

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 5516 (1996): Specification variable flow type air-permeability apparatus (Blaine type) [CED 2: Cement and Concrete]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक
परिवर्ती फ्लोटाइप वायुगम्यता उपकरण
(ब्लेन टाइप) — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard
VARIABLE FLOW TYPE AIR-PERMEABILITY
APPARATUS (BLAINE TYPE) — SPECIFICATION
(*First Revision*)

ICS 91.100.10

© BIS 1996

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

FOREWORD

This Indian Standard (First Revision) 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.

The Bureau of Indian Standards has formulated a series of standards on different types of cement and methods of tests of cement. As it has been recognized that reliable and reproducible test results could be obtained only with standard types of testing equipment which are capable of giving the desired level of accuracy, a series of specifications covering the requirements of testing equipment have been brought out to encourage the development and manufacture of standard testing equipment for cement testing in the country.

This standard was first brought out in 1969. The present revision has been taken up to incorporate the modifications found necessary in order to align this standard with EN 1966:1989 'Methods of testing cement: Determination of fineness'. The major modifications include changes in some dimensions of the apparatus, provision of rubber tube and aspirator bulb in the monometer and recommendation of inscription of a mark on centre position of the perforated disc on one side to ensure correct and uniform placing of disc. In this revision, the extent of smoothness of the internal wall of the permeability cell has also been defined in addition to making reference to the latest version of the relevant Indian Standard.

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 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

VARIABLE FLOW TYPE AIR-PERMEABILITY APPARATUS (BLAINE TYPE) – SPECIFICATION

(*First Revision*)

1 SCOPE

This standard covers the requirements of variable flow type air-permeability apparatus (Blaine type) and its accessories used for determination of specific surface of cements, pozzolanas and other powdery materials.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard

| IS No. | Title |
|-------------|--|
| 292 : 1983 | Leaded brass ingots and castings (<i>second revision</i>) |
| 6911 : 1972 | Stainless steel plate, sheet and strip |
| 7374 : 1974 | Glass rods and tubing for laboratory glassware |

3 MATERIALS

The materials of construction of different component parts of air-permeability apparatus (Blaine type) shall be as given in col 3 of Table 1. Recommended Indian Standards for different materials, where available, are given in col 5 of Table 1.

4 DIMENSIONS

Dimensions of different component parts of air-permeability apparatus (Blaine type) shall be as detailed in Fig. 1.

5 WORKING PRINCIPLE

The variable flow type air-permeability apparatus (Blaine type) shall consist essentially of a means for drawing a definite quantity of air under a falling pressure head through a prepared bed of powder of a definite porosity. The number and size of the pores in a prepared bed of cement of definite porosity is a function of the size of the particles and determine the rate of air flow through the bed.

6 PARTS AND ACCESSORIES

6.1 Permeability Cell

The permeability cell shall consist of a rigid right cylinder 12.7 ± 0.1 mm inside diameter A , constructed of austenitic stainless steel or other abrasion-resisting, non-corroding metal. The top and bottom faces of the cell shall be flat and normal to the axis of the cylinder, as shall the upper surface of the ledge at the

bottom of the cell. The bottom of the cell shall form an airtight connection with the top of the manometer. The internal walls of the cell shall be smooth, true and vertical with a finish of 0.8 micron. A ledge 0.8 ± 0.2 mm in width shall be an integral part of the cell located at a depth shown in Fig. 1 to support the perforated disc. The top of the permeability cell shall be fitted with a protruding collar to facilitate the removal of the cell from the manometer.

6.1.1 The bottom end of the cell shall be flared downwards from the ledge portion to a length of 35 ± 1 mm, along the axis if the cell is of the female type or if male type, the wall of the cell be flared upwards from the ledge level to a distance of 45 ± 1 mm. The flaring shall be about 5° from the axis of the cell. The flaring either of the male type or female type shall ensure an airtight connection with the corresponding part of the manometer limb.

6.2 Perforated Disc

The disc shall be constructed of non-corrodible metal, preferably brass or austenitic stainless steel and shall be 0.9 ± 0.1 mm in thickness, perforated with 30 to 40 circular holes, each one millimetre in diameter equally distributed over its area and finished smooth. The disc shall be of diameter $A - 0.1$ mm and shall fit the inside of the cell snugly and get support on the ledge. The centre portion of one side of the disc should be marked or inscribed in a legible manner so as to permit the operator always to place that side downwards while inserting it into the cell. The marking or inscription shall not extend into any of the holes nor touch their peripheries nor extend that area of the disc that rests on the cell edge. When in position on the ledge in the cell, its plane surfaces shall be normal to the axis of the cell.

6.3 Plunger

The plunger shall be of the same material as the cell and shall fit into the cell with a clearance of not more than 0.1 mm. The bottom of the plunger shall sharply meet the lateral surfaces and shall be at right angles to the axis. An air vent shall be provided on one side of the plunger by flattening 3 mm. The top of the plunger shall be provided with a collar such that when the plunger is placed in the cell and the collar brought in contact with the top of the cell, the distance between the bottom of the plunger and the top surface of the perforated disc shall be 15.0 ± 1 mm.

**Table 1 Materials of Construction for Different Parts of Variable
Flow Type Air-Permeability Apparatus (Blaine Type)
(Clause 3)**

| Sl No. | Part | Material | Special Requirement, if any | Recommended Indian Standard Specification, if any |
|--------|-----------------------|--|--|---|
| (1) | (2) | (3) | (4) | (5) |
| i) | Permeability cell | Austenitic stainless steel or other abrasion-resisting non-corrodible material | — | IS 6911 : 1972 IS 292 : 1983 |
| ii) | Plunger | do | — | IS 6911 : 1972 or IS 292 : 1983 |
| iii) | Perforated metal disc | do | — | IS 6911 : 1972 or IS 292 : 1983 |
| iv) | Manometer tube | Glass | Clear borosilicate (glass) or equivalent | IS 7374 : 1974 |
| v) | Manometer stand | Wood/ Suitable wood substitute/Pressed steel sheet | Well seasoned wood (teak) or wood substitute or pressed steel sheet | — |
| vi) | Stopcock | Glass or brass spring type | — | |
| vii) | Manometer | Liquid | Non-volatile, non-hygroscopic liquid of low viscosity and density, such as dibutylphthalate (dibutyl 1, 2-benzenedicarboxylate or a light mineral oil | — |

A plunger shall only be used with the corresponding cell the dimensions of which match within the permitted tolerances.

6.4 Filter Paper Discs

The filter paper shall be of medium porosity (Mean pore diameter 7 micron corresponding to No. 40 Whatman). The filter paper discs shall be circular, with smooth edges adopted to the dimensions of the cell.

NOTE — Filter paper discs that are too small may leave part of the sample adhering to the inner wall of the cell above the top disc. When too large in diameter, the disc may have a tendency to buckle and cause erratic results.

6.5 Manometer

The U-tube manometer shall be constructed according to the design indicated in Fig. 1 using 9.0 ± 0.4 mm outside diameter borosilicate glass tubing. One arm of the manometer shall be provided at the top with a conical socket to form an airtight fit with the conical surface of the cell. The same arm shall also have four etched lines and a T-joint whose positions shall

have the dimensions shown in Fig. 1. The side branch of the T-joint shall lead to use airtight stopcock at a distance not more than 50 mm from the manometer arm and beyond which shall be attached a suitable aspiration device such as the rubber tube and bulb shown in Fig. 1.

6.5.1 The manometer shall be mounted firmly on the vertical board of the manometer stand in such a manner that the arms are vertical.

6.5.2 The manometer shall be filled to the level of the lowest etched line with a non-volatile, non-hygroscopic liquid of low viscosity and density, such as dibutylphthalate (dibutyl 1, 2-benzenedicarboxylate) or light grade mineral oil.

6.6 Accessories

The filter paper disc cutter and air evacuating rubber bulb may be supplied as accessories.

7 MARKING

The following information shall be clearly and indelibly marked on the apparatus in such a manner that it does

not interfere with the performance of the apparatus:

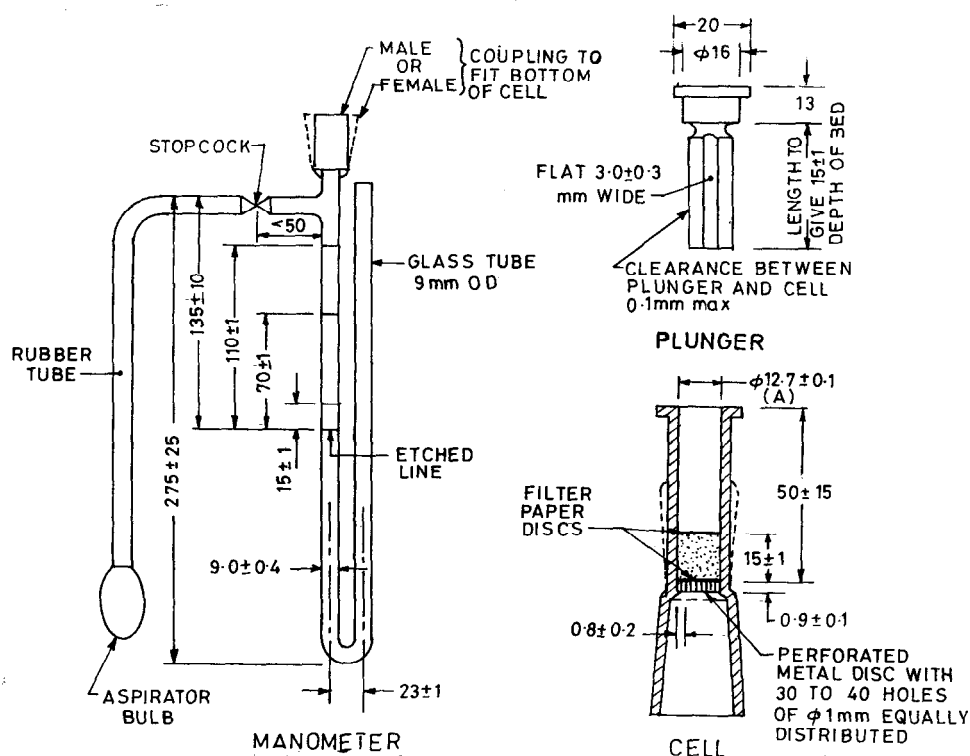
- Identification of the source of manufacture,
- Date of manufacture, and
- Serial number/Batch number.

8 BIS CERTIFICATION MARKING

The product may also be marked with the Standard

Mark.

8.1 The use of standard mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made there under. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.



All dimensions in millimetres.

FIG. 1 VARIABLE FLOW TYPE AIR PERMEABILITY APPARATUS (BLAINE TYPE)

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Cement and Concrete Sectional Committee, CED 2

Chairman

DR H. C. VISVESVARAYA

Members

SHRI H. BHATTACHARYA
 SHRI G. R. BHARTIKAR
 DR A. K. CHATTERJEE
 SHRI S. H. SUBRAMANIAN (*Alternate*)
 CHIEF ENGINEER (DESIGN)
 SUPERINTENDING ENGINEER (S&S) (*Alternate*)
 CHIEF ENGINEER, NAVAGAM DAM
 SUPERINTENDING ENGINEER QCC (*Alternate*)
 CHIEF ENGINEER, RESEARCH-CUM-DIRECTOR
 RESEARCH OFFICER , CONCRETE TECHNOLOGY (*Alternate*)
 DIRECTOR
 JOINT DIRECTOR (*Alternate*)
 DIRECTOR (CMDD) (N&W)
 DEPUTY DIRECTOR (CMDD) (NW&S) (*Alternate*)
 SHRI K. H. GANGWAL
 SHRI V. PATTABHI (*Alternate*)
 SHRI V. K. GHANEKAR
 SHRI S. GOPINATH
 SHRI R. TAMILAKARAN (*Alternate*)
 SHRI S. K. GUHA THAKURTA
 SHRI S. P. SANKARANARAYANAN (*Alternate*)
 SHRI N. S. BHAL
 DR IRSHAD MASOOD (*Alternate*)
 DR IRSHAD MASOOD
 SHRI N. C. JAIN (*Alternate*)
 JOINT DIRECTOR STANDARDS (B&S) (CB-I)
 JOINT DIRECTOR STANDARDS (B&S) (CB-II) (*Alternate*)
 SHRI N. G. JOSHI
 SHRI P. D. KELKAR (*Alternate*)
 SHRI D. K. KANUNGO
 SHRI B. R. MEENA (*Alternate*)
 SHRI P. KRISHNAMURTHY
 SHRI S. CHAKRAVARTHY (*Alternate*)
 DR A. G. MADHAVA RAO
 SHRI K. MANI (*Alternate*)
 SHRI G. K. MAJUMDAR
 SHRI J. SARUP (*Alternate*)
 SHRI PRAFULLA KUMAR
 SHRI P. P. NAIR (*Alternate*)
 MEMBER SECRETARY
 DIRECTOR (CIVIL) (*Alternate*)
 SHRI S. K. NATHANI, SO I
 DR A. S. GOEL, EE (*Alternate*)
 SHRI Y. R. PHULL
 SHRI S. S. SEEHRA (*Alternate*)
 SHRI Y. R. PHULL
 SHRI A. K. SHARMA (*Alternate*)
 DR C. RAJKUMAR
 DR S. C. AHLUWALIA (*Alternate*)

Representing

In personal capacity (University of Roorkee, Roorkee 247 667)

Orissa Cement Limited, New Delhi
 B. G. Shirke & Co, Pune
 The Associated Cement Companies Ltd, Bombay
 Central Public Works Department, New Delhi
 Sardar Sarovar Narmada Nigam Ltd, Gandhinagar
 Irrigation and Power Research Institute, Amritsar
 A. P. Engineering Research Laboratories, Hyderabad
 Central Water Commission, New Delhi
 Hyderabad Industries Ltd, Hyderabad
 Structural Engineering , Research Centre (CSIR), Ghaziabad
 The India Cements Ltd, Madras
 Gannon Dunkerley & Co Ltd, Bombay
 Central Building Research Institute (CSIR), Roorkee
 Cement Corporation of India, New Delhi
 Research, Designs & Standards Organizaztion (Ministry of Railways),
 Lucknow
 Indian Hume Pipes Co Ltd, Bombay
 National Test House, Calcutta
 Larsen and Toubro Limited, Bombay
 Structural Engineering Research Centre (CSIR), Madras
 Hospital Services Consultancy Corporation (India) Ltd, New Delhi
 Ministry of Transport, Department of Surface Transport Roads Wing,
 New Delhi
 Central Board of Irrigation and Power, New Delhi
 Engineer-in-Chief's Branch, Army Headquarters, New Delhi
 Central Road Research Institute (CSIR), New Delhi
 Indian Roads Congress, New Delhi
 National Council for Cement and Building Materials, New Delhi

(Continued on page 5)

(Continued from page 4)

Members

SHRI G. RAMDAS
 SHRI R. C. SHARMA (*Alternate*)
 SHRI S. A. REDDI
 REPRESENTATIVE
 SHRI J. S. SANGANERIA
 SHRI L. N. AGARWAL (*Alternate*)
 SHRI S. B. SURI
 SHRI N. CHANDRASEKARAN (*Alternate*)
 SUPERINTENDING ENGINEER (DESIGN)
 EXECUTIVE ENGINEER (S. M. R. DIVISION) (*Alternate*)
 SHRI A. K. CHADHA
 SHRI J. R. SIL (*Alternate*)
 DR. H. C. VISVESVARAYA
 SHRI D. C. CHATURVEDI (*Alternate*)
 SHRI VINOD KUMAR,
 Director (Civ Engg)

Representing

Directorate General of Supplies and Disposals, New Delhi
 Gammon India Ltd, Bombay
 Builder's Association of India, Bombay
 Geological Survey of India, Calcutta
 Central Soil and Materials, Research Station, New Delhi
 Public Works Department, Government of Tamil Nadu, Madras
 Hindustan Prefab Ltd, New Delhi
 The Institution of Engineers (India), Calcutta
 Director General, BIS (*Ex-Officio Member*)

Member Secretary

SHRI J. K. PRASAD
 Joint Director (Civ Engg), BIS

Instruments for Cement and Concrete Testing Subcommittee, CED 2 : 10**Convener**

DR A. K. CHATTERJEE

The Associated Cement Companies Ltd, Bombay

Members

SHRI P. RAY CHAUDHURI
 SHRI S. S. SEEHRA (*Alternate I*)
 SHRI HARJIT SINGH (*Alternate II*)
 DIRECTOR
 JOINT DIRECTOR (*Alternate*)
 DIRECTOR RESEARCH INSTITUTE
 DR T. N. CHOJER (*Alternate*)
 EXECUTIVE ENGINEER (D) – V
 SHRI H. K. GUHA
 DEPUTY SECRETARY (*Alternate*)
 SHRI S. C. JAIN
 SHRI S. S. MATHARU (*Alternate*)
 SHRI JATINDER SINGH
 SHRI GURBACHAN SINGH (*Alternate*)
 DR (SHRIMATI) S. LAXMI
 SHRI K. H. BABU (*Alternate*)
 SHRI B. R. MEENA
 SHRI B. MANDAL (*Alternate*)
 SHRI J. N. CHHANDA
 SHRI S. P. TEHRI (*Alternate*)
 DR. V. MOHAN
 SHRI B. V. B. PAI
 DR D. GHOSH (*Alternate*)
 SHRI Y. P. PATHAK
 SHRI M. V. S. MURTHY (*Alternate*)
 PROF C. K. RAMESH
 REPRESENTATIVE
 SHRI C. SANKARAN
 PROF S. N. SINHA

Central Road Research Institute, New Delhi
 A. P. Engineering Research Laboratories, Hyderabad
 Public Works Department, Uttar Pradesh
 Central Public Works Department, New Delhi
 All India Instrument Manufacturers and Dealers Association, Bombay
 Associated Instruments Manufacturers (I) Pvt Ltd, New Delhi and
 Advisory Committee for Standardization of Instruments (ACSI)
 Hydraulic Engineering Instruments, New Delhi
 National Council for Cement and Building Materials, New Delhi
 National Test House, Calcutta
 Central Building Research Institute, Roorkee
 National Physical Laboratory, New Delhi
 Associated Cement Companies Ltd, Bombay
 Research & Development Organization, Ministry of Defence, Pune
 Indian Institute of Technology, Bombay
 Department of Science & Technology, New Delhi
 Highways Research Station, Pune
 Indian Institute of Technology, New Delhi

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

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.

This Indian Standard has been developed from Doc No. CED 2 (5048).

Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|-----------|---------------|---------------|
| | | |
| | | |
| | | |
| | | |

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:

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

Telephone
{ 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

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400093

{ 832 92 95, 832 78 58
{ 832 78 91, 832 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR.
COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD.
JAIPUR. KANPUR. LUCKNOW. PATNA. THIRUVANANTHAPURAM.