IS 5513 (1996): Specification for vicat apparatus [CED 2: Cement and Concrete]

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IS 5513 : 1996
(Reaffirmed 2005)

भारतीय मानक

वाइकट उपकरण — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

VICAT APPARATUS — SPECIFICATION

(Second Revision)

ICS 91.100.10

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

May 1996

Price Group 3

FOREWORD

This Indian Standard (Second 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.

A series of standards have been formulated on different types of cement and methods of tests of cement. As it is 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 and subsequently revised in 1976. The present revision has been taken up to incorporate the modifications found necessary in order to align this standard with EN 196-3 : 1987 'Methods of testing cement : Determination of setting time and soundness'. The major changes include modifications in the dimensions of the mould and permitting the use of additional materials for making the vicat mould, including stainless steel, hard rubber and plastic, which have high strength and rigidity and are non-corroding and non-absorbent. In this revision the use of square needle for determining initial setting time of cement has been deleted. This revision also makes reference to the latest version of referred 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 reuirement of this standard is complied with, 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

VICAT APPARATUS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard covers the requirements of the Vicat apparatus used for determination of consistency of standard cement paste and initial and final setting times of cement.

2 REFERENCES

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

IS No.	*Title*
210 : 1978	Gray iron casting (*third revision*)
292 : 1983	Leaded brass ingots and castings (*second revision*)
4170 : 1967	Brass rods for general engineering purposes
6911 : 1972	Stainless steel plate, sheet and strip
9962 : 1981	Steel wires for needles

3 MATERIALS

The materials of construction of different component parts of Vicat apparatus shall be as given in col 2 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 Vicat apparatus shall be as detailed in Fig. 1 and 2 (*see* pages 3 and 4). Where tolerances are not specifically mentioned in the relevant clauses, dimensions shall be considered nominal.

5 CONSTRUCTION

5.1 General

The Vicat apparatus shall consist of a frame *D* having a movable rod *B* with a platform *A* at one end and the following which can be attached at the other end:

a) Needle *C* for determining the initial setting time,

b) Needle *F* for determining the final setting time, and

c) Plunger *G* for determining the standard consistency.

5.1.1 The needles *C*, *F* and plunger *G* shall be capable of being fixed centrally into the movable rod *B* by means of clamping screw as indicated in Fig. 1. Their movement shall be truely vertical and without appreciable friction, and their axis shall coincide with that of the needle or plunger.

5.2 Needles

The needles *C* and *F* shall be of hardened and tempered steel. Their hilts (fitting ends) shall be of brass.

5.2.1 There shall be about 6 mm clearance between the bottom end of the needle, when it is raised, and the top edge of the ring mould, to enable the mould to be located in position without damage to the needle.

5.2.2 *Dimensions of Needles*

Needle *C* shall be round of diameter 1.13 ± 0.05 mm. The needle shall have a flat end. The effective length, excluding the hilt shall be 50 ± 1 mm (*see* Fig. 1).

5.2.2.1 Needle *F* shall be of the same section as needle *C* but shall be 30 ± 1 mm in length, excluding the hilt, and fitted with a brass attachment hollowed out so as to leave a circular cutting edge 5 ± 0.1 mm in diameter. The depth hollowed out shall be 0.5 ± 0.1 mm. A 0.75 mm diameter vent hole shall be provided as shown. The needle shall project 0.5 ± 0.1 mm beyond the cutting edge (*see* Fig. 1).

5.3 Plunger

Plunger *G* shall be of polished brass 10 ± 0.05 mm in diameter with a projection at the fitting end for insertion into the movable rod *B*. The lower edge shall be flat. Its length shall be 50 ± 1 mm (*see* Fig. 1).

5.4 Movable Rod

Movable rod *B* shall carry an indicator which moves over a graduated scale attached to the frame *D*. A clearance of 0.25 mm around the movable rod is recommended to facilitate free movement. A suitable arrangement shall be provided to secure the movable rod in rest position when the apparatus is not in use (*see* Fig. 1).

5.5 Graduated Scale

Graduated scale shall be 40 mm in length and the smallest division of the scale shall be 1 mm (*see* Fig. 1).

5.6 Vicat Mould

The Vicat mould shall be of truncated conical form with an internal diameter of 70 ± 5 mm at the top, 80 ± 5 mm at the bottom and a height 40 ± 0.2 mm. The mould shall be adequately rigid and shall have a minimum wall thickness of 4 mm. A non-porous glass or stainless steel base plate shall be provided. A plate of glass or

stainless steel of at least 2.5 mm thickness is suitable.

NOTE – Split type Vicat mould may also be used as an alternative to single piece mould. The split type Vicat mould (*see* Fig. 2) shall consist of a split ring E_1 having an internal diameter 80.0 + 0.1 mm and a height of 40.0 + 0.2 mm. A non-porous base plate as given in **5.6** shall be provided. The split mould shall also be provided with a suitable clamping ring as shown in Fig. 2. The width and thickness of clamping ring shall be 8 to 10 mm. To ensure interchangeability of the clamping rings, the external diameter at the base of the split mould shall be 89.0 + 0.1 mm with a taper of 2° on the side from base to top edge. Total taper shall be 4° inwards from base to top. The inside surface of the clamping ring shall similarly be tapered. When assembled, this ring shall be clear above the base of the split mould, by a distance of 15 to 18 mm.

5.7 Mass

The total mass of the moving unit, when in use, complete with all attachments, that is, the cap and rod together with either needle *C* or needle *F* or plunger *G*, shall be 300 + 1 g.

5.7.1 Needle *C*, needle *F* and plunger *G* shall each weigh 9 ± 0.5 g.

6 MARKING

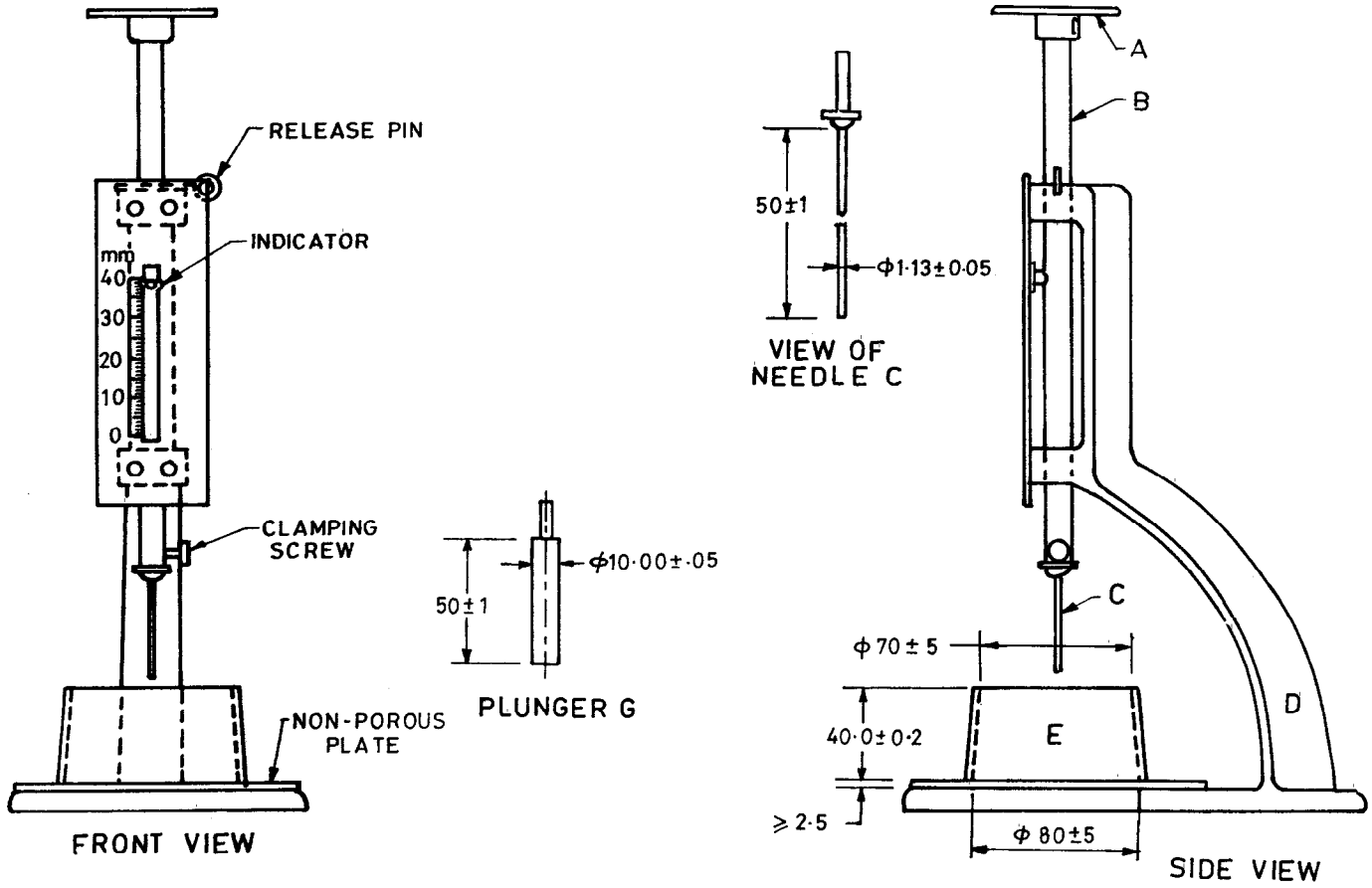
The following information shall be clearly and indelibly marked on the Vicat apparatus in such a manner that it does not interfere with the performance of the

Table 1 Materials of Construction for Different Parts of Vicat Apparatus

(*Clause* 3)

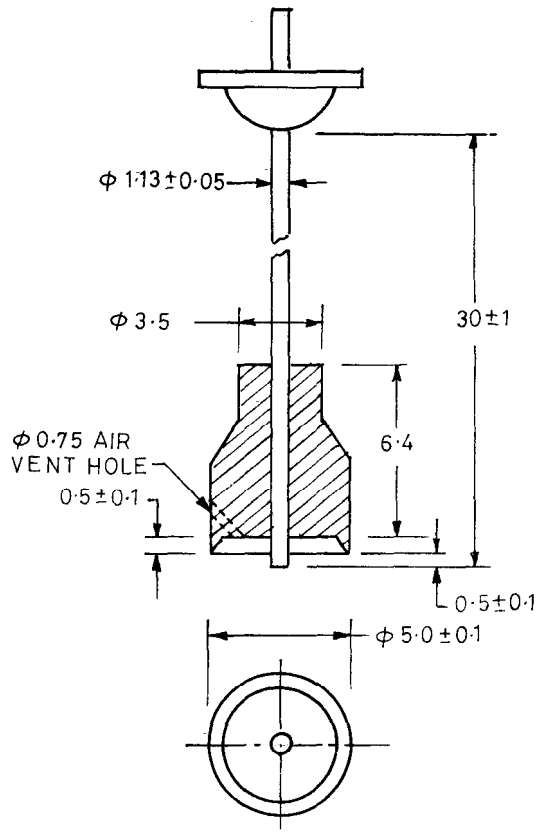
Sl No.	Part	Material	Special Requirement, if any	Recommended Indian Standard, if any
(1)	(2)	(3)	(4)	(5)
i)	Frame *D* Cast iron	Cast iron	Smooth surface	IS 210 : 1978
ii)	Movable rod *B*	Brass	Smooth surface	IS 4170 : 1967
iii)	Cap *A*	Brass	—	IS 292 : 1983
iv)	Needle *C* (for initial setting time) :			
	a) Hilt portion	Brass	Smooth surface	—
	b) Needle portion	Hardened steel	Polished surface	IS 9962 : 1981
v)	Needle *F* (for final setting time) :			
	a) Hilt portion	Brass	Smooth surface	—
	b) Needle portion	Hardened steel	Polished surface	IS 9962 : 1981
vi)	Plunger *G* (for normal consistency)	Brass	Polished surface	IS 4170 : 1967
vii)	Non-porous plate	Glass or stainless steel	Smooth surface	— IS 6911 : 1972
viii)	Mould *E*, Mould E_1 and clamping ring	High strength, rigid, non-corroding and non-absorbent materials such as brass, stainless steel, hard rubber, plastic, etc.	Smooth internal finish	IS 292 : 1983 (In case of brass)
ix)	Graduated scale	Brass plate	—	IS 292 : 1983
x)	Indicator attached to the movable rod	Brass	—	IS 292 : 1983

NOTE – The Roman capital letters succeeding the names of parts in col 2 correspond to those indicated in Fig. 1 and 2.



All dimensions in millimetres.

FIG. 1 VICAT APPARATUS (*Continued*)



Enlarged View of Needle 'F'

All dimensions in millimetres.

FIG. 1 VICAT APPARATUS (*Concluded*)

apparatus:

a) Indication of the source of manufacture,

b) Date of manufacture,

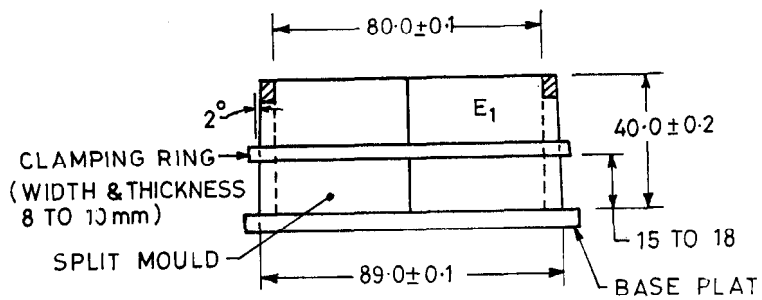
c) Serial number/Batch number, and

d) Type of mould.

7 BIS CERTIFICATION MARKING

The product may also be marked with Standard Mark.

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



All dimensions in millimetres.

FIG. 2 SPLIT TYPE VICAT MOULD

ANNEX A

(Foreword)

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(*Continued on page* 6)

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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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Amendments Issued Since Publication

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