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GRADUATION OF LEVELLING STAVES

(METRIC UNITS)

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BUREAU OF CEYLON STANDARDS

GRADUATION OF LEVELLING STAVES

(METRIC UNITS)

S. L. S. 227 : 1973

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BUREAU OF CEYLON STANDARDS
53, DHARMAPALA MAWATHA,
COLOMBO 3.

SRI LANKA STANDARD FOR GRADUATION OF LEVELLING STAVES

(METRIC UNITS)

FOREWORD

This Ceylon Standard was prepared by the Drafting Committee on Levelling Staves under the authority of the Metric Divisional Committee of the Bureau of Ceylon Standards. It was authorised for adoption and publication by the Council of the Bureau on 12th November, 1973.

Levelling Staves graduated in metric units will be required in increasing numbers when the country adopts the metric system of weights and measures.

It has been found that staves which are presently being used can be graduated in metric units by repainting the faces. The "E pattern" of graduation prescribed in this standard has been adopted in many metric countries as it has distinct advantages over the "line pattern" of graduation which is common in this country.

This standard intends to achieve the following objectives:

(i) to prevent a multiplicity of metric graduation patterns coming into use; and

(ii) to minimise confusions and errors, that may arise in the assimilation of new units.

This standard has been limited to cover only the faces of levelling staves. It does not cover details of manufacture as staves are not presently manufactured in Ceylon.

It is expected that all staves presently used which would be converted to new units and those to be imported anew, will conform to this standard.

All dimensions specified in this standard are in metric (SI) units. Equivalent values in inches are given in the appendix.

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 CS 102 (Ceylon Standard for Presentation of Numerical Values). The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

In the preparation of this standard considerable assistance obtained from the publications of the British Standards Institution is greatly acknowledged.

1. SCOPE

This standard lays down dimensional requirements, graduation and figuring of levelling staves used in levelling to provide height control for topographical or engineering surveys.

2. LENGTH OF INSTRUMENT

A levelling staff shall have a nominal length of 3 m, 4 m or 5 m.

3. WIDTH OF READING FACE

The reading face shall not be less than 38 mm wide.

4. FORM OF GRADUATION

4.1 All graduation marks shall have a vertical dimension of 10 mm and the space between graduation marks shall also be 10 mm. No graduation mark shall be less than 10 mm in its horizontal dimension.

4.2 Each set of five graduation marks collectively denoting each 100 mm interval of the staff, shall be off set by approximately 2 mm, alternately to the left and to the right of the vertical central line of the reading face.

4.3 The outside edges of the lower three graduation marks in each 100 mm interval, shall be connected by a vertical band with a minimum width of 5 mm forming the natural or reversed "E" form, the upper and lower edges of which locate the 50 mm and 100 mm intervals respectively (see Fig. 1 b).

4.4 The other two graduation marks, in each 100 mm interval, shall be set off from the same internal vertical datum line as the "E" form (See Fig. 1 b).

4.5 Graduation marks shall be coloured using red and black for alternate metres on a white or cream background. Graduation marks in the first metre shall be coloured in black.

5. SHAPE OF FIGURES

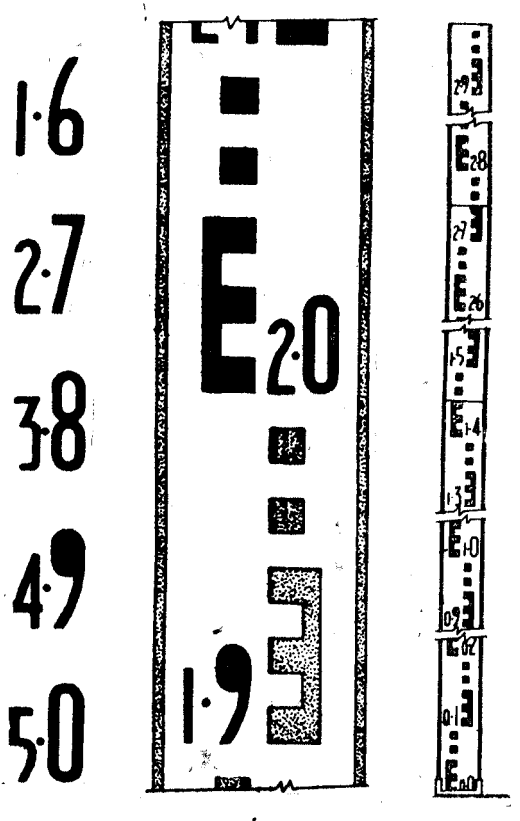
5.1 Shape of figures must be designed to obtain the maximum use of available space, without detracting from the legibility of the graduation marks. Special attention shall be paid to the design of similar shaped figures, with the 6's and 9's having open tails. The numeral 9 shall be 'blind' (see Fig. 1 a). The maximum distance at which the figures can be clearly and accurately read, through an optical instrument shall be approximately equal to the distance at which the graduation marks can be similarly discerned.

5.2 On staves where the reading face is 55 mm wide, figures whose size and shape are similar to those illustrated in Fig. 1 a shall be deemed to satisfy the above requirements. The size and spacing of figures on staves where the reading face is greater or less than 55 mm shall be increased or decreased porportionately.

5.3 All figures shall be coloured in black (on a white or cream background).

6. FORM OF FIGURING

6.1 The staff shall be figured at every 100 mm interval with figures denoting the relevant metre, the decimal point and the first decimal part of a metre. These figures shall be located



a Round shape of numerals with a reading face width 55 mm

b Sample portion of staff with a reading face width of 55 mm (Full size)

c Illustration of a 4 m staff

Fig. 1
The metric levelling staff

with their lower extremity coincident with the bottom edge of the first graduation mark in each 100 mm interval. The metre numerals shall be smaller than the numerals denoting the decimal fraction and shall be in the ratio 3:4. The decimal point shall be shown but may be located in the most convenient position between the numerals. (see Fig. 1 b).

6.2 Figuring shall be upright on the staff. Inverted numerals shall not be deemed to satisfy the requirements of this standard.

7. ACCURACY

7.1 The accuracy of graduation shall be $\pm$ 1 mm for the whole length as well as for any part of the whole length.

7.2 Graduation marks shall be tested for accuracy by a competent authority with a suitably calibrated and certified invar metal tape.

7.3 Telescopic and folding staves shall be tested for accuracy under normal conditions of use.

APPENDIX

Equivalent imperial values of standard metric dimensions are given below. The equivalent values have been calculated in accordance with C.S. 116: Principles of Conversion.

Standard Value m	Equivalent Value ft	Standard Value mm	Equivalent Value in
3	10	38	1.5
4	13	55	2.2
5	16		

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The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

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