

EL744. Recycled Slag Products

[EL744-1993/6/2005-68]



1. Scope

The criteria shall apply to the product processing steel slag and non-ferrous slag generated in the manufacturing process of steel and non-steel metal.

2. Definitions

2.1

“Slag” refers to gangue separated by using the difference of specific gravity with objective metal in molten metal when manufacturing metal in blast furnace and converter.

2.2

“Steel slag” refers to the to overall designation of blast furnace slag generated in the manufacturing process of pig iron and of steel slag generated in the manufacturing process.

2.3

“Blast furnace slag” refers to the byproducts generated when manufacturing pig iron by mixing ironstone, limestone and cokes in blast furnace of ironworks.

2.4

“Steel - making slag” refers to generated materials mainly based on non-metal oxide that is created at the same time when manufacturing steel by refining pig iron, processing scrap in the converter.

2.5

“Non-ferrous slag” refers to the slag generated in the manufacturing process of non-ferrous metal.

3. Certification Criteria

3.1 Environmental Criteria

3.1.1

Cement

It shall be used within the range of 35~65 weight% based on blast furnace slag, more than 40 weight% on annual average.

3.1.2

Aggregate

Steel slag and non-steel slag shall be used by 100 weight%.

3.1.3

Fine powder for concrete admixture

Steel slag shall be used by 100 weight%. However, in case of using materials prescribed in the following, it shall be considered as using steel slag.

1) Grinding aids using powder for concrete being 1 weight % or less when steel slag is crushed.

2) Gypsum being 8.5 weight % or less mixed to promote early hydration and reduced hydration heat in regard to concrete using powder.

3.1.4

Civil engineering construction material (excluding cement, aggregate and fine powder for concrete admixture), other product, steel slag and non-steel slag shall be used by more than 40 weight%.

3.2 Quality Criteria

3.2.1

Cement

Fineness of cement, stability, freezing time, intensity, heat of hydration, air -content of mortar shall satisfy the quality criteria of KS L 5210 (blast furnace cement).

3.2.2

Aggregate and Fine Powder for concrete admixture

3.2.2.1

Concrete aggregate shall satisfy respectively the quality criteria of KS F 2544 (blast

furnace slag aggregate for concrete) and KS F 2543 (lead slag aggregate for concrete) by type.

3.2.2.2

Steel slag used for base course of road, sub-base and hot asphalt mixture shall satisfy the quality criteria of KS F 2535(steel slag for road).

3.2.2.3

Fine powder for concrete admixture shall satisfy the quality criteria of KS F 2563(blast furnace slag fine powder for concrete).

3.2.2.4

If Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality or performance criteria of the standard in question. However, items related to “3.1 Environmental Criteria” are excluded

3.2.2.5

If no Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality and performance standard according to the following sequence. However, the items related to “3.1 Environmental Criteria” are excluded. Also, if the E-Mark Certification Criteria Setting Committee determines that the applying criteria are not reasonable considering the characteristic of the product, it should satisfy the standards that were modified by the committee (test item, test method, standards, etc.).

3.2.2.5.1

National standards other than Korean Industrial Standards.

3.2.2.5.2

Overseas national standards or international standards regarding the product quality in question.

3.2.2.5.3

Standards of the organizations at home and abroad that are referred by the current E-mark target product and certification standard.

3.2.2.5.4

A private standard that is recognized as higher than the national standard in the industry of the product in question.

3.2.3

Civil engineering construction material (excluding cement, concrete and fine powder for mortar admixture) and other products

3.2.3.1

Air-dried gravity of hollow concrete bloc, compression strength on shear area and absorption rate shall satisfy the quality criteria of KS F 4002 (hollow concrete bloc).

3.2.3.2

Air-dried gravity of hollow concrete bloc, compression strength and absorption rate shall satisfy the quality criteria of KS F 4004 (concrete brick).

3.2.3.3

Compression strength and absorption rate of concrete revetment shall satisfy the following criteria.

Quality Item	Test Sample Size[mm]	Standard Type and Deformed Block	
		Type 11	Type 22)
Compression Strength [N/mm ² kgf/cm ²]	100×100×100	Respectively, ≥ 17.64180 Average, ≥ 20.58210	Respectively, ≥ 20.58210 Average, ≥ 23.52240
	50×50×503)	Respectively, ≥ 15.68160 Average, ≥ 18.62190	Respectively, ≥ 18.62190 Average, ≥ 21.56220
Absorption Rate [%]	Respectively, ≤ 10, Average, ≤ 7		

Note 1) In case that the corrosion, neutralization, melting and freezing of bloc are not severe - a part above the water surface of river or sea, or a river excluding city or industrial area

Note 2) In case that the corrosion, neutralization, melting and freezing of bloc are severe - a part below the water surface of river or sea, or a river including city or industrial area

Note 3) The figure of 50×50×50mm compression strength is determined based on 100×100×100mm intensity.

3.2.3.4

If Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality or performance criteria of the standard in question. However, items related to “3.1 Environmental Criteria” are excluded

3.2.3.5

If no Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality and performance standard according to the following sequence. However, the items related to “3.1 Environmental Criteria” are excluded. Also, if the E-Mark Certification Criteria Setting Committee determines that the applying criteria are not reasonable considering the characteristic of the product, it should satisfy the standards that were modified by the committee (test item, test method, standards, etc.).

3.2.3.5.1

National standards other than Korean Industrial Standards.

3.2.3.5.2

Overseas national standards or international standards regarding the product quality in question.

3.2.3.5.3

Standards of the organizations at home and abroad that are referred by the current E-mark target product and certification standard.

3.2.3.5.4

A private standard that is recognized as higher than the national standard in the industry of the product in question.

3.3 Information for Consumers

Use rate of steel slag and non-steel slag

4. Test Methods

4.1 General Matters

4.1.1

One test sample shall be required for each applied product. However, if more than one test sample is needed, the former requirement may not be met.

4.1.2

Test samples shall be collected at random by a certification institute from products in market or those in storage at the production site. However, details on the method of gathering samples of aggregate shall be in accordance with KS F 2501 (methods of gathering samples of aggregate)

4.1.3

The result of test shall be numerically set according to KS Q 5002 (Statistical interpretation method of the data – Part 1: Statistical description of the data).

4.2 Cement

Certification Criteria	Test and Verification Methods
Environmental Criteria	Verification of submitted documents
Quality Criteria	Test report by an accredited testing laboratory in accordance with KS L 5210 (blast furnace slag cement) or certificate of equivalent
Consumer Information	Verification of submitted documents

4.3 Aggregate and Fine Powder

Certification Criteria	Test and Verification Methods
Environmental Criteria	Verification of submitted documents
Quality Criteria	3.2.1.1 Test report by an accredited testing laboratory in accordance with KS F 2544 (blast furnace slag aggregate for concrete) or certificate of equivalent Test report by an accredited testing laboratory in accordance with KS F 2543 (copper slag aggregate for concrete) or certificate of equivalent Test report by an accredited testing laboratory in accordance with KS F 2583 (lead slag aggregate for concrete) or certificate of equivalent
	3.2.1.2 Test report by an accredited testing laboratory in accordance with KS F 2563 (blast furnace slag fine powder for concrete) or certificate of equivalent
	3.2.1.3 Test report by an accredited testing laboratory in accordance with KS F 2535 (steel slag for road) or certificate of equivalent
	3.2.1.4~ 3.2.1.5 Test report by an accredited testing laboratory in accordance with the relevant standards or certificate of equivalent
Consumer Information	Verification of submitted documents

4.4 Civil Engineering-Construction Material (excluding cement, aggregate and fine powder for concrete admixture) and Other Products

Certification Criteria	Test and Verification Methods
Environmental Criteria	Verification of submitted documents

Quality Criteria	3.2.1.1	KS F 4002 (hollow concrete bloc) or certificate of equivalent
	3.2.1.2	KS F 4004 (concrete brick) or certificate of equivalent
	3.2.1.3	Test report by an accredited testing laboratory in accordance with the test methods 4.1 and 4.5
	3.2.1.4~ 3.2.1.5	Test report by an accredited testing laboratory in accordance with the relevant standards or certificate of equivalent
Consumer Information		Verification of submitted documents

4.5 Test Methods of Compression Strength and Absorption Rate of Concrete Revetment

4.5.1

Test Methods of Compression Strength

4.5.1.1

Cut the test sample to a 100×100×100mm cube and measure the dimension of it. However, in case that cutting is impossible with the dimension above, the test sample may be cut to 50×50×50mm cube. Measure the dimension down to the unit of 0.1mm, and calculate the average value to the forth place of effective number.

4.5.1.2

Cut test samples shall be capping to be as much as thin and flat necessarily to make both pressed aspects perpendicular to axis of ordinate.

4.5.1.3

After capping is stiffened, soak it into clear water for more than 2 hours to be absorbed and tested. In the case, compressed direction shall be the direction on which load is actually putting, whole aspects shall be evenly pressed and press in the speed of 0.2N/mm² every second per pressed shear area by using voltage equipment with sphere wetted surface in the center.

4.5.1.4

Compression strength shall be calculated in accordance with the following equation. At this time, in case that the reading value of maximum load is the unit of 'kg_f', the value shall be read to the third place of effective number, and the value of compression strength[N/mm²] shall be calculated down to the two decimal place.

$$\text{Compression intensity}[N/mm^2] = \frac{\text{Maximum load}}{\text{Pressed shear area}}$$

4.5.2

Test Methods of Absorption Rate

4.5.2.1

Take two test samples from the test sample as identical as the test samples for compression strength, and then measure the absolute dry weight and standard dry weight of the following test sample.

Note 1) 'Absolute dry weight' refers to the weight when the test sample is dried in the dryer with temperature of $105\pm 5^{\circ}\text{C}$ for 24 hours and then pulled out and frozen.

Note 2) 'Standard dry weight' refers to the weight measured right after wiping out visible water drops with fabric with good absorption capability when the test sample is absorbed in clear water with the temperature of $20\pm 5^{\circ}\text{C}$ for 24 hours and the pulled out.

4.5.2.2

Absorption rate shall be calculated by the following equation:

$$\text{Absorption rate [\%]} = \frac{\text{Standard dry weight[g]} - \text{Absolute dry weight[g]}}{\text{Absolute dry weight[g]}} \times 100$$

5. Reasons for Certification

"Use of recycled materials"

Common Criteria, Notice No. 2012-36, the Ministry of Environment

1. Eco-label products must follow the following provisions with regard to the proper treatment of environmental pollution substances, such as air and water wastes and noxious chemical substances emitted in the process of manufacturing or service operation.

A. When first applying for certification, the product manufacturer should observe the environment related laws and agreements pertaining to the region where the production factory or the place of service operation is located for a period of one year prior to the date of application. Any case of violation of the penalty clause will be verified by confirming documents involved during a period of one year to the date of application. Regarding any violation not related to the penalty clause, confirmation will be made on the completion of appropriate measures.

B. A person who has received a certification of eco-labeling shall observe the environment related laws and agreements pertaining to the region where the production factory or the place of service operation is located during the period of certification. However, regarding any violation besides a penalty, confirmation will be made on the completion of appropriate measures.

2. As a general rule, information for consumers shall be indicated on the surface of the product in such a way not to be easily erased. However, in case that indication on the surface of the product is impossible or undesirable, it can be indicated on the appropriate part such as product packaging, product guidebook and user's manual that consumers can recognize. However, the service information should be indicated inside and outside of the place of service operation. In case that indication inside and outside of the place of service operation is impossible or undesirable, it can be indicated on the appropriate part such as an agreement, letter of delivery, letter of guarantee, and PR materials that consumers can recognize.

3. In order to establish fair trade and to protect consumer, the applicant for eco-label and the holder of eco-label license shall observe the Act on the Fairness of

Indication and Advertisement with respect to the environmental aspects of the product.

4. For Various standards referred in the certification criteria by target product, the latest revised edition applies at the date of application, if not specified otherwise.

5. In applying the quality related criteria for each target product, if no standard is available that can be applied as the quality criteria, the president of Korea Environmental Industry & Technology Institute (KEITI) (hereafter referred to as "president of KEITI") may establish and operate the quality criteria for the product involved after review by a competent committee.