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Indian Standard

SPECIFICATION FOR PRISMATIC COMPASS, LIQUID

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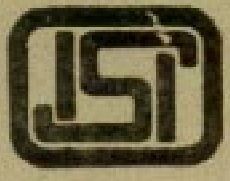

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

SPECIFICATION FOR PRISMATIC COMPASS, LIQUID

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SPECIFICATION FOR PRISMATIC COMPASS, LIQUID

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 17 October 1961, after the draft finalized by the Optical and Mathematical Instruments Sectional Committee had been approved by the Engineering Division Council.

0.2 The surveyors compass is an instrument for determining the difference in direction between any horizontal line and a magnetic needle, the needle pointing the magnetic north. Magnetic compasses, though of limited accuracy, have the advantage of giving reading directly in terms of directions or bearings referred to magnetic north. Prismatic compass, liquid, can either be used independently or in conjunction with other angle measuring instruments in orienting a map or plane table and making a survey or traverse.

0.3 Taking into consideration the views of producers and consumers, the Sectional Committee responsible for the preparation of this standard felt that it should be related to the manufacturing practices followed in the country in this field.

0.4 Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to the latest version of the standard.

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, 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.

0.6 India has changed over to metric system and all the dimensions in this specification are given in this system.

0.7 This standard is intended chiefly to cover the technical provisions relating to prismatic compass, liquid, and it does not include all the necessary provisions of a contract.

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1. SCOPE

1.1 This specification covers the requirements for prismatic compass, liquid, of 50 mm size.

2. NOMENCLATURE

2.1 Names of different components of the prismatic compass, liquid, are shown in Fig. 1.

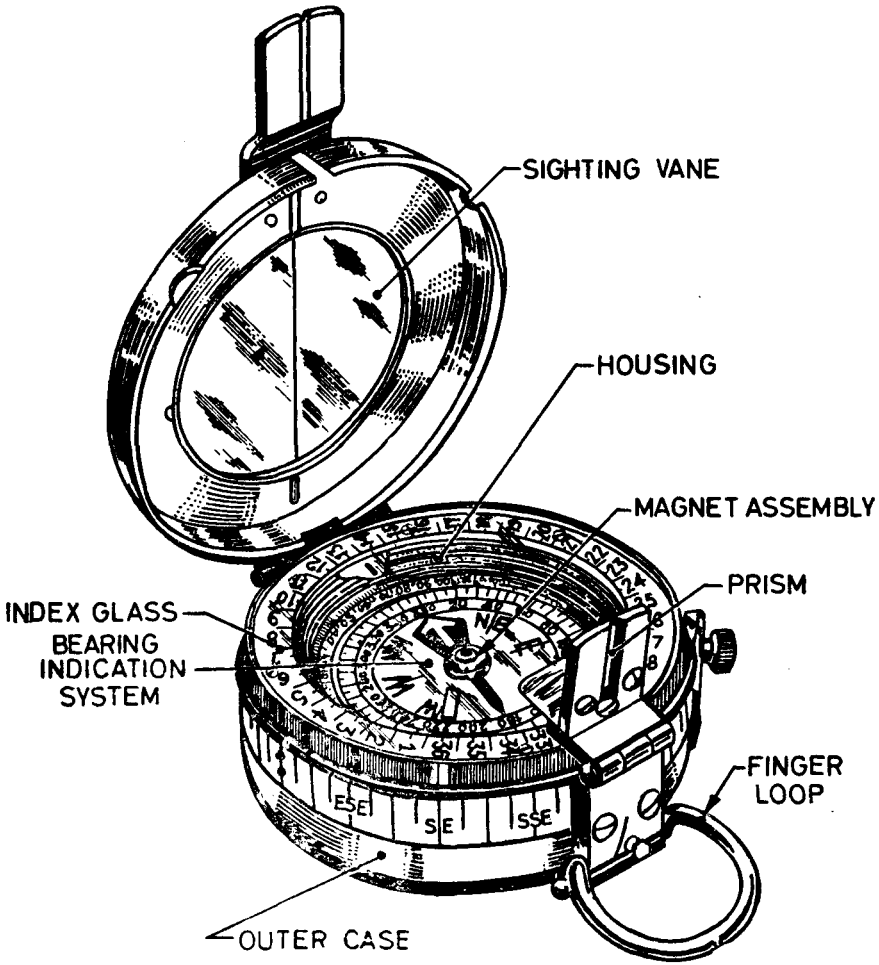

FIG. 1 PRISMATIC COMPASS, LIQUID

3. TERMINOLOGY

3.0 For the purpose of this standard, the following definitions shall apply.

3.1 True Bearing — The horizontal angle measured from the true north in a clockwise direction to desired line.

3.2 Magnetic Bearing — The horizontal angle measured from the magnetic north in a clockwise direction to desired line.

3.3 Traverse — The traverse consists of connected lines, the lengths and direction of which are measured.

3.4 Declination — The horizontal angle between the true north and the magnetic north.

3.5 Dip — The vertical angle between the horizontal plane and the plane of freely suspended symmetrical magnetic needle pivoted at its centre of symmetry.

NOTE — To overcome this dip, a small weight is placed on one side of the needle so that it can be adjusted until the needle is horizontal.

3.6 Orientation — The determination of the location of points and the establishment of lines of known directions.

3.7 Size of Compass — The size of the compass is indicated by the diameter of the reading edge of the graduated arc.

4. COMPONENTS

4.1 Sighting System — The sighting system shall consist of sighting vanes hinged diametrically opposite to each other on the outer case. The eyeing vane shall have a vertical line slot in the metal housing of the magnifying prism. The front or sighting vane shall have a fine vertical line marked on the lid window.

4.2 Magnet Assembly — The magnet assembly shall consist of a thin bar magnet fitted with a conical agate, sapphire, ruby or suitable hard metal bearing at its centre. The north seeking end of the needle shall be marked with an arrow head.

4.3 Bearing Indicating System — The bearing indicating system shall consist of a graduated circular disc slightly larger in diameter than the length of the magnet, the graduations being on a translucent disc of mother-of-pearl, mica or any other suitable material (*see* Fig. 2) and fastened to the magnet.

4.4 Damping-cum-Antiwear System — The liquid serves both as damping and antiwear device. The inside of housing may be given a coat of protective matt black paint.

4.5 Dip Adjusting Slide — The dip adjusting slide shall consist of a small

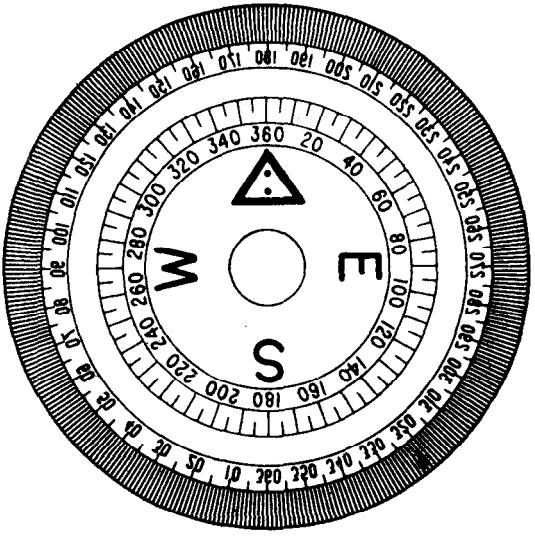

FIG. 2 BEARING INDICATING DIAL

metal rider which may slide along the needle to balance it in the horizontal plane.

4.6 Housing — The inner case shall have a sealing glass fixed to it to enable the graduations to be read and the whole of the magnetic assembly is rendered dustproof. There shall be a finger loop fixed to the casing. The outside of the casing shall be graduated as shown in Fig. 1. The bottom surface of the casing shall have an arrangement for fixing the compass on a suitable tripod.

4.7 Night Reading Device — The night reading device shall consist of luminised parts and a lubber line index (*see* Fig. 3).

4.8 Reading System — The reading system shall consist of a magnifying prism attached to the outer case.

5. MATERIALS AND WORKMANSHIP

5.1 Materials — All parts of the compass, except the magnetic needle, shall be made of non-magnetic materials.

5.2 Magnetic Needle — The magnetic needle shall be of good quality magnet steel. It shall be properly hardened and aged.

5.2.1 The magnetic moment of the needle shall be between 20 and 25 cgs units. Each pole of the magnetic needle shall have a flux of approximately 100 lines.

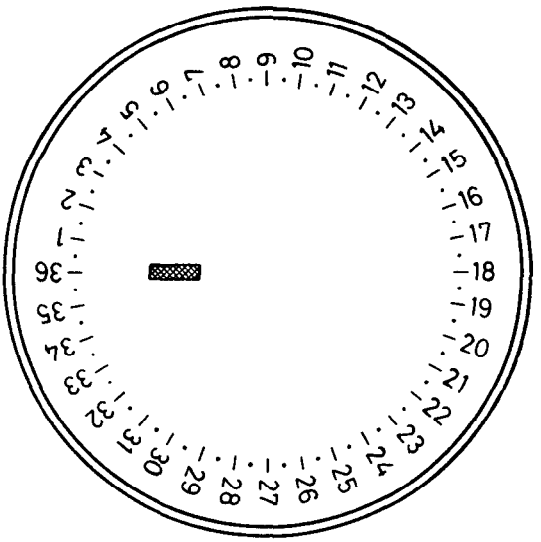

FIG. 3 INDEX GLASS

5.3 Bearing — The bearing shall be of good quality natural or synthetic white sapphire, ruby, agate or hard metal free from inclusions or other defects.

5.4 Pivot Tip — The pivot tip shall be made of hardened steel or iridium.

5.5 Pivot Mounting — The pivot shall be properly centred and fitted. Line of contact between pivot and mounting shall be continuously smooth and free from irregularities.

5.6 Liquid — Good quality kerosine, isopropyl alcohol or anhydrous ethyl alcohol shall be used as the liquid.

5.7 Prism — The prism shall be of good quality optical glass, colourless, free from bubbles, and shall be ground and brought to a high degree of polish on the reflecting and curved surfaces.

5.8 Sealing Glass, Lid Window and Index Glass — Polished plate glass, with parallel surfaces and with the edges ground truly circular, shall be used.

5.9 Dial — The dial, if made of mother-of-pearl, shall be of good quality, free from flaws, and shall be regularly formed and of uniform colour in daylight, or of good quality mica.

5.10 Adhesive — The adhesive used for securing the rubber friction ring shall have no action on the brass and the rubber. It shall not become soft or brittle when exposed to temperatures between 70°C and −40°C.

5.11 Luminous Compound — The luminous compound shall be such that the instrument is capable of being used continuously for 24 hours in dark.

5.12 Black Stoved Enamel — Black stoved enamel shall be used for the exterior of the compass. It shall be firmly adherent with no tendency to peel, scale or chip off.

5.13 Optical Dead Black — It shall be firmly adherent with a matt finish.

5.14 Chlorinated Rubber Lacquer — It shall be of a suitable quality of chlorinated rubber mixed with minimum quantity of solvent.

5.15 Black Filling — The black paints used for the interior of the inner box and for filling the markings and graduations on the dial should not be affected by the liquid used.

5.16 Friction Ring Rubber — Synthetic or vulcanized rubber with the outer surface rough grained may be used for the friction ring.

5.17 Screw Threads — The threads shall conform to *IS : 1362-1959 Dimensions for Screw Threads for General Purposes (Diameter Range 0·25 to 39 mm).

6. TESTS

6.1 Plane of Coincidence of the Features in the Sighting Axis — With the compass held level and sighted along the local magnetic meridian as obtained by a standard compass, the following features shall lie in the same vertical plane:

a) the notch in the finger loop,
b) the centre of the prism slide block,
c) the slot in the prism bracket,
d) the south line on the outer box below the prism,
e) the lines through the 18 and 36 points on the index ring when set to the centre line marked on the hinge,
f) the tip of the pivot,
g) the centre line of the luminous compound rectangle on the index ring glass,
h) the lubber line on the sealing glass,
j) the night lubber pin in the bubble trap,
k) the index mark on the edge of the index ring,
m) the north line of the outer box,

*Since revised and withdrawn)

n) the centre line marked on the hinge lug,
p) the two holes in the bezel ring of the lid window,
q) the sighting line on the lid window,
r) the centre line of the luminous compound strip in the lid,
s) the luminous compound strip and notch in the prism guard plate, and
t) the reading of the dial through the prism shall be 360° 0′ ±0° 30 .

6.2 Ease of Prismatic Reading — The slide of the prism shall be adjusted to suit the vision of the observer. The edge of the dial, the night lubber pin and the figures on the outer circle shall be clearly visible through the eye-hole in the prism bracket. The definition of the prism shall be sharp for all readings of the dial and shall be free from lateral distortion of the divisions on the dial. The normal focus of the prism shall be at half the range of the slide. The slide pins shall work smoothly in the slide block without shake, and shall be friction-tight in any position.

6.3 Leakage of Liquid — The inner box shall be perfectly free from leakage. A number of compasses from each consignment shall be placed in the exhaustion chamber in which the air shall be reduced to an absolute pressure of 400 mm of mercury and kept at this pressure for one hour. Any sign of leakage or the presence of bubble in the selected number of the compasses shall render the whole consignment liable to rejection.

6.4 Freedom From Bubbles — The compasses shall be perfectly free from bubbles throughout a temperature range of −40° to 70°C. They shall be subject to periodic cycles of sudden variations of temperature between −40° and 70°C without any bubbles appearing therein.

6.5 Range of Tilt — The compass shall be tilted through an angle of 7 degrees either way from the horizontal position, that is in elevation or in depression so as to give a total range of not less than 14 degrees and rotated. The suspension unit shall in no position foul with the inner box.

6.6 Frictional Error — The frictional error of the needle in the compass shall not exceed 15 minutes at 27°C. During the test the compass shall be level and free from external vibration. The frictional error shall be found by the following methods.

6.6.1 Deflecting the pointer through any angle to one side of any original position by a small iron rod, removing the cause of deflection and noting the reading of the pointer when it comes to rest.

6.6.2 Repeating the deflection through any angle to either side of the original position of the pointer as in **6.6.1**, removing the cause of deflection and noting the reading of the pointer when it comes to rest.

6.6.3 The total angular variation between the two readings so obtained shall be the frictional error, and shall not exceed 15 minutes at 27°C.

6.7 Bearing Errors — The total error in any magnetic bearing, as read through the prism, shall not exceed ± 30 minutes and the direct reading of the dial against the lubber line on the sealing glass shall agree with the supplementary angle of the magnetic bearing within ± 2 degrees.

6.7.1 Each compass shall be tested against a magnetic meridian determined by a standard compass or magnetometer and the total error in any magnetic bearing as indicated by the north seeking end of the compass shall not exceed ± 30 minutes.

6.8 Time of Swing — Compasses shall be tested for time of swing at a temperature of 15°C. The magnetic needle shall be deflected 90° from the magnetic meridian as viewed through the prism and kept there for an interval of 30 seconds in order to allow the compass liquid to settle; when released, the suspension unit shall return to rest in not less than 9 seconds nor more than 12 seconds.

7. MARKING

7.1 The compass shall be engraved at a suitable place with the maker's name or trade-mark and the year of manufacture.

7.1.1 The compass 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 compass shall be securely packed and placed upside down in the box to prevent damage to the tips of the pivots.

8.2 A leather case shall be provided, if required by the purchaser.

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