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Indian Standard

SPECIFICATION FOR FLOW TABLE FOR USE IN TESTS OF HYDRAULIC CEMENTS AND POZZOLANIC MATERIALS

(First Revision)

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Indian Standard

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(First Revision)

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Indian Standard

SPECIFICATION FOR FLOW TABLE FOR USE IN TESTS OF HYDRAULIC CEMENTS AND POZZOLANIC MATERIALS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 28 February 1983, 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 number of standards on different types of cements and methods of physical and chemical tests of these cements. Having recognized that reliable and reproducible test results could be obtained only with use of standard types of testing equipment capable of giving desired level of accuracy, the Committee had taken up formulation of Indian Standards on instruments for testing cement. These standards are expected to promote development and manufacture of standard testing equipment in the country.

0.3 This standard was first published in 1969 and the present revision has been formulated to incorporate certain modifications found necessary based on the experience gained in the manufacture and use of this equipment. In this revision, an optional requirement of providing a suitable counter for recording the number of drops of the table and a device for switching off the motor after a specified number of drops has been included. Further since the hardness requirements of the material have already been specified, the material specification for cam, cam shaft and vertical shaft have been modified to permit flexibility in selection of the material for manufacture. In addition, since outside caliper has not been considered as an essential accessory to the flow table equipment, the relevant provision has been suitably modified.

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.

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 covers requirements of flow table and accessory apparatus used in making flow tests for consistency of mortars in tests of hydraulic cements and pozzolanic materials.

2. MATERIALS

2.1 Materials for construction of different component parts of flow table apparatus shall be as given in Table 1.

TABLE 1 MATERIALS FOR CONSTRUCTION OF DIFFERENT COMPONENT PARTS OF FLOW TABLE

Sl No.	Part	Material	Special Requirements, if any	Recommended Indian Standard
(1)	(2)	(3)	(4)	(5)
i)	Table	Cast brass	Hardness, 25 *HRB* (220 *HV*), *Min*	IS : 292-1961*
ii)	Supporting frame	Cast iron	Not less than grade 20	IS : 210-1978†
iii)	Mould	Cast brass	Hardness, 25 *HRB*, (220 *HV*), *Min*	IS : 292-1961*
iv)	Cam	Mild steel, case-hardened	Cam tip hardness, 50 to 55 *HRC* (510 to 600 *HV*)	IS : 1570-1961‡
v)	Cam shaft	Mild steel	—	IS : 1570-1961‡
vi)	Vertical shaft	Mild steel, case-hardened	Wearing surface hardness, 50 to 55 *HRC*, (510 to 600 *HV*)	IS : 1570-1961‡
vii)	Base plate	Cast iron or steel	—	IS : 210-1978†

*Specification for brass ingots and castings (*revised*).
†Specification for grey iron castings (*third revision*).
‡Schedules for wrought steels for general engineering purposes.

*Rules for rounding off numerical values (*revised*).

3. DIMENSIONS

3.1 Dimensions with tolerance of different component parts of flow table apparatus shall be as detailed in Fig. 1. Except where other tolerances are specifically indicated against the dimensions in Fig. 1, all dimensions shall be taken as nominal dimensions.

NOTE — The allowable deviations for nominal dimensions shall be as laid down for coarse class of deviation in IS : 2102-1969*.

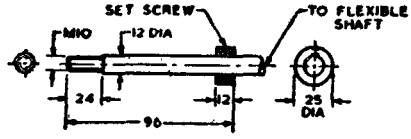
4. CONSTRUCTION

4.1 Flow Table and Frame — The flow table apparatus shall be constructed in accordance with Fig. 1A to 1G. The apparatus shall consist of an integrally cast rigid iron frame and a circular rigid table top 250 ± 2·5 mm in diameter, with a shaft attached perpendicular to the table top by means of a screw thread. The table top, to which the shaft with its integral contact shoulder is attached, shall be mounted on a frame in such a manner that it can be raised and dropped vertically through 12 mm height with a tolerance in height of ±0·1 mm for new table and ±0·4 mm for table in use, by means of a rotated cam.

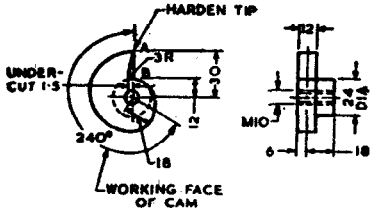
4.1.1 *Table* — The table top shall have a fine machined plane surface free from surface defects, and shall be scribed as shown in Fig. 1E. The table top shall not vary by more than 0 05 mm from a true plane surface. The table shall have an edge thickness of 7·5 mm and shall have six integral radial stiffening ribs. The mass of table and attached shaft shall be 4·00 ± 0·05 kg and shall be symmetrical around the centre of the shaft.

4.1.2 *Cam and Vertical Shaft* — The wearing surfaces of cam tip and vertical shaft shall be case hardened, where indicated in Fig. 1B and 1C. The shaft shall be straight and the difference between the diameter of the shaft and the diameter of the bore of the frame shall not be less than 0·05 mm and not more than 0·075 mm for new tables and shall be maintained at value from 0·05 to 0·125 mm for tables in use. The end of the shaft shall not fall upon the cam at the end of the drop, but shall make contact with the cam not less than 120° from the point of drop. The face of the cam shall be a smooth spiraled curve of uniformly increasing radius from 12 to 30 mm in 360° and there shall be no appreciable jar as the shaft comes into contact with the cam. The cam shall be recovered and the contact faces of the cam and the shaft shall be such that the table does not rotate more than one revolution in 25 drops. The surfaces of the frame and of the table which comes into contact at the end of the drop shall be maintained smooth, plane and horizontal, and parallel with the upper surface of the table and shall make continuous contact over a full 360° rotation.

*Allowable deviations for dimensions without specified tolerances (*first revision*).

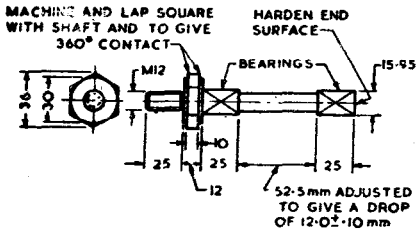


IA CAM SHAFT

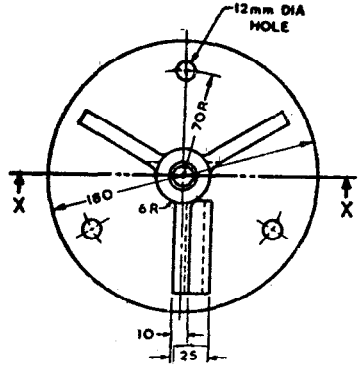


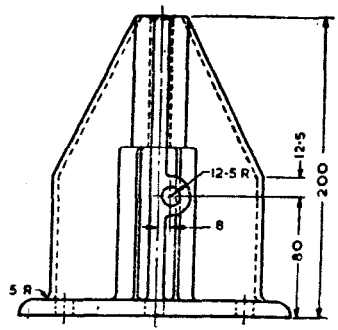
NOTE—CURVE FROM B TO A TO BE A SMOOTH SPIRAL OF UNIFORMLY INCREASING RADIUS FROM 12 mm TO 30 mm IN 360°

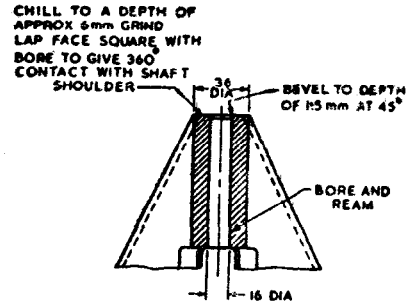
IB CAM



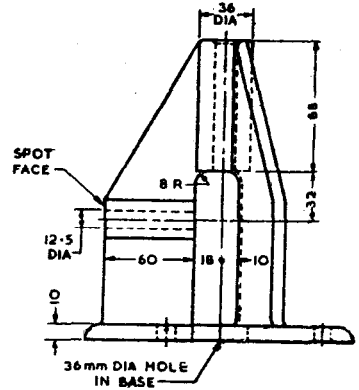
IC VERTICAL SHAFT







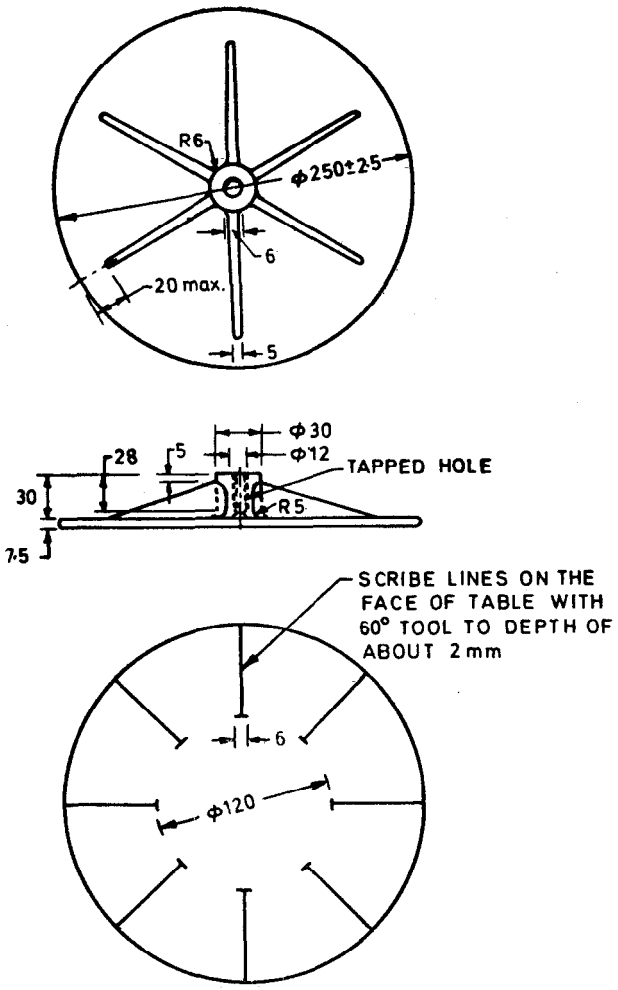
SECTION XX



ID SUPPORTING FRAME

All dimensions in millimetres.

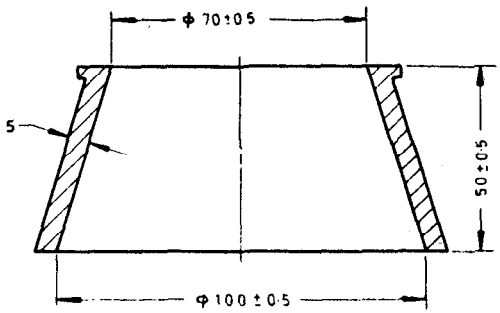
FIG. 1 FLOW TABLE AND ACCESSORY APPARATUS — *Contd*



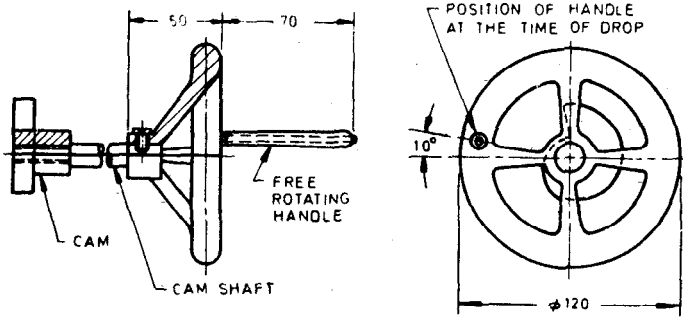
1E TABLE TOP

All dimensions in millimetres.

FIG. 1 FLOW TABLE AND ACCESSORY APPARATUS — *Contd*



IF MOULD



IG DETAILS OF MANUAL DRIVE

All dimensions in millimetres.

FIG. 1 FLOW TABLE AND ACCESSORY APPARATUS

4.1.2.1 The cam shall be screwed on to the cam-shaft and additionally secured in position with a suitable taper-pin.

4.1.3 *Supporting Frame* — The frame casting shall have three integral stiffening ribs extending the full height of the frame and located 120° apart. The top of the frame shall be chilled to a depth of approximately 6 mm and the face ground and lapped square with the bore and to give 360° contact with the shaft shoulder. The underside of the base of the frame shall be ground to secure a complete contact with the steel plate beneath.

4.1.4 *Drive* — The flow table may be operated either manually by a hand wheel mounted on the cam shaft or by a motor connected to the cam shaft through an enclosed worm gear speed reducer and flexible coupling (*see* Fig 1G). The speed of the cam shaft shall be approximately 100 rev/min. The motor driven mechanism, where provided, shall not be fastened or mounted on the table base plate or frame.

NOTE 1 — A 40 W motor has been found suitable for a power driven flow table.

NOTE 2 — If required by the purchaser, for motor-driven equipment a suitable counter for recording the number of drops may be provided; a suitable device for switching off the motor after a specified number of drops may also be provided.

4.2 FLOW TABLE MOUNTING

4.2.1 The flow table frame shall be securely bolted to a cast iron or steel plate at least 25 mm thick and 250 mm square. The top surface of this plate shall be machined to a smooth plane surface. The plate shall be anchored to the top of a concrete pedestal by four 12 mm bolts passing through the plate and embedded at least 150 mm in the pedestal. Positive contact at all points between the plate and the pedestal shall be ensured, preferably by casting the pedestal inverted on the plate. No nuts or other levelling devices shall be used between the plate and the pedestal. Levelling shall be affected by suitable means under the base of the pedestal.

4.2.2 The concrete pedestal shall weigh not less than 200 kg. A stable gasket cork pad, 12 mm thick and approximately 100 mm square, shall be inserted under each corner of the pedestal. The flow table shall be checked frequently to ensure that the table top is level, that the pedestal is stable, and that the nuts and bolts in the table base and pedestal plate are tight.

NOTE — A torque of 27 Nm is recommended when tightening the fastenings.

4.2.3 The table top, after the frame has been mounted on the pedestal, shall be level along two diameters at right angles to each other, in both the raised and lowered positions.

4.3 Accessory Apparatus

4.3.1 *Mould* — The surfaces of the base and top of the mould for casting the flow specimens shall be parallel and at right angles to the vertical axis of the cone.

4.3.1.1 The mould shall have a minimum wall thickness of 5 mm. The outside of the top edge of the mould shall be shaped so as to provide an integral collar for convenient lifting of the mould. All surfaces shall be machined to a smooth finish. A circular shield, approximately 250 mm in diameter, with a centre opening approximately 100 mm in diameter, made of non-absorbing material not attacked by the cement, shall be used with the flow mould to prevent mortar from spilling on the table top.

4.3.2 A suitable firm joint outside caliper shall be provided for measuring the diameter of the mortar after it has been spread by the operation of the table.

4.3.3 A tamping bar of steel, 12·5 mm in diameter and 125 to 150 mm long with a rounded working end shall be provided.

5. PERFORMANCE

5.1 The performance of a flow table shall be considered satisfactory if, in calibration tests, the table gives a flow value that does not differ by more than 5 percent from flow values obtained with a standard calibration material*.

6. LUBRICATION OF FLOW TABLE

6.1 The vertical shaft of the table shall be kept lightly lubricated with a light oil. Oil shall not be present between the contact faces of the table top and the supporting frame. Oil on the cam face will lessen wear and promote smoothness of operation. The table shall be raised and permitted to drop ten or more times just prior to use if it had not been operated for some time.

7. MARKING

7.1 The following information shall be clearly and suitably marked on each component of the flow table as far as practicable, in a way that it does not interfere with the performance of the flow table:

a) Name of the manufacturer or his registered trade-mark or both, and

b) Date of manufacture.

7.1.1 Each flow table may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

*The standard calibration material may be obtained from the Cement Research Institute of India, M-10, South Extension Part II, New Delhi 110049.

(*Continued from page* 2)

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INSTRUMENTS FOR TESTING CEMENT AND CONCRETE

IS:

5512-1983	Flow table for use in tests of hydraulic cement and pozzolanic materials (*first revision*)
5513-1976	Vicat apparatus (*first revision*)
5514-1969	Apparatus used in ' Le-Chatelier ' test
5515-1983	Compaction factor apparatus (*first revision*)
5516-1969	Variable flow type air-permeability apparatus (Blaine type)
5536-1969	Constant flow type air-permeability apparatus (Lea and Nurse type)
7320-1974	Concrete slump test apparatus
7325-1974	Apparatus for determining constituents of fresh concrete
9376-1979	Apparatus for measuring aggregate crushing value and ten percent fines value
9377-1979	Apparatus for aggregate impact value
9399-1979	Apparatus for flexural testing of concrete
9459-1980	Apparatus for use in measurement of length change of hardened cement paste, mortar and concrete
9799-1981	Pressure-meter for determination of air content in freshly mixed concrete
10070-1982	Machine for abrasion testing of coarse aggregates
10078-1982	Jolting apparatus for testing cement
10079-1982	Cylindrical metal measures for use in tests of aggregates and concrete
10080-1982	Vibration machine
10086-1982	Moulds for use in tests of cement and concrete

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