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**Ground granulated blast furnace slag used for
cement, mortar and concrete**

用于水泥、砂浆和混凝土中的粒化高炉矿渣粉

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Ground granulated blast furnace slag used for cement, mortar and concrete

1 Scope

This Standard specifies the definition, components and materials, technical requirements, test methods, inspection rules, factory-leaving, delivery and acceptance, packaging, marking, transportation and storage of ground granulated blast furnace slag powder (hereinafter referred to as slag powder).

This Standard applies to the ground granulated blast furnace slag powder that is used for cement mixture, mortar and concrete admixture.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB 175, Common Portland Cements

GB/T 176, Methods for chemical analysis of cement

GB/T 203, Granulated blast furnace slag used for cement production

GB/T 208, Test method for determining cement density

GB/T 1346, Test methods for water requirement of normal consistency, setting time and soundness of the Portland cement

GB/T 2419, Test method for fluidity of cement mortar

GB/T 5483, Natural gypsum

GB 6566, Limits of radionuclides in building materials

GB/T 8074, Testing method for specific surface of cement - Blaine method

GB/T 9774, Sacks for packing cement

GB/T 12573, Sampling method for cement

GB/T 17671, Method of testing cements - Determination of strength

W_{O_2} -- mass fraction of oxygen that is absorbed in the air during the burning of the slag powder, %;

$W_{\text{burnt } SO_3}$ -- mass fraction of SO_3 that is measured after the slag powder is burnt, %;

$W_{\text{unburnt } SO_3}$ -- mass fraction of SO_3 that is measured before the slag powder is burnt, %.

$$X_{\text{correction}} = X_{\text{measurement}} + W_{O_2} \dots\dots\dots (2)$$

Where:

$X_{\text{correction}}$ -- loss on ignition (mass fraction) after the slag powder is corrected, %;

$X_{\text{measurement}}$ -- loss on ignition (mass fraction) that is measured during the slag powder test, %.

6.7 Glass content

Perform according to Appendix C.

6.8 Radioactivity

Perform according to GB 6566, where the radioactivity test sample is made by slag powder and Portland cement in a mass ratio of 1: 1.

7 Inspection rules

7.1 Batching and sampling

7.1.1 Batching

Slag powder is batched and sampled at the same level before leaving the factory. Each batch number is a sampling unit. The slag powder factory batch number is specified according to the annual production capacity of slag powder single line as:

For above 60×10^4 t, not exceeding 2 000 t is a batch number;

For above $30 \times 10^4 \sim 60 \times 10^4$ t, not exceeding 1 000 t is a batch number;

For above $10 \times 10^4 \sim 30 \times 10^4$ t, not exceeding 600 t is a batch number;

For below 10×10^4 t, not exceeding 200 t is a batch number.

When the capacity of the bulk transportation means exceeds the tonnage of the batch number that is specified by the factory, the number of the batch number

7.3.2 Type inspection

7.3.2.1 Products, of which the type inspection result meets the technical requirements in Chapter 5, are qualified.

7.3.2.2 Products, of which any item of the type inspection result doesn't meet the technical requirements in Chapter 5, are unqualified.

7.4 Inspection report

The content of the inspection report shall include the batch number, inspection items, the type and amount of gypsum and grinding aids, and other technical requirements that are agreed in the contract. It shall also include the inspection results of the physical properties of cement. When it is required by the user, the production plant shall send the test results other than the 28 d activity index within 11 days from the day when the slag powder is sent. The 28 d activity index shall be reported within 32 days from the day when the slag powder is sent.

8 Factory-leaving, delivery and acceptance

8.1 Slag powder factory-leaving

Only when the technical specifications and packaging of the slag powder are confirmed to meet the requirements, it can leave the factory.

8.2 Delivery and acceptance

8.2.1 The quality acceptance of the slag powder at the time of delivery can be based on the test results of the physical samples, or the inspection report of the same batch of slag powder by the seller. The method of acceptance shall be agreed upon by the buyer and the seller, and shall be specified in the contract or agreement. It is the responsibility of the seller to inform the buyer of the method of acceptance. When there is no written contract or agreement, or the method of acceptance is not specified in the contract or agreement, the seller shall indicate on the invoice "the inspection report that is based on the same batch of slag powder from our factory shall be the basis for acceptance".

8.2.2 When the inspection result of the physical sample is taken as the acceptance basis, the buyer and the seller shall jointly sample and sign the seal before delivery or at the place of delivery. The sampling method is performed according to GB/T 12573; the sampling amount is 10 kg; it is divided into two equal parts. One is kept by the seller for 40 days, and the other is checked by the buyer according to the items and methods that are specified in this Standard.

Appendix C

(Normative)

Determination method of slag powder glass content

C.1 Principle

Obtain the glass content by measuring the ratio of the area of the glass portion to the area on the bottom line in the X-ray diffraction pattern of the ground granulated blast furnace slag powder.

C.2 Instrument

C.2.1 X-ray diffractometer (copper target)

The power is greater than 3 kW; test conditions: tube current ≥ 40 mA, tube pressure ≥ 37.5 kV.

C.2.2 Electronic balance

The measuring range is not less than 10 g; the minimum division value is not larger than 0.001 g.

C.2.3 Electrically heated drying oven

Temperature control range (105 ± 5) °C.

C.3 Test steps

C.3.1 Dry the slag powder sample in the oven for 1 h. Use agate grinding platinum to grind; pass it all through an 80 μm square-hole sieve. Scan the crystal plane interval of 0.237 nm ~ 0.404 nm ($2\theta = 22.0^\circ \sim 38.0^\circ$) at a scanning speed equal to or less than 1° (2θ) per minute.

C.3.2 The linear distance of the 1° (2θ) diffraction angle on the diffraction pattern curve is not less than 10 mm. The height of the strongest diffraction peak in the space (d-space) between 0.404 nm ~ 0.237 nm crystal planes shall be greater than 100 mm.

Note: When the scanning range is extended to $10^\circ \sim 60^\circ$, the existence of impurities can be searched. Identify and analyze its main components through the main peak of the impurities; report it together with the glass content.

C.4 Pattern processing

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