

**IS 4031 ( Part 15 ) : 1991**

( Reaffirmed 1995 )

भारतीय मानक

जलदृढ़ी सीमेंट के लिए भौतिक परीक्षण की पद्धतियाँ

भाग 15 आर्द्र छन्नी द्वारा बारीकी ज्ञात करना

*Indian Standard*

**METHODS OF PHYSICAL TESTS FOR  
HYDRAULIC CEMENT**

**PART 15 DETERMINATION OF FINENESS BY WET SIEVING**

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

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Price Group 3

## FOREWORD

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

Standard methods of testing cement are essential adjunct to the cement specifications. This standard in different parts, lays down the test procedures to evaluate the physical properties of different types of hydraulic cement. This part covers determination of fineness of cement by wet sieving. The procedures for conducting chemical tests of hydraulic cement are covered in IS 4032 series 'Methods of chemical analysis of hydraulic cement'.

Determination of fineness by wet sieving is required mainly for masonry cement, but the same method shall be applied when any manufacturer or user wants to determine fineness of any other cement for any other specific reason.

The composition of the technical committee responsible for the formulation of this standard is given in Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

## *Indian Standard*

# METHODS OF PHYSICAL TESTS FOR HYDRAULIC CEMENT

## PART 15 DETERMINATION OF FINENESS BY WET SIEVING

### 1 SCOPE

This standard ( Part 15 ) covers the procedure for determining the fineness of cement by wet sieving as represented by the mass of the residue left on a standard 45-micron IS Sieve.

### 2 REFERENCES

The Indian Standards listed below are necessary adjuncts to this standard.

<i>IS No.</i>	<i>Title</i>
3535 : 1986	Methods of sampling hydraulic cements ( <i>first revision</i> )
460 ( Part 1 ) : 1985	Specification for test sieves: Part 1 Wire cloth test sieves ( <i>third revision</i> )

### 3 SAMPLING AND SELECTION OF TEST SAMPLES

The samples of the cement shall be taken in accordance with the requirements of IS 3535 : 1986 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 TEMPERATURE

The temperature of the room and the materials shall preferably be maintained at  $27 \pm 2^\circ\text{C}$ .

### 5 APPARATUS

#### 5.1 Sieve

The sieve frame shall be of non-corrodible material and shall be circular  $50 \pm 5$  mm in diameter. The depth of the sieve from the top of the frame to the cloth shall be  $75 \pm 5$  mm. The frame shall have either side walls  $90 \pm 5$  mm in total height or legs of sufficient length, 12.0 mm minimum, to allow air circulation beneath the sieve cloth. The sieve frame shall be fitted with 45 micron stainless steel woven wire cloth sieve conforming to IS 460 ( Part 1 ) : 1985. The cloth shall be mounted in the frame without distortion, looseness or wrinkling. For a sieve fabricated by soldering the cloth to the frame, the joint shall be made smooth to prevent the cement from catching in the joints between the sieve cloth and frame. Two piece

sieves shall clamp tightly on the cloth to prevent the cement from catching in the joints between the sieve cloth and the frame.

#### 5.2 Spray Nozzle

The spray nozzle ( see Fig. 1 ) shall be constructed with non-corrodible material and shall be of 17.5 mm inside diameter with a central hole drilled in line with the longitudinal axis, and intermediate row of eight holes drilled 6 mm centre to centre at an angle of  $5^\circ$  from the longitudinal axis, and an outer row of eight holes drilled 11 mm centre to centre at an angle of  $10^\circ$  from the longitudinal axis. All holes shall be of 0.5 mm diameter.

#### 5.3 Pressure Gauge

The pressure gauge shall be of 75 mm minimum diameter and shall be graduated in  $0.01 \text{ N/mm}^2$  increments and shall have a maximum capacity of  $0.2 \text{ N/mm}^2$  with a marking at  $0.07 \text{ N/mm}^2$ . The accuracy at  $0.07 \text{ N/mm}^2$  shall be  $0.005 \text{ N/mm}^2$ .

#### 5.4 Balance

Analytical balance capable of reproducing results within 0.000 2 g with an accuracy of  $\pm 0.000 2$  g.

NOTE — Self indicating balance with equivalent accuracy may also be used.

#### 5.5 Standard Weights

#### 5.6 Oven

### 6 CALIBRATION OF 45 MICRON IS SIEVE

The calibration of the 45 micron sieve shall be made using standard reference material (SRM) from National Council of Cement and Building Materials. Place 1.000 g of the SRM on the clean dry 45 micron sieve and proceed as in 7. The sieve correction factor is the difference between the test residue obtained and the assigned residue value indicated by the electro-formed sheet sieve fineness specified for the standard sample, expressed as a percentage of the test residue. The sieve shall be re-calibrated after every 100 determinations.

#### Example :

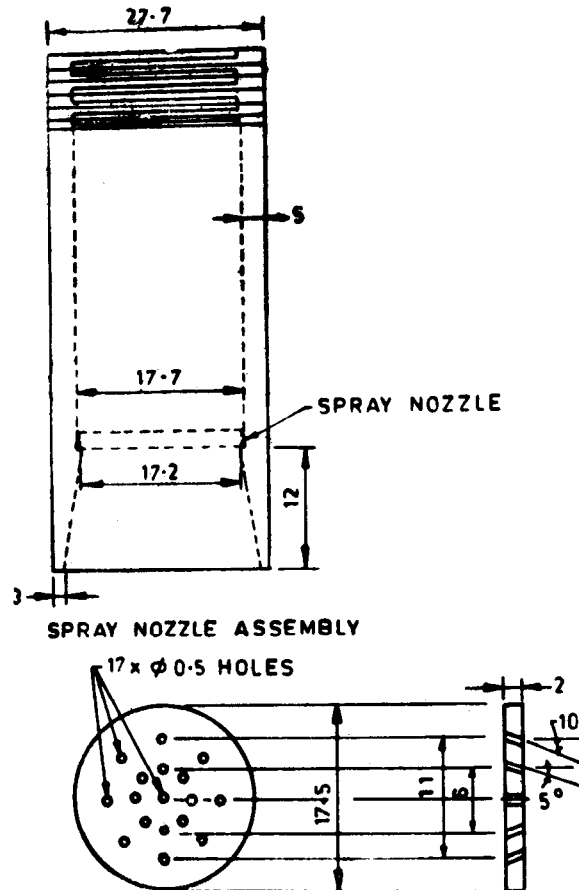
Residue on 45 micron IS Sieve of 14.0 percent SRM sample

Residue for a 1 g sample 0.140 g

Residue on Sieve being calibrated 0.105 g

Difference +0.035 g

Correction factor =  $\frac{0.035 \times 100}{0.105} = + 33.3$  percent



All dimensions in millimetres.

FIG. 1 SPRAY NOZZLE

## 7 PROCEDURE

Place 1'000 g of sample of the cement on a clean, dry 45 micron IS Sieve. Wet the sample thoroughly with a gentle stream of water. Remove the sieve from under the nozzle and adjust the pressure on the spray nozzle to  $0.07 \pm 0.005$  N/mm<sup>2</sup>. Return the sieve to its position under the nozzle and wash for 1 min, moving the sieve with a circular motion in a horizontal plane at the rate of one motion per second in the spray. The bottom of the spray nozzle shall extend below the top of the sieve frame by about 12 mm. Immediately upon removing the sieve from the spray, rinse once with 50 ml of distilled water, taking care not to lose any of the residue, and then blot the lower surface gently upon a damp cloth. Dry the sieve and residue in an oven or over a hot plate (see Note), supporting the sieve in such a manner that air may pass freely beneath it. Cool the sieve, brush the residue from the sieve and weigh.

NOTE — Care should be taken not to heat the sieve hot enough to soften the solder.

## 8 CALCULATION

Calculate the mass of the residue of the cement left on the standard 45 micron IS Sieve to the nearest 0.1 percent as follows:

$$Rc = Rs \times (100 + C)$$

where

$Rc$  = corrected residue in percent,

$Rs$  = residue of the sample retained on the 45 micron IS Sieve in g, and

$C$  = sieve correction factor which may be either plus or minus.

Example:

Sieve correction factor,  $C = + 33.3$  percent

Residue from sample being tested,  $Rs = 0.092$  g

$$\text{Corrected residue} = 0.092 \times (100 + 33.3) = 12.3 \text{ percent}$$

**ANNEX A**  
( *Foreword* )  
**COMPOSITION OF THE TECHNICAL COMMITTEE**  
**Cement and Concrete Sectional Committee, CED 2**

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