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*Indian Standard*  
SPECIFICATION FOR  
OPTICAL SQUARE (FOR SURVEYING)

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# Indian Standard

## SPECIFICATION FOR OPTICAL SQUARE (FOR SURVEYING)

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# *Indian Standard*

## SPECIFICATION FOR OPTICAL SQUARE (FOR SURVEYING)

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 16 August 1973, after the draft finalized by the Optical and Mathematical Instruments Sectional Committee had been approved by the Mechanical Engineering Division Council.

**0.2** The optical square is a surveying instrument used for quickly setting out a line at right angles to another. It essentially consists of a pair of plane mirrors mounted at an angle of  $45^\circ$  to each other or a pentagonal prism in a mount.

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### 1. SCOPE

**1.1** This standard covers the general and functional requirements of optical square.

### 2. TERMINOLOGY

**2.1** For the purpose of this standard, the definitions given in IS : 1399-1959\* and the following shall apply.

**2.1.1 Mount** — A (metallic) box, with openings at sides, in which the pentagonal prism or mirrors is/are placed and rigidly held.

### 3. TYPES

**3.1** The optical square shall be either mirror type (Fig. 1A and 1B) or prism type (Fig. 2).

### 4. GENERAL REQUIREMENTS

#### 4.1 Materials

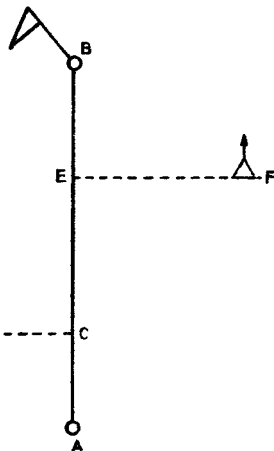
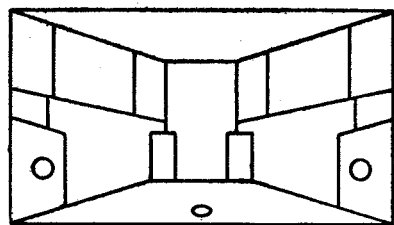
**4.1.1** The mirrors and prisms shall conform to the requirements of IS : 988-1959† and IS : 1400-1960‡.

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\*Glossary of terms used in optical technology.

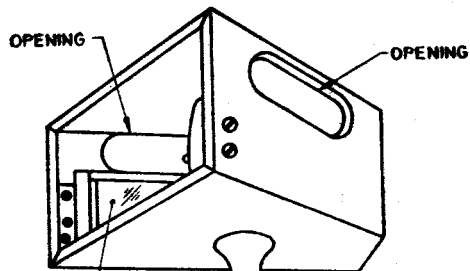
†General requirements for optical components.

‡Specification for optical glass.



(OFF SETS 'EF' AND 'CD' LAID OUT BY OPTICAL SQUARE)

1A



1B

FIG. 1 OPTICAL SQUARE, MIRROR TYPE

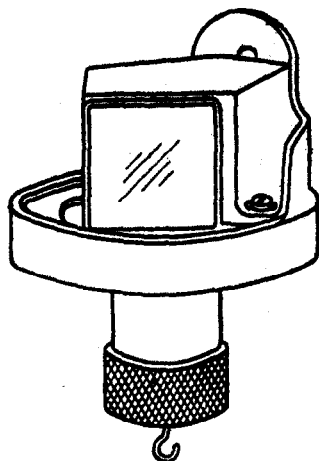


FIG. 2 OPTICAL SQUARE, PRISM TYPE

**4.1.2** The materials used for the manufacture of the mount shall be brass, aluminium or other suitable metals or alloys.

**4.2** The optical square shall have a convenient shape and size. If circular, the diameter of the mount shall be about 50 mm.

**4.3** A suitable handle shall be provided at the bottom of the mount with a hole or hook at the end of the handle for the plumb-bob, if used.

**4.4** The internal sides of the mount of the optical square shall be finished dull black.

**4.5** Arrangements shall be provided to cover the openings when not in use.

**4.6** The two mirrors in the mirror type optical square shall be placed at an angle of  $45^\circ$  with each other.

**4.7** Arrangement shall be provided to adjust the angle between the mirrors.

**4.8** The two reflecting faces of the pentagonal prism shall be silvered and suitably protected.

**4.9** A carrying case made of wood, rotproof canvas, leatherette, plastic or other suitable material as agreed to between the manufacturer and the purchaser shall be provided.

## 5. FUNCTIONAL REQUIREMENTS

**5.1** The mirrors and prism shall be held rigidly in their positions and shall not be disturbed or displaced even after slight jerks.

**5.2** The reflected image shall be free from distortion.

## 6. TESTS

**6.1** The optical square shall be initially examined for the following defects:

- a) Damage to external finish; and
- b) Scratched, broken or dirty optical surfaces.

**6.2** The quality of silvering, surface finish and durability of silvered surface shall be tested according to **4.5** and **7** of IS: 988-1959\*.

**6.3** The optical square shall be tested in the following way:

Hold the optical square at an intermediate point *O* on a straight line *AB* at both ends of which are erected two poles. Through the aperture of the optical square view the pole *A*. Erect a third pole at point *C* on a line *CO* perpendicular to *AB* and adjust the position of the pole at *C* such that its image seen through the optical square coincides with the pole *A* seen direct. Then rotate the optical square by  $180^\circ$  and view the pole *B* through the aperture. The pole *C*, seen through the optical square, should coincide with the pole *B*. Displacement, if any, between the two images represents the error in the optical square, and it shall not exceed 5 minutes.

**6.4 Heat Test** — The optical square shall be subjected to heat test in accordance with IS: 2352-1963†; the degree of severity being  $70 \pm 2^\circ\text{C}$  for 3 hours.

**6.5 Cold Test** — The optical square shall be subjected to cold test in accordance with IS: 2352-1963†; the degree of severity being  $30 \pm 3^\circ\text{C}$ .

NOTE — The heat test and cold test are recommended only for the purpose of type approval tests.

## 7. MARKING

**7.1** The optical square shall be marked at a suitable place with the manufacturer's name or trade-mark or both, its nomenclature, year of manufacture and serial number.

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\*General requirements for optical components.

†Procedure for basic climatic and durability tests for optical instruments.

**7.1.1** The optical square 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 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** The optical square shall be placed in its case which shall then be suitably packed for transit.



# **INDIAN STANDARDS**

## **ON**

### **SURVEYING INSTRUMENTS**

**IS:**

- 1492-1959 Metric surveying chains
- 1632-1960 Bubbles
- 1764-1961 Trough compass
- 1779-1961 4-metre, levelling staff, folding type
- 1842-1961 Surveying chains pins (arrows)
- 1955-1961 Prismatic compass, liquid
- 1957-1961 Prismatic compasses, non-liquid
- 2288-1963 Ranging rods
- 2539-1963 Plane tables
- 2976-1964 Optical theodolite
- 2988-1965 Vernier theodolite
- 4380-1967 Abney level
- 4590-1967 Engineer's level
- 5146-1969 Sounding sextant
- 5706-1970 Spirit levels for use in precision engineering
- 5928-1970 Tangent clinometer