the Presidential decree that may not uncover the trade secrets such as leaking core technology when the information on the configuration of materials or recycling method (hereinafter referred to as 'recycling information') is requested in order to promote the recycling of waste electrical and electronic equipments and automobiles.</p>
Enforcement ordinance	<p>Article 13 (Recycling information provision)</p> <p>The recycling information provided in accordance with the point, 2 shall include the following items.</p> <p>Composition of materials of synthetic polymer compounds (Synthetic resin parts over 25g in case of electrical and electronic equipments, and synthetic resin parts over 100g or synthetic rubber parts over 200g are excluded if the markings are on the parts)...</p>

【 Legal requirements from domestic Resource Recycling Law 】

(2) Target for Material marking

Plastic parts that have to be marked include plastic parts with the weight over 25g and with the area of flat surface over 200mm². Parts that cannot be manually disassembled such as electronic parts, electrical components, and other parts can be excluded from the evaluation.¹⁾

However, when there are almost no parts that meet this condition such as the plastic parts in mobile phones, materials with the weight over 5g shall be marked.

(3) Exempt case for material markings

Plastic parts except the following exceptions listed below shall be marked with the material type for this evaluation item.

- ① Parts without the space for marking (less than 25g, flat surface less than 200mm²)
- ② When markings cannot be done on the exterior (example : transparent plastic)
- ③ When there is a concern of damaging the product due to the marking
- ④ When the marking is difficult due to the manufacturing process (example : Pressure injection)
- ⑤ And other cases fro difficult marking (example : parts reuse)

(4) Material marking method

(A) Material marking method

Use the symbols and abbreviations given in KS M ISO 1043-1, KS M ISO 1043-2, KS M ISO 1043-3, and KS M ISO 1043-4, and put them between the marking symbols ">" and "<" so that they can be easily recognized in accordance with the "KS M ISO 11469; Plastics-Generic identification and marking of plastics products", and then mark the information by attachment, molding, engraving, and embossing.²⁾

① Single composition product

Plastic materials made of single polymer and co-polymer shall be marked as followings.

Example: >ABS<, >PC<

1) It is desirable to execute the item without exceptions for the importance of the material marking and in order to promote the recycling.

2) Material markings shall be made with proper symbols included in the mold design through embossed work, fusion engraving, or other easily readable non-erasable method.

② Polymer blend or alloy

– Marking sequence: synthetic resin code + synthetic resin code

Write the most important element first, and other elements in order of the mass using one or more “+” symbol.

Example : >PC+ABS<

③ Plasticizers

– Marking sequence: synthetic resin code–P(Plasticizers)

Example: PVC including Dibutyl phthalate plasticizers : >PVC–P(DBP)<

④ Flame Retardants

– Marking sequence: synthetic resin code–FR(flame retardant code number)

Example: 15% of Mineral Powder, 25% of Glass Fiber, and flame retardant red phosphorus(52) are used with Polyamide 66

: >PA66–(GF25+MD15)FR(52)< or >PA66–(GF+MD)40FR(52)<

⑤ When the part is composed of more than two materials that cannot be easily separated.

– Marking sequence: Visible material, configuring material, and major material with underline (based on the mass)

Example: ABS parts (based on the mass) over the polyurethane coated with PVC

: >PVC,PUR,ABS<

(5) Marking location

There are no specific requirements, regulations, or standard on the material marking locations and attached location, but it is desirable to put the markings where they can be easily identified.

The followings are examples of the marking locations.¹⁾

Marking material	Description	Note
Back cover plastic parts	Outer side is preferred than inner side for marking location	Markings can be inside considering the limitation of the design in case of back cover
Bottom surface and internal plastic parts	Markings shall be on the outside	There should be no limitation in design
Front and top cover plastic parts	Markings shall be on the inside	Limitation on design can be considered

1) Japan – JIS C 9912:2007, Identification and marking standard for plastic parts in electrical and electronic equipment

(3) Items to consider before evaluation

Few important factors to consider in plastic material marking are accurate matching between the material and the corresponding information, ability to check the additional information, identification of the material marking, and accessibility. These factors make the recycling process (especially selection process) of the plastic material easily, and it will improve the value and reliability of the recycled material.

The followings are items to consider before evaluation to improve the evaluation item.

■ Check the plastic parts inside the product

The information on plastic parts and materials used in the product is the most basic data to check the execution of this evaluation item, and it is required to manage the record on used plastic parts, name of the materials, weight (weight for each plastic material), and existence of the material markings. Additionally, evaluators can consider to identify the usage of the additives (flame retardant, plasticity, recycling material, and other additives) added to the plastic materials as a means of managing the quality, reliability, and hazard control of the recycled plastic¹⁾.

It is required to identify the reasons if there is no plastic material marking or if it is not necessary.

■ Check plastic parts material marking

Material markings have to be checked in person whether they can be identified with bare eyes. And the evaluators can consider establishing and managing additional standard for identifying the markings if necessary as a means of easier separation of plastic materials even when they are marked already. (For example: plastic material marking method – size, height, width, engraving position of the fonts, etc.)

■ Continuous improvement of the product

Product improvement is based on the comparative evaluation with the reference model (or existing model, target value) in accordance with the established control items, standard, and related procedure, and the improvement items shall be investigated and reflected to the design through benchmarking, documents, and design guide.

1) Japan – JIS C 9912:2007, Refer to the standard on Identification and markings for plastic parts in electrical and electronic equipment
Korea – KS Q ISO 14021:2006, Environmental Markings and Declaration – Refer to the standard on environmental self declaration

• Symbols of Synthetic Resin¹⁾

Symbol	Material
AB	Acrylonitrile-butadiene
ABAK	Acrylonitrile-butadiene-acrylate (ABA)
ABS	Acrylonitrile-butadiene-styrene
ACS	Acrylonitrile-butadiene-styrene (ACPES)
AEPDS	Acrylonitrile-chlorinated polyethylene-styrene (ACPES)
AMMA	Acrylonitrile-methyl methacrylate
ASA	Acrylonitrile-styrene-acrylate
CA	Cellulose acetate
CAB	Cellulose acetate butyrate
CAP	Cellulose acetate propionate
CEF	Cellulose formaldehyde
CF	Cresol-formaldehyde
CMC	Carboxymethyl cellulose
CN	Cellulose nitrate
COC	Cycloolefin copolymer
CP	Cellulose propionate
CTA	Cellulose triacetate
EAA	Ethylene-acrylic acid
EBAK	Ethylene-butyl acrylate (EBA)
EC	Ethyl cellulose
EEAK	Ethylene-ethyl acrylate (EEA)
EMA	Ethylene-methacrylic acid
EP	Epoxyde ; epoxy resin
E/P	Ethylene-propylene (EPM)
ETFE	Ethylene-tetrafluoroethylene
EVAC	Ethylene-vinyl acetate (EVA)
EVOH	Ethylene-vinyl alcohol
FEP	Perfluoro(ethylene-propylene) (PFEP)
FF	Furan-formaldehyde
LCP	Liquid-crystal polymer

1) Source : KS M ISO1043 1~4 (Page 46~58)

• Symbols of Synthetic Resin (Continued)

MABS	Methyl methacrylate-acrylonitrile-butadiene-styrene
MBS	Methyl methacrylate-butadiene-styrene
MC	Methyl cellulose
MF	Melamine-formaldehyde
MP	Melamine-phenol
MSAN	α-methylstyrene-acrylonitrile
PA	Polyamide
PAA	Poly(acrylic acid)
PAEK	Polyacryletherketone
PAI	Polyamidimide
PAK	Polyacrylate
PAN	Polyacrylonitrile
PAR	Polyarylate
PARA	Poly(aryl amide)
PB	Polybutene
PBAK	Poly(butyl acrylate)
PBD	1,2-polybutadiene
PBN	Poly(butylene naphthalate)
PBT	Poly(butylene terephthalate)
PC	Polycarbonate
PCCE	Poly(cyclohexylene dimethylene cyclohexanedicarboxylate)
PCL	Polycaprolactone
PCT	Poly(cyclohexylene dimethylene terephthalate)
PCTFE	Polychlorotrifluoroethylene
PDAP	Poly(dially phthalate)
PDCPD	Polydicyclopentadiene
PE	Polyethylene
PE-C	Polyethylene, chlorinated (CPE)
PE-HD	Polyethylene, high density (HDPE)
PE-LD	Polyethylene, low density (LDPE)
PE-LLD	Polyethylene, linear low density (LLDPE)
PE-MD	Polyethylene, medium density (MDPE)

• Symbols of Synthetic Resin (Continued)

PE-UHMW	Polyethylene, ultra high molecular weight (UHMWPE)
PE-VLD	Polyethylene, very low density (VLDPE)
PEC	Polyestercarbonate
PEEK	Polyetheretherketone
PEEST	Polyetherester
PEI	Polyetherimide
PEK	Polyetherketone
PEN	Poly(ethylene naphthalate)
PEOX	Poly(ethylene oxide)
PESTUR	Polyesterurethane
PESU	Polyethersulfone
PET	Poly(ethylene terephthalate)
PEUR	Polyetherurethane
PF	Phenol-formaldehyde
PFA	Perfluoro alkoxy alkane
PI	Polyimide
PIB	Polyisobutylene
PIR	Polyisocyanurate
PK	Polyketone
PMI	Polymethacrylimide
PMMA	Poly(methyl methacrylate)
PMMI	Poly-N-methylmethacrylimide
PMP	Poly-4-methylpent-1-ene
PMS	Poly-α-methylstyrene
POM	Polyoxymethylene; polyacetal ; polyformaldehyde
PP	Polypropylene
PP-E	Polypropylene, expandable (EPP)
PP-HI	Polypropylene, high density (HIPP)
PPE	Poly(phenylene ether)
PPOX	Poly(propylene oxide)
PPS	Poly(phenylene sulfide)
PPSU	Poly(phenylene sulfone)

• Symbols of Synthetic Resin (Continued)

PS	Polystyrene
PS-E	Polystyrene, expandable (EPS)
PS-HI	Polystyrene, high impact (HIPS)
PSU	Polysulfone
PTFE	Polytetrafluoroethylen
PTT	Poly(trimethylene terephthalate)
PUR	Polyurethane
PVAC	Poly(vinyl acetate)
PVAL	Poly(vinyl alcohol) (PVOH)
PVB	Poly(vinyl butyral)
PVC	Poly(vinyl chloride)
PVC-C	Poly(vinyl chloride), chlorinated (CPVC)
PVC-U	Poly(vinyl chloride), unplasticized (UPVC)
PVDC	Poly(vinylidene chloride)
PVDF	Poly(vinylidene fluoride)
PVF	Poly(vinyl fluoride)
PVFM	Poly(vinyl formal)
PVK	Poly-N-vinylcarbazole
PVP	Poly-N-vinylpyrrolidone
SAN	Styrene-acrylonitrile
SB	Styrene-butadiene
SI	Silicone
SMAH	Styrene-maleic anhydride (S/MA, SMA)
SMS	Styrene-α-methylstyrene
UF	Urea-formaldehyde
UP	Unsaturated polyester
VCE	Vinyl chloride-ethylene
VCEMAK	Vinyl chloride-ethylene-acrylate (VCEMA)
VCEVAC	Vinyl chloride-ethylene-vinyl acetate
VCKMAK	Vinyl chloride-methyl acrylate (VCKMA)
VCMMA	Vinyl chloride-methyl methacrylate
VCOAK	Vinyl chloride-octyl acrylate (VCOA)
VCVAC	Vinyl chloride-vinyl acetate
VCVDC	Vinyl chloride-vinylidene chloride
VE	Vinyl ester

• Symbols of Filler Material and Reinforcing Material

Symbol	Material	Symbol	Structure
B	Boron	B	Beads, spheres, balls
C	Carbon	C	Chips, cuttings
D	Alumina trihydrate	D	Fines, powder
E	Clay	F	Fibre
G	Glass	G	Ground
K	Calcium carbonate	H	Whisker
L	Cellulose	K	Knitted fabric
M	Mineral, metal	L	Layer
N	Natural organic (cotton, sisal, hemp, flax 등)	M	Mat (thick)
P	Mica	N	Non-woven (fabric, thin)
Q	Silica	P	Paper
R	Aramid	R	Roving
S	Synthetic organic	S	Flake
T	Talcum	T	Twisted or braided fabric, cord
W	Wood	V	Veneer
X	Not specified	W	Woven fabric
Z	Others not included in this list	X	Not specified
		Y	Yarn
		Z	Others not included in this list

• Symbols of Plasticizers

Symbol	Material	IUPAC	CAS no.
ASE	Alkylsulfonic acid ester	Alkanesulfonates or alkyl alkanesulfonates	Not known
BAR	Butyl o-acetylricinoleate	Butyl (R)-12-acetoxystearate	140-04-5
BBP	Benzyl butyl phthalate	Same	85-68-7
BCHP	Butyl cyclohexyl phthalate	Same	84-64-0
BNP	Butyl nonyl phthalate	Same	Not known
BOA	Butyl octyl adipate	Benzyl 2-ethylhexyl adipate	3089-55-2
BOP	Butyl octyl phthalate	Butyl 2-ethylhexyl phthalate	85-69-8
BST	Butyl stearate	Same	123-95-5
DBA	Dibutyl adipate	Same	105-99-7
DBEP	Di-(2-butoxyethyl) phthalate	Bis (2-butoxyethyl) phthalate	117-83-9
DBF	Dibutyl fumarate	Same	105-75-9
DBM	Dibutyl maleate	Same	105-76-0
DBP	Dibutyl phthalate	Same	84-74-2
DBS	Dibutyl sebacate	Same	109-43-3
DEZ	Dibutyl azelate	Same	2917-73-9
DCHP	Dicyclohexyl phthalate	Same	84-61-7
DCP	Dicapryl phthalate	Bis (1-methylheptyl) phthalate	131-15-7
DDP	Didecyl phthalate	Same	84-77-5
DEGDB	Diethylene glycol dibenzoate	Oxydiethylene dibenzoate	120-55-8
DEP	Diethyl phthalate	Same	84-66-2
DHP	Diheptyl phthalate	Same	3648-21-3
DHXP	Dihexyl phthalate	Same	84-75-3
DIBA	Diisobutyl adipate	Same	141-04-8
DIBM	Diisobutyl maleate	Same	14234-82-3

• Symbols of Plasticizers (Continued)

Symbol	Material	IUPAC	CAS no.
DIDA	Diisodecyl adipate		27178-16-1
DIDP	Diisodecyl phthalate		26761-40-0
DIHP	Diisoheptyl phthalate		41451-28-9
DIHXP	Diisoheptyl phthalate	Same	71850-09-4
DINA	Diisononyl adipate		33703-08-1
DINP	Diisononyl phthalate		28553-12-0
DIOA	Diisooctyl adipate		1330-86-5
DIOM	Diisooctyl maleate		130-76-3
DIOP	Diisooctyl phthalate		27554-26-3
DIOS	Diisooctyl sebacate		27214-90-0
DIOZ	Diisooctyl azelate		26544-17-2
DIPP	Diisopentyl phthalate	Same	605-50-5
DMEP	di-(2-methyloxyethyl) phthalate	Bis(2-methoxyethyl) phthalate	117-82-8
DMP	Dimethyl phthalate	Same	131-11-3
DMS	Dimethyl sebacate	Same	106-79-6
DNF	Dinonyl fumarate	Same	2787-63-5
DNM	Dinonyl maleate	Same	2787-64-6
DNOP	Di-n-octyl phthalate	Diocetyl phthalate	117-84-0
DNP	Dinonyl phthalate	Same	14103-61-8
DNS	Dinonyl sebacate	Same	4121-16-8
DOA	Diocetyl adipate	Bis(2-ethylhexyl) adipate	103-23-1
DOIP	Diocetyl isophthalate	Bis(2-ethylhexyl) isophthalate	137-89-3
DOP	Diocetyl phthalate	Bis(2-ethylhexyl) phthalate	117-81-7
DOS	Diocetyl sebacate	Bis(2-ethylhexyl) sebacate	122-62-3

• Symbols of Plasticizers (Continued)

Symbol	Material	IUPAC	CAS no.
DOTP	Diethyl terephthalate	Bis(2-ethylhexyl) terephthalate	6422-86-2
DOZ	Diethyl azelate	Bis(2-ethylhexyl) azelate	2064-80-4
DPCF	Diphenyl cresyl phosphate	Diphenyl x-tolyl orthophosphate	26444-49-5
DPGDB	Di-x-propylene glycol dibenzoate	Not possible	Not known
DPOF	Diphenyl octyl phosphate	2-ethylhexyl diphenyl orthophosphate or octyl diphenyl orthophosphate	1241-97-7
DPP	Diphenyl phthalate	Same	84-62-8
DTDP	Diisotridecyl phthalate		27253-26-5
DUP	Diundecyl phthalate	Same	3648-20-2
ELO	Epoxidized linseed oil	Not possible	8016-11-3
ESO	Epoxidized soya been oil	Not possible	8013-07-8
GTA	Glycerol triacetate	Same	102-76-1
HNUA	Heptyl nonyl undecyl adipate	Not possible	Not known
HNUP	Heptyl nonyl undecyl phthalate	Not possible	68515-42-4
HXODA	Hexyl octyl decyl adipate	Not possible	Not known
HXODP	Hexyl octyl decyl phthalate	Not possible	68515-51-5
NUA	Nonyl undecyl adipate	Not possible	Not known
NUP	Nonyl undecyl phthalate	Not possible	Not known
ODA	Octyl decyl adipate	Decyl octyl adipate	110-29-2
ODP	Octyl decyl phthalate	Decyl octyl phthalate	68515-52-6
ODTM	n-octyl decyl trimellitate	Decyl octyl hydrogen benzene-1,2,4-tricarboxylate	Not known
PO	Paraffin oil	Not possible	8012-95-1
PPA	Poly(propylene adipate)	Same	Not known
PPS	Poly(propylene sebacate)	Not possible	Not known

• Symbols of Plasticizers (Continued)

Symbol	Material	IUPAC	CAS no.
SOA	Sucrose octa-acetate	Sucrose octaacetate	126-14-7
TBAC	Tributyl o-acetylcitrate	Same	7-90-7
TBEP	Tri-(2-butoxyethyl) phosphate	Tris(2-butoxyethyl) orthophosphate	78-51-3
TBP	Tributyl phosphate	Tributyl orthophosphate	126-73-8
TCEF	Trichloroethyl phosphate	Tris(2-chloroethyl) orthophosphate	6145-73-9
TCF	Tricresyl phosphate	Tri-x-tolyl orthophosphate	1330-78-5
TDBPP	Tri-(2,3-dibromopropyl) phosphate	Tris(2,3-dibromopropyl) orthophosphate	126-72-7
TDCPP	Tri-(2,3-dichloropropyl) phosphate	Tris(2,3-dichloropropyl) orthophosphate	78-43-3
TEAC	Triethyl o-acetylcitrate	Same	7-89-4
THFO	Tetrahydrofurfuryl oleate	Same	5420-17-7
THTM	Triheptyl trimellitate	Triheptyl benzene-1,2,4-tricarboxylate	1528-48-9
TIOTM	Trisooctyl trimellitate	Tris(6-methylheptyl) benzene-1,2,4-tricarboxylate	27251-75-8
TOF	Trioctyl phosphate	Tris(2-ethylhexyl) orthophosphate	78-42-2
TOPM	Tetraoctyl pyromellitate	Tetrakis(2-ethylhexyl) benzene-1,2,4,5-tetracarboxylate	3126-80-5
TOTM	Trioctyl trimellitate	Tris(2-ethylhexyl) benzene-1,2,4-tricarboxylate	89-04-3
TPP	Triphenyl phosphate	Triphenyl orthophosphate	115-86-6
TXF	Trixylyl phosphate	Tri-x,y-xylyl orthophosphate	25155-23-1

- Flame Retardant Code Number
 - Use the upper case “FR”
 - Use the code number in the form of FR[code number]

<Halogenated compounds>

code	Material
10	Aliphatic/alicyclic chlorinated compounds
11	Aliphatic/alicyclic chlorinated compounds in combination with antimony compounds
12	Aromatic chlorinated compounds
13	Aromatic chlorinated compounds in combination with antimony compounds
14	Aliphatic/alicyclic brominated compounds
15	Aliphatic/alicyclic brominated in combination with antimony compounds
16	Aromatic brominated compounds (excluding brominated diphenyl ether and biphenyls)
17	Aromatic brominated compounds (excluding brominated diphenyl ether and biphenyls) in combination with antimony compounds
18	Polybrominated diphenyl ether
19	Polybrominated diphenyl ether in combination with antimony compounds
20	Polybrominated biphenyls
21	Polybrominated biphenyls in combination with antimony compounds
22	Aliphatic/alicyclic chlorinated and brominated compounds
23, 24	Not allocated
25	Aliphatic fluorinated compounds
26 to 29	Not allocated

<Nitrogen compounds>

code	Material
30	Nitrogen compounds (confined to melamine, melamine cyanurate, urea)
31 to 39	Not allocated

<Organic phosphorus compounds>

code	Material
40	Halogen-free organic phosphorus compounds
41	Chlorinated organic phosphorus compounds
42	Brominated organic phosphorus compounds
43 to 49	Not allocated

<Inorganic phosphorus compounds>

code	Material
50	Ammonium orthophosphate
51	Ammonium polyphosphate
52	Red phosphorus
53 to 59	Not allocated

< Metal oxides, metal hydroxides, metal salts >

code	Material
60	Aluminium hydroxide
61	Magnesium hydroxide
62	Antimony(III) oxide
63	Alkali-metal antimonate
64	Magnesium/calcium carbonate hydrate
65 to 69	Not allocated

< Boron and zinc compounds >

code	Material
70	Inorganic boron compounds
71	Organic boron compounds
72	Zinc borate
73	Organic zinc compounds
74	Not allocated

< Silica compounds >

code	Material
75	Inorganic silica compounds
76	Organic silica compounds
77 to 79	Not allocated

* Miscellaneous – 80 : Graphite, 81 to 99 : Not allocated

- Method of marking special characteristics of the plastic material
 - Up to four symbols can be used, and do not use the following symbols in front of plastic symbols.
 - Separate the plastic symbol and the symbol for showing the characteristics with the hyphen (-) without any space before and after the hyphen.

Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
A	Acid (modified)	H	Homo	S	Saturated
A	Amorphous, atactic	I	Impact	S	Sulfonated
B	Biaxial	L	Linear	S	Syndiotactic
B	Block	L	Low	S	Thermosetting
B	Brominated	M	Medium	T	Temperature
C	Chlorinated	M	Molecular	T	Toughened
C	Crystalline, isotactic	N	Normal	U	Ultra
D	Density	N	Novolak	U	Unplasticized
E	Elastomer	O	Oriented	U	Unsaturated
E	Expanded; expandable	P	Plasticized	V	Very
E	Epoxidised	P	Thermoplastic	W	Weight
F	Flexible	R	Raised	X	Crosslinked; crosslinkable
F	Fluorinated	R	Random	PVC-U	Poly(vinyl chloride), unplasticized (UPVC)
G	Glycol (modified)	R	Resol		
H	High	R	Rigid		

- ※ High-impact-modified polystyrene : PS-HI → Basic polymer : PS, High impact : HI
- ※ Linear low-density polyethylene : PE-LLD → Basic polymer : PE, Linear low density : LLD

2.3.2 Designs considering Material Recycling (4)

Evaluation item	Evaluation standard	Evaluation result
Use of recycled plastic	How much of recycled plastic (weight ratio) is used in the product to the total weight of the products? (Recycled materials used in the manufacturing process are excluded.)	() %
	Rate of use of recycled plastic (%) = $\frac{\text{Weight of recycled plastic}}{\text{Weight of all plastics used in the product}}$	

(1) Evaluation purpose

Using recycled plastic materials can reduce the environmental effects due to the disposal of the plastic material and recycle the resources. This is a positive effects in terms of recycling, but the trade off would be durability, safety, hazard, and other reliability of the products. The reality is that there is little recognition that using the recycled plastic is better than original plastic in terms of insufficient supply and economical efficiency and the recycled plastics used in electrical and electronic equipment are not as much as in other industries.

But the supply of the recycled plastic is increasing every year through the investment on the recycling technology and facility improvement, and the quality and performance are getting better to the level that there are no issues that concern the users compared to the original material. Therefore, the recycled plastic would bring a positive effect to environment, quality, and economical efficiency eventually with the changes in the recognition of manufacturers.

The purpose of this evaluation item is to make a contribution to build a resource recycling industrial structure across the electrical and electronic industries by promoting the use of recycled plastic materials for the producers while trying to grasp the status of the use of recycled plastic materials.

(2) Definition of recycled plastic material

Plastic materials are widely used for the products beyond the electrical and electronic equipment, and the recycled plastics are generated across the various industries through the entire life cycles of the products. But this evaluation item is not for entire range of usage of recycled plastic materials, and recycled or reused plastics in certain specific ranges are excluded from the range of recycled plastic materials.

Recycled plastics can be obtained through the following paths.¹⁾

① Post-consumer material

When the required purpose of the product is achieved or the product cannot be used anymore, it includes plastic materials generated by end users and materials collected through the distribution network, and they are applicable to the evaluation item.

a) Consumer goods

– Example : Personal goods

Film and container for packing

b) Durable goods

– Example : Household facilities

Electrical and Electronic Equipment

Automobiles

Construction materials, etc.

② Pre-Consumer material

Plastic materials scrapped during the manufacturing process are equivalent to Post-industrial Material, and they are not applicable for the evaluation.

a) Plastic materials from the manufacturers

– Example : Materials that do not meet the specification

b) Plastic processing companies

– Example : Purge material for processing²⁾ and scrap

Scrapped products, parts, and interim products³⁾

③ Miscellaneous

Industrial or commercial products with a part or entire part of the products made of plastics including the packing materials and containers are applied to this evaluation item.

1) Reference : Refer to KS M ISO 15270:2005, Plastics – Guidelines for recycling

2) Polymer material passing through the plastic processing equipments used for changing the color or grade of the polymer materials to other types, for changing the one type of polymer to other, or for cleaning equipments

3) Re-shredding material⁴⁾ that is reprocessed or generated during the process or materials that can be re-utilized during the process like scrap are not included in the pre-consumer material.

4) It has the shape of particles that can be moved freely when external force is applied, and this plastic material recovered in the form of shredded plate or grains is commonly used in the factory as the form of scrap generated during the plastic processing.

(3) Evaluation Method

The rate of use of the recycled plastic is calculated from the rate of usage of recycled plastic in the product base on the total usage of plastic, the results will be rounded off the numbers to the nearest thousandth. Packing materials, manual, and packing containers for protecting and moving the product are not included.¹⁾

When the total amount of plastic used in the product cannot be accurately measured, you can use the total weight of the product. In this case, you must specify the used calculation method or formula, or specify the symbol(Mp) at the end of the result.

① When based on the total amount of plastic used in the product

– Total weight of plastics used in the product : 5,200 g, Weight of recycled plastics : 10.2 g

Rate of use of recycled plastic = 0. 20% (Mpp) ※ Mpp : mass of plastic in product

② When based on amount of plastic over the total weight of the product

– Total weight of the product: 11,200g, Weight of the recycled plastic: 10.2g

Rate of use of recycled plastic = 0. 09% (Mp) ※ Mp : mass of product

If the plastic materials(resin) recycled and processed by the plastic recycling manufacturers was produced by mixing the waste plastic material and new material in certain fixed ratio, the weight of the new material shall be subtracted from the weight of the recycled plastic²⁾

(4) Items to consider before evaluation

One thing that can lead to misunderstanding in this evaluation item is whether the amount of plastics used in the products is calculated with the accurate data. Therefore, the objective and proving data on the usage of the recycled plastic must be managed separated.

The followings are items to consider before evaluation to improve the evaluation items

■ Check the usage of plastic and recycled plastics

1) It is desirable to separately submit the result of the rate of use of the recycled plastics for recycled parts and components beside the product in order to promote the use and distribution of the recycled plastics.

2) Since the recycled plastics produced by recyclers can contain the additives instead of using 100% waste materials.

It is desirable to manage the weight information of the plastics in parts and related components¹⁾ to check the usage of plastics in the product or total weight of the product in order to calculate the rate of use of the recycled plastics.

■ Check the recycled plastics

It is desirable to show the markings in the design specification or notes in the drawings as a means of checking the use of the recycled plastics.

In addition, you can present the purchase requisition of the corresponding components and materials, recycled part usage certificate from the corresponding supplier, and other miscellaneous quality test report of recycled plastics as a means of proving the use of recycled plastics.

■ Continuous product improvement

It is desirable to conduct the comparative evaluation with the reference model (or existing model, target values) in accordance with the internally established management items, standard, and related procedures first for the product improvement process of this evaluation item such as increasing the usage of recycled plastics and application to the product design for resource recycling.

Quality, durability, harmful substances, and other reliability of the recycled plastics for the given cost performance is close to the level of the new material, but there is lack of recognition of the users, and manufacturers require intensive tests and researches to secure the confidence on the recycled plastics through the internal quality level establishment and management about the recycled plastics.

1) It is desirable to separately submit the result of the rate of use of the recycled plastics for parts and components beside the product in order to promote the use and distribution of the recycled plastics.

2.3.2 Designs considering Material Recycling (5)

Evaluation item	Evaluation standard	Evaluation result
Use of recyclable plastics	Is PVC not used at all for all plastic parts over 25g? (PCM assembly and electric cables are excluded)	Yes / No

(1) Evaluation purpose

PVC is thermally processed by adding plasticizers, and it has excellent transparency and strength so that it is wide used in flat plate, hard film sheet, pipe, heteromorphy extrusion product, agriculture vinyl, soft film sheet, synthetic leather, soft heteromorphy extrusion product, and floor materials. It is also widely used in electrical and electronic equipments for packing sheet or film, wire covering, tube, hose, and refrigerator door packing.

But the harmful hydrochloric acid is broken away from the PVC structure during burning the material after disposal, and it is very important to choose and use plasticizers such heat stabilizers during PVC processing. These plasticizers can also generate the dioxin which could cause lung cancer, liver cancer, lymph gland cancer, blood cancer, and various diseases when it is burnt. The harmfulness of the material is still under debate, and many of the producers and customers refrain from using PVC materials as the use of PVC material including plasticizer is limited for toys and products.

This evaluation item is to check how much effort the manufacturers is making to manage it and convert to alternative materials by themselves including the efforts of reducing or prohibiting the use of PVC materials in the product because of harmfulness of using PVC.

(2) Items to consider before evaluation

The followings are items to consider to improve the evaluation item.

■ Check the plastic material

Firstly, the information on the plastic material over 25g in the products to be evaluated must be managed, and it may include plastic parts, name of material, and weight information.

■ Check the use of PVC

Manufacturers may need to store and manage the objective and scientific data such as related test report and information about the composition of the configuring substance of the parts in order to guarantee that the product is free from using PVC and whether the PVC is used or not among the plastic parts. In addition to this document, PVC free proof documents (suitability declaration) from the supplier and checking control system of the part suppliers on the prohibiting PVC usage might be required for the control document proving that the products are free from PVC.

■ Continuous product improvement

Conduct the comparative evaluation with the existing models (or existing models, target values) in accordance with the established management items, standards, and related procedures, and the benchmarking examples, development, and active application of the new material to the product are required in order to reduce the usage of PVC through evaluation results.

2.3.2 Designs considering Material Recycling (6)

Evaluation item	Evaluation standard	Evaluation result
Use of synthetic resin for packing material	What is the weight of used synthetic resin in the total packing materials?	
	Weight ratio of the used synthetic resin (%) $= \frac{\text{Total weight of synthetic resin}}{\text{Total weight of packing materials}}$	() %
	(Total amount of synthetic resin is same as the sum of amount of synthetic resin in the unit packing materials, and the total weight of the packing materials is same as the sum of the weight of unit packing materials.)	

(1) Evaluation purpose

Korean “Law of Promoting Savings and Recycling of Reduces” specifies the standard on packing material and packing method of the products that the manufacturers and importers have to comply with and the yearly reduction standard on reducing packing material using synthetic resin in order to promote the recycling and reduce the waste packing materials.

The main purpose of using synthetic resin for packing material is to protect the durability of the product effectively, and the usage is increasing every year due to good manufacturability regardless of the shape and structure of the product. Despite of these advantages, using continuously reusable packing materials and the substitute materials that are not harmful to the human are requested as the synthetic material is not easy to reuse and the harmfulness of the some material in disposal stage is still being questioned.

From this angle, the purpose of this evaluation item is to reduce the environmental effects due to the packing material through the improvement in the structure of the packing material and to lead the conversion to the materials that have less environmental effects or reducing the usage of the synthetic resin for packing materials.

Type of product	Packing material	Standard on yearly reduction After 2008
Electrical equipments, audio/video application devices, and information and office equipments among the electrical goods for safety certification specified in the Article 3 of Enforcement Regulations of Electrical Goods Safety Control	Filler materials for packing	Use packing filler materials excluding foaming polystyrene for the products with the packing volume less than 40,000 cm ³

【 Standard on yearly reduction of synthetic resin packing materials in Korea 】

(2) Range of packing materials

Packing materials defined in this evaluation item includes paper, plastic, and metals, which means a material or product that has a function to protect or easy storage of the contents, and the packing materials are divided into unit packing and total packing depending on the packing objects.

① Unit packing

Unit packing means that each product or part is packed separately such as TV, refrigerator, or air conditioner.

② Total Packing

Total packing means that many of same products are packed together mainly from components and accessories such as product, battery, tape, manual, or cable. (Example: Separate packing materials for transportation and export of the product – Carton box)

The scope of the packing in this evaluation item is “① Unit packing”.¹⁾

(3) Packing materials using synthetic resin

Synthetic resin defined in this evaluation item mean synthetic polymer material in general, including the material by adding foam additives to reduce the volume and weight.

(4) Items to consider before evaluation

The followings are items to consider before evaluation to improve the evaluation item

■ Product packing material information management

Grasp the information of the packing material used in the product such as type (purpose), material, and weight in order to identify the usage of the synthetic resin in the packing materials. Here, weight of the packing material means the weight of the total packing material and weight of each type of material, and the total weight of the packing material is same as weight for each material in case of single material packing.

■ Continuous improvement of the products

Product improvement is based on the comparative evaluation with the reference model(or existing model, target value) in accordance with the established control items, standard, and related procedure, and benchmarking example analysis and development and application of substitute material are required for the identified weakness from the evaluation result.

1) Commonly this means the packing state of products or parts when the customers receive the products.

2.3.3 Management System(1)

Evaluation item	Evaluation standard	Evaluation result
Technology development efforts to promote recycling	Building infrastructure for environmentally friendly take back and recycling and continuous efforts to make the recycling easier	Yes / No Or Not applicable

(1) Evaluation purpose

Most countries made a requirements for mandatory items on the takeback and treatment of waste electrical and electronic equipment with the manufacturer responsible recycling system during the disposal stage of electrical and electronic equipment. These mandatory items include building takeback and treatment system for waste electrical and electronic equipment, cost allocation, and providing information to customer for promoting recycling.

The purpose of this evaluation item is to comply with the abovementioned legal requirements for the producers to recycle the products and to check the voluntary efforts to improve the product recycling during the disposal stage.

(2) Scope of Evaluation

“Environmentally friendly takeback/recycling infrastructure” in this evaluation item means one of the followings.

- ① Independently operating takeback and treatment system for waste electrical and electronic equipment
- ② Recovery and recycling system contracted by local government or other organizations

And the efforts to promote the recycling besides the product design stage means one of the followings

- ① Providing information for the users related to the takeback service
- ② Providing information for the users related to the treatment service
- ③ Other recycling related information

(3) Items to consider before evaluation

The purpose of this evaluation item is to check the result of executing the legal requirements on product recycling and the voluntary efforts of the producers to promote the recycling, and the followings are the examples within the manageable range.

■ Building product takeback and treatment system

In general, producers must make efforts to manage and publicize the customer responsible takeback mandatory, explanation of treatment method and location, and the information for achievements of product takeback and treatment¹⁾ for the sold products by the companies through the home page, user's manual, electronic file, and other information media.

■ Other activities and efforts for recycling

Producers need to make an effort to voluntarily execute the various activities including investment of technology development and training for improving recycling.

1) Certified records (including the source information) about the recovery and processing of the waste product during the previous year, contract with third parties on recycling recovery and process, etc.

2.3.3 Management System(2)

Evaluation item	Evaluation standard	Evaluation result
Ecodesign process	Establishment of the product development procedure considering the environmental effects including easiness of disassembly and recycling	Yes / No or Not applicable

(1) Evaluation purpose

All products are outcome of the series of process achieve the common goal including purchase, design, production, inspection, and follow-up service, and it is very important to design the products considering the environmental effects because the most of environmental effects of electrical and electronic equipments are determined during the development stage throughout the process like other products.

The effort of Material and Structure Assessment will vanish if the abovementioned design items are not considered from the development process for especially all evaluation items explained in this guide including the disassembly and recycling improvements are determined during the development stage.

Therefore, the purpose of this evaluation item is to comply with the basic principles of the Material and Structure Assessment Guidance and to promote the voluntary efforts of the producers for improving product recycling, and the methods through the design process will continuously improve the recyclability of the products.

(2) Items to consider before evaluation

The followings present the example of manageable range for the evaluation item.

■ Ecodesign item and target value management

It is not necessary to consider all detailed items on the Material and Structure Assessment Requirement as the design items can be different for each manufacturer depending on the characteristics of the product, design strategy, requirements of interested parties, applied regulations, and management policy while considering the easiness of disassembly and recycling of the products.

However, manufacturers shall manage the ecodesign consideration items and target values such as ecodesign specification and procedures as a minimum and guarantee the execution(application to the product design). The result of these efforts can be reflected by the ecodesign and the result of third party certification (Environment Label – Type I, II, and III).

2.3.3 Management System(3)

Evaluation item	Evaluation standard	Evaluation result
Consideration of environmental burden	Development of environmentally friendly products considering the environmental burden caused by the products	Yes / No Or Not applicable

(1) Evaluation purpose

Products generate various environmental effects throughout the parts production (including the production of raw material), manufacturing, transportation, and use along with the “Design consideration items for disassembly and recycling” besides the disposal stage, and the purpose of the development of environmentally friendly products would be to reduce these environmental effects from the design stage.

The purpose of this evaluation item is to evaluate considering environmental effects throughout the entire cycle of the product besides the disposal stage for manufacturers, and to reduce the environmental effects across the entire stages of the product life cycle.

(2) Items to consider before evaluation

The followings present the example of manageable range for the evaluation item

■ Measurement and evaluation for the environmental effects of the product

Evaluators need to keep the records of the evaluation and result of environmental burden across the entire lift cycle of the products from the product design stage in accordance with the procedures and method established inside the company. These environment burden can be considered through the individual evaluation of all products, but it can be regarded that environmental burden are considered through the series of activities including specific development steps and environment effects evaluation of the specific product family through the ecodesign strategy, design items, and target value management.

Especially the typical examples would be to specify and informatize the environmental burden of the products quantitatively such as environmental information of the product through the environmental score certificate, carbon score certificate, and other internal standard.

2.3.3 Management System(4)

Evaluation item	Evaluation standard	Evaluation result
Record management	Establishment of internal management system for the record and storage of the documents for the result of environmental friendly product development activities internally	Yes / No Or Not applicable

(1) Evaluation purpose

A series of processes are applied to the manufacturing process for other products as well as electrical and electronic equipment, and one of the common applied system uses the PDCA¹⁾ concept that consists of closed loop cycle of Plan → Do → Check → Action → Plan, and the this process can be applied for developing better environmentally friendly products such that environmental characteristics of products are constantly analyzed to improve the product, and new environment design goal is established.

For this purpose, basically organizing and storing the result of all product development activities including the product evaluation result are required, and this history and results can help prevent reoccurrence of the problems and check the technical review during the development of next products.

The purpose of the evaluation item is to check the intention and efforts to continuously maintain the environmentally friendly products development activities by the producers through the management of records.

(2) Items to consider before evaluation

With the purpose of checking the continuous maintenance and execution of a series of process for development of environmentally friendly products, consider whether outcomes generated from the related procedures are applied to the next development stage and whether they are traceable.

■ Establishment of record management procedure

In general, records can be managed by the processes like document record and record management process of the management system such as ISO 9001 or 14001. Separate process or related regulations do not have to be established for this evaluation item, and it is desirable to manage the record within the scope of existing established procedure

1) P : Plan , D : Do, C : Check , A : Action

2.3.3 Management System(5)

Evaluation item	Evaluation standard	Evaluation result
Recycling information provision	Establishment of internal system to provide the recycling information of the product to the recyclers and relevant parties when requested	Yes / No Or Not applicable

(1) Evaluation purpose

The amount of waste materials from electrical and electronic equipment is increasing fast as the life cycle of the product is getting shorter due to the fast technical development speed and the changes in trends and design preference of the customers compared to other type of products, but the recycling technology is behind the product development technology as the recycling usually occurs at the end of the life cycle of the products. In this situation, product recycling information is greatly helpful in determining alternatives for needful recycling such as checking pre-separation parts and materials, manual disassembly and shredding method, and separation method by recycling centers, and grasping the trend and level of the future product recycling technology.

And also recycling information is legal requirement by the regulations of the corresponding countries where the products are sold. In Korea, information about the configuration material and recycling method must be provided within a month in paper or electronic media when requested in order to promote the recycling of the waste electrical and electronic equipment in accordance with the Article 12 of Resource Recycling Law.

The purpose of this evaluation item is to check the necessary items for proving recycling information such as process and method regardless of the request of the recycling information by the recyclers and interested parties, and to encourage the preparation if not sufficient.

(2) Items to consider before evaluation

Recycling information shall include the following information by the domestic Resource Recycling Law, and more detailed requirements about the recycling information forms are not specified as more detailed and various information providing method are needed to improve the efficiency of the recycling information.

■ Establishment for method of providing recycling information

Method of providing recycling information can include the followings.

- ① Product name, released year, model name, disassembly procedure

② Configuration material of synthesized polymer compounds (excluding the case that the material names are marked on the synthetic resin parts over 25g in case of electrical and electronic equipments), method of removal and location of harmful substances to be removed from the products.

③ Efficient process and recycling method that are known to the manufacturers and importers of electrical and electronic equipments or automobiles

In addition, it is desirable to establish internal procedures (for example, the term of validity-of the information, information providing method, and process period for providing information) to prepare beforehand the information providing forms and provide the information efficiently based on the abovementioned details regardless of the requests of recycling information.

2.3.3 Management System(6)

Evaluation item	Evaluation standard	Evaluation result
Improvement on the recommendation	Review and application to the design for the improvement request and recommendations on the material and structure of the products from the recyclers	Yes / No Or Not applicable

(1) Evaluation purpose

Design consideration items for developing environmentally friendly products are established from the various interested parties including requirements for customers and markets, changes in product environment trend, legal requirement, and the benchmarking of competitor product environment. In case of improvement request or recommendation about the material and structure presented in this evaluation item, it is desirable to establish active measures if necessary as one of the equipments of the interested parties as shown above.

However, the validity of the various requirements must be fully reviewed before applying to the design as applying all product environment requirements might have bad effects to the environments on certain stage and unique characteristics of the products.

The purpose of this evaluation is not to check the establishment of the measure about the request and recommendation on the material and structure or to check the application to the product design, but to encourage that the producers improves the environment characteristics of the product in long term through sufficient review and establishing the plan voluntarily

(2) Items to consider before evaluation

In Korea, recyclers can suggest the improvement for the material and structure of the product in accordance with the Article 12, Point 13 of the Resource Recycling Law, and they can recommend the contents to the producers through the validity review and deliberation considering the safety of the product, economic efficient and domestic technology level.




Therefore, it is desirable for producers to prepare the internal procedures to handle the improvement and recommendations as described above, and to execute the process according to the internal procedure when a request is made.

■ Request of improvement measure information and handling case recording

Execute the review of improvement possibilities for the corresponding request of the related departments in order to handle the improvement and recommendation request. It is required to make decisions considering the interactions between other factors such as quality, stability, and durability of the products and to manage the record about the result of improvement efforts.

The typical case of requesting the improvement measure of the product is the request from the recycle centers, and it is desirable to consider the improvement request items in Material and Structure Assessment Deliberation explained in this guide as well.

Example) Request of improving product material and structure from recycling center (air conditioner)

Improvement request items	Picture	Improvement review contents
<ul style="list-style-type: none"> - Front decoration glass of air conditioner : separating the glued product and stickers are difficult - Unification to recyclable material 		<ul style="list-style-type: none"> - Glass materials are used following the current trend. - Glass is much heavier than other parts, and adhesive force of the double sided tape is increased 1.5 times from the original specification due to field failures.
<ul style="list-style-type: none"> - Vibration absorbing rubber in the back of the panel and heat insulating materials are glued and they cannot be separated, so all of them are burned. - Change to the type that does not generate dew point 		<ul style="list-style-type: none"> -Trying to reduce the use of heat insulating material as much as possible, and minimum materials are attached after testing (concern on field failure due to water leak at the bottom), so removing heat insulating material is not possible without changing the design. - However, drain pan need to be designed to be detachable.
<ul style="list-style-type: none"> - Specification, model, and manufacturers of the bolts used in various parts are different : Large numbers of tools are required and it takes long time to disassemble. - Unify the bolt type 		<ul style="list-style-type: none"> - Unifying the parts has been outstanding project for long time. - Method of minimizing the type of head shape and screw driver type is required, and more feedback is required to improve.

2.3.4 Miscellaneous

Evaluation item	Evaluation standard	Evaluation result
Product environmental performance	Other environment friendly features of the evaluating product besides the items presented in this evaluation standard	Yes / No

(1) Evaluation purpose

Many design strategies can be established such as reduction of energy consumption, reduction of noise, reduction of volatile organic chemicals, resource saving, reduction of use of harmful substances, and improvement of packing materials besides the material and structure improvement evaluation items in order to improve the recycling of the waste electrical and electronic equipment.

These strategies can get the special benefit in sales and purchasing if they meet the certain standard values of the established system for each country like Green Purchase, and these environmentally friendly characteristics of the product can be used for marketing of the products.

The purpose of this evaluation item is for manufacturers and importers to grasp the voluntarily executed efforts of improving environmental characteristics and to find the optimum level of environmentally friendly characteristics of the product through the various method and opinion required for material and structure improvement.

(2) Items to consider before evaluation

Other characteristics considered in this evaluation item includes the evaluation contents of the voluntary consideration items in Material and Structure Assessment Annex II, including noticeable result of environmental achievement across the entire stage of the product life cycle and a series of activities such as Environmental Label and green purchase products certificate. Improving the recyclability of the product through the improvement of material and structure is not the only purpose, but the improvement achievement from the view point of various related product environment.

【 Reference 】 Material and Structure Assessment Method Group Standard Annex II, Voluntary Consideration Items

① Designs considering the structure improvement

Consideration item	Details
Easy separation of valuable parts	Designs for easy separation of recyclable and economically valuable parts and materials during the disposal stage
Disassembly time	To minimize the disassembly time for pre-separation parts and recyclable and economically valuable parts and materials

Consideration item	Details
Accessibility of the pre-separation parts	Design for easy access to the parts and materials containing harmful substances(pre-separation parts) dangerous to the safety of the workers during the disposal stage
Accessibility of valuable parts	Design for easy access to the recyclable and valuable parts and materials during the disposal stage
Product weight reduction	Selection of materials that can reduce the weight of original materials and reduce the recycling cost compared to the product with same function and specification
Product miniaturization	Reduction of the volume of the product considering the efficiency of packing, loading, and transportation, and the efficient of the recycling process during disposal stage compared to the product with same function and specification
Unification of the packing material	Selection of the minimum number of material type to easy separation during the recycling process

② Designs considering Material Recycling

Consideration item	Details
Materials used for labels and stickers	Use the same or compatible material as the main body for the labels attached to the product housing
Marking of reuse parts	Mark clearly the parts that can be reused
Materials that can be easily recycled	Use recyclable materials for the separated parts for increasing the recycling rate
Material compatibility	Consider the plastic compatibility when using different type of materials for separating plastic parts to increase the recycling rate
Metal inserts	Avoid the plastic metal inserts as much as possible
Surface treatment of the plastic parts	Avoid the coating or painting on the plastic parts

About MASPE Deliberation

This is a system to deliberate the self evaluation reports submitted by the companies in accordance with the Material and Structure Improvement Guide of Electrical and Electronic Equipments (Ministry of Environment Notification 2008-17, Ministry of Commerce, Industry, and Energy Notification No. 200807) following the Article 10, Article 1 of the Resource Recycling Law to promote the recyclability of electrical and electronic equipments.

For this purpose, manufacturers and importers of 10 type of electrical and electronic equipments corresponding to the Resource Recycling Law shall submit the self evaluation reports and related documents by the end of Jan. every year.

Material and Structure Assessment Data Management



Contents

- 3.1 Assessment documents to submit**
- 3.2 Preparation of the assessment data**
 - 3.2.1 List of assessment evidence documents**
 - 3.2.2 Forms of assessment backup document**
- 3.3 Preparation of deliberation material**

3.1 Assessment documents to submit

Manufactures executing the assessment shall submit the evaluation result to KEA by the end of Jan. every year.

Submit the following documents.

Contents	Related forms and contents	Reference
Material and Structure Assessment Items	Forms in the Annex of Material and Structure Improvement Guidance for Electrical and Electronic Equipments	Ministry of Environment Notification No. 2009-159 Ministry of Knowledge and Economy Notification No. 2009-179
Material and Structure Assessment Report	Annex I in Material and Structure Assessment Group Standard	KEA Group Standard: KEA CE-3300
Documentary Evidence	Additional evidences for each evaluation item	Material and Structure Assessment Guide for Electronic Products
Deliberation Material (When Requested)	Presentation Material for Assessment Deliberation including the Summary of Assessment Result, Things to Improve, and Future Plan	Material and Structure Assessment Guide for Electronic Equipment

① Material and structure assessment items

Manufacturers and importers shall prepare the 'Material and Structure Assessment Items' included in the Annex of the guide for the products that the material and structure assessment was made, and submit the document to the president of KEA by the end of Jan. every year.

② Material and Structure Assessment Report

Manufacturers and importers shall prepare the assessment report of 'Material and Structure Assessment' based on the assessment contents in the 'Assessment Standard Annex I' and the corresponding assessment result, and submit the documents to the president of KEA.

③ Documentary evidence

Manufacturers and importers shall submit the documents of evidence that can check the validity of the assessment result of to the president of KEA along with the 'Material and Structure Assessment Report'.

④ Deliberation Document

After the documents submitted in the abovementioned steps ①, ②, and ③, if the case is selected as the item for deliberation and in case the president of KEA requests the summary explanation of the assessment report and presentation material of deliberation, manufacturers and importers must submit the corresponding document by 15 days before the deliberation date to the president of KEA.

3.2 Preparation of assessment document

3.2.1 List of documentary evidence for assessment

The documents of evidence for Material and Structure Improvement Items Assessment Report shall be prepared by the producers as a general rule.

This guide provide a basic form that might be suitable for the documentary evidence for the convenience, and these methods and types can be modified and applied to meet the management standard of the producers.

1) Example documentary evidence for designs considering separability

#	Documentary evidence	Related assessment item	Form number	Note
1	Pre-separation parts and materials information	1.1	1)	Internal form Refer to basic form
2	Management standard and management procedure	1.1	–	Internal form
3	Product disassembly manual	1.1, 1.2, 1.3	2)	Internal form Refer to basic form
4	Improvement detail and example	Common	9)	Internal form Refer to basic form

2) Example of management document for designs considering material recyclability

#	Documentary evidence	Related assessment item	Form number	Note
1	Plastic parts information	2.1, 2.3, 2.4, 2.5	3)	Internal form Refer to basic form
2	Plastic material characteristics information	2.1	4)	Internal form Refer to basic form
3	Label and sticker use and separation method	2.2	5)	Internal form Refer to basic form
4	Recycled plastic use information	2.4	6)	Internal form Refer to basic form
5	Information on using plastics containing PVC	2.5	7)	Internal form Refer to basic form
6	Document to prove non-existence of PVC	2.5	–	Internal form
7	Packaging information	2.6	8)	Internal form Refer to basic form

	Documentary evidence	Related assessment item	Form number	Note
8	Improvement details and examples	Common	9)	Internal form Refer to basic form

3) Example of documentary evidence for management system

	Documentary evidence	Related assessment item	Form number	Note
1	Product takeback and service description material	3.1	–	Internal form
2	Product and company recycling related information	3.1	–	Internal form
3	Ecodesign strategy and procedure	3.2	–	Internal form
4	Evaluation result of product environment burden	3.3	–	Internal form
5	Document management related procedures and miscellaneous documents	3.4	–	Internal form
6	Recycling information provision form	3.5	–	Internal form
7	Example of handling recycling information request	3.6	–	Internal form
8	Example of handing Improvement request	3.6	–	Internal form
9	Assessment deliberation reflection details	3.2, 3.3	–	Internal form
10	Related certificates		–	Copy of Certificates

4) Example of other documentary evidences

	Documentary evidence	Related assessment item	Form number	Note
1	Assessment Annex, Internal assessment standard for each item, assessment method, assessment results, etc.	4.1	–	Internal form
2	Product environment certificate, system certificate, certificate details and certificate copies, etc.	4.1	–	Internal form
3	Other environmentally friendly characteristics of the product	4.1	–	Internal form

※ You can download the basic forms from <http://www.ecoe.or.kr> .

3.2.2 Assessment Evidence Documents Form

Form 1) Pre-separation parts and materials information ¹⁾

Classification	Part and Material	Included?	Quantity / Disassembly location
Legal selective processing parts and materials	Batteries containing PCB		
	Device containing mercury such as switch or back light		
	Battery		
	Mobile phone handset PCB		
	Personal Computer PCB		
	PCB of other devices when the size of PCB surface exceeds 10 cm ²		
	Bromated frame retardant products including plastics		
	Asbestos wastes and parts containing asbestos		
	CRT		
	CFC, HCFC, HFC, and HC		
	Discharge lamp		
	LCD with the surface area over 100 cm ² (including proper cover) and all LCD illuminated by discharge lamp		
	External electrical wire		
	Configuration elements including radio active material		
	Electrolytic capacitor (height > 25 cm, diameter > 25 mm, or similar size)		
Other legal selective parts and materials specified national regulations			
Pam containing harmful substances	Cadmium, Hexavalent Chromium, Lead, Mercury		
	BeO		
	Other Be		
	Fire resistant ceramic fiber		
	Other harmful substances		
Pam that affects the safety of workers	Parts containing compressed gas (> 1.5 bar)		Type/pressure of gas
	Parts containing liquid material (> 10 cl)		Type of liquid
	Parts containing mechanical energy (e.g. spring)		
	Other parts and materials that require special attention during disassembly and recycling process		

1) Recycling Information Provision for Electrical and Electronic Equipment KS M XXXXX: 2009 KS Annex B Form 2, standard forms in EICTA, CECED, AeA Europe and EERA Joint Position Guidance on implementing Article 11 of Directive 2002/96 (EC) concerning information for treatment facilities can be used.


- ① Identify whether the pre-separation parts and materials are included, quantity, and location inside the product using the form1). (Example: Mark ○ in the column of “Included”)
- ② Information about the disassembly location shall be prepared additionally in the product disassembly manual(form2) and submitted.
- ③ Pre-separation parts and materials can be added according to legal consideration, internal standard of producers, or request from recyclers.

Form 2) Product disassembly manual ¹⁾

Parts	Disassembly sequence	Disassembly method	Joint type	Quantity	Disassembly tool
Front Cover	1	Remove the cover by turning the screws with hands	Screw	6	Manual work
	2				
	3				
	4				

- ① The disassembly or disassembly information on pre-separation parts and materials must be included at least.
- ② The description of the disassembly method can be written in producers’ own way, and can be use the photos or drawings (disassembly expansion diagram) for additional explanation or replacing disassembly method.

3.2 Optional Graphic. If the disassembly process is complex, insert a graphic illustration below to identify the items contained in the product that require selective treatment (with descriptions and arrows identifying locations).

	<p>1 Remove cover from the unit</p> <p>Rotate screw to open the cover</p>
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【 Example of Computer Disassembly Information provided by HP 】

1) Refer to KS M XXXXX: 2009 ‘Recycling information provision for electrical and electronic equipments’ KS Annex B Form 3

Form 3) Plastic parts information

Parts name	Material name	Material marking (or photo insertion)	Weight (g)	Exceptions
A	ABS	>ABS<	210.1	
	PMMA	>PMMA<	102.2	
	PP	>PP<	30.0	
⋮				
Total	Total number of plastic types:	%	Total weight (g)	

- ① Information of plastic use and material marking is shown.

Plastics parts mixed with materials such as electronic devices except mechanical parts are excluded.

– Example of mechanical parts: Parts that don't use electric energy directly such as Internal/ external housing plastic parts, Key Button, Plastic Wall, Cover, Shelf, Tank, etc.

– Example of electronic devices parts: Parts that use electrical energy or parts that electrical energy is used directly or indirectly for moving electricity or electrical signal such as plastic material or plastic on PCB, harness, and various cables.

- ② Identify the parts using plastics by each material, show the material marking in the same way marked on the actual product, and fill in the weight information.

For plastic parts less than 25g (less than 5g for mobile phone terminals), fill in the information if the material marking is on the plastic part.

- ③ Calculate the ratio of marked materials over the total plastic materials in the product and fill into the field in "Total".

Form 4) Plastic Material Characteristics Information

Parts name	Material name	Specific gravity	Material compatibility
A	>ABS<	1.06	Yes
	>PMMA<	1.18	Yes
B	>ABS<	1.06	Yes
	>PP<	0.90	Yes
C	>ABS<	1.06	No
	>PMMA<	1.18	No
	>PP<	0.90	No
⋮			

- ① Plastic material characteristics information means the information submitted for the purpose of checking the recyclability (material compatibility) and possibility of separation with mechanical method (selection by specific gravity after shredding dismantling) as the used plastic parts cannot be separated into groups of same type of material.
- ② Enter the specific gravity of the plastic material for the information checking the possibility of selection with specific gravity. Do not consider the specific gravity of additives besides the plastic material. (flame retardant, plasticizer, other additives, painting, plating, etc.)
- ③ Determine the material compatibility by referring to the page 36 of this guide for the material compatibility of plastic material. When more than three plastic materials are used in a product, put “No” to compatibilities of all materials.

Form 5) Label and sticker usage and separation information

Label and sticker name	Material name	Material marking	Attachment location material	Separation method	Material compatibility	Exception
a	PE	>PE<	PC	D	@	
b	PET	>PET<	ABS	C	+	

- ① Fill in the followings for the separation methods of label and sticker.

A : Glue is not used (Insertion, etc.)

B : Glue is used, but they are same material as the material in attachment location

C : Glue is used, but the compatibility of the material at the attachment location is higher than “@” (Corresponding to compatibility +, @)

D : Glue is used, but label and sticker can be easily removed manually

E : Glue has strong adhesive force, and it can be removed with tools such as putty knife

F : Other method (include detained description)

- ② Separation method of label and sticker can be proved with actual photographs.

③ Plastic material compatibility means the compatibility with the material in the attachment location, and determine the compatibility of the material by referring to the page 36 – ‘heat plasticity resin plastic compatibility table’.

Form 6) Information of the usage of recycled plastic

Part name	Material name	Weight (g)	Contents ratio of recycled plastic	Evidence material
a	>ABS<	100	Contents : 10 g / Contents ratio : 10.0 %	Part design specification
	>PC<	30	Contents : 10 g / Contents ratio : 10.0 %	
Total		130g	MP : % / MPP : %	

① Contents of recycled plastic means actual amount of recycled plastic used in the product.¹⁾

Example: When 10g of recycled plastic is included in the 100g of plastic parts, the contents of recycled plastic is 10g, not 100g.

② Separate evidences have to be presented for the parts including recycled plastics, and it includes recycled plastic supply certificate, design specification of product or corresponding part, drawing, purchase request form of recycled material, and other related procedure and standard.

Form 7) Information of plastic containing PVC

Parts name	Material name	Weight (g)	PVC contents (g)	Evident of PVC free product
a	>ABS<	100	0 g	PVC free certification
	>PC<	30	0.5 g	–

① PVC contents means the content of PVC inside the plastic material.

② In case of PVC free plastic parts, separate evidence may be requested. PVC-free certificate and declaration form by parts manufacturers, management system and standards, test report, and content substance information of the corresponding part can be used for the evidence.

Form 8) Information of used packing material

① This is applied to products and parts that use packing material.

② Material name of packing material can be inserted as detailed name in case of plastic and as material family unit in case of other materials.

Example : PE → PE, corrugated board A → “paper”

1) Not entire plastic including recycling plastic becomes recycled plastic.

Product	Parts	Packing material	Weight of packing material (g)
A	–	Material 1	92.3 g
	–	Material 2	51.5 g
	a	Material 3	12.1 g
	b	Material 3	10.4 g
	C	Material 3	9.4 g
Total			Total weight of packing material (g)

③ Packing materials for product and parts with mixed materials are to be classified by the material and related information shall be provided.

Form 9) Improvement details and examples

① Improvement shall be compared with the reference model and existing model or target value in accordance with the internally established management item, standard, and procedure.

Evaluation items	Evaluation contents	Reference model (existing model)	Typical model (evaluation model)	Degree of improvement
Separability	Disassembly time	Reference model : XXX Disassembly time : XXX sec	Typical model : XXX Disassembly time : XXX sec	%
Recyclability	Recyclability	Reference model : XXX Recyclability : XXX %	Typical model : XXX Recyclability : XXX %	%

② Add detailed explanations on the effects of improvement by comparing before and after the improvement

Before improvement	After improvement	Effects of improvements
Insert the contents that shows actual situation before the improvement such as photographs or drawings.	Insert the contents that shows actual situation after the improvement such as photographs or drawings.	Put a simple description about the effects related to the recycling of the product

10) Management System Information

The followings show an example of evidence for the evaluation results for management system, and separate form for evidence is not presented. Manufacturers and importers can recommend the forms and they will be used.

① Efforts of developing technology to promote recycling

Item	Classification	Management Contents
Information on waste product takeback	Manual Home page	<ul style="list-style-type: none"> Actual information details provided to customers and interested parties: takeback treatment location, takeback cost, method to check the related information – home page address, other information details (example: waste product takeback and treatment records of the evaluating year)
	Misc	
Information on waste product treatment	Home page	<ul style="list-style-type: none"> Actual information details for recyclers: product disassembly guide for each model, treatment location Other information details (technology development, investment, customer PR and events for product recycling)
	Misc	

② Ecodesign process

Name of related procedure	Procedure number	Management details
“XXXXX”	XXX-XXXX	<ul style="list-style-type: none"> Ecodesign procedure, effectiveness of specification: evaluation standard and details, etc. Ecodesign strategy and design items, validity of target values

③ Design considering environmental burden

Name of related procedure	Procedure number	Management details
“XXXXX”	XXX-XXXX	<ul style="list-style-type: none"> Evaluation of environment friendliness of the products based on the established method and related procedures record contents : evaluation result, report, etc.

④ Record management

Name of related procedure	Procedure number	Management details
“XXXXX”	XXX-XXXX	<ul style="list-style-type: none"> Management method of documents : Storage period and management method of evaluation results – management log, electronic approval file, etc. Storage status of outcome specified in the procedure documents

⑤ Provision of recycling information

Name of related procedure	Procedure number	Management details
“XXXXX”	XXX-XXXX	<ul style="list-style-type: none"> • Effectiveness of the related procedure • Outcomes specified in the procedure: recycling information provision form, recorded case of handling requires of recycling information request, etc.

⑥ Handling recommendations

Name of related procedure	Procedure number	Management details
“XXXXX”	XXX-XXXX	<ul style="list-style-type: none"> • Effectiveness of the related procedure • Handling of improvement request and effectiveness of the procedure • Outcomes specified in the procedure: meeting minute, report, and other recorded case for handling improvement request – improvement requirement and review result from the material and structure improvement deliberation evaluation of the previous year

11) Other environmentally friendly products characteristics information

This information is for the case to manage the environmentally friendly characteristics besides the items provided in the evaluation standard and separate form is not provided. Manufacturers and importers can recommend the forms and they will be used.

① Items for internal consideration and evaluation contents

a. Design details considering structural improvement

Items to consider	Evaluation contents	Evaluation standard	Evaluation result	Note
Separability of valuable parts				
Disassembly time				
Accessibility to pre-separation parts				
Weight reduction of the product				
Smaller size of the product				
Unification of packing material				
Misc – 1				
Misc – 2				

b. Design details considering the material recycling

Items to consider	Evaluation contents	Evaluation standard	Evaluation result	Note
Materials used for labels and stickers				
Marking of reused parts				
Materials that can be easily recycled				
Material compatibility				
Meter inserts				
Surface treatment of plastics				
Misc –1				
Misc –2				

② Third party certification

Name of certificate	Contents and range of certificate	Valid terms of certificate	Note
Korean Environment Label	Recyclability, power consumption, harmful substance, etc.	200X. XX. XX ~ 200X. XX. XX	Attach the copy of certificate
Korean Green Purchase	Recyclability, power consumption		
Product XX certificate	Harmful substance		

③ Other environmentally friendly characteristics of the product


Environment ally friendly characteristics	Detailed items	Result	Note
Energy consumption	Reduction of power consumption	6.7W → 3.2W	Voluntary description including technical explanation
Operating environment reduction	Reduction of operating noise	52dB → 31dB	

3.3 Preparation of deliberation materials

Deliberation material shall include improvement activities and results on the evaluation result of Material and Structure Assessment Items for representative model, suitability of the evaluation result and additional explanation of documentary evidence, and measure to improve for the evaluation items that were not achieved. They do not have to include the technical details and details other than Material and Structure Assessment Items shall be avoided.

The following deliberation form and contents are provided just for the convenience, and the contents and the form do not have to be followed. Most desirable deliberation materials summarize the Material and Structure Assessment Results and provide good explanation. It is acceptable to use company internal form, type, and configuration.

a. Cover

Deliberation Report for Material and Structure Assessment of Electrical and Electronic Equipment			
 KEA Korea Electronics Association	발표자	업체명:	부서 :
	연락처	성명 및 직책 : 전화번호 : E-mail :	


b. Introduction of company and product (representative mode)


1. Introduction of company and product (representative model)

(1) Company introduction

주생산제품	
⋮	※ 환경규제 대응활동, 제품 국내시장 점유율, 직원수, 매출액 등

(2) Representative model introduction

제품군			
제품명 / 모델명			
무게	kg		
부피	(W*D*H) cm ³		
개발년도	년도	출시년도	년도
생산량	대 / 년도	총 생산비율	%
구성품	약세사리 1 (g / 개), 약세사리 2 (g / 개) .. 포장재 1 (g / 개), 포장재 2 (g / 개) ..		



c. Evaluation result

2. Material and Structure Assessment Result

2.1 Seperability


평가내용	평가기준	평가결과
분리 용이성	제품 폐기단계 시 ...	YES

a. Internal evaluation method for evaluation result and summary of the result

b. Improvement details (example : Improvement over existing products)

C. Future improvement plan, etc.

※ Material and structure assessment shall be in accordance with the assessment contents in the Annex I of Assessment Method Group Standard, and evaluate the assessment items that can be applied to the representative model, and write the result.



c. Evaluation Result

2. Material and Structure Assessment Result

2.1 Seperability

평가내용	평가기준	평가결과
일반공구사용	사전 분리 부품 및 ...	공구명 1 공구명 2 공구명 3

- a. Internal evaluation method for evaluation result and summary of the result
- b. Improvement details (example : Improvement over existing products)
- c. Future improvement plan, etc.

※ Prepare the evaluation contents and result for 'Joint Type', one of evaluation items under 2.1 separability using the same format.



2. Material and Structure Assessment Result

2.2 Material Recycling

평가내용	평가기준	평가결과
플라스틱 재질 종류수	25g 이상의 플라스틱 ...	YES

- a. Internal evaluation method for evaluation result and summary of the result
- b. Improvement details (example: Improvement over existing products)
- c. Future improvement plan, etc.



c. Evaluation Result

2. Material and Structure Assessment Result**2.2 Material Recycling**

평가내용	평가기준	평가결과
라벨 및 스티커 분리	제품의 하우징에 ...	YES

a. Internal evaluation method for evaluation result and summary of the result

b. Improvement details (example : Improvement over existing products)

c. Future improvement plan, etc.

※ Use the same form in this page to write the evaluation result of plastic material marking, use of recycled material, use of recyclable plastic, and use of synthetic resin for packing material, which are evaluation items of the 2.2 Material Recycling Evaluation Result and write the result.



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2. Material and Structure Assessment Result**2.3 Management System**

평가내용	평가기준	평가결과
재활용촉진기술개발노력	제품이 친환경적 ...	YES

a. Summary and explanation on activities and progress

b. Future improvement plan, etc.



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c. Evaluation Result

2. Material and Structure Assessment Result

2.3 Management System

평가내용	평가기준	평가결과
친환경 설계 프로세스	제품 개발단계에서 ...	YES

- a. Summary and explanation on activities and progress
- b. Future improvement plan, etc.



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※ Use the same form in this page to write the evaluation result of consideration of environmental burden, record management, recycling information provision, and improvement for the recommendations, which are evaluation items of the 2.3 Management System evaluation result and write the result.

2. Material and Structure Assessment Result

2.4 Misc

평가내용	평가기준	평가결과
제품 환경성과	평가 제품은 본...	YES

- a. Summary of environmentally friendly design characteristics
- b. Other improvement cases



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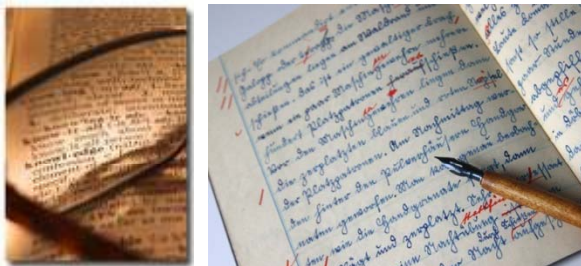
About Material and Structure Assessment Standard

Material and Structure Assessment Standard is a Group Standard of KEA established for the purpose of supporting assessment method in accordance with the notification of Material and Structure Improvement Guide, establishing detailed environmental specifications of electrical and electronic equipment, and applying to ecodesign guide of the companies or detailed standard.

This standard is revised and modified when necessary considering the environmental characteristics and the development of recycling technology, and the result of Material and Structure Assessment. Therefore, evaluators shall grasp the revision status and revised details before executing the assessment process.

Appendix

Appendix



Contents

1. FAQ

1. FAQ

No	Question	Answer
1	What is the purpose of Material and Structure Assessment for electrical and electronic equipments?	The purpose of the Material and Structure Assessment is to provide an environment to assess the environment problems by the companies themselves and set up environment to improve them from the design stage of the products in order to improve the recyclability of the waste electrical and electronic equipment, and to change to the resource recycling structure by achieving economically efficient resource takeback and recycling.
2	What is the scope of Material and Structure Assessment?	Manufacturers and importers producing electrical and electronic equipment must execute the Material and Structure Assessment for 10 types of products specified in the Article 8 of the 'Enforcement Ordinances of the Resource Recycling Law of Electrical and Electronic Products and Automobiles'. * 10 product types applied to Resource Recycling Law : TV, refrigerator, washing machine (for home use only), air conditioner, personal computer (including monitor and keyboard), audio (excluding portable), mobile phone terminal (including battery and charger), printer, copier, and fax.
3	How can I execute Material and Structure Assessment?	You can execute Material and Structure Assessment by referring to the assessment method in the 'Material and Structure Assessment Method (Specification Number KEA CE-3300) of Electrical and Electronic Equipment' guidelines established as Group Standard of KEA. We also produced 'Electrical and Electronic Equipment Material and Structure Assessment Guidance Book' to help the companies to understand the Assessment in easier way, which is available for your reference.

<p>4</p>	<p>How can I select representative model for Material and Structure Assessment?</p>	<p>Select one product for each evaluating item regardless of manufacturing year, size, capacity, price, structure, or usage, and you may select the model that was sold in large quantity and that has good environmental characteristics.</p>
<p>5</p>	<p>Do I have to execute evaluation items in the Annex II of Material and Structure Assessment Guidance (Group Standard)?</p>	<p>You may execute Material and Structure Assessment in accordance with the standard in Annex I of the 'Material and Structure Assessment Method of Electrical and Electronic Equipment' guidelines. As they are written for additional voluntary items considering the various aspects of materials and structures depending on the functions of electrical and electronic equipment, you can evaluate them additionally by referring to them when necessary.</p>
<p>6</p>	<p>Where can I get the material related to Material and Structure Assessment?</p>	<p>You can download the latest materials from the Electrical and Electronic Equipment and Automobile Recycling System of ENVICO (www.ecoas.or.kr) or Product Environment Information System of KEA (www.ecoe.or.kr). Materials related to Material and Structure Assessment include 'Material and Structure Assessment list', 'Material and Structure Improvement Items Assessment', 'Material and Structure Assessment Guideline', 'Method of selecting Representative Model', and 'Material and Structure Assessment Guidance'.</p>
<p>7</p>	<p>Importers have difficulties in preparing Material and Structure Assessment, how can I handle this?</p>	<p>Importers have many difficulties in preparing the documents due to the lack of basic data on material and structure of the products. However, this assessment is also mandatory for importers, and importers must submit the documents written by the manufacturers or by receiving related data from the manufacturers in the country to import from by providing proper explanations on the background of Material and Structure Assessment.</p>

8	<p>I heard that the assessment has to be executed every year. Could you tell me the schedule when in the year the assessment has to be executed?</p>	<p>You may select the representative model from the product sold in the evaluating year, execute the assessment, write the report, and submit the report to KEA by the end of Jan..</p>
9	<p>Our company produces or imports very small volume of products corresponding to 10 product types for Material and Structure Assessment. Do we have to execute Material and Structure Assessment for such a small volume?</p>	<p>Material and Structure Assessment is applicable if your company produces or imports one more products corresponding to the 10 product types. You have to execute the assessment regardless of the volume of production or import as long as you have the record or producing or importing the corresponding product.</p>
10	<p>Our company produces more than two types of products among 10 products types applicable to Material and Structure Assessment, so do we have to execute Material and Structure Assessment for each product separately?</p>	<p>You must execute the assessment separately when one company produces or imports more than two products corresponding to 10 products types applicable to Material and Structure Assessment. For examples, if a company produces refrigerators and washing machines, the company must execute the assessment for both refrigerators and washing machines separately, and submit the results</p>
11	<p>What if I do not write or keep the Material and Structure Assessment List, or submit the report?</p>	<p>Writing and keeping Assessment List and submitting Assessment Report is a mandatory item of manufacturers and importers producing product corresponding to 10 product types applicable to Material and Structure Assessment. The corresponding company must prepare the Material and Structure Assessment Report every year, submit and keep the documents. Penalty might be imposed to the violating companies. Refer to the 'Penalty imposing standard for each type of violation' in Enforcement Ordinances of Resource Recycling Law for the details.</p>