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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 24175-2009

Test method for stability of steel slag

钢渣稳定性试验方法

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Foreword

GB/T 24175-2009 was issued on 25 June 2009 by the General Administration of Quality Supervision, Inspection and Quarantine and the Standardization Administration of the People's Republic of China, and has been in force since 1 April 2010. It is classified under ICS 77.140.99 and CCS H 54.

The document is a recommended national standard: the /T in the designation marks it as recommended rather than compulsory, which in the Chinese system means it is the method the reviewer applies.

1 Scope

China's national test method for the stability of steel slag. Steel slag is produced in enormous quantity - roughly a tenth of a tonne for every tonne of steel - and using it as aggregate in road base and concrete is the only route that consumes it at that scale. The obstacle is a specific and destructive one: the slag contains free calcium and magnesium oxide left unreacted from the lime added in refining, and those hydrate slowly when wet, expanding as they do. The expansion is delayed by months or years, so a road built on unstable slag looks perfect and then heaves, and concrete made with it cracks from within. That single failure mode is why slag must be aged in stockpiles or steam-treated before use, and why a test is needed to establish whether a given slag is stable. The standard specifies the terms and definitions, the apparatus, the determination of the immersion expansion ratio, the determination of the autoclave chalked ratio, and the test report.

This standard specifies the terms and definitions, the instruments and apparatus, the determination of the immersion expansion ratio, the determination of the autoclave chalked ratio, and the test report for the test methods for the stability of steel slag.

The method for determining the immersion expansion ratio applies to steel slag used as road subgrade and base course material, steel slag used as aggregate for asphalt pavement, and steel slag used as engineering backfill. The autoclave chalked ratio method applies to steel slag used in building mortar, in building material products and in concrete.

2 Normative references

The following documents contain provisions which, through reference in this standard, constitute provisions of this standard. For dated references, subsequent amendments (excluding corrections) or revisions do not apply; however, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions. For undated references, the latest edition applies.

GB/T 750 Test method for autoclave soundness of portland cement

GB/T 6003.1 Test sieves - Technical requirements and testing - Part 1: Test sieves of metal wire cloth

GB/T 6003.2 Test sieves - Technical requirements and testing - Part 2: Test sieves of perforated metal plate

GB/T 8170 Rules of rounding off for numerical values

GB/T 50123 Standard for soil test method

3 Terms and definitions

The terms and definitions given in YB/T 804 and the following apply to this standard.

3.1 immersion expansion ratio - the rate of volume change of steel slag after immersion under the specified test conditions.

3.2 autoclave chalked ratio - the proportion by mass of particles smaller than 1.18 mm after the steel slag has been chalked under the specified conditions of pressure and time.

4.1 Weighing equipment

4.1.1 Range not less than 20 kg, scale interval not greater than 10 g.

4.1.2 Range not less than 5 kg, scale interval not greater than 1 g.

4.1.3 Range not less than 0.5 kg, scale interval not greater than 0.01 g.

4.2 Compaction test equipment

Comprising a metal cylinder of 152 mm internal diameter and 170 mm height, a collar 50 mm high, a spacer block within the cylinder of 151 mm diameter and 50 mm height, a base, and a compaction apparatus. The base of the rammer is 50 mm in diameter and the total mass of the rammer is 4.5 kg. The total travel of the rammer within the guide tube is 450 mm.

4.3 Perforated base

With supports on both sides and a perforated plate in the middle covered with 2 mm round holes.

4.4 Perforated top plate

Diameter 148 mm, covered with 2 mm round holes, made of stainless steel or brass, with a threaded central hole.

4.5 Semicircular loading plates

Hollow concentric semicircular stainless steel plates of 150 mm diameter and 10 mm thickness, with a central hole of 52 mm diameter, each of 1.25 kg.

4.6 Dial gauge and its stand

The accuracy of the dial gauge is 0.01 mm.

4.7 Constant temperature water bath

Minimum dimensions of the water bath: 1100 mm long by 330 mm wide by 350 mm high, with temperature control above 90 degrees C.

The arrangement of the apparatus for determining the immersion expansion ratio is shown

in the figure: 1 perforated base; 2 steel slag; 3 perforated top plate; 4 semicircular loading plate; 5 dial gauge.

4.8 Drying oven

Capable of temperature control at 105 degrees C with an accuracy not worse than 5 degrees C.

4.9 Filter paper

Diameter 152 mm.

4.11 Autoclave

Design pressure 2.5 MPa; working pressure 2.0 MPa; working medium saturated steam; minimum volume 0.0085 cubic metres.

4.12 Test sieves

Complying with GB/T 6003.1 and GB/T 6003.2, with apertures of 31.5 mm, 26.5 mm, 19.0 mm, 16.0 mm, 13.2 mm, 9.5 mm, 4.75 mm, 2.36 mm, 1.18 mm, 0.3 mm and 0.075 mm.

4.13 Sieve shaker

Vibration frequency 221 times per minute.

4.14 Autoclave basket

With a circular sieve of 1.18 mm aperture at the bottom, 100 mm in diameter and 90 mm high, with a cloth over the sieve mesh.