*भारतीय मानक*

***Indian Standard***

**IS 1562 : 2023**

# मीट्रिक डायग्नल स्केल (कार्टोग्राफर, सर्वेयर और इंजीनियर) — विशिष्टि

*( पहला पुनरीक्षण )*

# Metric Diagonal Scales (Cartographers, Surveyors and Engineers) — Specification

*( First Revision )*

ICS 01.100.40



भारतीय मानक ब्यूरो
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**November 2023** **Price Group 6**

Educational Instruments and Equipment Sectional Committee, PGD 22

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft is finalized by the Educational Instruments and Equipment Sectional Committee had been approved by the Production and General Engineering Division Council.

This standard deals with metric diagonal scales used by cartographers, surveyors and engineers in measuring or setting off distances upon geometrical and other drawings, maps, plans etc. with correctness aimed at up to one-hundred part of a millimeter. 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.

This standard is intended chiefly to cover the technical provisions relating to metric diagonal scales, and it does not include all the necessary provisions of a contract.

This standard was first published in 1962. The first revision has been taken up to keep pace with the latest technological developments and international practices. In this revision, the following changes have been made:

a) UDC number has been replaced by ICS number;
b) Testing requirement has been included; and
c) General requirement clause has been included.

This standard is one of a series of Indian Standards on metric scales. Other Indian Standards issued in the series are:

IS 1480 : 1970 Metric scales for general purposes (*first revision*)
IS 1481 : 1970 Metric steel scales for engineers
IS 1491 : 2023 Metric scales for architectural purposes

The composition of the Committee, responsible for the formulation of this standard is given in Annex A.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# METRIC DIAGONAL SCALES (CARTOGRAPHERS, SURVEYORS AND ENGINEERS) — SPECIFICATION

*( First Revision )*

## 1 SCOPE

This standard specifies the requirements of metric diagonal scales used by cartographers, surveyors and engineers.

## 2 TERMINOLOGY

The term ‘Diagonal Scale’ has been used in this standard to indicate a strip of material (metal) of suitable thickness with diagonal scale or scales engraved or etched thereon.

## 3 MATERIAL

The diagonal scale shall be made of rust-proof steel, stainless steel or hard-drawn brass. The surface of the metal shall be smooth and even on all sides.

## 4 SIZES AND DESIGNATIONS OF DIAGONAL SCALES

**4.1** The diagonal scales shall be manufactured to the sizes as shown in Fig. 2 to Fig. 5.

**4.2** The sizes of the diagonal scales shall be designated as A, B, C and D. The scales designated B and C shall have three different diagonal scales, namely 1/100 000, 1/50 000 and 1/25 000, and the scale designated D shall have 1/100 000, 1/8 000 and 1/4 000 diagonal scales. The scale designated A shall carry only one diagonal scale (1 : 1). The sizes of the diagonal scales shall be as given in Table 1.

## 5 CONSTRUCTIONAL DETAILS

**5.1** The diagonal scale shall be constructed as shown in Fig. 1.

**5.2** The front of the scales shall have one edge bevelled, and shall carry a centimetre scale (1 : 1),the diagonal scales be etched or engraved centrally on one or both faces, as specified in **5.3** and **5.4**.

### 5.3 Front Face

The front face shall carry centimetre scale (1 : 1) along the bevelled edge and a diagonal centimetre scale (1 : 1) in the centre as indicated in Fig.2 to Fig. 5 (front face) corresponding to scales A, B, C and D respectively. In scale B, C and D, this central scale of (1 : 1) also serves as a scale of 1 : 100 000 as illustrated in Fig. 3 to Fig. 5.

### 5.4 Back Face

The back faces of the scales B and C shall carry two diagonal scales 1 : 50 000 and 1 : 25 000 centrally and the back face of the scale D shall carry diagonal scales 1 : 8 000 and 1 : 4 000 as shown in Fig. 3 to Fig. 5 respectively, while in case of the scale A the back face shall be left blank.

**Table 1 Dimensions of Diagonal Scales**

(*Clauses* 4.2 *and* 6.1)

| Sl No. | Designation | NominalOverall Length | Length of the Graduated Part | Width of Scale | Nominal Thickness at | |
|---|---|---|---|---|---|---|
| | | | | | Unbevelled Edge | Bevelled Edge |
| | | cm | cm | cm | mm | mm |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| (i) | A | 152 | 150 | 6 | 5 | 1 |
| (ii) | B | 102 | 100 | 6 | 5 | 1 |
| (iii) | C | 52 | 50 | 6 | 5 | 1 |
| (iv) | D | 152 | 150 | 6 | 5 | 1 |

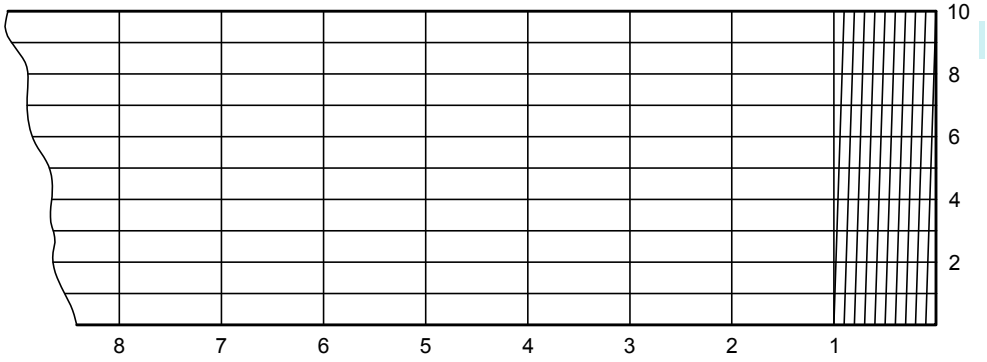



FIG. 1 CONSTRUCTION OF DIAGONAL SCALE

## 6 DIMENSIONS AND GRADUATION DIVISIONS

### 6.1 Dimensions

The leading dimensions of the scales of designation A, B, C and D in respect of length, width and thickness shall be as given in Table 1.

**6.2** Graduation divisions shall be as indicated in Fig. 2 to Fig. 5. Line work shall consist of fine clear lines of uniform thickness of 0.09 mm ± 0.01 mm.

**6.3** The length of graduation lines in the centimetre scales on the bevelled edges (1 : 1) shall be as given in table below:

| *Sl No.* | *Graduation Mark* | *Length of Graduation Lines* |
|---|---|---|
| *(1)* | *(2)* | *(3)* |
| i) | cm marks | 9 mm |
| ii) | 5 mm marks | 4 mm |
| iii) | mm marks | 2.5 mm |
| iv) | 0.5 mm marks | 1.5 mm |

**6.4** Leading dimensions in respect of clear spaces to be left from the edges or in between two scales or in positioning of the diagonal scales on the centre of metal strips are indicated in Fig. 2 to Fig. 5, and shall be followed as typical example for construction of the scales A, B, C and D respectively.

**6.5** The figures and lettering shall be etched or engraved on the metal as shown in Fig. 2 to Fig. 5.

**6.6** The values of divisions of diagonal scales 1 : 100 000, 1 : 50 000 and 1 : 25 000 shall be in kilometres, metres and centimetres on scales B and C as shown in Fig. 3 and Fig. 4. While in case of the scales A the values of divisions of diagonal scale (1 : 1) shall be in centimetres (*see* Fig. 2). The values of divisions of diagonal scales 1 : 100 000, 1 : 8 000 and 1 : 4 000 on scale D shall be in kilometres, metres and centimetres (*see* Fig. 5).

## 7 ACCURACY

The scales, when compared against a certified metal scale under a travelling microscope shall not have a cumulative error for the entire length of the graduated part exceeding ± 0.1 mm in case of diagonal scale and ± 0.25 mm case of centimetre scale.

## 8 TESTING REQURIEMNT

### 8.1 Flexibility test

**8.1.1** The scales shall be bent round in the form of a segment of a circle till the two ends are brought to a distance of about 20 cm apart. The scales shall then be stretched and the operation repeated five times. The Scales shall not show any sign of permanent set after the test.

**8.1.2** The scales shall be held at the two ends and given a twist of 30 degree then released. The scales after this test shall not show any sign of warpage.

### 8.2 Ink Adhesion Test

A pressure-sensitive tape of at least 75 mm in length and 25 mm in width shall be applied on the marking. Within 90 s ± 30 s of application, remove the tape by seizing the free end and pulling it off rapidly (not jerked) back upon itself at as close to an angle of 180° as possible. Examine the marking and there should be no ink removal.

## 9 GENERAL REQUIREMENTS

The edges of the scales shall not deviate from a straight line by more than 0.3 mm/500 mm length and their plane surfaces shall not vary from a plane by more than 0.5 mm at any point.

## 10 MARKING

**10.1** The abbreviations ‘km’, ‘m’, ‘cm’, and ‘mm’ shall be marked at the end and on both sides of the scales.

**10.2** The designation A, B, C and D (*see* **4.2**) shall be marked at either end of the front face of each scale and shall be 4 mm in height.

**10.3** The ratios of reduction against the centimetre scale along the bevelled edge and diagonal scales shall be shown as indicates in Fig. 2 to Fig. 5.

**10.4** If required by the purchaser, each scale shall be legibly and indelibly marked with maker’s name or trade mark and the year of manufacture.

### 10.5 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

## 11 PACKING

Each scale shall be packed in a seasoned hardwood box or case of suitable size. The container shall be suitable padded inside. The designation of the scale shall be marked inside and outside the container so as to facilitate easy identification.

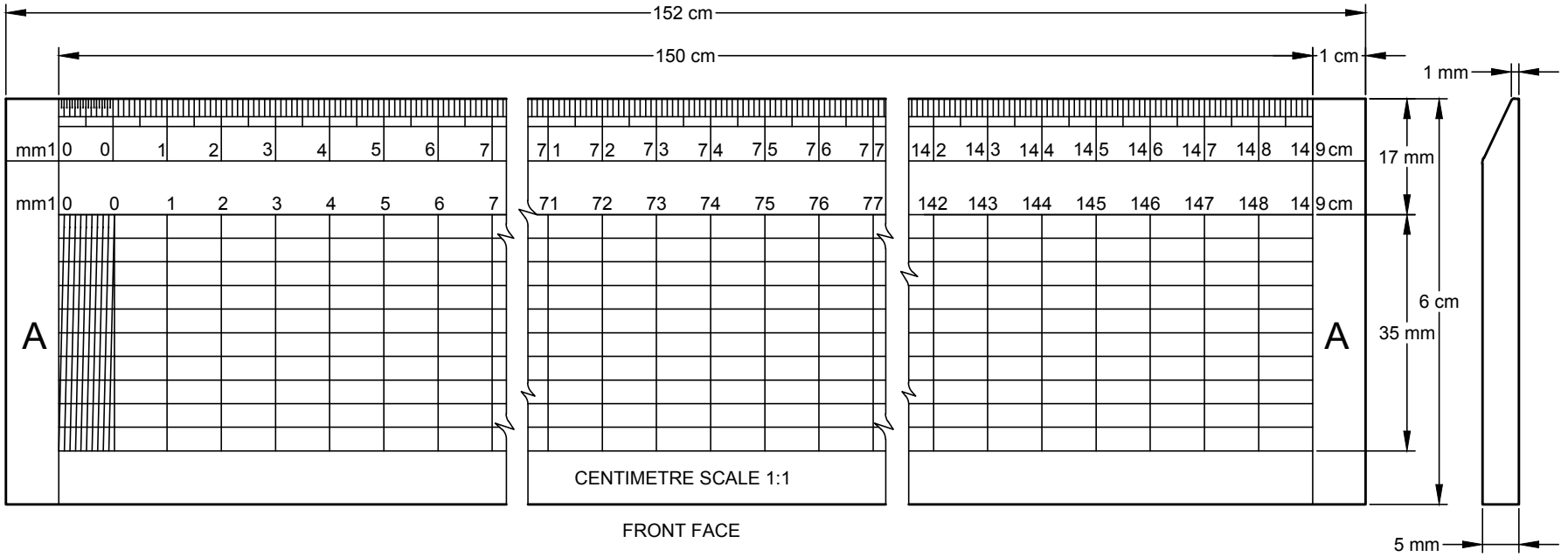



FIG. 2 DIAGONAL SCALE A

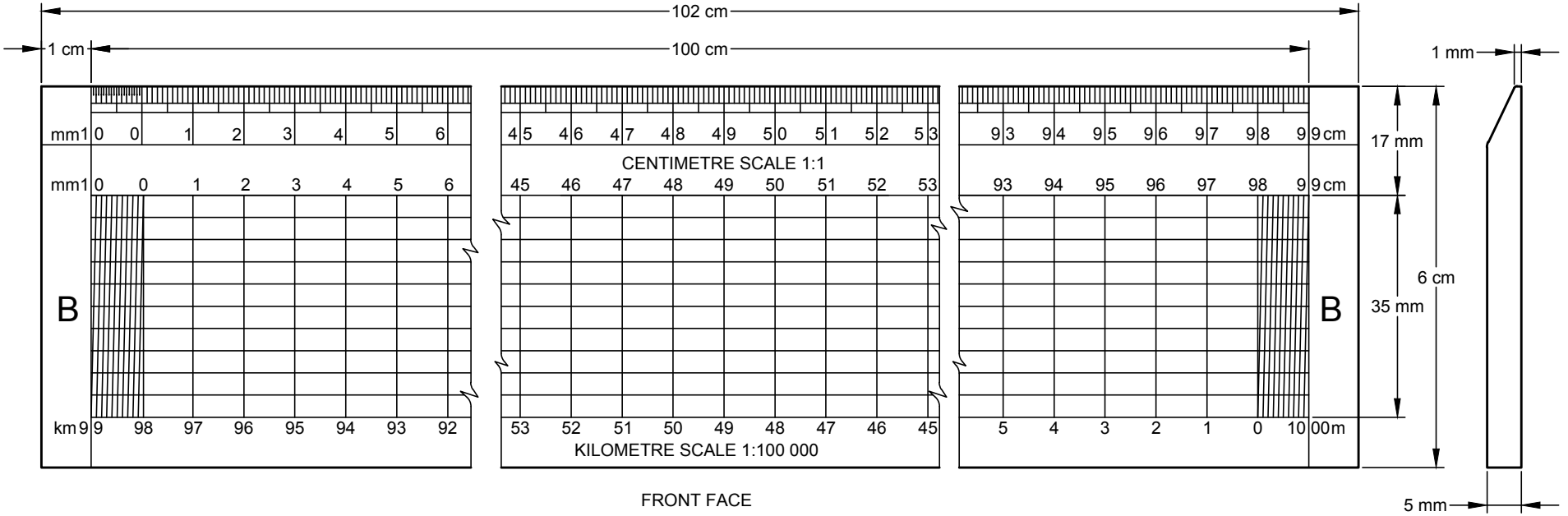
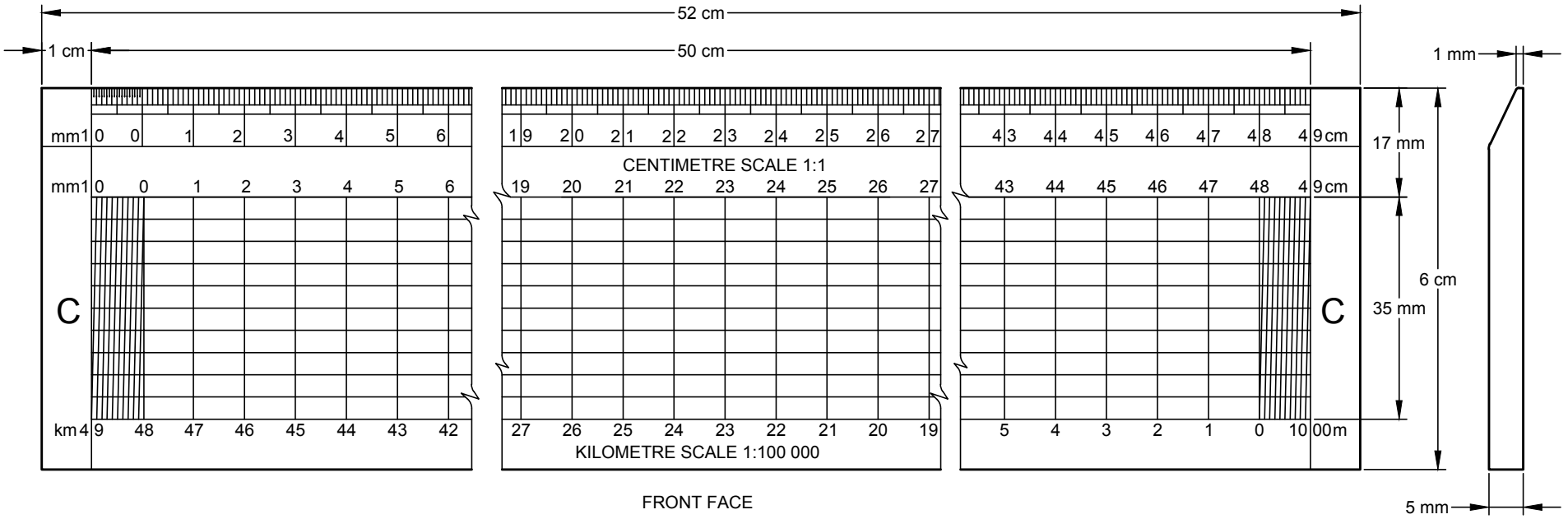



FIG. 3 DIAGONAL SCALE B



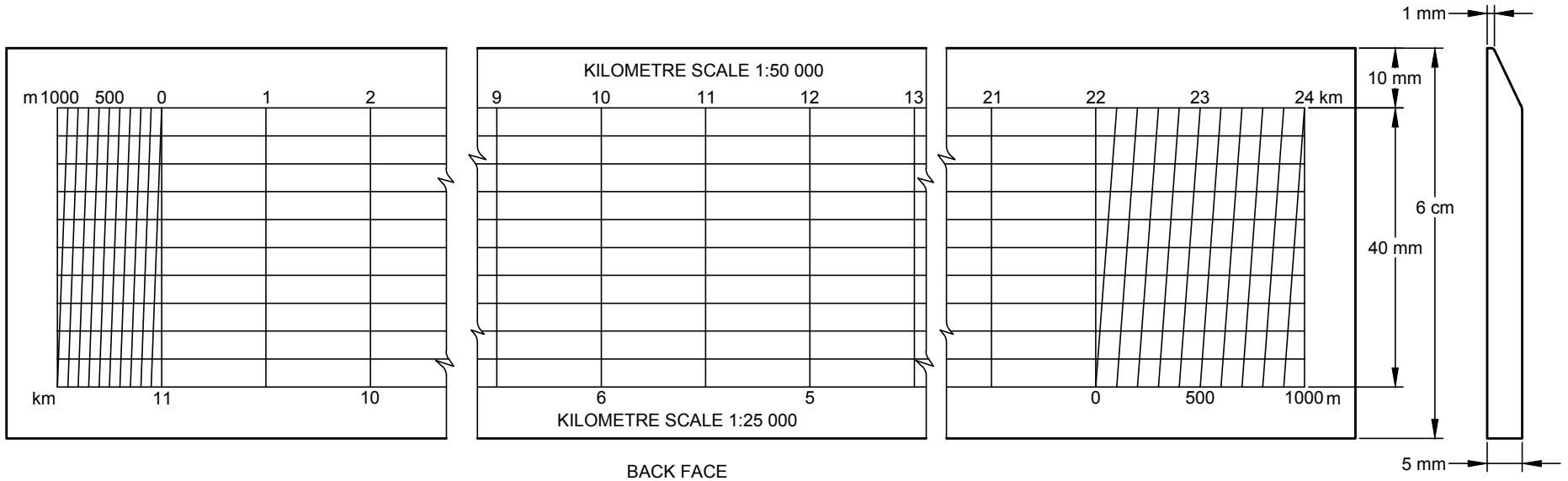




FIG. 4 DIAGONAL SCALE C

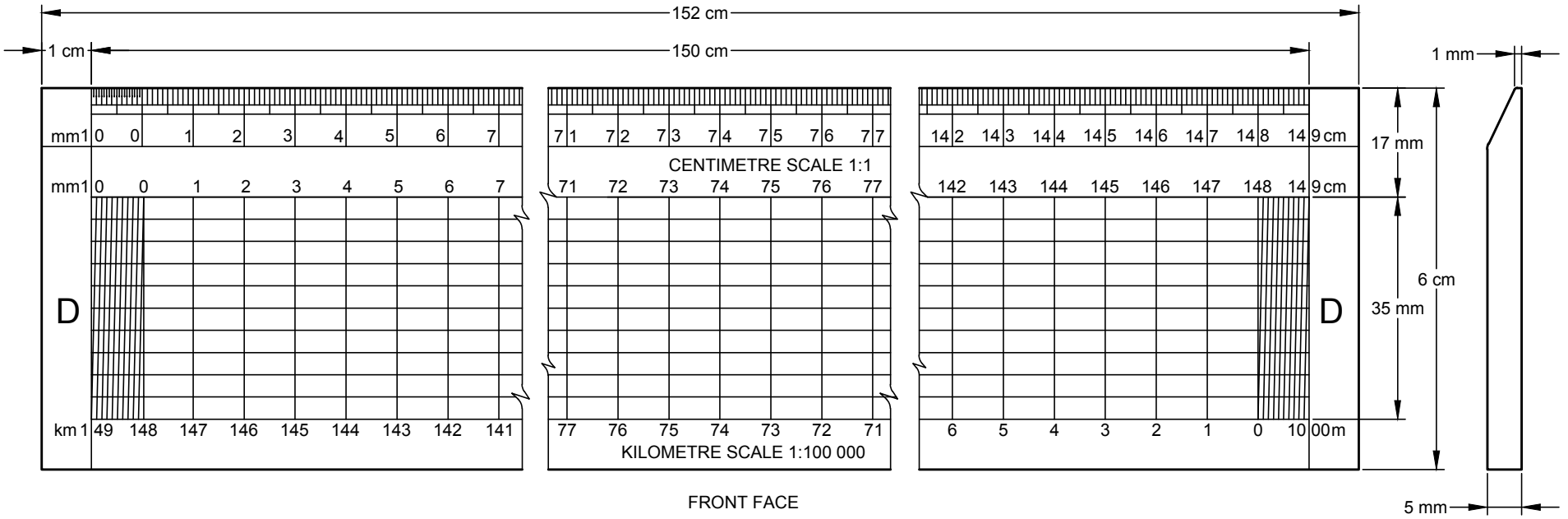



FIG. 5 DIAGONAL SCALE D

## ANNEX A

(*Foreword*)

## COMMITTEE COMPOSITION

Educational Instruments and Equipment Sectional Committee, PGD 22

| *Organization* | *Representatives(s)* |
|---|---|
| In Personal Capacity (*7/57, Second Floor, Old Rajinder Nagar, New Delhi - 110060*) | DR SUKHVIR SINGH **(*Chairperson*)** |
| Ambala Scientific Instruments Manufacturers Association, Ambala Cantt | SHRI ASHWANI GOEL<br>SHRI PUNEET GUPTA (*Alternate*) |
| CSIR - Central Scientific Instruments Organisation, Chandigarh | DR S. V. RAMAGOPAL |
| Directorate General of Quality Assurance, Ministry of Defence, New Delhi | SHRI K. CHANDRASEKARAN |
| Directorate of Standardisation, Ministry of Defence, DTE of Standardization Government, New Delhi | GP CAPT M. K. PANI |
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| Indian Association of Physics Teachers, Delhi | DR MAMTA |
| Industrial Design Product Design, IIT Delhi, New Delhi | SHRI LALIT KUMAR DAS |
| Instrument Research and Development Establishment, Dehradun | SHRI SUBHASH CHANDER KUMAR<br>SHRI K. K. KAILASIA (*Alternate*) |
| Instruments Design Development and Facilities Centre, Ambala Cantt | SHRI J. K. S. GANGWAR |
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| National Council of Educational Research and Training, New Delhi | DR GAGAN GUPTA<br>PROF ALKA MEHROTRA (*Alternate*) |
| National Science Center, New Delhi | SHRI A. S. MANEKAR |
| Office of Development Commissioner (MSME), New Delhi | SHRI S. VIJAYA KUMAR<br>SHRI ALURI SURESH (*Alternate*) |
| Survey of India, Geodetic and Research Branch, Dehradun | SHRI MAM CHAND |
| BIS Directorate General | SHRI RAJEEV RANJAN SINGH SCIENTIST 'F'/ SENIOR DIRECTOR AND HEAD (PRODUCTION AND GENERAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)] |

*Member Secretary*
SHRI ASHUTOSH RAI
SCIENTIST 'B'/ASSISTANT DIRECTOR
(PRODUCTION AND GENERAL ENGINEERING), BIS

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**Review of Indian Standards**

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.:PGD 22 (20958).

## Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

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