

IS : 9459 - 1980
(Reaffirmed 1992)

Indian Standard
SPECIFICATION FOR
APPARATUS FOR USE IN MEASUREMENT OF
LENGTH CHANGE OF HARDENED CEMENT
PASTE, MORTAR AND CONCRETE

(Second Reprint JUNE 1998)

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

Indian Standard

SPECIFICATION FOR APPARATUS FOR USE IN MEASUREMENT OF LENGTH CHANGE OF HARDENED CEMENT PASTE, MORTAR AND CONCRETE

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Indian Standard
SPECIFICATION FOR
APPARATUS FOR USE IN MEASUREMENT OF
LENGTH CHANGE OF HARDENED CEMENT
PASTE, MORTAR AND CONCRETE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 8 February 1980, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 The Indian Standards Institution has already published a series of standards on methods of testing cement and concrete. It has been recognized that reproducible and repeatable test results can be obtained only with standard testing equipment capable of giving the desired level of accuracy. The Sectional Committee has, therefore, decided to bring out a series of specifications covering the requirements of equipments used for testing cement and concrete, to encourage their development and manufacture in the country.

0.3 Accordingly, this standard has been prepared to cover requirements of the apparatus for use in measurement of length change of hardened cement paste, mortar and concrete. This apparatus may be used for determining the initial drying shrinkage, drying shrinkage and moisture movement of concrete (*see* IS : 1199-1959*), alkali reactivity of aggregate [*see* IS : 2386 (Part VII)-1963†] and drying shrinkage of Portland pozzolana cement (*see* IS : 4031-1968‡).

0.4 In the formulation of this standard, due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

*Methods of sampling and analysis of concrete.

†Methods of test for aggregate for concrete: Part VII Alkali aggregate reactivity.

‡Methods of physical tests for hydraulic cement.

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

1. SCOPE

1.1 This standard lays down the requirements of apparatus (known as length comparator) to measure length change in hardened cement paste, mortar and concrete, using a suitable micrometer.

2. APPARATUS

2.1 The apparatus shall consist of an adjustable length comparator using a screw or dial micrometer, together with a suitable reference bar.

3. CONSTRUCTION AND DIMENSIONS

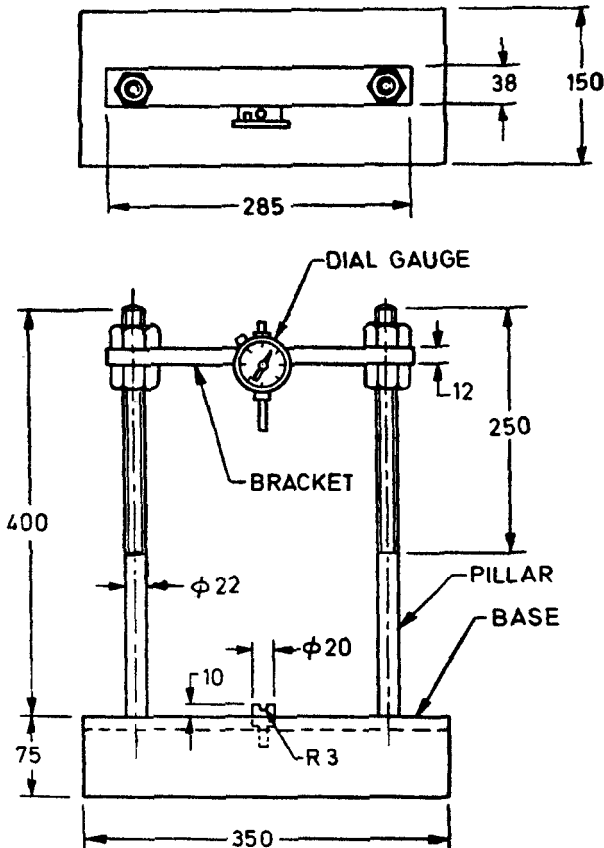
3.1 The construction of the length comparator shall be as given in Fig. 1 or Fig. 2. The type of apparatus shown in Fig. 2 is recommended for testing heavy specimens, since the pressure caused by the weight of the specimen, which would otherwise fall on the lower reference ball, is carried by the slotted shelf. The apparatus shall preferably be adjustable for specimens of different lengths. Nominal dimensions of the apparatus of the type shown in Fig. 1 are indicated in the figure. The end of the frame to seat the lower end of the reference bar shall be provided with a cylindrical or conical recess. The surfaces in contact with the specimen reference points shall be heat-treated, hardened and polished.

3.1.1 The measuring instrument in the length comparator shall be a high grade micrometer having a range of at least 10 mm and graduated to read in 0.002 mm units, accurate within 0.002 mm in any 0.020 mm range or a suitable dial gauge. This gauge shall be rigidly mounted in a measuring frame and shall have a conical spindle which can be located upon a 6 mm diameter ball or other reference point cemented in the specimen.

3.2 The reference bar against which the readings of the gauge are tested, shall be of stainless steel having a co-efficient of thermal expansion not greater than 2 millionth per deg C. The reference bar may have an overall diameter of 20 mm and of $300 \pm_{0}^{1.5}$ mm or $150 \pm_{0}^{1.5}$ mm length which

*Rules for rounding off numerical values (revised).

ever is appropriate. The length of the reference bar shall be standardized at a particular temperature and provided with calibration charts for reading length at different temperatures. Each end of the bar shall be machined to 6 mm diameter spherical ends or 6 mm dia balls may be swaged or otherwise fixed to the end. The ends shall be heat-treated, hardened and then polished. The central 100 mm of the length of the bar shall be covered by insulating material, such as 6 mm thick rubber tube, to facilitate handling and to minimize the effect of temperature during handling. The bar shall be provided with a positioning mark near one end.



All dimensions in millimetres.

FIG. 1 LENGTH COMPARATOR

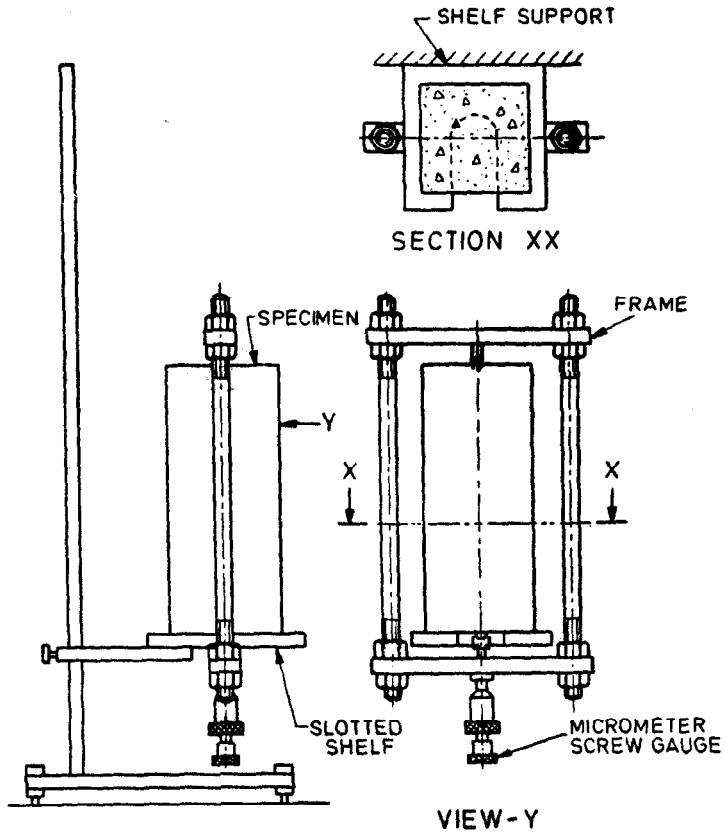


FIG. 2 TYPICAL SET UP FOR DRYING SHRINKAGE AND MOISTURE MOVEMENT TEST ON HEAVY SPECIMEN

3.3 Except where the tolerances are specifically indicated against the specified dimensions, all dimensions shall be taken as nominal dimensions with tolerances normally applicable in general engineering practice.

4. MATERIAL

4.1 Materials of construction of different component parts of the apparatus shall be as given in Table 1.

TABLE 1 MATERIALS FOR LENGTH COMPARATOR

(Clause 4.1)

SL No.	PART	MATERIAL	SPECIAL REQUIREMENTS, IF ANY
i)	Base	Channel mild steel (IS : 226-1975*)	—
ii)	Pillars	Mild steel (IS : 226-1975*)	Threaded for adjustment
iii)	Bracket	Mild steel (IS : 226-1975*)	—
iv)	Reference bar	Stainless steel	Ends heat-treated, hardened and then polished
v)	Rubber tube	Rubber	—

NOTE — All non-working mild steel parts of the apparatus shall be provided suitable anticorrosive treatment such as painting, nitriding and phosphating conforming to relevant Indian Standards.

*Specification for structural steel (standard quality) (*fifth revision*).

5. MARKING

5.1 The apparatus shall be marked with the following information:

- a) Name of the manufacturer or his trade-mark, and
- b) Date of manufacture.

5.1.1 The product may also be marked with Standard Mark.

5.2 The use of the Standard Mark is governed by the provisions of *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 or producers may be obtained from the Bureau of Indian Standards.

(Continued from page 2)

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TO
IS : 9459 - 1980 SPECIFICATION FOR APPARATUS
FOR USE IN MEASUREMENT OF LENGTH
CHANGE OF HARDENED CEMENT
PASTE, MORTAR AND CONCRETE

Alterations

(*Page 4, clause 3.1, fifth sentence*) — Substitute the following for the existing matter:

‘ The end of the yoke opposite to the micrometer end of the reference bar shall be provided with an anvil having a cylindrical or conical recess.’

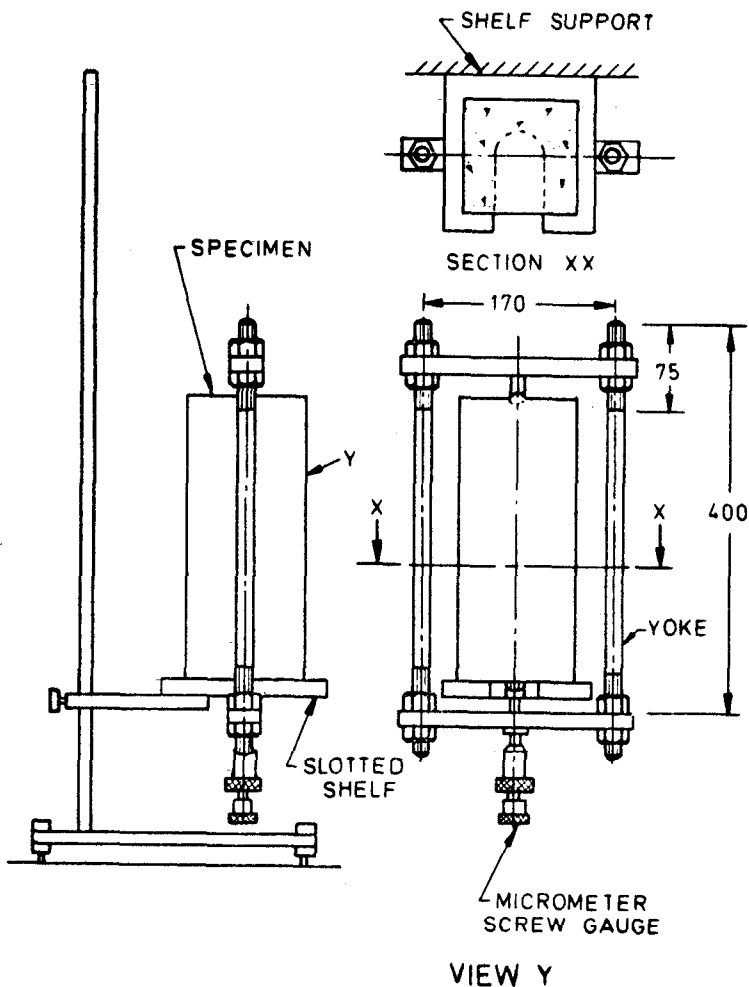
(*Page 4, clause 3.1.1, line 5*) — Substitute ‘ yoke ’ for ‘ frame ’.

(*Page 4, clause 3.2, line 4*) — Substitute ‘ 12 mm ’ for ‘ 20 mm ’.

(*Page 5, Fig. 1*) — Substitute ‘ YOKE ’ for ‘ PILLAR ’.

(*Page 6, Fig. 2*) — Substitute the figure given on page 2 for the existing figure.

[*Page 7, Table 1, col 3, Sl No. (i)*] — Substitute ‘ ISLC 150 or ISMC 150 conforming to IS : 226-1975* ’ for the existing matter.



All dimensions in millimetres.

FIG. 2 TYPICAL SET UP FOR DRYING SHRINKAGE AND MOISTURE MOVEMENT TEST ON HEAVY SPECIMEN

(BDC 2)

AMENDMENT NO. 2 APRIL 1993
TO
IS 9459 : 1980 SPECIFICATION FOR APPARATUS FOR
USE IN MEASUREMENT OF LENGTH CHANGE OF
HARDENED CEMENT PASTE, MORTAR AND
CONCRETE

(*Page 6, clause 3.3*) — Substitute the following for the existing clause:

'3.3 Except where the tolerances are specifically indicated against the specified dimensions, all dimensions shall be taken as nominal dimensions with tolerances as laid down in IS 2102 (Part 1) : 1980*.'

(*Page 6, foot-note*) — Insert the following foot-note at the end:

‘*General tolerances for dimensions and form and position: Part 1 General tolerances for linear and angular dimensions (*second revision*).’

(*Page 7, Table 1*) :

- i) Substitute ‘Yoke’ for ‘Pillars’ in col 2 of SI No. (ii).
- ii) Delete ‘conforming to relevant Indian Standards’ from the NOTE.