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SPECIFICATION FOR PLANIMETERS

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SPECIFICATION FOR PLANIMETERS

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Indian Standard

SPECIFICATION FOR PLANIMETERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 27 January 1975, after the draft finalized by the Optical and Mathematical Instruments Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 Planimeter is an instrument consisting essentially of two arms joined together so as to move with perfect freedom in one plane and a wheel which is attached to one of the arms turning on this as an axis. The wheel records by its revolutions the area of the figure traced out, by a point of the arms to which it is attached while the instrument revolves, on a fixed point on the other arm.

1. SCOPE

1.1 This specification covers the requirements for planimeter used for measuring area of plane or irregular outline figures.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply (*see* Fig. 1).

2.1 Tracer — A point used to trace along the perimeter of the figure whose area is to be calculated.

2.2 Roller — A graduated roller which rolls with the movement of the tracer and contains a vernier to count the fractions of revolution of the dial. It is so arranged that for one revolution of the dial, the roller rotates ten times.

2.3 Vernier and Counting Dial — An integrating device which revolves in company with the roller with the movement of the tracer and records the area of the traced figure, by the extent of its revolutions.

2.4 Tracing Arm — A graduated sliding arm which moves parallel to the surface of the map and carries near one end, the tracer. The graduation help in fixing the position of the sliding box to calculate the area knowing the scale of the map.

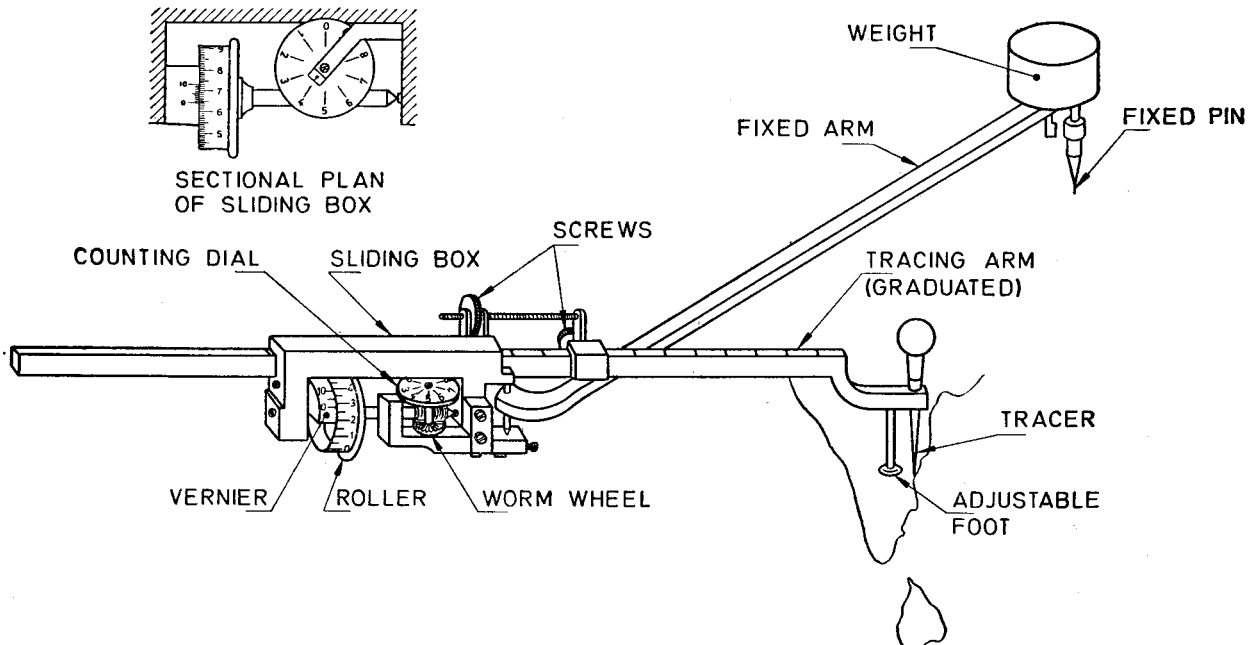

FIG. 1 NOMENCLATURE FOR PLANIMETER

2.5 Sliding Box — A complex containing the counting dial, roller, gearing mechanism, magnifier and slow motion device, which is capable of being set at any pre-selected position along the tracing arm.

2.6 Test Plate — A thin pivoted arm which in conjunction with the planimeter traces a known area for checking the setting of the planimeter.

3. GENERAL REQUIREMENTS

3.1 The tracing arm shall be graduated to a length of 25 cm. Each centimetre division shall be sub-divided into ten divisions. The graduations on the tracing arm shall commence from the tracer end.

3.1.1 The range movement of the slow motion screw of the tracing arm shall be at least 10 mm.

3.2 The roller which moves on the paper shall be free of friction so as to ensure free movement and thereby allowing accurate measurement at all times.

3.3 The graduated edges of the roller and the vernier shall not touch each other nor shall there be so much space between them as to interfere with quick and accurate reading.

3.4 The tracer shall be carefully fixed and guarded against damage. An adjustable foot may be attached to the tracing arm near the tracer.

3.5 The centre pin, the axis and the extremity of the tracing point shall be in one plane.

3.6 The pivot of the fixed arm shall rotate freely in its seating on the sliding box.

3.7 Pivot Mounting — The pivots shall be properly centred and the line of contact between pivot and screw ends shall be free from irregularities so as to be smooth.

3.8 Screw Threads — All threads shall conform to IS : 4218-1967*.

3.9 A detachable magnifying glass (at least 5X) shall be provided which may be fitted, if required, on the sliding box, for reading scales.

3.10 The instrument shall be able to cover the maximum area, for which it is designed, with ease in one operation.

3.11 A standard test plate with a pivoting pin at one end shall be provided for testing the accuracy of the instrument.

*ISO Metric screw threads.

3.12 A table shall be provided with the box which provides for various settings of the sliding box on the tracing arm for the purpose of calculating areas of different map scales.

3.13 The difference between any three readings due to lack of consistency in reading, graduation and frictional error shall not exceed 0·003 for paper area of 15 × 15 cm and shall not exceed 0·006 for the largest area that can be measured in one operation.

3.14 The weight on the fixed arm may be either fixed or detachable. The arm shall have a suitable anchor weight at the outer end fitted with a needle on the underside to prevent slipping on the working surface.

4. MATERIALS

4.1 All parts of the instrument except the counting dial and roller with vernier piece shall be made of metals which are noncorrosive, have good dimensional stability against temperature and humidity changes and also have sufficient mechanical strength. The counting dial and the roller with vernier piece shall be made of plastic material.

4.2 Pivot Tips — The pivot tips shall conform to the requirements specified in IS : 7010-1973*.

4.3 The needle points shall conform to the requirements of materials and hardness to the details stipulated in IS : 3216-1965†.

5. TESTS

5.1 The performance and accuracy of the instrument shall be checked by measuring a known area or against the standard area formed by the test plate. The measured paper area of 10 cm^2 shall not be in error by more than two percent.

6. GRADUATIONS

6.1 The counting dial, the roller and the vernier shall be graduated preferably by etching on white surface and filled in black. The graduations shall be fine clear lines of uniform thickness of 0·05 ± 0·01 mm.

6.1.1 The lengths of graduation lines shall be 4·00 mm, 2·5 mm and 1·5 mm on counting dial, roller and vernier respectively.

*Pivots for compasses.

†Engineers' drawing instruments, needles.

6.2 The graduation lines on tracing arm shall be fine clear lines of uniform thickness 0·2 ± 0·01 mm and of lengths as under:

a) Length of large graduated lines 3·7 mm,

b) Length of medium graduated lines 2·7 mm, and

c) Length of short graduated lines 2·0 mm.

7. MARKING

7.1 The planimeter shall be engraved at a suitable place with the maker's name, trade-mark and the year of manufacture. It shall also be marked with the largest paper area that it can measure.

7.1.1 The planimeter may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI 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 ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

8. PACKING

8.1 Each part of the planimeter shall be securely packed in a box to prevent damage to the tips of the pivots and other components.

8.2 A booklet containing instructions for use shall be provided with each instrument.

INDIAN STANDARDS

ON

DRAWING INSTRUMENTS

IS:

1360-1963 Engineers' pattern tee squares (*revised*)
1444-1963 Engineers' pattern drawing boards (*revised*)
1480-1970 Metric scales for general purposes (*first revision*)
1481-1970 Metric steel scales for engineers (*first revision*)
1482-1970 Metric scales for use with drafting machines (*first revision*)
1491-1959 Metric scales for architectural purposes
1561-1962 Set squares for use of drawing offices
1562-1962 Metric diagonal scales (cartographers, surveyors and engineers')
1563-1962 Protractors for use of drawing offices
2233-1962 Straightedges for drawing office use
2286-1963 Pantograph
2287-1970 Drafting machines (*first revision*)
2466-1963 Beam compasses
2533-1963 Geometry boxes
2666-1963 Slide rules (linear type)
3206-1965 Engineers' drawing instruments, dividers
3207-1965 Engineers' drawing instruments, rotating compasses
3208-1965 Engineers' drawing instruments, half set of compasses
3209-1965 Engineers' drawing instruments, spring bow compasses
3210-1965 Engineers' drawing instruments, drawing pens
3211-1965 Engineers' drawing instruments, pen points
3212-1965 Engineers' drawing instruments, lengthening bars
3213-1965 Engineers' drawing instruments, handles
3214-1965 Engineers' drawing instruments, pencil points
3215-1965 Engineers' drawing instruments, needle points
3216-1965 Engineers' drawing instruments, needles
3217-1965 Engineers' drawing instruments, prickers
3218-1968 Parallel rulers 150 mm (link type)
3219-1966 Engineers' drawing instruments, boxes for leads and needles
3220-1966 Engineers' drawing instruments, screw drivers
3221-1966 Sets for drawing instruments
3222 (Part I)-1966 Instrument screws, Part I Fasteners for drawing instruments
5153-1969 Proportional compasses 150 mm, 200 mm and 300 mm
5205-1969 Drawing pins
5213-1969 French curves for drawing office use
5694-1970 Engineers' drawing instruments, dotting pens
5726-1970 Engineers' drawing instruments, bordering pens
5737-1970 Engineers' drawing instruments, curve pens

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INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110001

Telephone : 27 01 31 (20 lines) **Telegrams : Manaksanstha**

Branch Offices:	Telephone
'Sadhna', Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001	2 03 91
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