

JAPANESE INDUSTRIAL STANDARD  
JIS A 1203-1990  
Test method for water content of soils

1995.11

## ERRATA

| Page | Position                     | Wrong                     | Correct                   |
|------|------------------------------|---------------------------|---------------------------|
| 1    | The 4th line of<br>Clause 2. | ...at <u>100</u> °C to... | ...at <u>110</u> °C to... |

Remarks: This errata is for correcting the first edition of this Standard.  
Japanese Standards Association

JAPANESE INDUSTRIAL STANDARD  
JIS A 1210-1990  
Test method for soil compaction using a rammer

1995.11

## ERRATA

| Page | Position                            | Wrong                             | Correct                           |
|------|-------------------------------------|-----------------------------------|-----------------------------------|
| 7    | The 5th line of<br>(6) of Clause 6. | ...,from the <u>outer</u> part... | ...,from the <u>upper</u> part... |

Remarks: This errata is for correcting the first edition of this Standard.  
Japanese Standards Association

JAPANESE INDUSTRIAL STANDARD  
Ⓒ JIS A 5011-1992  
Slag aggregate for concrete

1995.11

## ERRATA

| Page | Position                                         | Wrong                              | Correct                             |
|------|--------------------------------------------------|------------------------------------|-------------------------------------|
| 30   | The 3rd line of<br>Sub-clause 7.2                | ...make it <u>sulfur</u> ...       | ...make it <u>sulfuric acid</u> ... |
| 33   | The 1st line of<br>(1)(f) of<br>Sub-clause 8.2.3 | ...mercury <u>chloride(II)</u> ... | ...mercury <u>(II) chloride</u> ... |

Remarks: This errata is for correcting the first edition of this Standard.  
Japanese Standards Association

# JIS

**JAPANESE INDUSTRIAL STANDARD**

**Slag aggregate for  
concrete**

Ⓔ **JIS A 5011**—1992

**Translated and Published**

**by**

**Japanese Standards Association**

Printed in Japan

In the event of any doubt arising,  
the original Standard in Japanese is to be final authority.



1. **Scope** This Japanese Industrial Standard specifies the blast-furnace slag aggregate and ferro-nickel slag aggregate <sup>(1)</sup> for concrete (hereafter referred to as "slag aggregate for concrete").

Note <sup>(1)</sup> This Standard shall not be applied to ferro-nickel slag aggregate for concrete which is to be cured at high temperature and high pressure (an auto-clave curing).

Remarks 1. The standards cited in this Standard are shown in Attached Table 1.

2. The units and numerical values given in { } in this Standard are based on the traditional units and are appended for informative reference.

## 2. Types, classes and designation

2.1 Types The types of slag aggregates for concrete shall be as shown in Table 1.

Table 1. Types

| Type                         |                                     | Symbol | Summary                                                                                                                                                               |
|------------------------------|-------------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Blast-furnace slag aggregate | Blast-furnace slag coarse aggregate | BFG    | Produced from molten slag generated simultaneously with pig iron in blast-furnace, after cooling it slowly, crushed and grading.                                      |
|                              | Blast-furnace slag fine aggregate   | BFS    | Produced from molten slag generated simultaneously with pig iron in blast-furnace, after cooling it rapidly with water, air or the like, crushed and grading.         |
| Ferro-nickel slag aggregate  | Ferro-nickel slag fine aggregate    | FNS    | Produced from molten slag generated simultaneously with ferro-nickel in furnace, after cooling it slowly or rapidly with water, air or the like, crushed and grading. |

2.2 Classes by grading of aggregate Classes by grading of slag aggregate for concrete shall be as follows:

(1) Classes by grading of blast-furnace slag coarse aggregate shall be as shown in Table 2.

Table 2. Classes by grading of blast-furnace slag coarse aggregate

| Class                                    | Range of grading<br>of aggregate mm | Symbol     |
|------------------------------------------|-------------------------------------|------------|
| Blast-furnace slag coarse aggregate 4005 | 40 to 5                             | BFG40 - 5  |
| Blast-furnace slag coarse aggregate 4020 | 40 to 20                            | BFG40 - 20 |
| Blast-furnace slag coarse aggregate 2505 | 25 to 5                             | BFG25 - 5  |
| Blast-furnace slag coarse aggregate 2005 | 20 to 5                             | BFG20 - 5  |
| Blast-furnace slag coarse aggregate 1505 | 15 to 5                             | BFG15 - 5  |

- (2) Classes by grading of blast-furnace slag fine aggregate shall be as shown in Table 3.

Table 3. Classes by grading of blast-furnace slag fine aggregate

| Class                                            | Range of grading<br>of aggregate mm | Symbol   |
|--------------------------------------------------|-------------------------------------|----------|
| 5 mm Blast-furnace slag fine aggregate           | 5.0 max.                            | BFS5     |
| 2.5 mm Blast-furnace slag fine aggregate         | 2.5 max.                            | BFS2.5   |
| 1.2 mm Blast-furnace slag fine aggregate         | 1.2 max.                            | BFS1.2   |
| 5 mm to 0.3 mm Blast-furnace slag fine aggregate | 5.0 to 0.3                          | BFS5-0.3 |

- (3) Classes by grading of ferro-nickel slag fine aggregate shall be as shown in Table 4.

Table 4. Classes by grading of ferro-nickel slag fine aggregate

| Class                                           | Range of grading<br>of aggregate mm | Symbol   |
|-------------------------------------------------|-------------------------------------|----------|
| 5 mm ferro-nickel slag fine aggregate           | 5.0 max.                            | FNS5     |
| 2.5 mm ferro-nickel slag fine aggregate         | 2.5 max.                            | FNS2.5   |
| 1.2 mm ferro-nickel slag fine aggregate         | 1.2 max.                            | FNS1.2   |
| 5 mm to 0.3 mm ferro-nickel slag fine aggregate | 5.0 to 0.3                          | FNS5-0.3 |

2.3 Classes by specific gravity in absolute dry condition, percentage of water absorption and unit weight of aggregate Classes by specific gravity in absolute dry condition, percentage of water absorption and unit weight of blast-furnace slag coarse aggregate shall be as shown in Table 5.

Table 5. Classes by specific gravity in absolute dry condition, percentage of water absorption and unit weight of aggregate

| Class | Specific gravity in absolute dry condition | Water absorption % | Unit weight of aggregate kg/l | Symbol |
|-------|--------------------------------------------|--------------------|-------------------------------|--------|
| A     | 2.2 min.                                   | 6.0 max.           | 1.25 min.                     | A      |
| B     | 2.4 min.                                   | 4.0 max.           | 1.35 min.                     | B      |

2.4 Designation The designation of the slag aggregate for concrete shall be as follows:

Example: BFG 40-5 A

BFS 5

FNS 2.5

Symbol of classes by specific gravity in absolute dry condition, percentage of water absorption and unit weight of blast-furnace slag coarse aggregate

Symbol of classes by grading of slag aggregate for concrete

Symbol of types of slag aggregate for concrete

### 3. Quality

3.1 General The slag aggregate for concrete shall not include the substances in a hazardous quantity that have bad influences upon the quality of the concrete.

3.2 Quality The slag aggregate for concrete shall be subjected to the tests in accordance with 4.2 to 4.8 and conform to the requirements specified in Table 6.

Table 6. Quality

| Quality                                        |                                         | Blast-furnace slag aggregate                                                           |           | Ferro-nickel slag aggregate       | Applied test item |                           |
|------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------|-----------|-----------------------------------|-------------------|---------------------------|
|                                                |                                         | Blast-furnace slag coarse aggregate                                                    |           | Blast-furnace slag fine aggregate |                   |                           |
|                                                |                                         | A                                                                                      | B         |                                   |                   |                           |
| Chemical component                             | Calcium oxide (as CaO) %                | 45.0 max.                                                                              |           | 45.0 max.                         | 15.0 max.         | 4.2<br>Annex 1<br>Annex 2 |
|                                                | Total sulfur (as S) %                   | 2.0 max.                                                                               |           | 2.0 max.                          | 0.5 max.          |                           |
|                                                | Sulfur trioxide (as SO <sub>3</sub> ) % | 0.5 max.                                                                               |           | 0.5 max.                          | —                 |                           |
|                                                | Total iron (as FeO) %                   | 3.0 max.                                                                               |           | 3.0 max.                          | 13.0 max.         |                           |
|                                                | Magnesium oxide (as MgO) %              | —                                                                                      |           | —                                 | 40.0 max.         |                           |
|                                                | Metallic iron (as Fe) %                 | —                                                                                      |           | —                                 | 1.0 max.          |                           |
| Specific gravity in the absolute dry condition |                                         | 2.2 min.                                                                               | 2.4 min.  | 2.5 min.                          | 2.7 min.          | 4.3                       |
| Water absorption %                             |                                         | 6.0 max.                                                                               | 4.0 max.  | 3.5 max.                          | 3.0 max.          |                           |
| Unit weight kg/l                               |                                         | 1.25 min                                                                               | 1.35 min. | 1.45 min.                         | 1.50 min.         | 4.4                       |
| Lost part in washing test %                    |                                         | —                                                                                      |           | —                                 | 7.0 max.          | 4.5                       |
| Immersion in water                             |                                         | It shall be free from such phenomena as cracks, decomposition, muddiness and dustings. |           | —                                 | —                 | 4.6                       |
| Irradiation by ultraviolet light (360.0 nm)    |                                         | It shall not radiate, or shine in even violet shades.                                  |           | —                                 | —                 | 4.7                       |
| Alkaline silica reaction                       |                                         | —                                                                                      |           | —                                 | harmless          | 4.8                       |

### 3.3 Grading and fineness modulus

3.3.1 Blast-furnace slag coarse aggregate Grading and fineness modulus of the blast-furnace slag coarse aggregate shall be as follows:

- (1) The grading of the blast-furnace slag coarse aggregate shall be tested in accordance with 4.9, and conform to the requirements specified in Table 7.

Table 7. Grading of blast-furnace slag coarse aggregate

| Class                                    | Nominal size of sieves <sup>(2)</sup>  |           |           |           |           |          |         |
|------------------------------------------|----------------------------------------|-----------|-----------|-----------|-----------|----------|---------|
|                                          | Percentage of passing sieves by mass % |           |           |           |           |          |         |
|                                          | 50                                     | 40        | 25        | 20        | 15        | 10       | 5       |
| Blast-furnace slag coarse aggregate 4005 | 100                                    | 95 to 100 | —         | 35 to 70  | —         | 10 to 30 | 0 to 5  |
| Blast-furnace slag coarse aggregate 4020 | 100                                    | 90 to 100 | 20 to 25  | 0 to 15   | —         | 0 to 5   | —       |
| Blast furnace slag coarse aggregate 2505 | —                                      | 100       | 95 to 100 | —         | 30 to 70  | —        | 0 to 10 |
| Blast-furnace slag coarse aggregate 2005 | —                                      | —         | 100       | 90 to 100 | —         | 20 to 55 | 0 to 10 |
| Blast-furnace slag coarse aggregate 1505 | —                                      | —         | —         | 100       | 90 to 100 | 40 to 70 | 0 to 15 |

Note <sup>(2)</sup> Nominal sizes of these sieves shall be those of the test sieves specified in JIS Z 8801, respectively as 53 mm, 37.5 mm, 26.5 mm, 19 mm, 16 mm, 9.5 mm and 4.75 mm.

- (2) The fineness modulus of the blast-furnace slag coarse aggregates shall not vary  $\pm 0.30$  or more from that of the trade sample submitted to acceptance test by the manufacturer upon purchase.

3.3.2 Blast-furnace slag fine aggregate Grading and fineness modulus of the blast-furnace slag fine aggregate shall be as follows:

- (1) The grading of the blast-furnace slag fine aggregate shall be tested in accordance with 4.9 and conform to the requirements specified in Table 8.

Table 8. Grading of blast-furnace slag fine aggregate

| Class                                            | Nominal size of sieves <sup>(3)</sup>  |           |           |           |          |          |         |
|--------------------------------------------------|----------------------------------------|-----------|-----------|-----------|----------|----------|---------|
|                                                  | Percentage of passing sieves by mass % |           |           |           |          |          |         |
|                                                  | 10                                     | 5         | 2.5       | 1.2       | 0.6      | 0.3      | 0.15    |
| 5 mm Blast-furnace slag fine aggregate           | 100                                    | 90 to 100 | 80 to 100 | 50 to 90  | 25 to 65 | 10 to 35 | 2 to 15 |
| 2.5 mm Blast-furnace slag fine aggregate         | 100                                    | 95 to 100 | 85 to 100 | 60 to 95  | 30 to 70 | 10 to 45 | 2 to 20 |
| 1.2 mm Blast-furnace slag fine aggregate         | —                                      | 100       | 95 to 100 | 80 to 100 | 35 to 80 | 15 to 50 | 2 to 20 |
| 5 mm to 0.3 mm Blast-furnace slag fine aggregate | 100                                    | 95 to 100 | 65 to 100 | 10 to 70  | 0 to 40  | 0 to 15  | 0 to 10 |

Note <sup>(3)</sup> Nominal sizes of these sieves shall be those of the test sieves specified in JIS Z 8801, respectively as 9.5 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600  $\mu$ m, 300  $\mu$ m and 150  $\mu$ m.

- (2) The fineness modulus of the blast-furnace slag fine aggregate shall not vary  $\pm 0.20$  or more from that of the trade sample submitted to acceptance test by the manufacturer upon purchase.

3.3.3 Ferro-nickel slag fine aggregate Grading and fineness modulus of the ferro-nickel slag fine aggregate shall be as follows:

- (1) The grading of the ferro-nickel slag fine aggregate shall be tested in accordance with 4.9 and conform to the requirements specified in Table 9.

Table 9. Grading of ferro-nickel slag fine aggregate

| Class                                           | Nominal size of sieves <sup>(a)</sup>  |           |           |           |          |          |         |
|-------------------------------------------------|----------------------------------------|-----------|-----------|-----------|----------|----------|---------|
|                                                 | Percentage of passing sieves by mass % |           |           |           |          |          |         |
|                                                 | 10                                     | 5         | 2.5       | 1.2       | 0.6      | 0.3      | 0.15    |
| 5 mm ferro-nickel slag fine aggregate           | 100                                    | 90 to 100 | 80 to 100 | 50 to 90  | 25 to 65 | 10 to 35 | 2 to 15 |
| 2.5 mm ferro-nickel slag fine aggregate         | 100                                    | 95 to 100 | 85 to 100 | 60 to 95  | 30 to 70 | 10 to 45 | 2 to 20 |
| 1.2 mm ferro-nickel slag fine aggregate         | —                                      | 100       | 95 to 100 | 80 to 100 | 35 to 80 | 15 to 50 | 2 to 25 |
| 5 mm to 0.3 mm ferro-nickel slag fine aggregate | 100                                    | 95 to 100 | 45 to 100 | 10 to 70  | 0 to 40  | 0 to 15  | 0 to 10 |

- (2) The fineness modulus of the ferro-nickel slag fine aggregate shall not vary  $\pm 0.20$  or more from that of the trade sample submitted to acceptance test by the manufacturer upon purchase.

3.4 Stability of storage of the blast-furnace slag fine aggregate at high atmospheric temperature Stability of storage of the blast-furnace slag fine aggregate at high atmospheric temperature shall be confirmed by the agreement between the purchaser and supplier.

Informative reference 1. For the confirmation of the stability of storage, carry out the test in accordance with "Test methods of stability of storage of the blast-furnace slag fine aggregate" shown in Informative reference 2. If the result of the judgment is A, it shall be considered to be stable.

#### 4. Test method

4.1 Sampling method Representative products shall be sampled and subdivided by a reasonable method.

**4.2 Chemical analysis test** The chemical analysis test of the blast-furnace slag coarse aggregate and the blast-furnace slag fine aggregate shall be carried out in accordance with Annex 1.

The chemical analysis test of the ferro-nickel slag fine aggregate shall be carried out in accordance with Annex 2.

**4.3 Tests of specific gravity in absolute dry condition and percentage of water absorption** The tests of specific gravity in absolute dry condition and percentage of water absorption of the slag aggregates for concrete shall be carried out as follows:

**4.3.1 Blast-furnace slag coarse aggregate** The tests of the specific gravity in absolute dry condition and percentage of water absorption of blast-furnace slag coarse aggregate shall be carried out in accordance with JIS A 1110.

The samples specified in 3.1 of JIS A 1110 shall be those which are retained on the 5 mm test sieve and the samples specified in 3.2 of JIS A 1110 shall be the samples specified in JIS A 1110 which are treated with the following procedures; thoroughly wash off dusts and the like on the surface of the particles with water, and dry these to be a constant weight at temperature of 100 °C to 110°C and then cool down to normal temperature. Then immerse in water of  $20 \pm 2^\circ\text{C}$  for a period of 24 h to absorb water.

**4.3.2 Blast-furnace slag fine aggregate and ferro-nickel slag fine aggregate** The tests of the specific gravity in absolute dry condition and percentage of water absorption of blast-furnace slag fine aggregate and ferro-nickel slag fine aggregate shall be carried out in accordance with JIS A 1109 <sup>(4)</sup>, <sup>(5)</sup>.

Note <sup>(4)</sup> In the blast-furnace slag fine aggregate and ferro-nickel slag fine aggregate which are rich in micro-powder component, the blast-furnace slag fine aggregate and ferro-nickel slag fine aggregate which are washed by the method in accordance with JIS A 1103 can be used as samples. In this case, it shall be commented on in the report item.

<sup>(5)</sup> The method of preparation of saturated surface-dry condition of granular ferro-nickel slag fine aggregate produced by rapid cooling with air shall be in accordance with 3.3 of JIS A 1110. In this case, it shall be commented on in the report item.

**4.4 Test for unit weight** The test for unit weight of slag aggregate for concrete shall be carried out in accordance with JIS A 1104.

**4.5 Washing test** The test for the mass lost in the washing test of ferro-nickel slag fine aggregate shall be carried out in accordance with JIS A 1103.

**4.6 Water immersion test** Water immersion test of blast-furnace slag coarse aggregate shall be carried out as follows:

- (1) Samples About 2000 g of blast-furnace slag coarse aggregates shall be sampled and screened with a 10 mm test sieve. The on-sieve particles shall be contained in a vessel. Water shall be poured into the vessel and the contents shall be stirred violently to eliminate fine particles adhering to the surfaces of the blast-furnace slag coarse aggregates and those included in the cavities. Washing water suspended by fine particles shall be poured out by tilting the vessel. The blast-furnace slag coarse aggregates in the vessel shall be transferred on a 10 mm sieve that is placed on another vessel. Again, water shall be poured to the blast-furnace slag coarse aggregates in the vessel and the contents shall be stirred. This procedure shall be repeated until washing water becomes clear. The blast-furnace slag coarse aggregates of 10 mm or more free from fine particles obtained after these procedures shall be regarded the samples.
- (2) Procedures Thirty pieces from samples shall be arbitrarily taken out and immersed in water of  $20 \pm 2^\circ\text{C}$  for 2 days.
- (3) Results and judgement After immersion, for all pieces of the sample, the presence of cracks, decomposition, muddiness and dusting shall be investigated. When cracks, decomposition, muddiness and dusting are found even on one piece of the sample, the retest shall be carried out.

4.7 Irradiation test by ultraviolet light (360.0 nm) The irradiation test by ultraviolet light for blast-furnace slag coarse aggregates shall be carried out as follows:

- (1) Samples About 2000 g of air dried blast-furnace slag coarse aggregates shall be extracted and screened with a 10 mm test sieve. Ten pieces shall be taken out arbitrarily from the on-sieve pieces to prepare the sample.
- (2) Testing apparatus The testing apparatus shall be an ultraviolet light discriminating apparatus which is capable of radiating ultraviolet light of wave length 360.0 nm, free from visible lights, and composed of a quartz lamp for analysis and nickel oxide glasses (for U.V. filter).
- (3) Procedures Ten pieces of sample are crushed with a hammer and chisel to expose fresh fracture surfaces. Then, the fractured surfaces shall be observed with radiating the ultraviolet light of 360.0 nm.
- (4) Results and judgement As a result of observation, when it does not radiate or shine in even violet shades, it shall be regarded to be acceptable. Whenever a single piece radiates abnormally, the retest shall be carried out.

4.8 Alkaline silica reaction test The alkaline silica reaction test for ferro-nickel slag fine aggregates shall be carried out in accordance with Annex 7 [Alkaline silica reaction test method for aggregates (Chemical method)], or Annex 8 [Alkaline silica reaction test method for aggregates (Mortar-bar method)] of JIS A 5308. The grading distribution of aggregates to be used for Mortar-bar method test for 1.2 mm ferro-nickel slag fine aggregates shall be as given in Table 10.

Table 10. Grading distribution of aggregates to be used for Mortar-bar method test for 1.2 mm ferro-nickel slag fine aggregates

| Particle diameter<br>mm | Mass percentage<br>% |
|-------------------------|----------------------|
| 2.5 to 1.2              | 5                    |
| 1.2 to 0.6              | 35                   |
| 0.6 to 0.3              | 40                   |
| 0.3 to 0.15             | 20                   |

4.9 Grading test The grading test for slag aggregates for concrete shall be carried out in accordance with JIS A 1102.

5. Inspection method For the slag aggregates for concrete to be inspected, the lot size shall be determined in accordance with JIS Z 9001 or upon agreement between the purchaser and supplier, and the samples shall be extracted by a reasonable sampling inspection system. Those samples shall be tested according to 4., and conform to the requirements of 3.

Upon the agreement between the purchaser and supplier, a part of the inspection items can be omitted.

6. Marking The following items shall be stated in the invoice of the slag aggregates for concrete.

- (1) Type (expressed by the designation in 2.4)
- (2) Date of manufacture or its abbreviation
- (3) Manufacturer's name or abbreviation
- (4) Name of manufacturing plant or its abbreviation
- (5) Other notices on use

7. Reports When requested by the purchaser, the manufacturer shall submit the table on the test results. For the table on test results, the forms given on Tables 11 to 13 shall be standard.

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Related standards:

- JIS A 1125 Method of test for total moisture content and surface moisture of aggregate by drying
- JIS A 1205 Test method for liquid limit and plastic limit of soils
- JIS B 7505 Bourdon tube pressure gauges
- JIS K 0211 Technical terms for analytical chemistry (general part)
- JIS R 5201 Physical testing methods for cement

Table 11. Table on the test results for blast-furnace slag coarse aggregate for concrete

Date \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Company \_\_\_\_\_ Plant \_\_\_\_\_  
 Date of manufacture: \_\_\_\_\_

| Type        | Chemical component (%)    |                        |                                          |                        | Materials                                     |                           |                       |                                  |
|-------------|---------------------------|------------------------|------------------------------------------|------------------------|-----------------------------------------------|---------------------------|-----------------------|----------------------------------|
|             | Calcium oxide<br>(as CaO) | Total sulfur<br>(as S) | Sulfur trioxide<br>(as SO <sub>3</sub> ) | Total iron<br>(as FeO) | Specific gravity in<br>absolute dry condition | Water absorp-<br>tion (%) | Unit weight<br>(kg/l) | Lost part in<br>washing test (%) |
|             |                           |                        |                                          |                        |                                               |                           |                       |                                  |
|             |                           |                        |                                          |                        |                                               |                           |                       |                                  |
|             |                           |                        |                                          |                        |                                               |                           |                       |                                  |
|             |                           |                        |                                          |                        |                                               |                           |                       |                                  |
| BFG 40 - 5  | A                         | 45.0 max.              | 2.0 max.                                 | 3.0 max.               | 2.2 min.                                      | 6.0 max.                  | 1.25 min.             | —                                |
|             | B                         |                        |                                          |                        | 2.4 min.                                      | 4.0 max.                  | 1.35 min.             |                                  |
| BFG 40 - 20 | A                         | 45.0 max.              | 2.0 max.                                 | 3.0 max.               | 2.2 min.                                      | 6.0 max.                  | 1.25 min.             | —                                |
|             | B                         |                        |                                          |                        | 2.4 min.                                      | 4.0 max.                  | 1.35 min.             |                                  |
| BFG 25 - 5  | A                         | 45.0 max.              | 2.0 max.                                 | 3.0 max.               | 2.2 min.                                      | 6.0 max.                  | 1.25 min.             | —                                |
|             | B                         |                        |                                          |                        | 2.4 min.                                      | 4.0 max.                  | 1.35 min.             |                                  |
| BFG 20 - 5  | A                         | 45.0 max.              | 2.0 max.                                 | 3.0 max.               | 2.2 min.                                      | 6.0 max.                  | 1.25 min.             | —                                |
|             | B                         |                        |                                          |                        | 2.4 min.                                      | 4.0 max.                  | 1.35 min.             |                                  |
| BFG 15 - 5  | A                         | 45.0 max.              | 2.0 max.                                 | 3.0 max.               | 2.2 min.                                      | 6.0 max.                  | 1.25 min.             | —                                |
|             | B                         |                        |                                          |                        | 2.4 min.                                      | 4.0 max.                  | 1.35 min.             |                                  |

Table 11. (continued)

| Type        | Percentage of passing sieves by mass (%) |       |           |           |           |          |         | Fineness modulus *                                           | Immersion in water *                                                                | Irradiation by UV (360.0 nm) *                      | Other precautions on use |
|-------------|------------------------------------------|-------|-----------|-----------|-----------|----------|---------|--------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------------|
|             | 50 mm                                    | 40 mm | 25 mm     | 20 mm     | 15 mm     | 10 mm    | 5 mm    |                                                              |                                                                                     |                                                     |                          |
| BFG 40 - 5  | A                                        | 100   | 95 to 100 | 35 to 70  | —         | 10 to 30 | 0 to 5  | Shall not vary $\pm 0.30$ or more from that of trade sample. | Shall be free from such phenomena as cracks, decomposition, muddiness and dustings. | Shall not radiate, or shines in even violet shades. |                          |
|             | B                                        |       |           |           |           |          | —       |                                                              |                                                                                     |                                                     |                          |
| BFG 40 - 20 | A                                        | 100   | 90 to 100 | 0 to 15   | —         | 0 to 5   | —       |                                                              |                                                                                     |                                                     |                          |
|             | B                                        |       |           |           |           |          |         |                                                              |                                                                                     |                                                     |                          |
| BFG 25 - 5  | A                                        | —     | 100       | —         | 30 to 70  | —        | 0 to 10 |                                                              |                                                                                     |                                                     |                          |
|             | B                                        |       |           |           |           |          |         |                                                              |                                                                                     |                                                     |                          |
| BFG 20 - 5  | A                                        | —     | —         | 90 to 100 | —         | 20 to 55 | 0 to 10 |                                                              |                                                                                     |                                                     |                          |
|             | B                                        |       |           |           |           |          |         |                                                              |                                                                                     |                                                     |                          |
| BFG 15 - 5  | A                                        | —     | —         | 100       | 90 to 100 | 40 to 70 | 0 to 15 |                                                              |                                                                                     |                                                     |                          |
|             | B                                        |       |           |           |           |          |         |                                                              |                                                                                     |                                                     |                          |

Note \*: "Acceptable" or "Not acceptable" shall be indicated as the judgement of test results.

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A 5011-1992

Table 12. Table on the test results for blast-furnace slag fine aggregate for concrete

Date \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Company \_\_\_\_\_ Plant \_\_\_\_\_  
 Date of manufacture: \_\_\_\_\_

| Type        | Chemical component (%)    |                        |                                          |                        | Materials                                        |                           |                       |                                  |
|-------------|---------------------------|------------------------|------------------------------------------|------------------------|--------------------------------------------------|---------------------------|-----------------------|----------------------------------|
|             | Calcium oxide<br>(as CaO) | Total sulfur<br>(as S) | Sulfur trioxide<br>(as SO <sub>3</sub> ) | Total iron<br>(as FeO) | Specific gravity<br>in absolute<br>dry condition | Water absorp-<br>tion (%) | Unit weight<br>(kg/l) | Lost part in<br>washing test (%) |
|             |                           |                        |                                          |                        |                                                  |                           |                       |                                  |
|             |                           |                        |                                          |                        |                                                  |                           |                       |                                  |
|             |                           |                        |                                          |                        |                                                  |                           |                       |                                  |
| BFS 5       | 45.0 max.                 | 2.0 max.               | 0.5 max.                                 | 3.0 max.               | 2.5 min.                                         | 3.5 max.                  | 1.45 min.             | —                                |
| BFS 2.5     | 45.0 max.                 | 2.0 max.               | 0.5 max.                                 | 3.0 max.               | 2.5 min.                                         | 3.5 max.                  | 1.45 min.             | —                                |
| BFS 1.2     | 45.0 max.                 | 2.0 max.               | 0.5 max.                                 | 3.0 max.               | 2.5 min.                                         | 3.5 max.                  | 1.45 min.             | —                                |
| BFS 5 - 0.3 | 45.0 max.                 | 2.0 max.               | 0.5 max.                                 | 3.0 max.               | 2.5 min.                                         | 3.5 max.                  | 1.45 min.             | —                                |