BRITISH STANDARD

BS 4372:1968

Specification for

Engineers' steel measuring rules

Confirmed
February 2012

Co-operating organizations

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

Associated Offices' Technical Committee
Association of Consulting Engineers
Association of Mining Electrical and Mechanical Engineers
Board of Trade
British Chemical Plant Manufacturers' Association
British Compressed Air Society
British Electrical and Allied Manufacturers' Association
British Gear Manufacturers' Association
British Internal Combustion Engine Manufacturers' Association
British Mechanical Engineering Federation
British Pump Manufacturers' Association
British Steel Industry
Crown Agents for Oversea Governments and Administrations
Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales
Engineering Equipment Users' Association
Gas Council
Institute of Marine Engineers
Institution of Civil Engineers
Institution of Gas Engineers
Institution of Heating and Ventilating Engineers
Institution of Mechanical Engineers
Institution of Mechanical Engineers (Automobile Division)
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Locomotive and Allied Manufacturers' Association of Great Britain
London Transport Board
Machine Tool Trades Association
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Ministry of Technology — Ministry of Public Building and Works
Ministry of Technology — National Engineering Laboratory
Ministry of Transport
National Coal Board
National Physical Laboratory (Ministry of Technology)
Radio Industry Council
Royal Institute of British Architects

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee, was published under the authority of the Executive Board on 30 December 1968

The following BSI references relate to the work on this standard:
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Amendments issued since publication

Amd. No.	Date	Comments

Contents

Foreword

This standard makes reference to the following British Standards:

BS 427, *Method for Vickers hardness test — Part 1. Testing of metals.*

BS 970, *Wrought steels in the form of bars, billets and forgings, up to 6 in ruling section, for automobile and general engineering purposes. En series.*

BS 1134, *Centre-line-average height method for the assessment of surface texture.*

BS 1224, *Electroplated coatings of nickel and chromium.*

This British Standard has been prepared to meet the demand for a specification for steel rules in metric units for use in engineering. In recognition of the fact that the metre and the millimetre are recommended SI units, it is officially recommended that the figuring on the rules covered by this standard be in millimetres wherever possible. However, in those cases where practical considerations make it preferable to use centimetre figuring this is permissible as a second choice. Typical rules complying with the standard are illustrated. Recommendations for preferred lengths are included and are based on the known demands of countries already using the metric system.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 7 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 General

1.1 Scope

This British Standard specifies requirements for steel rules of up to 1 metre nominal length, for use in engineering.

The standard comprises three sections as follows:

— *Section 1: General;*

— *Section 2: Steel rules;*

— *Section 3: Folding steel rules.*

NOTE Inch/metric rules are not included in this standard but it is recognized that they will continue in use for some time to come; the general requirements for these rules and for the metric graduation on them are in accordance with the provisions of this standard and the inch graduation should be of comparable accuracy.

1.2 Definitions

For the purposes of this British Standard, the following definitions apply:

steel rule

a graduated continuous length of steel with one or two square datum ends

folding steel rule

two or more graduated lengths of steel connected together by swivel joints, with two square datum ends

1.3 Marking

The rule shall be marked with at least the manufacturer's name or trade mark and the number of this British Standard, i.e. BS 4372.

NOTE The mark BS 4372 on or in relation to the product is a claim by the manufacturer that it complies with the requirements of the standard.

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2 Steel rules

2.1 Material and finish

2.1.1 Steel rules shall be manufactured in one continuous length from carbon steel, carbon steel matt chrome plated in accordance with BS 1224[1)] or rust-resisting steel. The steel shall be hardened and tempered and shall have a hardness of 450 to 550 HV [2)].

[1)] BS 1224, *"Electroplated coatings of nickel and chromium"*.

[2)] BS 427, *"Method for Vickers hardness test"*, Part 1, *"Testing of metals"*.

2.1.2 Suitable rust-resisting steels are En 56C and En 56D to BS 970[3]. The faces and edges of the rules shall have a clean but not highly reflective finish. The surface roughness of unplated rules shall not exceed 0.8 micrometre CLA (32 micro inch CLA), assessed in accordance with BS 1134[4].

2.2 Recommended lengths

It is recommended that the lengths given below be regarded as preferred and that those in the first choice series be selected wherever possible:

First choice:		150		300	500	1 000 mm
Second choice:	100		200		600 mm	

2.3 Suggested sections

Rules are at present made in various widths and thicknesses; the sections given in Table 1 are suggested for future guidance. Rules should not be so thick that parallax impairs the accuracy of reading.

Table 1 — Suggested sections for steel rules

Nominal rule length			Material section	
			Narrow	Standard
			mm	mm
100 mm	150 mm	200 mm	13 × 0.4	20 × 0.75
300 mm			13 × 0.4	28 × 1.0
500 mm	600 mm	1 m	20 × 0.5[a]	30 × 1.5

[a] This section is not normally available in the 1 m length.

2.4 Graduation lines and figuring

2.4.1 Graduation lines. Graduation lines shall be of uniform width, square to the edges. They shall extend from the rule edge for a distance of at least 1.5 mm and shall differ in length so as to clearly indicate the subdivisions of the basic measurement unit. The width of these lines shall not be less than 0.1 mm nor more than 0.2 mm and shall not exceed half the width of the scale interval.

2.4.2 Figuring. Figuring, which may refer to either one or both scales on a rule face, shall indicate:

1) the distance in millimetres of each 10 mm graduation line, or

2) the distance in centimetres of each 1 cm graduation line from a square end of the rule.

When rules are "graduated" in cm, then the first figured graduation line should be marked "cm".

NOTE Recommended SI units are the metre and the millimetre and it is officially recommended that preference be given to figuring in millimetres wherever possible.

The degree of scale interval shall be marked within 25 mm of the commencement of, and be aligned with, such scale intervals.

2.4.3 Marking of graduation lines and figuring. Graduation lines and figuring shall be effected by metal removal; this shall have a minimum depth of 0.02 mm for carbon steel and 0.01 mm for rust-resisting steel rules.

The graduation lines and figuring of rules shall provide a durable contrast to the surface.

2.5 Accuracy

When referred to the standard reference temperature of 20 °C, the tolerances in **2.5.1** to **2.5.4** shall apply.

2.5.1 Rule edges shall be straight to within 0.1 mm on any length up to 300 mm.

2.5.2 Rule edges shall be parallel to within 0.1 mm on any length up to 300 mm.

2.5.3 Flat ends shall be square to the rule edges to within 0.05 mm over the width of the rule.

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[3] BS 970, *"Wrought steels. En series".*

[4] BS 1134, *"Centre-line-average height method for the assessment of surface texture".*

2.5.4 Graduation lines shall be accurate to within the tolerances specified in Table 2. These tolerances apply to the distances between the centre lines of the graduation lines.

Table 2 — Accuracy of graduation

Rule length	Departure from nominal		
	Up to and inc. 300 mm	Over 300 mm up to and inc. 500 mm	Over 500 mm up to and inc. 1 m
	mm	mm	mm
Distance between any two graduation lines on a single scale	0.1	0.2	0.25
Distance between any two adjacent graduation lines	0.05	0.05	0.05
Position of the 10 mm graduation line from its flat end datum	0.08	0.08	0.08

3 Folding steel rules

3.1 Construction

3.1.1 The rule shall consist of "legs" of approximately equal length, connected end to end by permanent joints to form a straight line. Both extreme ends of the rule shall be flat and square to the rule edges.

3.1.2 The joints shall locate the legs in a straight line during service and also allow the rule to fold into a convenient length.

Both ends of the rule may be fitted with tips if so desired; such tips shall be within the graduated length. The tip shall be of the same width as the rule and shall fit flush with the rule end and edges. Tips shall be securely fastened to the outer face only of the appropriate legs.

3.2 Material and finish

3.2.1 Legs. Each leg shall be manufactured in one continuous length from carbon steel, carbon steel matt chrome plated in accordance with BS 1224[5)] or rust-resisting steel. The steel shall be hardened and tempered and shall have a hardness of 450 to 550 HV.

Suitable rust-resisting steels are En 56C and En 56D to BS 970[6)].

3.2.2 Joint components. The exposed components of rust-resisting rules shall also be of rust-resisting material.

3.3 Suggested sections

The sections given in the table below are suggested for future guidance. Rules should not be so thick that parallax impairs the accuracy of reading.

Table 3 — Suggested sections for folding steel rules

Nominal length of leg	Material section
	mm
Up to 250 mm	13 × 0.5
Over 250 mm	20 × 0.75

[5)] BS 1224, *"Electroplated coatings of nickel and chromium"*.

[6)] BS 970, *"Wrought steels. En series"*.

3.4 Graduation lines and figuring

3.4.1 Graduation lines. Graduation lines shall be of uniform width, square to the edges. They shall extend from the rule edge for a distance of at least 1.5 mm for rules of less than 15 mm width, marked on both edges; graduation lines on all other rules shall have a length of not less than 2.5 mm. Graduation lines shall differ in length so as to clearly indicate the subdivisions of the basic measurement unit. The width of these lines shall not be less than 0.12 mm nor more than 0.25 mm and shall not exceed half the width of the scale interval.

3.4.2 Figuring. Figuring shall indicate:

1) the distance in millimetres of each 10 mm graduation line, or

2) the distance in centimetres of each 1 cm graduation line from the end of the rule.

When rules are "graduated" in cm, then the first figured graduation line should be marked "cm".

NOTE Recommended SI units are the metre and the millimetre and it is officially recommended that preference be given to figuring in millimetres wherever possible.

Those figures whose legibility or location would be adversely affected by the joints may be omitted. Where the size of a joint component obscures the identity of some graduation lines, the joint component shall be marked to indicate the major graduation, e.g. 300 mm.

The degree of scale interval shall be marked within 25 mm of the commencement of, and be aligned with, such interval.

3.4.3 Marking of graduation lines and figuring. Graduation lines and figuring shall be effected by metal removal; this shall have a minimum depth of 0.02 mm for carbon steel and 0.01 mm for rust-resisting steel rules.

The graduation lines and figuring of rules shall provide a durable contrast to the surface.

3.5 Accuracy

When referred to the standard reference temperature of 20°C, the tolerances in **3.5.1** to **3.5.4** shall apply.

3.5.1 Flat ends shall be square with the rule edges to within 0.05 mm over the width of the rule.

3.5.2 Each joint shall ensure the alignment of the graduated edges of its two associated legs to within 0.25 mm. It shall also locate the positional continuity of the graduation to within 0.2 mm.

3.5.3 Each individual leg of the rule shall be accurately graduated with a maximum permissible error between the centre lines of any two graduation lines on a single scale in accordance with the tolerances given in Table 2.

3.5.4 The positional error of the centre line of the first and last 10 mm or 1 cm graduation lines relative to its nearest square end shall not exceed 0.12 mm.

Typical examples of rules complying with the standard

(See Foreword)

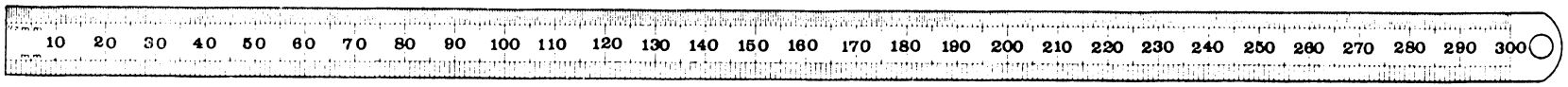

Figure 1

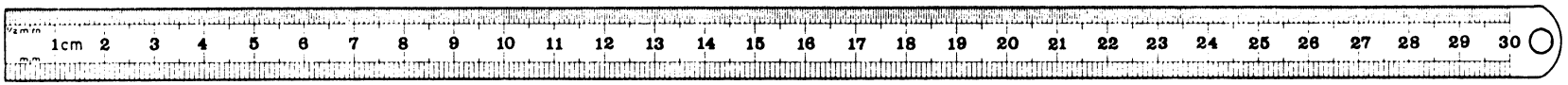

Figure 2

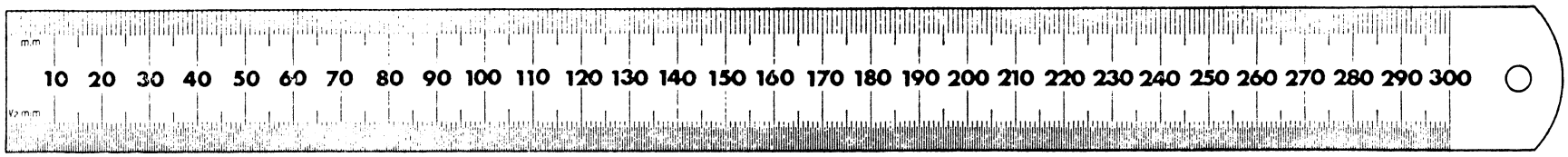

Figure 3

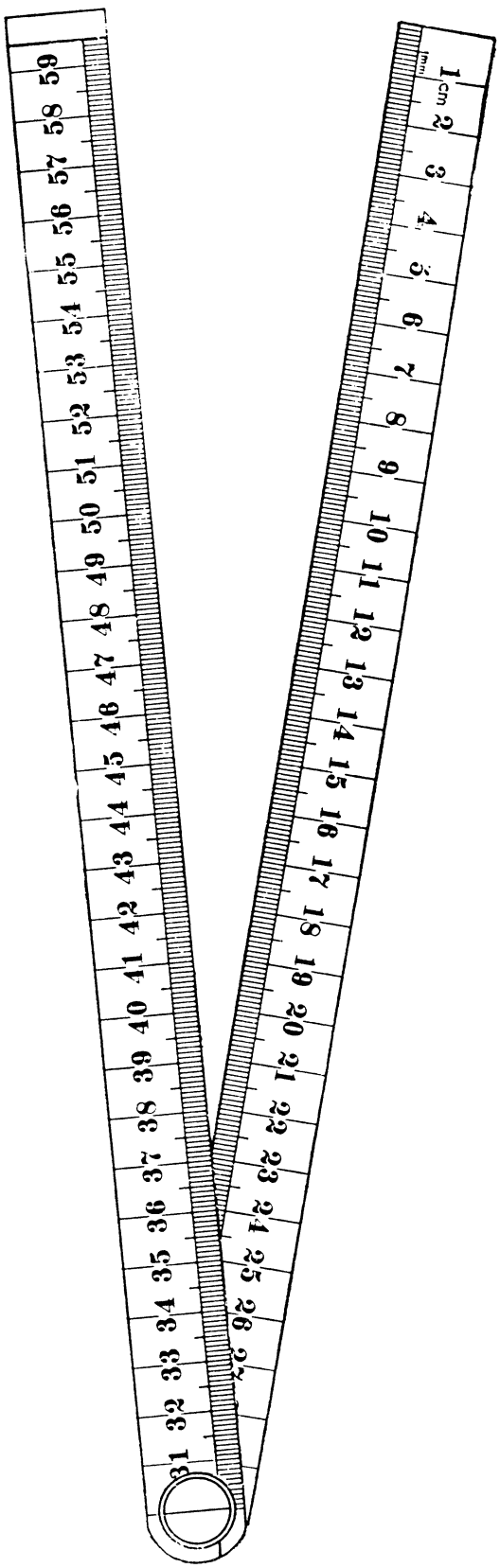

Figure 4

Figure 5

Example of simplified scales suggested for the future

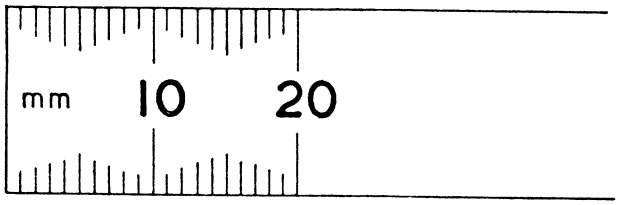

Figure 6

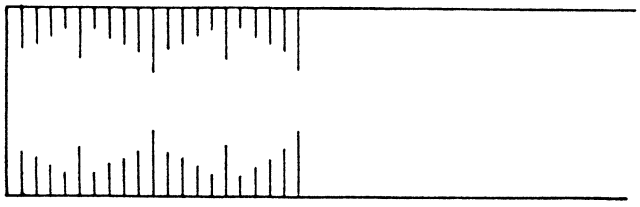

Figure 7

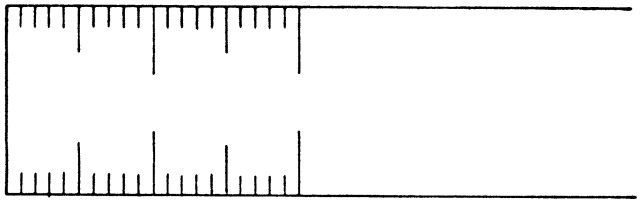

Figure 8

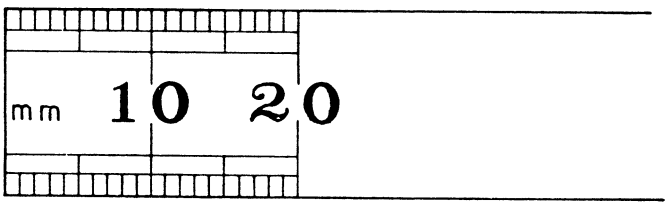

Figure 9

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