

## Product Certification Criteria for “Tile-Block Version 2.1”

Revised: June 10, 2004

### 1. Environmental Background

The following table compares the effective use of recycled main wastes used in tile-blocks based on materials from 1990 to 1994 and from 1999 to 2001.

**Table Changes in Effective Use Rate of Wastes for Recycled Materials in Tile-Blocks**

Type of Waste/By-Product		Year	Effective Use Rate	Year	Volume Generated/Year	Effective Use Rate	
Slag	Blast furnace slag	1994	100%	*1	2001	23,290,000 tons	99%*2
	Converter slag	1994	90%	*1	2001	13,720,000 tons	97%*2
	Waste molding sand	1990	41%	*1			
Sludge	Water supply sludge	1993	26%	*1	2000	356,000 tons	37%*3
	Waste water sludge	1993	25%	*1	2000	2,090,000 m <sup>3</sup>	56%*4
	Construction sludge	1993	2%	*1	2000	8 million tons	41%*5
Ash	Coal ash	1993	62%	*1	1999	7,600,000 tons	81%*6
	Waste incineration ash	1993	1.6%				
Construction debris	Concrete lump	1993	67%	*1	2000	35 million tons	96%*5
	Asphalt /concrete lump	1993	78%	*1	2000	30 million tons	98%*5

\*1:1995 White Paper on the Environment

\*2: Nippon Slag Association materials

\*3: Japan Water Works Association materials

\*4: Japan Sewage Works Association materials

\*5: 2000 Construction By-Products Survey Results (Ministry of Land, Infrastructure and Transportation)

\*6: Center for Coal Utilization, Japan materials

Blast furnace slag, steel-making slag, large pieces of concrete, large pieces of asphalt-concrete, etc. are used 100% effectively. The effective use of sludge and ash is also greater than 80%, with increasing reuse of sludge. This promotion of effective use is decreasing the volume of wastes that are disposed. There is, however, no data on the effective use of waste incineration ash for 1999 to 2001. Waste incineration ash is currently converted to melted sludge as measures to reduce dioxins and extend the life of the final waste disposal site, and the effective use of this melted sludge is reportedly about 40%\*1). Compared to the period from 1993 to 1994, the effective use of all wastes during the latter period has increased as shown in the table.

The production of tiles in 2001 totaled 53,000,000m<sup>2</sup> \*2). With concrete blocks, the production volume of those used for bank protection was 2,760,000 tons, and 7,620,000 tons\* for road construction<sup>3</sup>). Of these tile-block products are used in construction work, those made of recycled materials were estimated to still account for as low as about 5% for interlocking blocks and 10% for tiles.

The Basic Law for Establishing the Recycling-based Society, enforced in 2001, aims to reduce the consumption of natural resources and reduce environmental load by developing material recycling in the community. This law prescribes the priority of

waste disposal methods as: reduction of emissions (reduction), reuse as products and parts (reuse), recycling as raw materials (recycling), and heat recovery. To fulfill their extended producer responsibilities, manufacturers are called to make efforts to give consideration to the environment such as reduction of emissions, reuse, and recycling in all stages of product life-cycle from manufacturing to disposal.

Under such changing social circumstances, reviews carried out to establish Version 2.0 of Product Category 109 covered reduced emissions of wastes through extended product life and simplified packaging in addition to the reuse of wastes. With anticipated progress of technologies that can render environmental preservation and improvement functions to products, the importance of such technologies to the Eco Mark Program was also examined.

- \*1) National Institute for Environmental Studies. 2002 Study on Promotion of Reuse of Melted Waste Slugs, NIES Annual Report 2001, p104-105.
- \*2) Ministry of Economy, Trade and Industry. Bulletin on Sundry Goods Statistics 2001
- \*3) Ministry of Economy, Trade and Industry. Bulletin on Ceramic Engineering and Construction Materials Statistics 2001

## **2. Applicable Products**

This product category undertakes tiles, bricks, and blocks for construction and road pavement purposes. Applicable products of each material category correspond to JIS, JASS 7 or ISO, which are given in “2. Applicable Products” in this certification criteria. Products falling outside the categories set down by these quality standards and products without quality standards are not applicable. Since the JIS R 1250 “Common bricks” category prescribes “clay” as a raw material, it is clearly specified in this product category that raw materials contain recycled materials, in order to avoid confusion.

Incidentally, products do not always require JIS or JASS 7 certification for acquiring Eco Mark certification; they just need to meet the specified quality standard or equivalent standard.

“Applicable Products” of Version 2.0 has been extended to cover concrete L-shaped groove for road pavement purposes as a product with similar purpose of use as tiles, bricks, and blocks. From Version 2.0, this product category has been combined with Product Category No. 61 “Vegetation-supporting Concrete Paving Blocks”. With this integration, interlocking concrete blocks taken up in Product Category No. 61 will now be included in the scope of Product Category No. 109. As a result of the addition of these two items, the JIS A5371 Category I products will also fall under this product category including “un-reinforced concrete pipes for water channels”. For consistency, the JIS R1201 “ceramic pipes” are also covered in this product category. (The partial revision in June 2004 includes the following additions: JIS A 5371 “Precast Unreinforced Concrete Products” was revised on March 20, 2004, and “Interlocking Block” and “Large Concrete Piling Block” were added for recommended specification of JIS A 5371 Type I. For Eco Mark, “Interlocking Block” of JASS 7M-101 was adopted for “Interlocking Block”, but it was different from the substance of the

JIS standard for “Interlocking Block”. So it was decided both JASS and JIS standards for “Interlocking Block” shall be adopted for the meantime. In addition, for “Large Concrete Piling Block”, only that of JIS A 5371 Type II had been adopted until this point, but “Large Concrete Piling Block” of JIS A 5371 Type I became subject to the Eco Mark Product Category since the specification on this product became clear by this revision.) For JIS A5212 “Glass blocks (hollow)” taken up in Product Category No.124 “Glass Products Version 1.0”, it was deemed appropriate to be included in this particular category considering its purposes and functions.

Terrazzo products have been excluded because they are considered not corresponding to Eco Mark products since they are used as ornamentation. JIS A 5371 Type II was reviewed for inclusion in Version 2.0, but it was eventually excluded because shape, size, and strength of this product group are set arbitrarily by discussion between the buyer and supplier, and therefore products in this group are not necessarily limited to tile and block products.

To deal with the trend that tiles will grow larger and larger by the year, the ISO standard “Ceramic tiles” was adopted in Version 2.0 based on the expectation that it will be eventually included in JIS standards.

Environmental advantages due to structural features of products such as structure that allows vegetation and water holding property have been excluded in Version 2.0 because they are influenced by how the product is processed and used by the user.

### **3. Terminology**

With regard to the definition of pre-consumer materials in Version 1.0 of this product category, established in 1998, there were opinions from manufacturers that the range of products excluded from the category should be extended from the current definition of “materials recycled in the same process (plant)” to “materials recycled in the same manufacturing line company or group company”. However, this definition was not changed in Version 2.0 because 1) the definition conforms to ISO 14021; and 2) there are an estimated large number of Eco Mark certified products which efficiently use materials produced in the same manufacturing line company or group company.

Regarding interlocking blocks for vegetation with no hollows/cavities inside the blocks themselves but which may form hollows/cavities depending on their placement, Version 2.0 states that these are excluded from the scope. In addition, it has been confirmed that the criteria in Eco Mark Product Category No. 61 specifying that “the product shall be a concrete paving block with a projected area of apertures allowing the roots of plants to grow and accounting for at least 30% of the block surface area, with an area for soil that accounts for at least 60% of the block surface area” shall

continue to be referred to in the screening of products submitted for application as interlocking blocks for vegetation described in JASS 7M-101.

#### 4. Environmental Criteria

##### 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.

The focus of environmental impact items for category No. 109 of “Tile-Block Version 2.0” is as shown in the “Chart for Selecting Environmental Impact Items at Each Stage of Product Lifecycle” (X in the Chart). Out of these items the following were finally selected as the environmental criteria: A-1, B-2, B-5, B-6, B-8, B-9, C-7, D-1, D-4, D-5, D-6, D-7, D-8, E-4, E-6, E-7, E-8 and F-7 (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.

It is also discussed that additional environmental performance of products should be accepted as certification criteria.

Following are details of establishing environmental criteria:

Table 1: Chart for Selecting Environmental Impact Items at Each Stage of Product Life Cycle

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

#### A Resource Extraction Stage

##### A-1 Resource consumption

The following points were reviewed under this item:

- (1) The use rate of recycled materials shall be maximized where possible
- (2) Minimum volume of by-products disposed in resource gathering
- (3) Minimum use of water
- (4) For products using lightweight aggregate, the weight percentage of the lightweight aggregate making up the whole product can be a value obtained by formula.

For Point (1), it is desirable to maximize the use rate of recycled materials where possible. However, this criterion may lack practicality from the viewpoint of promoting recycling if the standard mixture rate is set to high values that are technically difficult.

When establishing criteria Version 1.0 for the “Tile-blocks Made of Recycled Materials” category, standard mixture rates for normal temperature molded products and baked products were defined to avoid the sense of injustice and unfairness that would be developed if the standard mixture rate of recycled materials differed between these two products. Close values were chosen; recycled materials including joining materials such as cement were also accepted as recycled materials.

The standard mixture rate was set at 50% from the awareness that products must be made up of at least 50% recycled materials to be called a “product using recycled material”. However for sludge generated in daily life and naturally, the standard mixture rates were compromised at 40% and 50% for based products and normal temperature molded products respectively in the aim to promote reuse. The same scopes and standard mixture rates of Version 1.0 were adopted in continuation in Version 2.0.

The comment “Waste sand from quarries and ceramics should not be included as recycled materials because they are already used as ordinary raw materials” received for Version 1.0. was reviewed in the compilation of Version 2.0. The effective use of wastes is indeed expanding in society, and there are recycled materials that are now widely used. However, in the manufacture of tile-blocks, waste sand from quarries and ceramics are not always good quality materials. The spread of these wastes as recycled materials owes much to the efforts of manufacturers and researchers in improving these materials for reuse. About half of Eco Mark certified tile-block products are made up of waste sand from quarries as the main component of recycled materials. The elimination of waste sand from quarries from recycled materials will have a major impact on these certified products. In addition, this elimination from recycled materials would strip waste sand from quarries and ceramics of their value as recycled materials and result in a retrograde to their original state as wastes. For these reasons, the proposal was deemed inappropriate at this point.

The standard mixture rate of glass blocks (hollow) was set at “glass cullet 100%” to conform to the standard mixture rate set down in product Category No.124 mentioned earlier. With the inclusion of glass blocks (hollow), the product category in Table 1 (attached) was changed to normal temperature molded products, baked products, and melted products. For melted products, though a standard mixture rate of 100% was considered, it was temporarily established at 50% (40% for sludge generated in daily life and naturally), referring to the criteria for based products and

giving importance to the promotion of the reuse of recycled materials.

The JIS R1201 "Clay pipes" added to the applicable products of this product category from Version 2.0 are large in product size compared to the other applicable products of this category and are accompanied by numerous problems that need to be resolved in terms of use of recycled materials (i.e. problems in the structure of the baking furnace required, etc.). It was therefore decided that only JIS R1201 "Clay pipes" products having a recycled material weight percentage less than the standard mixture amount by up to 5 percentage points shall be accepted.

Point (2) was again deemed unnecessary as a criterion in Version2.0.

Point (3) was omitted because it has already been reviewed in A-6 (Discharge of water pollutants), A-7 (Discharge/disposal of wastes), and A-8 (Use/discharge of hazardous materials).

For Point (4), since reducing the product weight by using lightweight aggregate should contribute to reducing environmental load, it was verified that the weight percentage of recycled lightweight aggregate making up the whole product can be a value obtained by formula as with product categories No. 123 "Building Products Using Recycled Material" and No. 124" Glass Products Version 1.0".

#### A-2 Discharge of greenhouse gases

The following point was reviewed under this item:

(1) Consumption of fossil fuel and CO <sub>2</sub> emissions in the transportation of raw materials shall not be conspicuously high
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This point was omitted because it was reviewed together with B-2.

This point was not selected as a criterion.

#### A-6 Discharge of water pollutants

The following point was reviewed under this item:

(1) No elution of toxic substances in the acquisition of raw materials
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In the establishment of Version1.0, this point was passed up for standardization due to the reason that in general, raw materials and tile-block manufacturers are separate entities with different organization, and thus it would be difficult to have tile-block manufacturers to provide assurance on environmental burden during the acquisition of raw materials. As of the time of Version 2.0 establishment, since circumstances had not changed, this point was not selected as a criterion owing to the same reasons.

There have been comments that the reduction of environmental burden in the acquisition of resources would require the expansion of social systems by establishing certification criteria for raw materials manufacturers. However the observance of laws and regulations in the acquisition of raw materials and pre-treatment stages is naturally a requirement in the use of recycled materials.

#### A-7 Discharge/disposal of wastes

The following point was reviewed under this item:

(1) Minimum volume of by-products disposed

As stated in A-6, it was decided that the pre-treatment of converting wastes serving as raw materials into recycled materials would not be included in the criteria, and this point was not selected as a criterion.

#### A-8 Use/discharge of hazardous materials

The following points were reviewed under this item:

(1) No elution of heavy metals, etc. from disposed materials other than those designated in this product category (e.g. waste soil such as waste mud from lakes, etc.)

(2) No elution of hazardous materials in the acquisition of raw materials

(3) Minimum volume of hazardous substances in materials used

As stated in A-6, it was decided that the pre-treatment of converting wastes serving as raw materials into recycled materials would not be included in the criteria, and these points were not selected as criteria.

### **B. Manufacturing Stage**

#### B-1 Resource consumption

The following points were reviewed under this item:

(1) The use of recycled materials shall not cause the content of sub-materials to exceed natural materials, nor require the use of large amounts of special additives

(2) Minimum use of water

For Point (1), though the increase in content of sub-materials, etc. in the use of recycled materials was discussed, it was decided that this did not need to be established as a criterion.

Point (2) was deliberated together with the discharge of substances influencing global warming. Because tile-blocks contain materials melted for recycling purposes, and also require baking and melting processes in manufacturing, quantitative comparative review of the whole life-cycle on amount of energy used, amount of CO<sub>2</sub> generated, and amount of water used is necessary. However, since this issue exceeds the scope of the Committee, which focuses on the planning of product categories, it was suggested that the evaluation criteria and methods for amount of energy used, amount of CO<sub>2</sub> generated, and amount of water used be studied by a special committee.

Consequently, this point was not selected as a criterion.

## B-2 Discharge of greenhouse gases

The following points were reviewed under this item:

- (1) In manufacturing baked and melted products, consideration shall be given to energy saving and low CO<sub>2</sub> emissions without limiting the focus to fossil fuel
- (2) Heat quantity in baking and melting shall not increase according to material used
- (3) Heat energy shall not be consumed in large amounts for incinerating and melting sludge, etc.
- (4) Energy saving efforts shall be made in manufacturing processes that include baking

Increase in heat quantity in association with the use of recycled materials was discussed. Since increase in energy use is inevitable for certain recycled materials, this point was selected as a criterion.

Since it is difficult to compare the amount of energy used in the entire manufacturing stage, including the acquisition of raw materials between products using recycled materials and products using natural materials, it was decided that this point should be established as a criterion applicable only to CO<sub>2</sub> emissions during baking and melting. However, because of the difficulty in acquiring data providing the basis for determining absolute values required by criteria, efforts should be made to prevent an increase in the amount of energy in products using recycled materials in comparison to products using natural materials.

It was also decided that proof of compliance with this criterion would require the comparison of CO<sub>2</sub> emissions per ton between products using recycled materials and products made of natural materials, with the focus placed only on the difference in emission proportion.

However, as stated in B-1, the quantitative evaluation of items related to the whole product life-cycle (i.e. amount of energy used, CO<sub>2</sub> emissions, and amount of water used) needs to be reviewed separately.

## B-4 Destruction of eco systems

The following point was reviewed under this item:

- (1) Plants with the risk of destroying nature, etc. shall not be developed

Since proper methods and criteria for determining effects of development at plants on the natural environment according to location have yet to be established, this point was not selected as a criterion. However the need for giving consideration to the natural environment according to the plant location was emphasized.

## B-5 Discharge of atmospheric pollutants

The following points were reviewed under this item:

- (1) Discharge of hydrogen chloride, dust, low boiling-point metals, etc. shall be reduced or eliminated in manufacturing, especially the baking process; Precautions must especially be taken for products using incinerated ash as material

(2) No generation of toxic substances such as dioxins in the incineration or melting of sludge, etc.

As stated in A-6, manufacturers of incinerated ash shall be responsible for the control of the discharge of air pollutants in the material acquisition stage of blocks (e.g.: manufacturing of incineration ash). On the other hand, tile-block manufacturers need to implement this control in the manufacturing stage in accordance with related environmental laws and pollution control agreement. Consequently, these points were selected as a criterion.

#### B-6 Discharge of water pollutants

The following point was reviewed under this item:

(1) No discharge of toxic substances in the manufacturing stage; if eluted components above the designated amount are contained in the recycled material, facilities to eliminate these components shall be installed

Plants that handle waste as materials for recycling particularly need to implement control of the discharge of water pollutants and pollution prevention measures inside the plant. The incineration of organic substances, which may remain as residue in recycled material in the pre-treatment stage, was also set as a prerequisite. Consequently, this point was selected as a criterion.

#### B-7 Discharge/disposal of wastes

The following points were reviewed under this item:

(1) Environmental laws and regulations shall be observed for the treatment of industrial wastes generated in the manufacturing process  
(2) The manufacturing method shall be one with minimum discharge of by-products that require disposal

Point (1) was omitted because it was discussed together with B-5 and B-6. It was decided that Point (2) need not be established as a criterion since it is dealt with separately by manufacturers, and therefore it was not selected as a criterion.

#### B-8 Use/discharge of hazardous materials

The following points were reviewed under this item:

(1) No harmful binding material or additive shall be used  
(2) Related environmental laws and regulations as well as pollution control agreements shall be observed for air pollution, water pollution, foul odor, and discharge of toxic substances

For Point (1), this product category prescribes a criterion prohibiting use of harmful binding materials and additives in the elution tests of products as described later. Due to some cases of high concentration of residual dioxin in ash seen for incineration ash of urban wastes before the melting process, which incidentally is not

an additive, certification of recycled materials is restricted to melted sludge. \*5)

There were comments, however, that there is no guarantee that the melted sludge method would continue to be the optimum technology in the future. Rather, restricting pre-treatment methods allowed for this melted sludge method would interfere with research and development incentives in the future. Therefore, a note that any treatment method developed in the future that is equivalent to or above the melted sludge technique is subject to certification was added in Attached Table 1.

From the assumption that no harmful substances are used and discharged in the manufacturing stage, this point was selected as a criterion.

Point (2) was omitted because it was discussed together with B-5 and B-6.

\*5) Journal of Japan Society of Waste Management Experts: Vol.8 (1997)  
No.4, p.14

#### B-9 Other environmental impacts

The following point was reviewed under this item:

(1) No generation of noise or foul odor in the manufacturing stage
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Given the need to pay particular attention to this requirement in the use of recycled materials, this item was selected as a criterion.

#### C. Distribution Stage

##### C-2 Discharge of greenhouse gases

The following points were reviewed under this item:

(1) Products shall be light, or shall not be made heavier than equivalent products (2) Consumption of fossil fuel and CO <sub>2</sub> emissions in the transportation of products shall not be conspicuously high
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Point (1) was not selected as a criterion when Version 1.0 was compiled, since it was determined that the weight of products using recycled materials would not differ from when natural materials are used.

The consumption of fossil fuel and CO<sub>2</sub> emissions during transportation of products, addressed by Point (2), are difficult to evaluate and prove, and increase with transportation distance. It was shown that the establishment of this point as a quantitative criterion could pose as a trade barrier for overseas products.

For these reasons, Point (2) was not selected as a criterion.

##### C-5 Discharge of atmospheric pollutants

The following point was reviewed under this item:

(1) Measures shall be implemented to prevent dispersal of powder dust during transportation
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Currently, environment preservation effects of this point in the distribution stage of product are uncertain. Consequently, it was not selected as a criterion.

It is not always true, however, that there is no need to control the production of powder dust: this point requires careful attention.

#### C-7 Discharge/disposal of wastes

The following points were reviewed under this item:

- (1) No increase in packaging material
- (2) Use of eco-friendly material for packaging

Point (1) was not selected as a criterion in Version 1.0 due to the fact that there exists no rational ground that packaging material increases for products made of recycled materials compared to those made of natural materials.

In the compilation of Version 2.0, Point (2) was discussed based on the fact that Product Category No.124 “Glass Products” prescribes a criterion requiring the use of easy-to-recycle packaging material. Since tile-blocks are not as breakable as glass products, they require less packaging. It was therefore decided that, on the contrary, criteria would be established on the toxicity of materials used for packaging and the promotion of recycling packaging material, and would prescribe the need to disclose packaging material use to promote consideration for packaging material.

Consequently, this point (2) was selected as a criterion.

#### D. Use and Consumption Stage

##### D-1 Resource consumption and D-7 Discharge/disposal of wastes

The following points were reviewed under this item:

- (1) Same durability (including performance such as strength) as other products with the same functions
- (2) Proper use and management methods of the product shall be clearly indicated

Discussions were carried out from the perspectives of the conservation of resources (raw materials, etc.) required for manufacturing through product durability for long-term use, and reduction of disposal after use.

The “strength” given in Point (1) pertains to quality criteria, and was reviewed in this aspect. Product durability was discussed with regard to test methods. For instance, one available wear test method is the JIS 1451 “wear test methods for architectural materials and components”, but this criteria does not prescribe test methods for all the products given in this category nor provide values serving as evaluation criteria for wear. In addition, the use of recycled materials does not always suggest reduced product durability. Concluding that products satisfying current standards are equipped with a certain level of strength regardless of the amount of recycled materials used, this point was not selected as a criterion related to environment.

For Point (2), there were comments on the need to promote long product life by

having manufacturers convey recommended usages and management methods to purchasers and users. Consequently, this point was selected as a criterion in Version 2.0.

#### D-2 Discharge of greenhouse gases and D-9 Other environmental impacts

The following point was reviewed under this item:

(1) Tile-blocks shall have water-retaining capacity and water permeability
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Use of tile-blocks with water-retaining capacity and water permeability in cities is expected to contribute to enhancing the environment by easing the heat island phenomenon and securing sound water circulation. Still, no clear proof that these functions will provide the required effects is available. In addition, the presence of water in tile-blocks on the contrary may cause destruction by freezing, thereby reducing product life.

Due to these reasons, this point was not selected as a criterion.

#### D-4 Destruction of eco systems and D-6 Discharge of water pollutants

The following point was reviewed under this item:

(1) No elution of toxic substances such as heavy metals by rain
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In the use and disposal of products reusing wastes as raw materials, the top priority in terms of environmental needs is zero pollution by toxic substances. To ensure safety in use and safety after the landfill of products disposed, standard elution values prescribed by enforcement regulations of the law concerning soil pollution control were adopted.

Regarding wastes that are subject to high temperature treatment in the pre-treatment or baking stages, Version 1.0 restricted substances that need to undergo elution tests to the six types with the substantial risk of elution since organic chlorides and agricultural chemicals break up and vaporize in the manufacturing process. This special measure was taken to avoid an increase in unnecessary tests and procedures, referencing related solutions implemented by Metropolitan Tokyo and Chiba Prefecture, etc. In Version 2.0, the number of toxic substances subject to elution tests have been increased to eight (with the addition of boron and fluoride), which were added as regulated substances in the environmental standards for soil and the law concerning soil pollution control.

Consequently, this point was again selected as a criterion in Version 2.0.

#### D-5 Discharge of atmospheric pollutants and D-8 Use/discharge of hazardous materials

The following points were reviewed under this item:

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|---|
| (1) No generation of toxic dusts at the site of processing and use<br>(2) No elution of toxic substances such as heavy metals by rain |
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When Version 1.0 was being compiled in 1997, there were comments that in order to control the density of toxic substances in powder dust generated by wear in processing and use, criteria on content and concentration of toxic substances in tile-block products should also be established.

In Version 1.0, criteria on the content of cadmium, lead, arsenic, and mercury in incinerated ash melted sludge in Saitama Prefecture, etc. (according to the Guidelines on Soil Pollution Survey and Measures Related to Heavy Metals, etc., developed by the Japan Environment Agency Water Quality Bureau in November 1994) were referred to, and submission of analyzed values of these substances was prescribed. Out of all products applied based on Version 1.0, only one product exceeded the referenced standard values for four substances.

In Version 2.0, it was decided that the concentration of toxic substances in products shall be restricted in accordance with designated criteria on the content of nine designated toxic substances, in the enforcement regulations of the law concerning soil pollution control issued on December 26, 2002 (see table below).

These designated criteria were established presuming the direct exposure of humans to polluted soil, orally or through skin contact. Since direct exposure to toxic substances contained in powder dust that is generated by polishing in tile-block construction or use is expected, the content of toxic substances in products was adjusted to the designated standard values in the enforcement regulations of the law concerning soil pollution control. However, toxic substances subject to high temperature treatment in the pretreatment or baking process of wastes were restricted to eight types excluding free cyanide.

Consequently, this point was selected as a criterion. No new criteria were established, however, for powder dust itself.

(Reference) Table Example of Reference Concentration for Content-Restricted Substances

Unit: (mg/kg)

	Cadmium	Lead	Arsenic	Mercury	Hexa-valent chrome	Free cyanide	Selenium	Fluoride	Boron
Guidelines on Soil Pollution Survey and Measures*6)	9	600	50	3	—	—	—	—	—
Law Concerning Soil Pollution Control*7)	150	150	150	15	250	50	150	4,000	4,000

\*6) Guidelines on Soil Pollution Survey and Measures related to Heavy Metals, etc. (November 1994, Japan Environment Agency Water Quality Bureau)  
Revised to Guidelines on Soil and Underground Water Pollution Survey and Measures. (January 1999, Japan Environment Agency Water Quality Bureau)

\*7) Enforcement Regulations on the Law Concerning Soil Pollution Control (December 26, 2002, Ministry of Environment Ordinance No. 29)  
[Supplement] Guidelines on the Effective Use of Melted Sludge in Saitama Prefecture (April 27, 1997, Saitama Prefecture Environment Department Waste Guidance Division) was established referring to the Guidelines on Soil Pollution Survey and Measures related to Heavy Metals, etc.

## E. Disposal Stage

### E-4 Destruction of eco systems and E-6 Discharge of water pollutants

The following point was reviewed under this item:

(1) No elution of toxic substances such as heavy metals due to rain water or underground water after landfill

Point (1) was omitted because it was discussed together with D-4 and D-6.  
This point was selected as a criterion.

### E-5 Discharge of atmospheric pollutants

The following point was reviewed under this item:

(1) No discharge of toxic substances in the incineration of disposed products

Since tile-blocks themselves do not burn when incinerated, substances which adhere to the tile-block products in use are suspected as sources of toxic substances. However, it was concluded that giving consideration to pollution during use is outside the Eco Mark certification criteria; additionally, there should be no problems if even smaller powders are produced in incineration because the content of toxic substances is restricted in D-8.

For these reasons, this point was not selected as a criterion.

#### E-7 Discharge/disposal of wastes

The following point was reviewed under this item:

(1) Tile-blocks generated when buildings are abolished shall not be restricted in disposal, and ideally, they shall be easier to discharge and dispose than conventional tile-blocks

Tile-blocks allowed for use are restricted not only to general types made of only one material, but those made of various materials. This may require special treatment in disposal or complete disposal.

There were comments that the recycling rate be indicated when compiling Version 2.0. However, the recycling of tile-blocks requires social systems such as central industries for recycling construction wastes including rubble. Currently, there are no such social systems except those for large pieces of concrete, etc. Taking such circumstances into consideration, the indication of recyclable rate is unrealistic and was not sought in Version 2.0.

Consequently, this point was selected as a criterion.

#### E-8 Use/discharge of hazardous materials

The following points were reviewed under this item:

(1) No generation of powder dust including toxic substances through crushing processes for disposal  
(2) No elution of toxic substances after disposal and landfill

These points were omitted because they were discussed together with D-8.

These points were selected as a criterion.

#### E-9 Other environmental impacts

The following point was reviewed under this item:

(1) No increased generation of noise and dust in disposal compared to products with the same functions

This point was not selected as a criterion based on the conclusion that the generation of noise and dusts in disposal depends largely on the disassembly method rather than product characteristics.

### **F. Recycling Stage**

#### F-2 Discharge of greenhouse gases

The following point was reviewed under this item:

(1) The crushing process for recycling shall not require large amounts of energy compared with products having the same function

This point was discussed together with B-2. As stated in B-2, comparison of the heat amount used is difficult between recycled and non-recycled products even during the acquisition of natural materials; comparison shall be restricted to baking. Consequently, it was not selected as a criterion.

#### F-5 Discharge of atmospheric pollutants

The following point was reviewed under this item:

(1) Minimum discharge of toxic substances in the incineration of disposed products

This point was omitted because it was discussed together with E-5, and was not selected as a criterion.

#### F-6 Discharge of water pollutants

The following point was reviewed under this item:

(1) No elution of toxic substances even when recycled for other purposes such as aggregates after disposal

This point was discussed together with D-6 and E-6, and selected as a criterion in those categories. Consequently, establishment as a criterion in the recycling stage was deemed unnecessary.

#### F-7 Discharge/disposal of wastes

The following point was reviewed under this item:

(1) Tile-blocks generated when buildings are abolished shall not be restricted in disposal, and ideally, they shall be easier to discharge and dispose than conventional tile-blocks

This point was omitted because it was discussed together with E-7, and was not selected as a criterion.

#### F-8 Use/discharge of hazardous materials

The following point was reviewed under this item:

(1) No generation of powder dust including toxic substances through crushing processes for disposal

This point was discussed in D-8 and E-8, and selected as a criterion in those categories. Consequently, establishment as a criterion in the recycling stage was deemed unnecessary.

Version 1.0 prescribes that unbaked products containing glass and concrete mixture must be implemented with measures to control alkali aggregate reaction (4-1(8)), and that glass cullets must be subject to edgeless processing (melting,

chamfering) (4-1(9)).

Criterion 4-1(8) was verified as not requiring changes in the text in Version 2.0, and for Criterion 4-1(9), glass cullets protruding out of the surface are certified as Eco Mark products as long as they have undergone edgeless treatment. Such glass cullets protruding out of the product surface require edgeless treatment as they can cause injuries in use. Though glass cullets that do not protrude out of the surface still need to be handled carefully in the recycling stage, edgeless treatment was not made compulsory for all glass cullets requiring extra manufacturing energy and costs.

In the review of the criteria for Version 2.0, it was discussed whether additional environmental preservation and enhancement functions should be adopted as certification criteria for products that come with environment purification functions (products using titanium oxide optical catalysts were given as specific examples). Considering the absence of methods and criteria for evaluating these functions in the present situation, the criterion based on these functions was not included in this product category.

#### 4.2 Quality Criteria

For example, a category on strength is provided for “concrete blocks for architecture”. According to this criterion, products below a certain strength would not be eligible under this product category even if they meet criteria in other categories such as shape, etc.

One specific example is concrete blocks whose shape and material correspond to “concrete blocks for architecture” which fall outside the JIS A 5406 category if their compression strength is under 8Mpa (8N/mm<sup>2</sup>). These low strength concrete blocks generally used for horticulture, etc. are not certified as Eco Mark products.

Ideally, Eco Mark certified-products need to have sufficient strength and durability to last over a long time upon satisfying requirements on waste generation control. Consequently, the products categorized as JIS A 5371 Type II were excluded from this product category for reasons that they have no quality criteria specifying size, shape, and strength, nor do they necessarily have the strength to tolerate long-term use.