भारतीय मानक

जलीय सीमेंट के भौतिक परीक्षणों की पद्धतियाँ

भाग 1 शुष्क छनाई द्वारा मलीनता ज्ञात करना

(दूसरा पुनरीक्षण)

Indian Standard

METHOD OF PHYSICAL TESTS FOR HYDRAULIC CEMENT

PART 1 DETERMINATION OF FINENESS BY DRY SIEVING

(Second Revision)

ICS 91.100.10

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 1996

Price Group 2

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by Cement and Concrete Sectional Committee had been approved by Civil Engineering Division Council.

Standard methods of testing cement are essential adjunct to the cement specifications. This standard in different parts lays down the procedure for the tests to evaluate physical properties of different types of hydraulic cements. The procedure for conducting chemical tests of hydraulic cement is covered in IS 4032 : 1985 'Methods of chemical analysis of hydraulic cement (*first revision*)'. Originally all the tests to evaluate the physical properties of hydraulic cement were covered in one standard but for facilitating the use of this standard and future revisions, the revised standard was brought out in different parts, each part covering different tests. This part covers determination of fineness of cement by dry sieving.

The second revision of this standard has been prepared with a view to align this test method with European Standard EN 196 (Part 6) Method of testing cements: Determination of fineness.

The composition of the Committee responsible for the formulation of this standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METHOD OF PHYSICAL TESTS FOR HYDRAULIC CEMENT

PART 1 DETERMINATION OF FINENESS BY DRY SIEVING

(*Second Revision*)

1 SCOPE

1.1 This standard (Part 1) covers the procedure for determining the fineness of cement by dry sieving as represented by the mass of residue left on a standard 90 μm IS Sieve.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
460	Specification for test sieves:
(Part 1) : 1985	Wire cloth test sieves (*third revision*)
(Part 3) : 1985	Methods of examination of apertures of test sieves (*third revision*)
3535 : 1986	Methods of sampling hydraulic cements (*first revision*)
5165 : 1969	Interchangeable conical ground - glass joints

3 SAMPLING AND SELECTION OF TEST SPECIMENS

3.1 The samples of the cement shall be taken according to the requirements of IS 3535:1986 (*see* **2.1**) and the relevant standard specification for the type of cement being tested. The representative sample of the cement selected as above shall be thoroughly mixed before testing.

4 SIEVING METHOD

4.1 Principle

The fineness of cement is measured by sieving it on standard sieve. The proportion of cement of which the grain sizes are larger than the specified mesh size is thus determined.

A reference sample having a known proportion of material coarser than the specified mesh size is used for checking the specified sieve.

4.2 Apparatus

4.2.1 *Test Sieve*

It comprises a firm, durable, non-corrodible, cylindrical frame of 150 mm to 200 mm nominal diameter and 40 mm to 100 mm depth, fitted with 90 μm mesh sieve cloth of woven stainless steel, or other abrasion-resisting and non-corrodible metal wire.

The sieve cloth shall comply with the requirements of IS 460 (Part 1) : 1985 and IS 460 (Part 3) : 1985 and shall be free of visible irregularities in mesh size when inspected optically by the methods of IS 460 (Part 3) : 1985. A tray fitting beneath the sieve frame and a lid fitting above it shall be provided to avoid loss of material during sieving.

4.2.2 *Balance*

Capable of weighing up to 10 g to the nearest 10 mg.

4.2.3 *Brush*

A nylone or pure bristle brush, preferably with 25 to 40 mm bristle, for cleaning the sieve.

4.3 Material for Checking the Sieve

A Standard reference material of known sieve residue shall be used for checking the sieve.

The material shall be stored in sealed, airtight containers to avoid changes in its characteristics due to absorption or deposition from the atmosphere. The containers shall be marked with the sieve residue of the reference material.

4.4 Procedure

4.4.1 *Determination of the Cement Residue*

Agitate the sample of cement to be tested by shaking for 2 min in a stoppered jar to disperse agglomerates. Wait 2 min. Stir the resulting powder gently using a clean dry rod in order to distribute the fines throughout the cement.

Fit the tray under the sieve, weigh approximately 10 g of cement to the nearest 0.01 g and place it on the sieve, being careful to avoid loss. Disperse any agglomerates. Fit the lid over the sieve. Agitate the sieve by swirling, planetary and linear movement until no more fine material passes through it. Remove and weigh the residue. Express its mass as a percentage, R_1, of the quantity first placed in the sieve to the nearest 0.1 percent. Gently brush all the fine material off the base of the sieve into the tray.

Repeat the whole procedure using a fresh 10 g sample

to obtain R_2. Then calculate the residue of the cement R as the mean of R_1 and R_2 as a percentage, expressed to the nearest 0.1 percent.

When the results differ by more than 1 percent absolute, carry out a third sieving and calculate the mean of the three values.

The sieving process is carried out manually by a skilled and experienced operator.

NOTE - Alternatively a sieving machine may be used provided that it can be shown to give the same results as the manual operation.

4.4.2 *Checking the Sieve*

Agitate the sample of cement to be tested by shaking for 2 min in a stoppered jar to disperse agglomerates. Wait 2 min. Stir the resulting powder gently using a clean dry rod in order to distribute the fines throughout the cement.

Fit the tray under the sieve. Weigh approximately 10 g of the reference material to the nearest 0.01 g and place it in the sieve, being careful to avoid loss. Carry out the sieving procedure as in 4.4.1 including the repeat determination of residue to yield two values p_1 and P_2 expressed to the nearest 0.1 percent.

The two values of P_1 and P_2 for a satisfactory sieve should differ by not more than 0.3 percent. Their mean *P* characterizes the state of the sieve.

Given the known residue on the 90 μm mesh of the reference material, R_o, calculate R_o/P as the sieve factor, F, expressed to the nearest 0.01. The residue, R, determined as in 4.4.1 shall be corrected by multiplying by F, which may have a value of 1.00 ± 0.20.

Check the sieve after every 100 sievings.

NOTE - Any other checking procedure, such as the optical methods described in IS 460 (Part 3) : 1985 may be used. All sieves will wear slowly and consequently their sieve factor, F, will slowly change.

5 EXPRESSION OF RESULTS

Report the value of R, to the nearest 0.1percent, as the residue on the 90 µm sieve for the cement tested.

The standard deviation of the repeatability is about 0.2 percent and of the reproducibility is about 0.3 percent.

ANNEX A
(*Foreword*)

COMMITTEE COMPOSITION

Cement and Concrete Sectional Committee, CED 2

Chairman	*Representing*
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Member Secretary
SHRI J.K. PRASAD
Joint Director (Civil Engg), BIS

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Composition of Cement, Pozzolana and Cement Additives Subcommittee, CED 2 : 1

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition.

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 323 01 31, 323 94 02, 323 83 75

Telegrams: Manaksanstha
(Common to all offices)

Regional Offices:	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002	323 76 17, 323 38 41
Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054	337 84 99, 337 85 61, 337 86 26, 337 86 62
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022	60 38 43, 60 20 25
Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	235 02 16, 235 04 42, 235 15 19, 235 23 15
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