



Eco Mark Product Category No. XXX

“Glass Products (Draft)”Japan Environment Association
Eco Mark Office**1. Environmental Background**

The glass, which is used in such products as bottles, windows of the buildings and automobiles, daily necessities such as mirrors and tableware, electrical appliances such as TV sets, luminaires, and glass fibers used in insulation etc., is an indispensable material for our daily household and also for industrial activities. Its annual production amounts to 1.206 million tons for plate glass, 1.59 million tons for bottles, 1.0 million tons for electrical glass, 84 thousand tons for kitchen and tableware, 87 thousand for basic glass products, and 68 thousand for other glass products including flower vases and ashtrays (referring to statistics published by each industry association in 2000).

As for bottles, although the returnable bottle that could be used repeatedly is becoming popular for mainly beverages, the proportion of its usage is still small in the whole drink containers. As for bottles for other usages and glass products such as plate glasses, the practice of repetitive use or recycle has not been seen. Various legislative measures for constructing the recycling-oriented society are now established including the “Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (Containers and Packaging Recycling Law)”, the “Law for Recycling of Specified Kinds of Home Appliances (Home Appliances Recycling Law)”, the “Law for Promotion of Effective Utilization of Resources”, and the “Law on Recycling Construction-related Materials (Construction Material Recycling Law).” Vast amount of glass wastes, collected separately, is expected to come out in the future.

Therefore, in order to smoothly develop the recycling-oriented society, it is very important to make a so-called outlet pipe of recycling loop larger by promoting the diffusion of glass products made from recycled waste glass that has not been recycled so widely in the past (plate glass, CRT, glass bottles made from colored cullet). At the same time, this product category aims to reduce the environmental impacts by protecting the spread of chemical substances and preventing the global warming through energy savings, on the basis of studies on the reduction of overall environmental impacts conducted from the aspect of life-cycle.

2. Applicable Products**(1) Glass Bottles**

Bottles made of soda lime glass.

(2) Glass Fibers

Products correspond to “Glass Wool Isolating Material for Floating Floors” JIS A 6322, “Textile Glass Yarns” JIS R 3413, “Textile Glass Rovings” JIS R 3412, “Textile Glass Chopped Strand Mats” JIS R 3411, “Textile Glass Fabrics” JIS R 3414, “Finished Textile Glass Fabrics” JIS R 3416, “Textile Glass--Woven Roving” JIS R 3417, “Textile Glass Chopped Strands” JIS R 3419, or “Textile Finished Glass Tape” JIS R 3422.

(3) Construction Materials

Construction materials made of glass such as “Hollow Glass Blocks” JIS A 5212, “Glass Beads for Traffic Paint” JIS R 3301, Stained Glass, Gardening Materials, and Exteriors.

(4) Glass Daily Necessaries

Daily necessities made of glass such as “Heat Resistant Glass Wares” JIS S 2030, “Glass Tumblers” JIS S 2043, “Vacuum Bottles” JIS S 2006, or daily necessities of pottery and chinaware such as “Heat-resistant Ceramic Tablewares” JIS S 2400.

(5) Electrical Glass

Products correspond to “Glass Tubing for Fluorescent Lamps” JIS C 7708, “ Designation Method for Glass Bulbs of Lamps” JIS C 7710 or “Cathode-ray Tubes”.

(6) Glass for Physics and Chemistry and Medical Use

Glass for physics and chemistry and medical uses corresponds to “Glass Tubes” JIS R 3644, “Glass Rods” JIS R 3645, “Cover Glasses for Microscopes” JIS R 3702, “Slide Glasses for Microscope” JIS R 3703, “Test Method of Glass Apparatus for Chemical Analysis” JIS R 3502, “Glass Apparatus for Chemical Analysis” JIS R 3503, “Ampoule Pipe” JIS R 3511, “Ampoule” JIS R 3512, “Vials for Injection” JIS R 3521, “Glass Bottles for Drug” JIS R 3522, “Tubular Bottle for Injection” JIS R 3523, or “Glass Syringes” JIS T 3201.

(7) Plate Glass

Products correspond to “Float Glass and Polished Plate Glass” JIS R 3202, “Patterned Glass” JIS R 3203, “Wired Glass” JIS R 3204, “Laminated Glass” JIS R 3205, “Tempered Glass” JIS R 3206, “Heat Absorbing Glass” JIS R 3208, “Solar Reflective Glass” JIS R 3221, “Sealed Insulating Glass” JIS R 3209, or “Glass Mirror, Unworked” JIS R 3220.

(8) Safety Glass for Road and Railway Vehicles

Products correspond to “Safety Glazing Materials for Road Vehicles” JIS R 3211 or “Safety Glass for Railway Rolling Stock” JIS R 3213.

3. Terminology

-Recycle: Refers to material recycle.

-Post-consumer materials: Glass materials or products disposed after used as a product.

-Pre-consumer materials: Glass materials or defective glass products generated

through the disposal route of product manufacturing processes. However, those recycled within the same process (or factory) are excluded.

- Recycled materials: Post-consumer materials or pre-consumer materials or mixture of those that are defined in the followings.
- Cullet: Glass materials recycle-processed (sorting, elimination of foreign bodies, etc.) from waste glass.
- Other colored cullet: Cullet obtained from empty bottles other than those of transparent or brown color.
- Glass cullet content: Percentage of glass cullet in the whole glass materials used in a product. i.e. Glass cullet content = Recycled materials/Whole glass materials (per product), where materials are expressed in weight.
- Glass-recycled lightweight aggregates: Aggregates, such as concrete made by processing waste glass, that are used to reduce weight and improve insulating capability, with absolute dry density of less than 2.0g/cm³ for coarse aggregates and 2.3g/cm³ for fine aggregates.

4. Criteria for Eco Mark Certification

4-1. Environmental Criteria

1) Glass Bottles

- (1) The glass cullet content of other colored cullet for the glass bottle shall be more than 90% (by weight).
- (2) Safety of the glass bottle (elution of total mercury, chromium, arsenic, selenium) shall be verified and explained. The elution of the subject materials shall conform to the requirement of the Environmental Standard concerning soil pollution (the Ministry of Environment Notice No.46, Aug.23, 1991).
- (3) The coloring agent used in the glass bottle shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compound as its constituent.
- (4) The glass bottle shall conform to the elution test for cadmium and lead in accordance with the Food Sanitation Law.
- (5) In the production process of the glass bottle, the air and water pollution, noise, vibration, offensive odor and emission of toxic substances shall conform to the related environmental regulations or pollution control agreements.
- (6) The composition of the glass bottle shall be soda lime glass.

2) Glass Fibers

- (1) The glass cullet content of the product shall be more than 80% (by weight).
- (2) Safety of the glass cullet (elution of total mercury, chromium, arsenic, selenium) shall be verified and explained. The elution of the subject materials shall conform to the requirement of the Environmental Standard concerning soil pollution (the Ministry of Environment Notice

No.46, Aug.23, 1991).

- (3) The coloring agent used in the product shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compound as its constituent.
- (4) In the production process of the product, the air and water pollution, noise, vibration, offensive odor and emission of toxic substance shall conform to the related environmental regulations and pollution control agreements.

3) Glass Daily Necessaries

- (1) The subject glass daily necessities shall contain more than 50% (by weight) of glass material. The glass cullet content of the product shall be more than 70% (by weight). Pottery and chinaware daily necessities shall contain more than 15% (by weight) of glass material. The glass cullet content of the product shall be more than 70% (by weight).
- (2) Safety of the glass cullet used (elution of total mercury, chromium, arsenic, selenium) shall be verified and explained. The elution of the subject materials shall conform to the requirement of the Environmental Standard concerning soil pollution (the Ministry of Environment Notice No.46, Aug.23, 1991). However, for the tableware, cooking ware, or other apparatus for food or food additives that comes in contact with them as defined in the Food Sanitation Law, this provision will not be applied in the test for cadmium and lead.
- (3) The coloring agent used in the product shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compound as its constituent.
- (4) The tableware, cooking ware, or other apparatus for food or food additives that comes in contact with them as defined in the Food Sanitation Law shall conform to the elution test for cadmium and lead.
- (5) In the production process of the product, the air and water pollution, noise, vibration, offensive odor and emission of toxic substance shall conform to the related environmental regulations and pollution control agreements.
- (6) The packaging of the product shall be easy to recycle and its environmental impact shall be small when incinerated.
- (7) The product shall be recyclable after the end of use. Its parts composed of other kinds of materials shall be easily detachable.

4) Construction Materials

- (1) The product shall contain glass material by more than 50% (by weight) of its total weight. However, for the product using glass-recycled lightweight aggregates, the value obtained from the formula below shall be more than 0.5:

Calculation formula: $\frac{1.7/(\text{mass of glass-recycled lightweight aggregates per unit volume})}{(\text{weight of product})}$	x	(weight of glass-recycled lightweight aggregates)	+	(weight of glass cullet excluding aggregates)
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Significant figure: To the second decimal place (rounded off at the third decimal place)

- (2) The glass cullet content shall be 100% (by weight).
- (3) Safety of the glass cullet (elution of total mercury, chromium, arsenic, selenium) used in the product shall be verified and explained. The elution of the subject materials shall conform to the requirement of the Environmental Standard concerning soil pollution (the Ministry of Environment Notice No.46, Aug.23, 1991).
- (4) The coloring agent used in the product shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compound as its constituent.
- (5) In the production process of the product, the air and water pollution, noise, vibration, offensive odor and emission of toxic substance shall conform to the related environmental regulations and pollution control agreements.
- (6) The packaging of the product shall be easy to recycle and its environmental impact shall be small when incinerated.
- (7) The product shall be recyclable after the end of use. Its parts composed of other kinds of materials shall be easily detachable.
- (8) The non-firing product of glass-concrete mixture shall be verified for alkali aggregate reaction by the harm removal test in accordance with JIS A 5308 (Mortar Bar Method). For the product to be used as a non-firing product by removing harms through firing or coating after mixing glass, the harm removal test is not required.
- (9) The glass cullet shall be processed with edgeless treatments (melting, edge rounding).

5) Electrical Glass

- (1) The glass cullet content of the product shall be more than 20% (by weight).
- (2) Safety of the glass cullet used (elution of cadmium, lead, total mercury, chromium, arsenic, selenium) shall be verified and explained. The elution of the subject materials shall conform to the requirement of the Environmental Standard concerning soil pollution (the Ministry of Environment Notice No.46, Aug.23, 1991).
- (3) The coloring agent used in the product shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compound as its component. However, this requirement for mercury will not apply for

the glass tube used in fluorescent lamps. Also, the requirement for lead will not apply for CRTs.

- (4) In the production process of the product, the air and water pollution, noise, vibration, offensive odor and emission of toxic substance shall conform to the related environmental regulations and pollution control agreements.
- (5) The sorted disposal or recovery system shall be prepared for the product at the disposal.

6) Glass for Physics, Chemistry and Medical Use

- (1) The glass cullet content of the product shall be more than 20% (by weight).
- (2) Safety of the glass cullet used (elution of cadmium, lead, total mercury, chromium, arsenic, selenium) shall be verified and explained. The elution of the subject materials shall conform to the requirement of the Environmental Standard concerning soil pollution (the Ministry of Environment Notice No.46, Aug.23, 1991).
- (3) The coloring agent used in the product shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compound as its constituent.
- (4) In the production process of the product, the air and water pollution, noise, vibration, offensive odor and emission of toxic substance shall conform to the related environmental regulations and pollution control agreements.
- (5) The packaging of the product shall be easy to recycle and its environmental impact shall be small when incinerated.

7) Plate Glass

- (1) The glass cullet content of the product shall be more than 10% (by weight).
- (2) Safety of the glass cullet used (elution of cadmium, lead, total mercury, chromium, arsenic, selenium) shall be verified and explained. The elution of the subject materials shall conform to the requirement of the Environmental Standard concerning soil pollution (the Ministry of Environment Notice No.46, Aug.23, 1991).
- (3) The coloring agent used in the product shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compound as its constituent.
- (4) In the production process of the product, the air and water pollution, noise, vibration, offensive odor and emission of toxic substance shall conform to the related environmental regulations and pollution control agreements.
- (5) Parts that compose the product shall be easy to separate with each other, so that the product will satisfy the glass cullet acceptance standard defined in Attached Table 1 as a material for plate glass at the recycling.

(6) The overall heat flow resistance of the sealed insulating glass shall be more than $1/U0.25K\text{-}m^2/w$.

8) Safety Glass for Road and Railway Vehicles

- (1) The glass cullet content of the product shall be more than 10% (by weight).
- (2) Safety of the glass cullet used (elution of cadmium, lead, total mercury, chromium, arsenic, selenium) shall be verified and explained. The elution of the subject materials shall conform to the requirement of the Environmental Standard concerning soil pollution (the Ministry of Environment Notice No.46, Aug.23, 1991).
- (3) The coloring agent used in the product shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compound as its constituent.
- (4) In the production process of the product, the air and water pollution, noise, vibration, offensive odor and emission of toxic substance shall conform to the related environmental regulations and pollution control agreements.
- (5) The product shall satisfy the glass cullet acceptance standard defined in Attached Table 2 as a material for glass at the recycling.

4-2. Quality Criterion

- (1) The product quality shall conform to the laws including the Food Sanitation Law, JIS standards, or self-imposed standards of the industry. Further, the quality control shall be fully practiced at the production process.

5. Certification Procedure

- (1) Data that verify conformance of the product to each criterion shall be attached to the application form.
- (2) As for the requirement specified in 4-1.(1)(4-1.(1) and (2) for construction materials), the glass cullet content shall be clearly identified in the Eco Mark application form. For the glass daily necessities, pottery and chinaware daily necessities, and construction materials, the weight fraction of glass materials in the product shall be clearly identified in the Eco Mark application form. For the product that uses cement and plaster, the weight of product is to include that of water for mixing.
- (3) As for the requirement specified in 4-1.(2)(4-1.(3) for construction materials), purchasing methods and acceptance test standards (for cadmium, lead, mercury, chromium, arsenic, and selenium; test for some substance might not necessary depending on the subject product) of the glass cullet shall be submitted.
- (4) As for the requirement specified in 4-1.(3)(4-1.(4) for construction materials), the ingredient or Material Safety Data Sheet (MSDS) for coloring agents and others issued by their manufacturer shall be submitted.

- (5) As for the requirement specified in 4-1.(4) for glass bottles and glass daily necessities, the test results prescribed in the Food Sanitation Law shall be submitted.
- (6) As for the requirement specified in 4-1.(4)(4-1.(5) for glass bottles, glass daily necessities, and construction materials), the self-provided certificate that testify their conformance and non-violation of local environmental regulations applicable to the glass manufacturing factory for the past 5 years prior to the application, issued by a director of the plant that produces the product, shall be submitted.
- (7) As for the requirement specified in 4-1.(5) for glass for physics, chemistry and medical use (4-1.(6) for glass daily necessities and construction materials), the packaging materials shall be explained specifically in the Eco Mark application form.
- (8) As for the requirement specified in 4-1.(5) for electrical glass, a description of sorted disposal or recovery system at disposal (a system of sorted disposal or recovery, disposal capacity, details of disposal, etc.) shall be submitted.
- (9) As for the requirement specified in 4-1.(5) for plate glass and safety glass for road and railway vehicles, details shall be explained specifically in the Eco Mark application form.
- (10) As for the requirement specified in 4-1.(6) for glass bottles, whether the composition of glass bottle is soda lime glass or not shall be explained specifically in the Eco Mark application form.
- (11) As for the requirement specified in 4-1.(6) for the plate glass, the overall heat flow resistance shall be explained specifically in the Eco Mark application form.
- (12) As for the requirement specified in 4-1.(7) for construction materials (4-1.(7) for glass daily necessities), the names of part that is composed of other kinds of material and the method of separation shall be explained specifically in the Eco Mark application form.
- (13) As for the requirement specified in 4-1.(8) for construction materials, the result of harm removal test prescribed in JIS A 5308 (Mortar Bar Method) shall be explained specifically in the Eco Mark application form for glass-concrete mixed non-firing products. For the product, which is used as a non-firing product through harm-elimination processes such as firing or coating after mixing the glass, such fact shall be explained in the Eco Mark application form. For the product that is not incorporating the glass-concrete mixing, such fact shall be explained in the Eco Mark application form.
- (14) As for the requirement specified in 4-1.(9) for construction materials, the method of edge treatment for glass cullet shall be explained specifically in the Eco Mark application form.
- (15) As for the requirement specified in 4-2.(1), a certificate of product's conformance to subject quality standards shall be submitted. Otherwise, a self-provided certificate to testify that the quality control is fully practiced in the production process and there is no violation of regulations, issued by a

director of the plant that produces the product, shall be submitted.

6. Others

- (1) For glass bottles, bottlers (business entities responsible for content of the bottle) shall apply for the Eco Mark. However, industry associations etc. that are composed of multiple bottlers may apply for the Eco Mark as one entity.
- (2) The product classification shall be in accordance with the usage listed in 2. “Applicable Product” and for each brand name. Classification by size or color of the product shall not be applied. Application shall be considered identical even if the glass cullet content is different.
- (3) A certification number shall be printed near the Eco Mark identification. For glass bottles, a notice such as “This bottle is using recycled glass and certified for the Eco Mark. The Eco Mark and the content are not related.” shall be printed. The applicant shall clearly explain that the Eco Mark is not related to the content of the bottle. This notice shall be clearly written on the Eco Mark application form at the application.
- (4) The notice in the lower of the Eco Mark shall be the environmental information marking shown below. In this case, it shall be a single-column description of left justified text in a rectangular box, with the indication of: “Recycled glass: XX%”. XX% shall indicate the weight fraction of glass cullet in the whole product weight.



Attached Table 1: Acceptance Standard of Glass Cullet as a Material for Plate Glass (Proposal by the Plate Glass Association)

1. Impurities other than window glass	
(1) Sealant, laminate, film, paper, sticker, rubber, paste, organic materials such as wood, organic compounds	
Size	Permissible level
Over 10 mm	Not to be contained
Under 10 mm	Under 20 ppm (under 20g/ton)
*Excluding those vapor deposited or laminated with metal.	
(2) Stone, sand, ceramics, cement, etc.	
Size	Permissible level
Over 0.5 mm	Not to be contained
Under 0.5 mm	Under 10 ppm (under 10g/ton)

(3) Iron scraps (Excluding special steel containing nickel, such as stainless steel, etc.)

Size	Permissible level
Over 1 mm	Not to be contained
Under 1 mm	Under 10 ppm (under 10g/ton)

(4) Aluminum alloy, nonferrous metal, nickel compound

Size	Permissible level
All	Not to be contained

2. Water Less than 2.5%

3. Size Over 2 mm ϕ under 100 mm ϕ

4. Glasses not to be mixed

(a) Transparent glass, heat absorbing glass, wired glass and patterned glass shall not to be mixed with each other.

(b) Glass for construction use, for which the composition is widely different to soda lime glass (ordinary plate glass for construction use), such as borosilicate glass and transparent crystalline glass.

(c) Laminated glass, print-attached glass

(d) Glasses other than for construction use (bottle, mirror, display, interior decoration glass, heat-resistant glass, tableware, etc.)

Attached Table: 2 Acceptance Standard for Scrapped Car (Proposal by the Plate Glass Association)

1. Acceptance Standard

(1) Permissible level of impurities other than glass for automobiles

Impurities	Size	Permissible level	Note
1) Laminate of laminated glass, film, paper, sticker, rubber Plastic, paste, organic materials such as wood, organic compounds (Excluding those vapor deposited or laminated with metal)	Over 10mm	Not to be contained	
	Under 10mm	Under 20ppm	Under 20g/ton
2) Stone, sand, ceramic, Cement, etc.	Over 0.5mm	Not to be contained	
	Under 0.5mm	Under 10ppm	Under 10g/ton
3) Iron fillings (Excluding special steels containing nickel, such as stainless steel, etc.)	Over 1mm	Not to be contained	
	Under 1mm	Under 10ppm	Under 10g/ton
4) Aluminum, nonferrous metal, Nickel compound	All size	Not to be contained	

(2) Water Less than 2.5%

(3) Size Over 2mm ϕ Under 100mm ϕ

(4) Glass not to be mixed

Glass to be recovered is a transparent portion of tempered glass with TV of over

70%, UV tempered glass, and laminated glass, sorted separately. Accordingly, the following glasses shall not be mixed.

- Tempered glass with TV under 70%
- Glasses other than for automotive use (bottle, headlamp, etc.)
- Print-attached glasses such as black ceramic band, rear defogger

Scheduled date of establishment: June 1, 2002

These certification criteria for the product category will be reviewed in five years after the date of enactment, and the certification criteria and/or the product category will be revised or abolished.

Product Certification Criteria for “Glass Products”

Scheduled Establishment: June 1, 2002

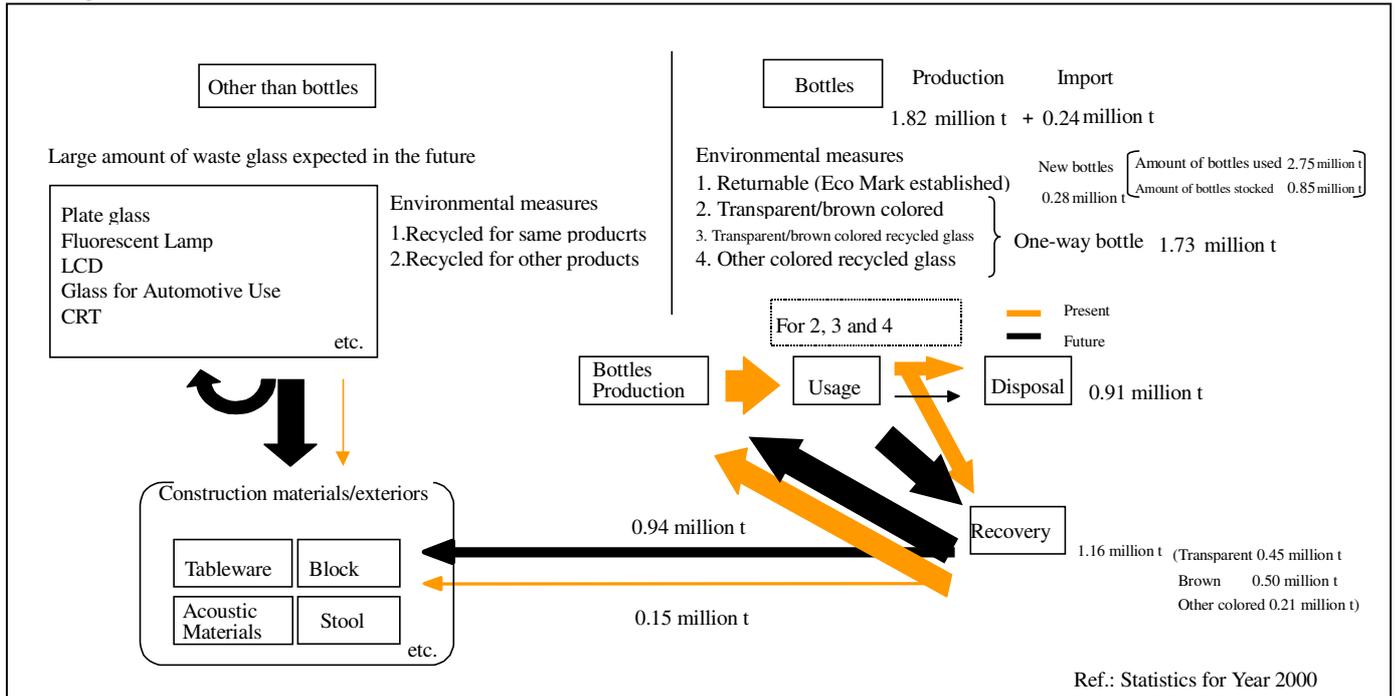
1. Environmental Background

The material flow regarding glass is as shown below in the Figure, “Circulation Flow of Glass”. When the glass cullet is used as a raw material for glass bottles, single-colored, transparent or brown cullet are more manageable than cullet of other colors.

In view of environmental considerations for the glass products, the utmost priority is, in the case of glass bottles, on the promotion of returnable bottles, and the environmental impacts are expected to become less as the number of times of bottle return increases, as reported in the LCIA results, “Report on Comparison of Containers by LCA Method (Revised) dated Aug. 2001 (Container Comparison Study Group: I. Yasui, Representative)”. In the Eco Mark project, the Eco Mark product category No.121 “Returnable Container/Packaging Material” is already established in accordance with this course of action, and the recycle of glass cullet is adopted in the requirements of present product category as the next action. In this respect, the glass cullet reuse rate for transparent and brown colored cullet is already fairly high, and therefore the improvement of reuse rate for other colored cullet is the current target. Accordingly, the present product category aims to promote recycling of the other colored cullet.

In glass products other than glass bottles, the glass cullet is used in construction materials and exteriors, where waste glass bottles have been mostly used. In the future, a large amount of waste glass from sorted recovery practice is expected to come out as the legislations for creating a recycling-oriented society, such as the “Law for Recycling of Specified Kinds of Home Appliances (Home Appliance Recycling Law)”, and “Law for Promotion of Effective Utilization of Resources”, “Law on Recycling Construction-related Materials (Construction Materials Recycling Law)”, are enforced. Thus the criteria applicable to whole glass products are considered in this category.

Figure Circulation Flow of Glass



2. Applicable Products

As a whole, the category assumes products prescribed by such standards as the Japan Industrial Standard as applicable products. The application is limited only to products that comply with standards, because so-called industrial art objects are difficult to confirm their performance.

As for glass fibers, the criteria were prepared by assuming the products of which the body is solely made of glass. Regarding products complying to the “Man made mineral wool thermal insulation materials for dwellings” JIS A 9521, “Man made mineral fiber thermal insulation materials” JIS A 9504, “Loose fill thermal insulation” JIS A 9523, and “Sound absorbing materials” JIS A 6301”, those are excluded from the scope of this category as those will be dealt with in the Eco Mark product category “Products for Construction Using Recycled Materials (Proposal)”.

The “Liquid Crystal Panel” is excluded from the scope, as its recycle from glass to glass is technically difficult at the moment.

As for the “Disk of the Hard Disk Drive” and “Optical Fiber”, they are to be included in the glass daily necessities when applications are made for the Eco Mark, although glass cullet is difficult to incorporate in those products.

As for the “Tile Block”, it is excluded from this product category, as it is dealt with in the Eco Mark product category No.109 “Tile-blocks made of recycled materials”. However, the product complying to “Hollow glass blocks” JIS A 5212 is out of scope of the category “Tile-blocks made of recycled materials” and made solely of glass, so it is included in the scope of this product category.

3. Terminology

The definition of “Recycle” is prepared on the basis of ISO 14021 similarly as for other product categories. However, as the energy recovery or oil regeneration are not conceivable in the case of glass, descriptions not applicable were deleted.

The ground glass waste is included in the “Cullet” if it satisfies certain conditions. For the “Glass-Recycled Lightweight Aggregates”, the definition complies with that of the “Study Group Report on the High-performance Lightweight Concrete (Japan Concrete Institute)”.

4. Criteria for Eco Mark Certification

4-1. Details of Establishing Environmental Criteria

For setting up the criteria, environmental impacts over the whole life cycle of a product was considered, using the “Chart for Selecting Environmental Impact Items at Each Stage of Product Lifecycle.” As a result, impact items that are considered to be important to establish criteria for Eco Mark certification were selected. For these items, qualitative or quantitative criteria were established.

Environmental impact items considered for the category of “Glass Products” are as shown in the “Chart for Selecting Environmental Impact Items at Each Stage of Product Lifecycle” (X in the Chart). Out of these items were finally selected as the environmental criteria: A-1, A-8, B-5, B-6, B-8, B-9, C-1, C-7, D-2, E-7, F-1, F-8, and F-9 (XX in the Chart).

The blank columns in the table show items that were out of the scope of review or which were reviewed in combination with other items. Following is the details of establishing environmental criteria.

Table “Chart for Selecting Environmental Impact Items at Each Stage of Product Lifecycle”

Environmental Impact Item	Product Life Stage					
	A. Resource Extraction	B. Manufacturing	C. Distribution	D. Use/Consumption	E. Disposal	F. Recycling
1. Resource consumption	XX		XX	X	X	XX
2. Discharge of greenhouse gases		X		XX	X	
3. Discharge of ozone layer depleting substances						
4. Destruction of ecosystem						
5. Discharge of atmospheric pollutants		XX	X			X
6. Discharge of water pollutants		XX				X
7. Discharge/disposal of wastes			XX		XX	
8. Use/discharge of hazardous materials	XX	XX		X		XX
9. Other environmental impacts		XX				XX

A. Resource Extraction Stage

A-1 Resource Consumption

The following points were examined in this item:

The glass cullet content of the product shall be more than XX%
(by weight).

(1) For the product using glass-recycled lightweight aggregates, the weight fraction of glass material in the whole product may be more than the value obtained from a calculation formula.

In the glass industry, efficient use of in-house wastes has been practiced for some time. In the present product category, in addition to the efficient use of in-house wastes, the recycle of glass cullet is considered effective for protecting environment, as described in the environmental background. Accordingly, these points were selected for the criteria.

In the light of recycling, every kind of glass is not the same, and there are recyclable and non-recyclable glasses. Also, different kind of glasses such as soda lime glass (plate glass, bottle, tableware, etc.), borosilicate glass (glass for physics and chemistry, heat-resistant glass, lighting equipment, etc.), or lead glass cannot be mixed when recycled.

The safety glass for automotive use is laminated, and an intermediate layer of film exists between glasses. This makes its recycling difficult, and automotive manufacturers are now studying the design for recycle of the automotive safety glass to improve the recycle rate of automobiles. Considering such background, a glass cullet content of 7% was initially proposed based on the test calculation made by the industry association. However, there were opinions that this value is too low. After a reexamination, the required glass cullet content of 10% was set by subtracting a value of 40% for the in-house cullet usage rate from the design value of cullet usage rate of 50% for a glass-melting kiln. The criterion for plate glass was also set following the same reasoning. Although the production volume of plate glass is large and efficient usage of cullet generated in the factory is in progress, the recycling of glass cullet is not practiced because the recovery system is not prepared yet. Therefore, the present value of 10% should be reviewed as the situation progresses.

Among daily necessities, the quality requirements against bubbles and color of tableware are particularly strict, and no tableware manufacturers are using post-consumer materials. Although pre-consumer material wastes coming out from the plate glass factory could be utilized, actual use of such wastes is difficult because the quality requirement against color is severer than for the plate glass. However, the Ryukyu glass is the product derived from recycling of the empty bottles, and the use of glass cullet in tableware was judged possible. As for pottery and china tableware, the required glass cullet content of 70% was set referring to the test results published by the industry association. There were discussions that this class of product should be excluded from applicable products, because raw materials other than glass are used in the pottery and chinaware. However, it was included in the applicable products, as it was considered effective to promote utilization of the glass cullet.

For the glass fiber, 83 to 85% at the most, or officially 80% of the glass cullet (pre-consumer material wastes in the plate glass factory, etc.) is used and recycled. Other than this amount, about 5% of in-house waste is used.

The electrical glass (glass tubes for fluorescent lamps) will give ill effects to the melting furnace at the recycling process, because mercury diffuses and permeates into glass. Also, a half of the straight-tube fluorescent lamps are applied with tin film to introduce rapid start capability. Its effect at the recycling is another concern. 95% of the used fluorescent lamps are processed for mercury removal before burial. Removal of tin and mercury that have diffused and permeated into glass is the key for recycling. There is no problem in utilizing the in-house generated waste. The glass valve for light bulb for home use is mostly buried because its production volume is rather small, although there is no problem in the recycling of its glass bulb part. The recycling of glass for physics and chemistry is not difficult, but the actual recovery rate is limited to only a few %. It is considered possible to increase the requirement for glass cullet content of the electrical glass and glass for physics and chemistry to about 20%.

For the glass bottles, the glass cullet content is already exceeding 70%. However, the use of other colored cullet is slow, and this product category aims to widen the pipe of circulation. The glass cullet content for other colored glass is set at 90% because the glass bottles using other colored glass cullet are already commercialized.

Lightweight aggregates made by firing and foaming glass cullet are already used in daily necessities and construction materials. A volume ratio-based utilization rate was set in the Eco Mark product category No.64 "Products Made from Recycled Cullet", but it is changed to a weight ratio-based rate in this product category in accordance with the provision of ISO 14021. Thus the characteristics of lightweight aggregates might not be utilized. Therefore, the glass content should be considered by mass per unit volume of the lightweight aggregates which is well established as a product field.

A-8 Use/discharge of hazardous materials)

The following point was examined in this item:

Safety of the glass cullet as a raw material (elution of cadmium, lead, total mercury, chromium, arsenic, selenium, etc.) shall be verified and explained. The elution of the subject material shall conform to the requirement of the Environmental Standard concerning soil pollution (Ministry of Environment Notice No.46, Aug. 23, 1991).

Heavy metals are used in glass as coloring agents or additives (clearing agent, de-coloring agent, etc). Therefore, the glass cullet used as a recycled material contains these chemical substances. It is known that glass can retain metals at a chemically stable condition. So, the requirement was set as to confirm that the level of metal elution is not a problem, and the chemical substances are to be controlled and those contained in the recycled materials to be prevented from diffusion. On the condition that the substances controlled in the environmental standards shall comply with their regulation limit, this item was selected and included into the items for preparing the criteria for all the glass products.

B. Manufacturing Stage

B-2 Discharge of greenhouse gases

The following point was examined in this item:

- (1) The energy consumed and fossil fuels used in the manufacturing and firing processes shall not increase as compared to products not using recycled materials.

For the glass bottles using recycled materials, it is clearly shown that 10% increase of the glass cullet content will save required amount of fuel by about 2.5% resulting in energy savings. The required glass cullet content is set as a criterion for each applicable product. Therefore, this item was not selected for the criteria.

B-5 Discharge of atmospheric pollutants

The following point was examined in this item:

- (1) Hazardous materials shall not be generated/discharged in the production process.

Regarding this subject, it is considered necessary to suppress the generation/discharge of hazardous materials in the production process as much as possible. Therefore, the criteria were set as the manufacturing factory to comply with the local agreements, regulations and laws of its site, and to be controlled properly. This item is applicable not only to the discharge of atmospheric pollutants but also to that of water pollutants and other hazardous effects such as vibration, noise and bad odor. Following a similar reasoning, those discharges shall comply with the standards set in agreements, regulations and laws of the corresponding area.

B-6 Discharge of water pollutants

The following point was examined in this item:

- (1) Hazardous materials shall not be generated/discharged in the production process.

This subject (1) is examined collectively in B-5, so the discussion is omitted.

B-8 Use/discharge of hazardous materials

The following points were examined in this item:

- (1) The coloring agents used in the product shall not contain cadmium, lead, mercury, chromium, arsenic, selenium and their compounds as a constituent.
- (2) For the solar reflective glass, attention should be paid to the content of metals such as nickel, cobalt and selenium.

As for the point (1), there was an opinion that hazardous materials in the raw material used in coloring agents, etc. should be considered, expecting the usage of

coloring agents and additives that contain heavy metals. It is known that glass can retain metals at a chemically stable condition. According to the result of test done by a related industry association, the elution of lead, cadmium, chromium and arsenic was not found (detection limit less than 10 ppb). However, the Food Sanitation Law controls the elution of cadmium and lead from glass, so the requirement for tableware and glass bottles was set as to conform to the control values of this Law. Furthermore, it was decided that the prevention of chemical substance diffusion at glass cullet production and effects at the disposal processing were to be considered by avoiding the use of materials controlled by the environmental regulations throughout the glass products in general. Thus the item was included in the criteria.

A small amount of selenium is used in the tableware as a de-coloring agent. This treatment is utilizing the principle of complementary color. High-quality silica sand is colorless, and the de-coloring agent is not applied. Also, cobalt and other elements are used as a substitute when selenium is not used.

The elution of these elements from glass is possible, but the test method is not standardized. Therefore, the requirement for selenium in the tableware was not included in the criteria.

In the safety glass for automotive use, lead is contained in the part called "black ceramic band". It was decided that the situation will be reviewed in the future, and the use of lead is to be permitted for the moment.

As for the point (2), heavy metals are used in the product, as explained in the discussion of point (1). The requirement could not be established for the subject, because there are no substitutes for those coating agents at the moment.

B-9 Other Environmental Impacts

The following point was examined in this item:

(1) There should be no problems of noise and vibration in the manufacturing process.
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As for this item, it was judged that the environmental impacts will be reduced when the related environmental regulations and antipollution agreements are observed by appropriately responding to claims from neighborhood. Therefore, the item was included in the criteria.

C. Distribution Stage

C-1 Resource Consumption

The following points were examined in this item:

(1) Weight reduction of the product (2) Use of returnable materials for distribution such as P-box of refined sake. (3) Easy to recycle packages and reduced environmental impacts at the incinerated disposal of the product (4) Packages of the product and papers attached for transportation should be recovered after use.
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As for the point (1), it was not included in the criteria because of the difficulty in setting up the numerical requirements. Suppliers are making efforts of environmental protection such as energy savings by increasing the use of lightweight bottles.

As for the point (2), it is targeted on the materials used in distribution of the product. As will be explained in the next point (3), there are many applicable products, which are using returnable packaging materials. It was decided that new effects of environmental protection will be hard to obtain even if an examination rule for returnable packaging materials is prescribed. Therefore, the item was not included in the criteria.

As for the point (3), there was a view that the suppression of excessive packaging and covers is effective to reduce the consumption of resource. It is difficult to set any numerical standards for this item. Accordingly, a voluntary effort of applicant shall be urged through the reporting at the application for the Eco Mark. Thus the item was included in the criteria for the applicable products provided with one-way individual packaging for home-use, etc.

Also, among the applicable products that are not selected to set the criteria, iron pallets are used for the automotive safety glass, and they are used over and over. Flexible container, polyethylene bags, and cardboard are used for the glass fiber. Returnable packaging materials are commonly used for the electrical glass, and those such as pallets are also used for glass bottles, which incorporate bulk or shrink packaging.

As for the point (4), attached papers are recycled as used paper or, for those damaged too badly to be recycled, burned as industry wastes. Therefore, after discussion, the item was not included in the criteria.

C-5 Discharge of Atmospheric Pollutants

The following point was examined in this item:

(1) Replacement to low-pollution cars

As for the point (1), the subject was not selected for inclusion in the criteria because the setting up of numerical standard and verification of conformance are difficult. Suppliers are already making such efforts.

C-7 Discharge/disposal of wastes

The following points were examined in this item:

(1)Efficient loading shall be practiced during the distribution by truck and ship transportation.
(2)Packaging of the product shall be easy to recycle and less in environmental effects at the incinerated disposal.
(3)Packaging of the product and attached papers for transportation shall be recovered after use.

As for the point (1), the subject was not selected for inclusion in the criteria because the setting up of numerical standard and verification of conformance are difficult. Suppliers are already making such efforts.

The points (2) and (3) were examined collectively in C-1, so the discussion is omitted.

D Use/consumption Stage

D-1 Resource Consumption

The following points were discussed in this item:

- (1) The bottle shall be returnable.
- (2) Supplemental materials shall not be used.
- (3) Wastes such as caps shall be recycled.

As for the point (1), there was a concern that the inclusion of this item in the criteria will set the hurdle of Eco Mark certification too high, as the utmost priority of this product category is placed on the promotion of glass cullet utilization. Therefore, the item was not included in the criteria. However, the Eco Mark product category No.121 “Returnable Container/Packaging Material” is already established for the returnable materials and the use of returnable materials has priority over recycling for container and packaging material.

As for the point (2), the subject was not selected for inclusion in the criteria because the setting up of numerical standard and verification of conformance are difficult.

As for the point (3), the subject was not selected for inclusion in the criteria because caps are disposed or recycled by the consumer.

D-2 Discharge of Greenhouse Effect Substances

The following point was examined in the item:

- (1) The sealed insulating glass shall be of energy saving specifications.

As for the point (1), the criteria are established for the Eco Label in North Europe and the U.S. Although the calculation method of the coefficient of overall heat transmission in the U.S. is different, fairly high level of less than 1.4W/m²K is set for the requirement in North Europe. The requirement for insulating performance is considered severe in North Europe because of a higher latitude. After examining the overall heat transmission data from suppliers, the value of overall heat transmission resistance 1/U prescribed in JIS R 3209 was adopted in the criteria.

D-8 Use/discharge of hazardous materials

The following point was examined in this item:

- (1) Dusts including hazardous materials shall not be generated in usage.

As for the point (1), the carcinogenesis is not a concern for dusts from the glass fiber. According to the International Agency for Research on Cancer (IARC), dusts have been classified as Class 2B, "Possible carcinogenesis on human". However, those were reevaluated to Class 3, "Not classifiable for carcinogenesis on human", in October, 2001. Therefore, it was determined not necessary to set a requirement.

E. Disposal Stage

E-1 Resource consumption

The following point was examined in this item:

(1) Ease of reducing volume, ease of disposal.
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As for the point (1), the basic idea is the design for recycling, and it is considered to be a common idea. Therefore, the ease of disposal was not selected as an item for preparing the criteria.

E-2 Discharge of Greenhouse Effect Substances

The following point was examined in this item:

(1) There shall be no difference in the discharge of greenhouse effect substances at the disposal.
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The point (1) was examined collectively in B-2, so the discussion is omitted.

E-7 Discharge/disposal of wastes

The following points were examined in this item:

(1)Sorted disposal systems shall be prepared for the disposal. (2)The product shall be recycled. (3)Raw materials other than glass shall be identified in the application form.

Regarding the points (1) and (2), the preparation of sorting and recovery system is slow for many of the applicable products, while the legislation is in place for glass bottles, construction materials and CRTs. Therefore, the establishment of criteria is difficult for the products for which system preparation is slow, while it is possible for those with appropriate legislation. The subject was selected for the item in the criteria accordingly.

As for the point (3), caps and labels will fall under the condition for bottles. The subject was raised because toxic gases may be generated from the incinerated disposal. Generally, the disposal after use is done by incineration if not be recycled, but a uniform standard is difficult to set for the product. The procedure of reporting at the Eco Mark certificate application was examined, but it was decided that new effects of environmental protection will not be probable. Therefore, the subject was not

selected for the item for preparing the criteria.

F. Recycling Stage

F-1 Resource consumption

The following points were examined in this item:

- (1) Resource consumption shall be small at recycling.
- (2) The product shall be further recyclable after use. Different constituents shall be easy to separate.
- (3) Law materials other than glass shall be clearly identified in the application form.
- (4) Separation of different materials shall be easy and the system of sorted recovery be prepared, and the technology of eliminating foreign body be established, so that the glass cullet could meet the acceptance standard (see Reference 1)) as a raw material for the plate glass.

This item is also related with F-9, and the restriction on use of materials other than glass in the design of recyclable products was included in the criteria. Specifically, the requirement refers to the mixing of foreign bodies, restriction on types of glass (soda lime glass, borosilicate glass, etc.), and ease of sorting by material.

F-5 Discharge of atmospheric pollutants

The following point was examined in this item:

- (1) Atmospheric pollutants shall not be discharged from the recycling process.

As described in the item E-5, it is virtually difficult for the manufacturers to guarantee disposal processes for the recycling, and they cannot control the discharge to be within atmospheric standard requirements in the actual situation.

Therefore, the item was not selected for inclusion in the criteria.

F-6 Discharge of water pollutants

The following point was examined in this item:

- (1) Water pollutants shall not be discharged from the recycling process.

Processes such as washing of cullet might be expected regarding this subject. As described in the item E-5, it is virtually difficult for the manufacturers to guarantee disposal processes for the recycling, and they cannot control the discharge to be within waste water standard requirements in the actual situation.

Therefore, the item was not selected for inclusion in the criteria.

F-8 Use/discharge of hazardous materials

The following point was examined in this item:

- (1) Strongly toxic materials such as heavy metals shall not be included at the recycling.

The point (1) is examined collectively in B-8, so the discussion is omitted.

F-9 Other environmental impacts

The following points were examined in this item:

- (1) The product shall be further recyclable after use. Different constituents shall be easy to separate.
- (2) Law materials other than glass shall be clearly identified in the application form.
- (3) The non-firing product of glass-concrete mixture shall be verified for alkali aggregate reaction by the harm-removal test in accordance with JIS A 5308 (Mortar Bar Method). For the product to be used as a non-firing product by removing harms through firing or coating after mixing glass, the harm-removal test is not required.
- (4) The glass cullet shall be processed with edgeless treatments (melting, edge rounding).

This item is examined collectively in F-1, so the discussion is omitted.

3 to 7% of resin is used in the glass fiber. The resin is usually removed by incineration. However, the glass wool can be recycled even if resin is used. As for the long fibers, the production process is extremely sensitive to the inclusion of foreign bodies, and the recycling is difficult. Therefore, the item was not selected for inclusion in the criteria.

In order to recycle the glass bottles, they are required to be made of soda lime glass. Therefore, the item was selected for inclusion in the criteria.

In the daily necessities, the mirror cannot be recycled because it is coated with silver. Therefore, the item was not selected for inclusion in the criteria.

In the construction materials, mixing of materials such as glass-concrete mixing is permitted. Therefore, the ability to separate “parts” made of different materials was set as a criterion.

As for the points (3) and (4), those were included in the items for preparing the criteria as performance evaluation requirements.

5. Others

For the classification of applicant, the application for glass bottles is to be made by the bottler (business entities responsible for content of the bottle). In the case of common bottles, recycling activities by multiple business entities, rather than by a single entity, are common. In order not to hinder the Eco Mark application procedures, it was clearly indicated that a single application by a collaborating body (industry associations, etc.) composed of multiple entities is acceptable. When a collaborating body makes a single application for products made by multiple entities, the conditions for Eco Mark certification are that; the applied products are identical, the collaborating body is the Eco Mark contracting party, and there is a restriction for usage of the Eco Mark for participants of the collaborating entities.