Building Metrication News

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This section appears in the fourth issue of 'Building' each month, and gives current news and information on metrication, as well as providing a forum in which the ramifications on the change to metric can be freely discussed. It is published in association with the Modular Society.

METRIC MONTH

Metric modular housing—official!

There is a no-nonsense, positive attitude about the Minister of Housing's first circular of the year, which comes as something of a relief after last week's cuts. He tells local authorities that he intends to support BSI's metric change programme to the hilt and expects them to do likewise. This is the kind of straight talking, supported as it is by the necessary degree of compulsion, which should give the whole industry the evidence that it needs of government intentions. There can be no doubt left in the minds of architects, manufacturers or contractors that at least housing is going metric, that it is going to be dimensionally co-ordinated and it is going to be on time.

In his circular (1/68), 1 January 1968, Mr. Greenwood sets out the objectives of his ministry towards dimensional co-ordination. 'The aim is to establish a dimensional framework within which it will be possible to make the maximum use of dimensionally co-ordinated standard components and so reduce building costs and provide better value for money.' But he then goes on to give these aims some teeth. He has decided in principle that as from 1 January 1972 all authorities submitting schemes at tender stage will be required to specify British Standards for all components for which standards exist. In support of these recommendations his ministry is to revise Design Bulletin No. 8 and is preparing a new Bulletin giving detailed guidance on the use of the new co-ordinated metric dimensions. This is to be published as soon as possible.

Going metric on time

The Minister is no less precise about the programme. Authorities are asked not to submit metric plans at layout stage before 1 January 1969, or at tender stage before 1 January 1970 (and incidentally never to submit plans in both metric and imperial measure). In exceptional cases new standard plans may be submitted before these dates but only after the metric dimensional framework has been promulgated. At the other end of the programme all schemes submitted after 1 January 1972 are required to be in metric. This applies to associated site works as well.

Data for industry

Last month in Building Metrication News we asked both government and the RIBA to provide manufacturers with advance warning of the pace at which the change is likely to take place. Under the circular, authorities are asked to provide the Ministry (or Welsh Office) with this information and we hear that the RIBA are now making plans also. Problems are expected in the change and the NBA is to keep in touch with schemes in progress and to provide an information service, including the arrangement of lectures.

At what cost?

But what of costs? Metric schemes like imperial will be subject to minimum standards and cost limits. A metric version of Design Bulletin 6 is being prepared and an appendix to the circular (mandatory from 1 January 1969) sets out the metric versions of the principal standards recommended as minima in the Parker Morris report. It appears that these are greater than the imperial measurements, and if, as appears likely, some building materials, particularly sheet materials, go up in price, what has to give? The NFBTE made some interesting comments on this problem in a recent memorandum which is summarised in our News from the Industry column.

Another draft British Standard

This month we publish a second draft British Standard, 'Building site instruments for linear measurement, Part I: Graduation and figuring (metric units). A fairly practical sort of job, rather different to the first draft we published on controlling dimensions. Also one which is not likely to be affected by the Minister's comments on mandatory standards. But now that component standards are to become mandatory it seems more and more important for BMN to publish these drafts. This is the only way that everyone who is going to have to use these standards can have the opportunity of commenting before they are published rather than just objecting to them after they are published.

Site Instruments for Linear Measurement

PART 1: GRADUATION AND FIGURING—DRAFT BRITISH STANDARD FOR COMMENT

This draft BS is published by arrangement with the British Standards Institution. It is to be submitted, together with the comments resulting from circulation, for consideration and approval by the Technical Committee. Views on this document should be sent to the committee secretary, G. J. Guy, at BSI, 2 Park-street, London, W1, by no later than Friday 23 February. Suggestions entailing revision of the text should indicate the preferred wording. The relevant clause number should be quoted against any comment made.

Draft British Standard for Building Site Instruments for Linear Measurement: Part 1: Graduation and Figuring (metric units).

FOREWORD

This Standard has been prepared to cater for the need for a metric specification covering those instruments for linear measurement which are in common use, and which are suitable in situations where speed of reading and general convenience are as important as very fine accuracy. Precision instruments requiring skilled application or observation have been excluded from consideration.

The choice of instrument to be used should always be determined by the degree of accuracy appropriate to the particular type of work in accordance with the recommendations of CP.... 'The control of inaccuracy in building'.[1]

There appears to be no immediate need, or demand, for radical changes in the materials, form of construction or quality of manufacture of the instruments site operatives are accustomed to use. Such changes may even be undesirable during the period of gaining familiarity with metric units of measurement. The objective of Part I of this standard is to ensure that during this period, observational errors are minimised by graduating and figuring instruments in accordance with well established ergonomic principles. In addition to the need for clarity and legibility, particular importance is attached to the facility for reading plan dimensions directly from the instrument without having to apply a conversion factor.

It is assumed that dimensions will be presented on drawings in either metres or millimetres, in accordance with the recommendations of PD 6031,[2] The impracticality of figuring instruments to allow instantaneous reading of both units of measurement suggests the need to round off dimensions whenever possible. In this standard it is accepted that graduation to a 1 mm interval will sometimes be necessary but ergonomic research has shown that fine division increases the time required to read the instrument, or leads to an increase in observational errors. Research has also shown that interpolation to one-fifth of a coarser scale spacing can be achieved rapidly with minimal errors. Since 5 mm is a convenient sub-division of the metre and bears some relationship to the degree of accuracy found to exist in site work, it has been accepted as being a more suitable interval for general usage.

The sizes of graduation lines and numerals have been related to maximum reading distance, based on the recommendations of BS 3693. Sizes of instruments are included where these influence the graduation of the instrument.

Illustration of typical markings complying with this standard are shown.

[1] CP .... in course of preparation.

[2] PD 6031, 'A guide for the use of the metric system in the construction industry'

SPECIFICATION

1. General

1.1. Scope

1.1.1. This British Standard specifies the requirements for rules, laths and squares of boxwood or other suitable non-ferrous materials; plastics coated linen and glass fibre tapes; general purposes levelling staves; land chains and ranging poles.

The Standard is to be published in several parts. Part 1 relates to the gradation and figuring of these instruments and is divided into six sections, as follows:

Section 1: General.
Section 2: Boxwood rules, laths and graduated squares.
Section 3: Plastics coated linen and glass fibre tapes.
Section 4: Levelling staves.
Section 5: Land chains.
Section 6: Ranging poles.

1.2. Definitions

1.2.1. For the purposes of this British Standard the following definitions shall apply:

(1) *Rule or lath.* A straight, continuous strip of boxwood or other species, or any other suitable non-ferrous material, graduated over its full nominal length.

(2) *Operative's rule.* A rule consisting of four equal lengths connected by two hinges and a central 'V' joint.

(3) *Two-fold and multi-fold laths.* A rule consisting of two or more equal lengths connected with spring stop or pin joints.

(4) *Square.* An 'L' or 'T' shaped instrument of boxwood or other species, or any other suitable non-ferrous material, used primarily for marking or setting out right angles but sometimes graduated to allow for linear measurement.

(5) *Tape.* A graduated continuous length of plastics coated woven linen, with or without metal thread reinforcement, or of PVC coated glass fibre, complete with a metal, plastic or leather case and winding handle. May also apply to refil tapes.

(6) *Levelling staff.* A graduated scale on a rigid backing of wood or metal, in one, two or more lengths which may be telescopic, hinged or snap jointed. Used with an optical instrument for vertical measurement but may also be used for tacheometric measurement.

May also apply to refills of paper, metal or laminates, for converting existing staves.

(7) *Land chain.* A chain consisting of straight links of tempered steel wire connected by three oval rings and terminating with swivel handles. Measurement is denoted by metal tallies of distinctive shape.

(8) *Ranging pole.* A tube of steel or aluminium, or wooden pole, with pointed metal shoe and painted in bands of colour for ease of observation but sometimes used for coarse measurement.

(9) *Scale.** An array of marks, together with any associated figuring in relation to which the dimension of the measured object is directly observed.

(10) *Scale mark.** Graduation mark; graduation line. One of the marks constituting a scale.

(11) *Major scale mark.** Major mark. The scale marks which form the primary divisions of the scale.

(12) *Intermediate scale mark.** Intermediate mark. The scale marks which may sometimes be used for the purpose of providing guidance in reading the scale between the major scale marks.

(13) *Minor scale marks.** Minor marks. The scale marks which form the secondary division of the scale. Each interval between the major marks is divided into a number of scale divisions delineated by minor scale marks.

(14) *Graduation.** The process of setting out a scale.

(15) *Scale division.** A part of a scale delimited by two adjacent scale marks.

(16) *Scale interval.** The increment of the measured quantity corresponding to the distance between the centres of two adjacent scale marks.

(17) *Interpolated spacing.** The distance corresponding to one part of a scale spacing when the latter is subdivided by eye into a number of equal parts.

(18) *Rapid reading.* An observation time of not more than two seconds after the instrument has been positioned.

(19) *Scale base length.** The basis for setting out a scale in relation to the maximum distance at which the instrument can be read with the minimum number of mistakes. Provides a basis for determining the height and thickness of graduation lines and the size of numerals.

Where 'D' is the maximum reading distance and 'L' the scale base length (D and L being the same units) then:

$D = 14{,}4\ L$

$L = D/14{,}4$

1.3. Presentation

1.3.1. All instruments covered by this specification shall be clearly set out to allow ease of reading with minimum observational error.

The presentation shall indicate the accuracy of the instrument and shall be compatible with the purposes for which it is to be used.

* These definitions are reproduced from BS 3693, 'Recommendations for the design of scales and indexes; Part 1: Instruments of bold presentation and for rapid reading'.

No instrument shall be divided so that the minor scale interval is less than the specified limits of error with which the instrument purports to comply, except where the boldness of presentation precludes any serious possibility of misuse.

1.4. Dividing

1.4.1. Graduation shall be in metres divided into decimal sub-multiples, each sub-multiple interval being halved by an intermediate graduation line to give a minor interval of either 5 or 1 millimetres. See Table 1.

TABLE 1: DIVISION

Major interval mm	Intermediate interval mm	Minor interval mm
1000	500	100
100	50	10
10	(a) 5	0
	(b) 5	1

(a) = 'Coarse' division
(b) = 'Fine' division

The figured graduation lines shall indicate the distance in metres, 100 mm, 50 mm and 10 mm, measured from the end of the instrument. When bold presentation is required, or when the error of the instrument exceeds 10 mm, the sub-division and figuring of the 10 mm interval and graduation lines, shall be omitted.

For the purposes of this specification, it is assumed that sufficiently accurate readings can be obtained by interpolating to ±1/5 of the interval spacing.

1.5. Legibility

1.5.1. *Graduation lines.* Graduation lines shall differ in height and/or thickness so as to clearly indicate the metre and its sub-multiples.

Metre and 100 mm graduation lines shall normally extend to the full width of the instrument and shall be distinguished by the method of numbering.

The length of un-numbered graduation lines and the adjoining major graduation lines shall be determined by the required reading distance—see Table 2. The length shall be such that adequate space is available for numerals which will be legible at the same reading distance, the size of figure at the 100 mm graduation line being the basis of comparison.

The width or thickness of graduation lines given in Table 2 shall only apply to instruments of bold presentation. When lines of a different height-width proportion are used, the width, rather than height, shall determine the reading distance.

TABLE 2: SIZES OF LINES AND NUMERALS

Reading distance = D	Scale base length L = D/14·4	Major scale lines		Minor lines		Numerals
		Length 0·042L–0·05L	Width 0·0045L–0·0067L	Length 0·025L	Width 0·0045L	Height 0·035L–0·045L
mm	mm	mm mm	mm mm	mm	mm	mm mm
750	58	2·2–2·6	0·23–0·35	1·3	0·23	1·8–2·3
1 000	70	2·9–3·5	0·31–0·46	1·7	0·31	2·4–3·1
1 440	100	4·2–5·0	0·45–0·67	2·5	0·45	3·5–4·5
1 750	121	5·1–6·1	0·55–0·82	3·0	0·55	4·3–5·5
2 000	139	5·8–7·0	0·63–0·93	3·5	0·63	4·9–6·2
2 500	174	7·3–8·7	0·78–1·16	4·3	0·78	6·1–7·8
3 000	208	8·8–10·4	0·94–1·40	5·2	0·94	7·3–9·5

(based on recommendations of BS 3693, Part 1).

When the minor scale is 1 mm the graduation line thickness shall not exceed 25 per cent of the interval, i.e. 0·25 mm and a reading distance of 750 mm. Since fine division creates the optical illusion that the major lines are thinner than the minor lines, they may be increased in thickness by 10 per cent. In practice, minor and major lines of 0·2 and 0·25 mm respectively will prove to be more satisfactory.

When fine and coarse division occur on opposite edges of the same side, the width of line given in Table 2 appears excessive by contrast and the width may be reduced to 0·4 or 0·5 mm.

Intermediate lines shall be the length of the minor scale lines plus half the difference between the major and minor lines.

Instruments shall be manufactured with white lines and figuring on a black ground, for use in conditions of low level illumination. To counteract the effect of irradiation, by which white lines appear thicker than they are, all graduation and figuring shall be 10 per cent thinner than the equivalent black marking.

1.5.2. *Figuring.* The figures used shall be in the form of the series which have been designed for British Standards Institution to provide maximum legibility —Reference BS 3693, A and B.

Similar series such as Granby Bold or Futura shall be deemed to comply with this standard, provided:

(i) the figure 3 has a flat top and the 6 and 9 have open tails;
(ii) the width-height ratio is 3:5;
(iii) the stroke width-height ratio is between 1:7 and 1:8.

A numeral shall consist of not more than three digits. Those consisting of one or two digits shall be positioned centrally in relation to the graduation line. A numeral consisting of three digits shall be so positioned that the graduation line shows the position of the decimal marker.

Digits indicating the whole metre may be coloured red.

Figuring shall allow instantaneous reading of the metre to two decimal places. This requirement shall be deemed to be satisfied when all the digits of the measurement can be read directly from the instrument within the scale base length—see Table 2. A single digit positioned centrally in relation to the graduation line shall denote the omission of a zero or other figure which must be read at the nearest 100 mm graduation line.

Instruments of less than 10 metres shall be figured with each metre numbered 1–99 at each 10 mm graduation line. See Fig. 1.

Instruments of more than 10 metres, or requiring bold presentation shall have each 100 mm interval numbered 1–9 at each 10 mm graduation line. Each 100 mm graduation line will have at least a two-digit numeral indicating the whole metre and the first decimal place. In the first metre the 100 mm lines will have a zero metre reading, e.g. 0·7; 0·8; 0·9. See Fig. 3, Type B.

The two alternative types of figuring will determine the maximum size of numeral which shall be consistent with the reading distance of the graduation lines. Three sizes of digit shall be used to give emphasis to the metre submultiples. Emphasis by changing the form of the numeral or the use of a bolder type is deprecated.

At metre graduations the letter 'm' may be used.

For maximum legibility, and also for good appearance, the spacing between digits comprising a numeral shall comply with the recommended spacings given in BS 3693, Part 1[3].

1.5.3. *Decorative marking.* Any marking which is solely for decorative purposes shall be omitted. Metric and foot/inch measures shall not be marked on the same instrument.

1.6. *Marking.* Each instrument shall be marked with the name and/or symbol of the manufacturer and the number of this British Standard. Particular attention shall be given to the size and location of these and any other markings so as to ensure the legibility of the graduation and figuring is not impaired.

2. BOXWOOD RULES, LATHS AND GRADUATED SQUARES

2.1. General

2.1.1. Rules, laths and squares shall comply with the requirements for graduation and figuring of 1 of this standard.

Subject to accuracy of manufacture they shall be graduated with coarse (5 mm) and fine division on opposite edges of one or both sides, or on alternative sides.

Graduation lines shall be straight, normal to the edge.

Marking shall be by die pressing to a depth of relief of not less than 0·05 mm before filling in with black or other suitable colour to form distinctive markings against a contrasting background.

Marking by other methods (e.g. coated and printed markings) shall meet the requirements of Part 2 of this standard (to be prepared later).

NOTE: The form of testing to be agreed after trials.

When the natural wood forms the background to markings it shall be carefully selected and matched for lightness of colour to maintain a constant level of contrast throughout the length of the instrument.

Lacquer, polish or other protective coating shall be provided and shall have a matt or eggshell finish to minimise reflectiveness.

TABLE 3: PREFERRED LENGTHS FOR GRADUATION LINES

Minor	Intermediate	Major	Reading distance
mm	mm	mm	mm
2	–	4	1 150
2·5	(3·75)	5	1 440
3	(4·5)	6	1 750
4	(6)	8	2 300

Monotonic increasing graduations shall be an acceptable alternative form of graduation—see Fig. 1, Type B. The shortest line shall not be less than 1·3 mm and the longest line no longer than the normal intermediate line.

TABLE 4: PREFERRED SIZE GROUPINGS OF NUMERALS

Interval	Digit height	Reading distance	Digit height	Reading distance	Digit height	Reading distance	Digit height	Reading distance
mm	mm	mm	mm	mm	mm	mm	mm	mm
10	2	720	3	1 080	6	2 160	4	1 440
50	2·5	900	4	1 440	7	2 520	5	1 700
100	3	1 080	5	1 700	8	2 880	9	3 240
Range	1	360	2	620	2	720	5	1 800

2.2. Operative's Rules

see Fig. 1

2.2.2. It is recommended that rules should be manufactured in two lengths and two widths:

(a) 1 metre and 0·6 metre long × 35 mm wide × 9 mm thick.
(b) 1 metre and 0·6 metre long × 22·5 mm wide × 9 mm thick.

Rules shall be graduated and figured as illustrated in Fig. 1, over their total length, reading from left to right.

The zero, or point of beginning of measurement, shall be the metal end tip which shall be the same width as the rule and sit flush with the rule end and edges.

Those figures whose legibility or location would be adversely affected by the joints and end tips, may be omitted.

The edge which is unbroken by the extension of the central 'V' joint when the rule is open, shall be the working edge and shall be graduated along its entire length, including graduation of the tips and joints by metal removal to a minimum depth of 0·02 mm.

Type A, Fig. 1. Width of rule face 17·5 mm shall be graduated on one or two edges of both sides. The working edge shall have fine division on one side and coarse division on the other.

The sizes of graduation and figuring shall be:

	two edges each side	*one edge each side*
Coarse division	2·5 and 5 mm × 0·4 mm	4 and 8 mm × 0·5 mm
Fine division	3; 4·5 and 6 mm × 0·2 or 2·5	4; 6; 8 mm × 0·2 or 0·25
Height of numerals	3; 4 and 5 mm	3; 4; 5 mm

Type C, Fig. 1. Width of rule face 11·25 mm shall be graduated on the working edge only of both sides as shown.

Coarse division	2·5 and 5 mm × 0·4 mm
Fine division	2·5; 3·75 and 5 mm × 0·2 or 0·25 mm
Numerals	2; 2·5 and 3 mm or 3; 4 and 5 mm

2.3. One Metre Rules

see Fig. 2

2.3.1. The three types of graduation illustrated at Fig. 2 shall apply to continuous rules with section 25 mm × 5 mm.

Types A and C have graduation lines size 4; (6); 8 mm and numerals size 3; 4; 5 mm.

Type B has graduation lines size 2·5 and 5mm and numerals size 2·5; 3; 4mm.

All shall be graduated on one or both sides and Types B and C shall be graduated on one edge of one or both sides with fine division. When graduated on both sides Type C shall read from bottom to top on one side and in a downward or negative direction on the other.

The same patterns of graduation and figuring shall apply to longer rules or laths. Recommended lengths 1; 1·5 and 2 metres, with section 40 × 6 mm.

[3]BS 3693, 'Recommendations for the design of scales and indexes; Part 1: Instruments of bold presentation and for rapid reading'.

Technical Committee B/98

Constructional Work Measuring Instruments

CONSTITUTION

ORGANISATIONS REPRESENTED

Association of Consulting Engineers
Building Research Station
Drawing Office Material Manufacturers and Dealers Association
Federation of Civil Engineering Contractors
Incorporated Association of Architects and Surveyors
The Royal Institution of Chartered Surveyors
Ministry of Public Building and Works
Royal Institute of British Architects
Trades Employers

2.4. Two-fold and Multi-fold Laths

see Fig. 3

2.4.1. The lath shall consist of 'legs' of equal length measured from the squared end or centre of joint to the centre of the next joint.

Two metre rules with section 25 or 22·5 mm × 5 mm shall be limited to two-fold (1 metre) four-fold (500 mm) or five-fold (400 mm). It is recommended that the length of six-fold laths shall be 1·8 m giving legs of 300 mm, with particular application to the co-ordinated dimensions recommended in BS 4011.[4]

Graduation shall be on one or two edges of both sides, over the full length of the instrument. Two-fold laths shall be graduated as Type A or B in Fig. 3 but with more joints the greater is the justification for bold presentation complying with Type B.

2.5. Graduated Squares

2.5.1. Graduation of boxwood squares and T squares shall comply with the requirements of Part 1 of this specification. They shall be graduated on one or both edges of one or both sides of the blade and stock, according to the form of construction and whether or not the instrument is reversible.

(1) *Squares with blade thinner than stock.* The zero, or point of beginning of measurement, shall be the line of the face of the stock.

When graduated on one edge only this shall be the outside edge of the blade, with figuring vertical to the edge of the blade and read from the inside of the square, i.e. looking from the toe.

Figuring shall have the same form and presentation as operative's rules, except that when a blade is graduated on both edges and is more than 50 mm wide, each edge shall be figured separately.

(2) *Blade and stock of the same thickness.* The zero shall be the heel of the square. The outside edge of both stock and blade shall be graduated and figured for vertical reading similar to Type C, Fig. 2.

(3) *Glazier's square.* The blade of glazier's squares shall be 1; 1·5 or 2 metres long × 50 mm wide × 6 mm thick. The blade only shall be graduated on both edges of both sides, the zero being the face of the metal tip at the blade end. Figuring shall be read vertically from blade tip to stock.

(4) *Other types of graduation.* Other types of graduation for squares and T squares will be deemed to comply provided that all other requirements in the standard are satisfied.

[4] BS 4011, 'Recommendations for the co-ordination of dimensions in building. Basic sizes for building components and assemblies'.

3. PLASTICS COATED LINEN AND GLASS FIBRE TAPES

3.1. Tapes of plastics coated woven linen, plastics coated 'metallic' linen and p.v.c. coated glass fibre shall be available in a single width of 15 mm and in lengths of 10 metres, 15 metres, 20 metres, 25 metres and 30 metres.

Tapes which are 50 metres long shall also be available but shall be made only of glass fibre.

The outer end of the tape shall be fitted with a metal hook ring, and the zero, or point of beginning of measurement, shall be the outside of the ring.

When specially ordered, the tape shall be left blank for a length of not more than 100 mm between the outside of the ring and the point of beginning of measurement.

Tapes shall be graduated on one edge of one side, normally the top edge and illustrated in Fig. 4, Types A and B, but tapes graduated on the bottom edge may be made available on request.

The inherent inaccuracy of tapes in use shall be emphasised by the boldness of presentation. Graduation lines shall be 4 and 8 mm long by 0·8 mm thick to be legible at a distance of 2·3 metres.

Metallic linen and glass fibre tapes may be divided to 5 mm intervals and figured as illustrated in Fig. 4, Type A, or divided to 10 mm intervals and figured as Type B. Increasing the size of figuring from 5 mm to 9 mm will increase the reading distance from 1·7 metres to 3·2 metres but will lose the advantages of continuous numbering.

Plastics coated linen tapes shall be graduated and figured as shown in Fig. 4, Type B.

Tapes shall be white with black lines and figures but digits indicating whole metres may be printed in red.

Durability of the graduation and figuring shall meet the requirements of Part 2 of this standard.

No material shall be used in the construction of the case and winding mechanism which is liable to corrode and cause discolouration of the tape.

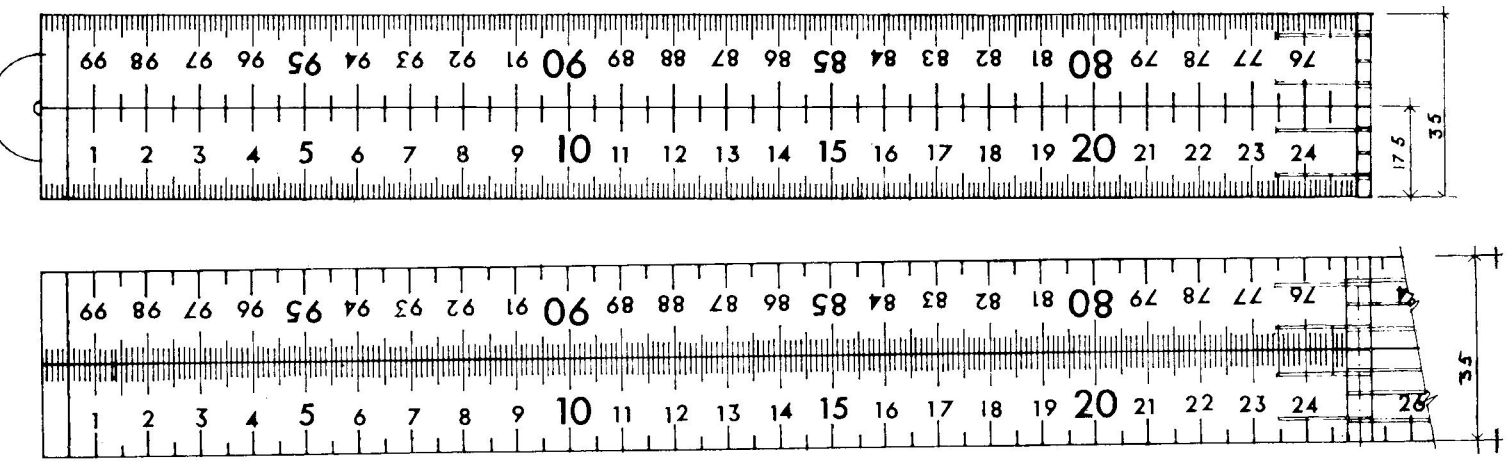
The mouth of the case shall be fitted with non-ferrous metal or nylon rollers to reduce friction and wear on the tape.

4. LEVELLING STAVES

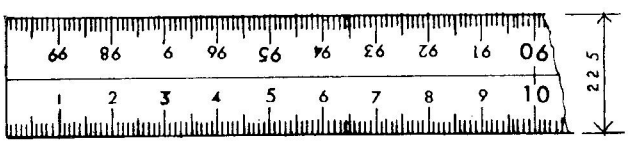
4.1.1. *Size of staff.* Staves shall be available in lengths of 2 metres, 3 metres, 4 metres and 5 metres, but telescopic staves shall not exceed 4 metres.

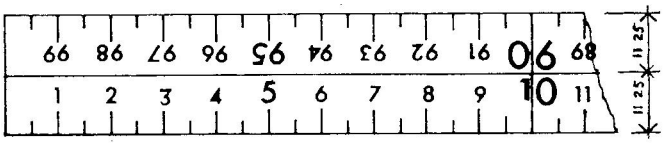
The width of face will be determined by the material and form of construction

FIG 1. Typical markings: operative's boxwood rule (1 m or 0,6 m)



top, Type 'A': two edge marking; above, Type 'A'; below, Type 'B': monotonic increasing graduation lines; bottom, Type 'C': single edge marking





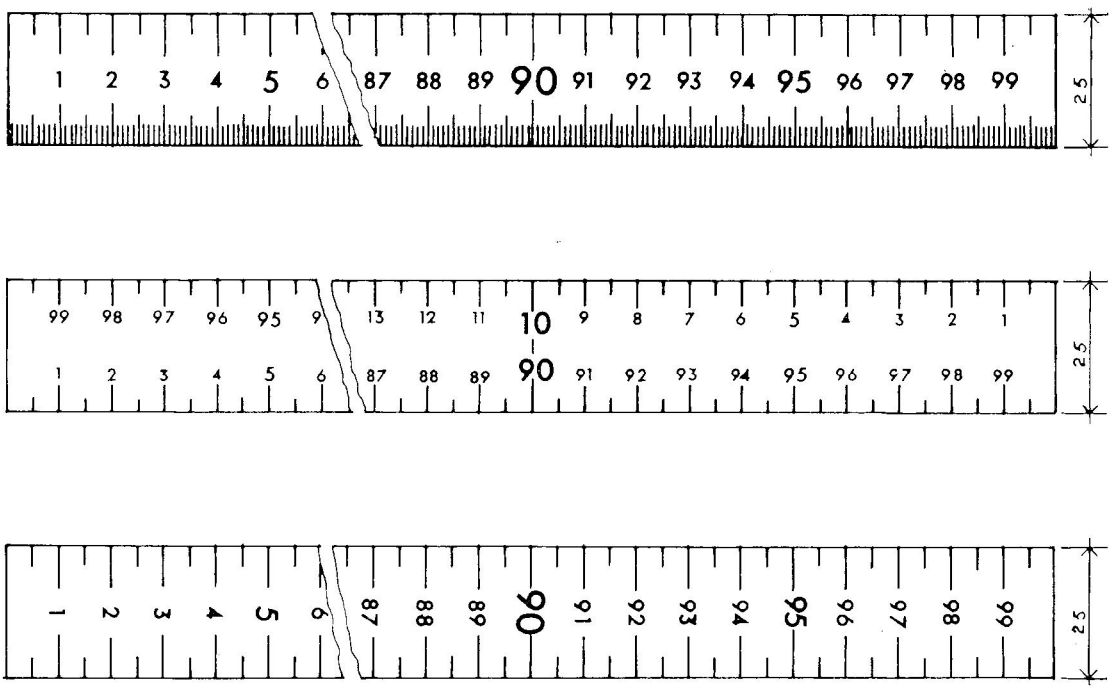


Fig. 2 Typical markings: one metre laths. Top, Type 'A'; middle, Type 'B' counter reading; bottom, Type 'C' vertical reading

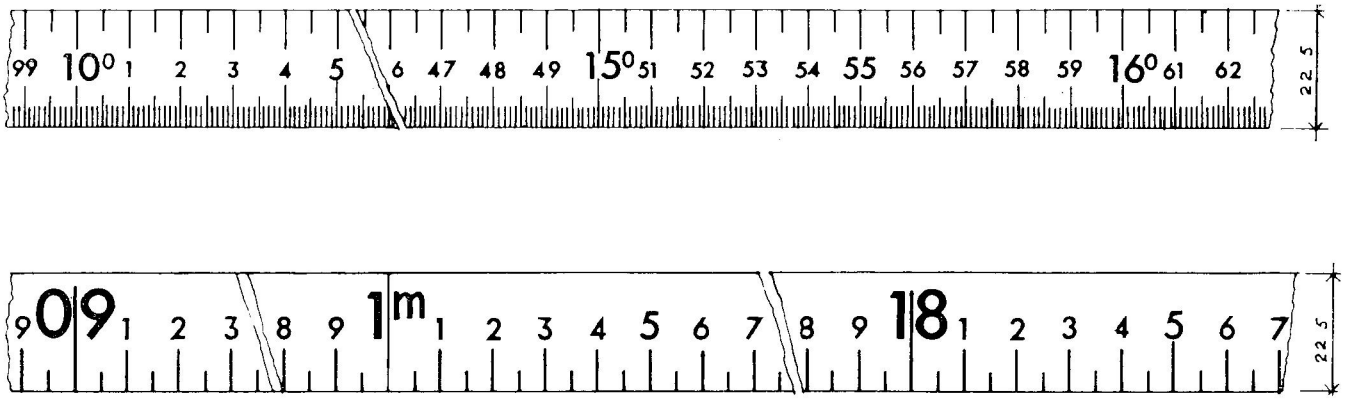


Fig. 3. Typical markings: multifold laths, Top, Type 'A,' two edge marking; bottom, Type 'B' single edge marking

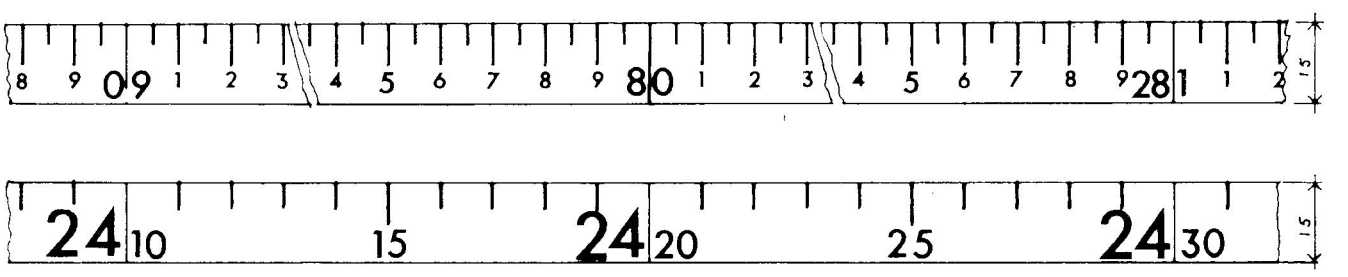


Fig. 4. Typical markings: tapes. Top, Type 'A' glassfibre and metallic linen and bottom Type 'B' non metallic linen

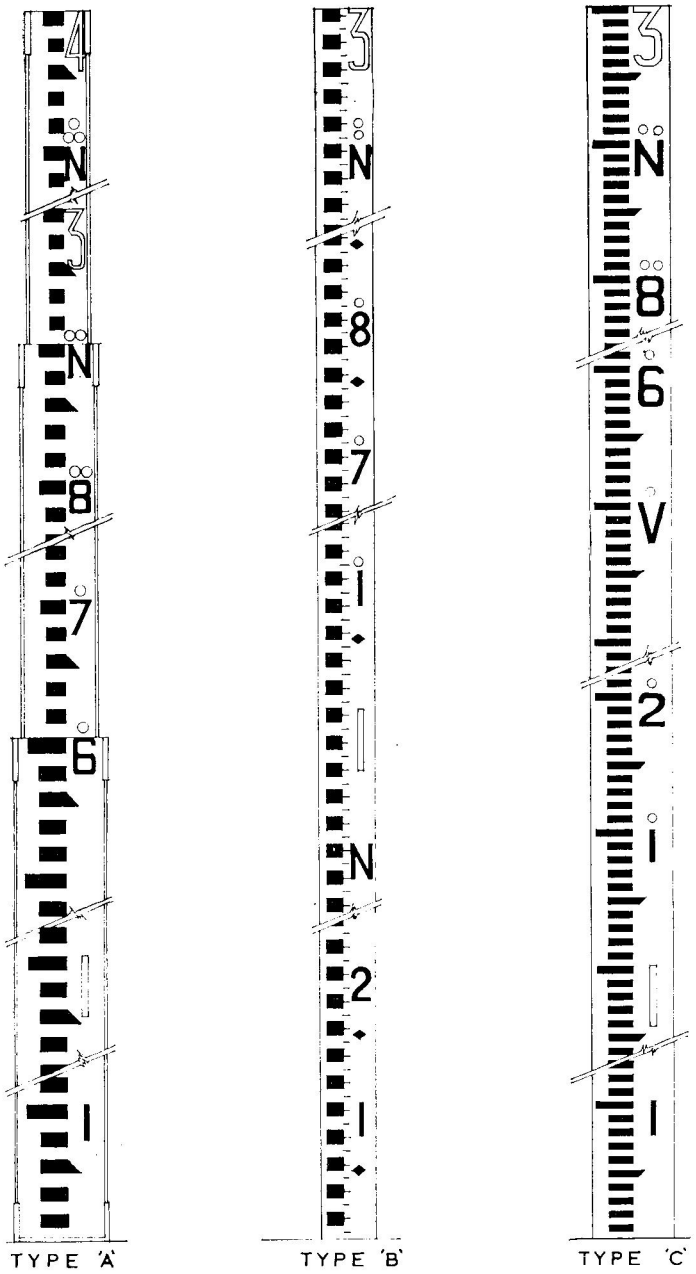


Fig. 5 Typical markings: levelling staves

of the staff. The typical markings illustrated at Fig. 5 relate to staves that are more than 40 mm wide, but a staff of any width shall be deemed to comply provided that it complies in other respects.

4.1.2. *Division.* Staves shall be divided in metres, 1/10 metres and 1/100 of a metre. To facilitate interpolation it may be divided into 1/200 of a metre. Every alternative 1/100 shall be filled in to form the scale marks (Types A and B) or every alternate 1/200 in the case of Type C.

The 1/10 metre marks shall be identified by it being coincident with the top of the numerals and/or extending its length away from the numeral.

Intermediate marks shall extend in a chisel point in the direction of the numerals or denoted by a diamond shaped mark 12 mm long by 10 mm wide.

With telescopic staves the width of face reduces in each section of the staff but the minimum length shall be 12 mm.

4.1.3. *Figuring.* Metres shall be denoted by a numeral coloured red, 45 mm long, the top of the digit being coincident with the metre position. To ensure instantaneous metre reading each 1/10 metre numeral has one or more red dots over.

The 1/10 metre numerals shall be 25 mm high and coloured black. Each metre shall be numbered 1 to 9 except that in the 'Sopwith' tradition the figure 9 is always replaced by the letter N.

To ensure adequate space for numerals the scale marks shall start on the centre line of the staff face.

Type A marking shall be used when accuracy of 2 mm by interpolation is acceptable. The fine line on Type B gives an interval of 5mm giving accuracy by interpolation but is not sufficiently defined for long readings.

Type C gives clear definition of the 5 mm interval and is more suitable than Type B for longer readings.

All the typical markings shall be available as inverted reading.

5. LAND CHAINS

5.1. Land chains shall consist of straight links connected with three oval rings of hardened, tempered and black enamelled steel wire. The length of each link shall be 200 mm and chains shall be available in lengths of 20 metres, 25 metres, 30 metres and 50 metres.

The length will include a brass swivel handle at each end and the zero, or point of beginning of measuremen shall be the outside of the handle. Markings shall be provided by tallies at each metre, with 5 metre tallies larger and 10 metre tallies numbered each side. See Fig. 6.

NOTE: This figure is reproduced to a reduced scale in this draft. It will be full size in the published standard.

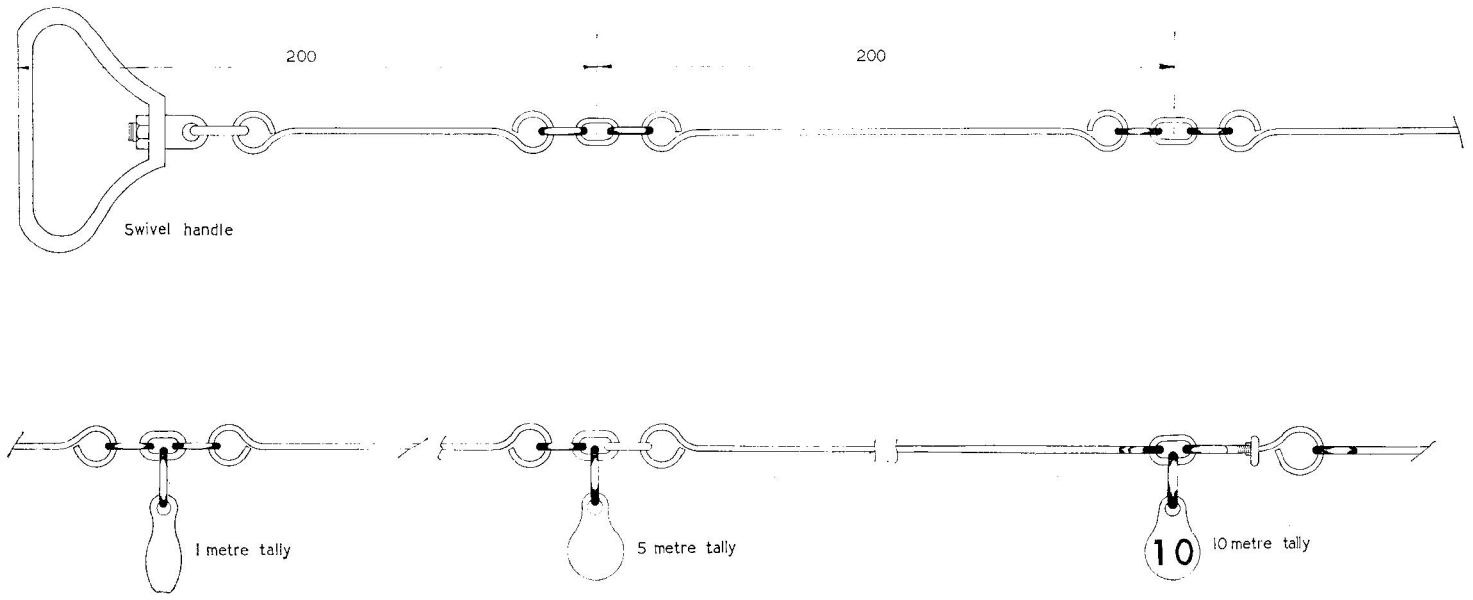
6. RANGING POLES

6.1. Ranging poles shall be 2 metres, 2·5 metres and 3 metres long, painted in 500 or 200 mm divisions alternatively red and white.

In order to reduce the time taken to prepare standards, it is now the practice in appropriate cases where a draft is available (prepared by an authoritative organisation or by BSI staff in consultation with experts) for its circulation to industry for comment to take place *before* consideration by the Technical Committee. This draft British Standard is being circulated in accordance with this procedure. It will be submitted, with the comments resulting from circulation, for consideration and approval by the Committee on which the organisations listed on page 119 are represented.

It would be appreciated if any views on this document were submitted before Friday, 23 February 1968, to BSI.

Fig. 6 Land chain 20:25:30:50 metres



LETTERS

A Logical Approach

Sir,—As one of those individuals who spend their lives attempting to explain the complexities of construction technology to students, I would appeal for a more logical approach to metrication than is evident now.

Correctly approached, metrication will be a tremendous aid to teaching and to the whole construction industry, but some of the suggestions being made would make a nightmare of our task.

I should like to draw your attention to the following points.

Decimal marker and grouping of figures in threes. PD6031 recommends the comma, and follows BS 1957 regarding separation of groups of three figures by a space. The recommendation is unanswerable—we go metric to follow Europe, and Europe uses, mainly, the comma—so why argue? BSI is itself an offender in this respect.

Units of linear measure. PD6031 recommends the metre and millimetre only. Arguments arise that the metre only should be used—or the millimetre only. Try expressing the height of a column in millimetres, or the thickness of steel sheet in metres, obviously both units must be used as appropriate.

BSI have produced documents in decimetres, and other bodies quote decimetres and centimetres—neither of which are recommended.

Units of area and volume, etc. PD6031—m^2, mm^2, m^3, mm^3. These are valid for description and specification use, but where areas and geometrical properties of sections are frequently used in calculation, such as structural work, there will be occasions where millimetres will result in cumbrous figures. In special applications like this, it is evident that the practical unit would be the cm, but this would only be used in the calculations—not in drawings or text.

Consider 21 x 13 x 142 UB, expressing properties in millimetres: area = 26 960 mm^2; Ixx = 1 416 820 000 mm^4; Zxx = 5 199 000 mm^3. In centimetres: 269,6 cm^2; 141 682 cm^4; 5 199 cm^3.

Description of units. The illustrations in PD6031 show millimetre dimensions on drawings by a simple number, to nearest whole millimetre, and no unit description. The metre is shown by a simple number, *with a decimal marker,* and no unit description.

Thus, 200 means 200 mm or 0,2 m,
0,2 means 200 mm or 0,2 m
and 1,23 means 1 230 mm or 1,23 m

The habit of inserting a unit description on drawings—ft, in, yd, m, mm,—can be dispensed with altogether. A note would be necessary on drawings during the changeover period, to emphasise that all dimensions were metric.

It seems sensible to me to apply this system in written matter as well as drawings. The result will be a simplification of drawings, printed material, and particularly field-notes for surveys.

In levelling, all readings will be in metres and decimals, with none of the present confusion between observed levels in foot-decimals and site markings in foot-inches.

As regards quantities, C. H. Stevens ('BMN,' 24 Nov. 1967) would describe his sprocket as

50 x 100 x 1 020 sprocket,

or

50 x 100 x 1,02 sprocket,
(suitable for drawings)

or

0,05 x 0,1 x 1,02 sprocket
(suitable for computer
or calculations).

For area and volume, the correct expressions in SI are m^2, m^3, but there are no valid objections to the use of sq. m, cu. m, and similar in typed bills of quantities, etc., as a special application. Expressions such as '6 m. sq.,' would not be suitable, due to possible confusion and being read as '6 metres squared = 6^2 m, or 6^2 m^2,' instead of '6 square metres = 6 m^2.'

The idea of any new marker, such as the 'M' suggested, must be resisted. This could lead to confusion with the 'M' used in PD6031 representing 'Module' of 100 mm.

Brick dimensions. These are a subject of controversy, most suggestions leading to trouble. Consider the present brick size, and that proposed by the brick manufacturers—neither gives simplicity in design or in construction.

Present size

Net, 220 x 105 x 67 (to nearest mm)
Unit lengths of wall, 10 mm joint.
230 345 460 690
no rational relationship.
1B 1½B 2B 3B
Unit heights, 10 mm joint.
77 154 231
1 2 3 courses.
8 (!) joint
75 150 225, four courses to 300 mm
Wall thicknesses,
105 220 335 450
no rational relationship.
½B 1B 1½B 2B

Brick manufacturer's size

Net, 215 x 102,5 mm x 65
Unit lengths of wall, 10 mm joint
225 337,5 mm 450 675
irrational.
1B 1½B 2B 3B
Unit heights, 10 mm joint
75 150 225 300 acceptable.
Wall thicknesses, 10 mm joint
102,5 mm 215 327,5 mm 440
irrational.
½B 1B 1½B 2B

Neither of these arrangements is practical—imagine the nightmare of setting-out bonds, or calculating wall dimensions using them!

Practical dimensions

The only easy system, with units similar to our present units, would be the nominal 200 x 100 brick, conforming with the Modular Society's 2 decimetre x 1 decimetre brick.

Net, 190 x 90 x 65
Unit lengths of wall, 10 mm joint
200 300 400 600
1B 1½B 2B 3B
Unit heights, 10 mm joint
75 150 225 300
Wall thicknesses, 10 mm joint
90 190 290 390 490 590
½B 1B 1½B 2B 2½B 3B
To obtain wall thickness, ½B gives 90 mm, every ½B after the first adds 100 mm.

The advantages of these dimensions, in use, must be self-evident. The use of 90 mm ht., 100 mm per course, would be better still, but could be aimed at for the future.

I understand that some manufacturers are producing 12 in. bricks now, and if these converted to a nominal 300 x 100, they could be used with the planning grids based on the 300 mm spacing suggested by the draft standard on dimensional co-ordination.

No doubt brick manufacturers have problems in tackling new sizes — but these should be aimed at making our problems simpler, not more difficult. The present sizes are better than the ones suggested by the manufacturers.

W. S. WHYTE [ARICS],
66 Hidcote-road,
Oadby, Leicester.

Three Issues

Sir,—In the many contributions on metrication in the last three months, there have been three interesting sub-issues: 1) Scales conversion; 2) brick sizes; 3) the decimal point.

1) As one who has never hesitated to expose his ignorance (one learns that way) I must confess that the article on 'The Change to Metric' by W. J. Pinfold of the BRS ('Building,' 1 September) was almost completely unintelligible to me.

Would it be possible for the writer to re-cast this article in language understandable by building technicians on site and in the office, who in general have no knowledge of ergonomic theory and only a glimmer of what the word means?

Personally, I should have thought the obvious approach to the change of scales and rules for metrication would be to ascertain what scales are in common use on the continent. Surely, the practices resulting from nearly two centuries of experience should be suitable for us too. What are the scales used? They must be fewer than we have, which (not counting those used on site plans, such as 1/500) total 10: from 1/16 in. to 6 in. to the foot. There must be some common metric scales

which approximate in size reduction to enough of these to ensure that drawings would not be all that different from ours at present.

2) On reading of the brick co-ordination squabble, it seems to me that the brickmakers have lost the battle from the date that metrication was decided upon. If they plump for a disguised 9 in. x 3 in. x 4½ in. brick, they will be odd-man-out among building material suppliers. But are they as important to the ultimate decision as the architect and bricklayer in the first instance? The new brick size should have aesthetically pleasing proportions, if possible, and be of such weight and/or design that the brickie can handle them no less efficiently than existing bricks (more, we hope) and the brickmaker then makes bricks to suit, whatever it costs. This approach has relevance to the four alternative metric sizes tentatively proposed by the Modular Society ('BMN,' 24 November) in determining which of them is best.

To take the third option first, the 2 x 1 x 0.75 decimetre size will be needed for an indefinite period for matching existing work, as pointed out, and can, therefore, be accepted and ruled out of the argument. Being available, it can have the test of experience, and this is the best test of suitability.

The 2 x 1 x 1 decimetre size is a proportion that has nothing in its favour that the two remaining sizes (3 x 1 x 1 and 2 x 2 x 1) don't also have between them. As it is obviously less economic of labour and mortar than either the 3 x 1 x 1 or the 2 x 2 x 1 sizes, and doesn't maintain the proportion of the existing brick size to which the eye is accustomed and which would, therefore, be acceptable presumably, if approximated by a metric brick such as the 3 x 1 x 1 (in stretcher bond only, of course), why not forget this option? We could then also forget the problem whether a cavity wall should be 10 in. with a 2 in. cavity (pardon the duodecimal thinking) or 11 in. with a 3 in. cavity.

Considering the 3 x 1 x 1 size, 12 in. x 4 in. x 4 in., this lends itself to stretcher bond, but would be practically the same as a brick-and-a-half wall 12 in. thicker in any other bond. This might have its advantages. However, I like the 2 x 2 x 1 (8 in. x 8 in. x 4 in.), the 'Calculon' (never heard of it before!) provided the brickie can handle it. Reason: I don't like cavity walls because of the difficulty of mortar droppings and bridging, etc. Why not select for the metric brick one which is *not* suitable for cavity walls, which were a good thing in their day, but due for re-consideration for the coming era?

Let's hear from the architects, the aesthetics experts, how they would relate metric brick proportions to brickwork elevations.

3) The decimal comma question is, I think, a test of the whole metrication operation, for on analysis it leads to re-thinking our basic assumption that we ought to go metric because Europe is metric. Nothing of the kind—we ought to go metric because we have five fingers on each hand and not six, which is a pity from the standpoint of the superior usefulness of duodecimals. (How six fingers would function 'ergonomically' is another matter.) But having ten digits at the ends of our upper limbs, and universally ten numerical symbols to represent the system of counting based on them by our ancestors, it follows that unless by international agreement we invent two more symbols to make duodecimals viable, we ought to calculate decimally as well as count. That is the case for the metric system in a nutshell. But the comma has nothing to do with this, and Europe is not necessarily correct in using the comma as we use a decimal point. How, in fact, would they express 10, 765, 432.89 kilometres?

I hope, that along with the various interests mentioned ('BMN,' 22 September) to be consulted on this decimal point, will be included a few representatives of the educational world, particularly a mathematician or two and a grammarian, to assist with the philosophical and punctuation aspects of numbers having decimals.

Certainly, it would be stupid to abandon our decimal point without international agreement on the logic of the decision. Common Market or no, Britain will continue to trade with the United States.

N. BROWN [MSAAT],
46 South Hill Park,
London, NW3.

Pricing Metric Bills

Sir,—The greatest difficulty which metrication and currency decimalisation will bring to all concerned with estimating and tendering is temporary unfamiliarity with the new price units. This difficulty will be unnecessarily aggravated if we find ourselves having to deal with all four of the combinations which could arise as a result of the currency change occurring in the middle of the three-year metrication period. These can be illustrated as follows:

Before February 1971		After February 1971	
Foot-inch	Metric	Metric	Foot-inch
10s/L.Y.	11s/m	£0,55/m	£0,50/L.Y.
10s/S.Y.	12s/m²	£0,60/m²	£0,50/S.Y.
10s/C.Y.	13s/m³	£0,65/m³	£0,50/C.Y.

The change from the first to the third column is inevitable. The fourth column will occur with 'late' foot-inch contracts but I hope there will be few of these. The second column will occur with all 'early' metric contracts unless we eliminate it entirely by pricing and extending these in £'s and decimals thereof. This is quite practicable (since the decimal currency unit is to be based on the £) and would halve our conversion problems.

May I make a strong plea, therefore, for all to 'go decimal as soon as you go metric'?

K. H. JONES [ARICS],
Chartered Quantity Surveyor,
Westering, Gig-lane,
Carnon Downs, Truro, Cornwall.

METRIC INSTRUMENTS

As metric items for the drawing office become available we are publishing details in 'BMN.' For the provision of this information we are indebted to DOMMDA, 157 Victoria-street, London, SW1.

Film

Drafting film, .002 in. double matt and .003 in. single or double matt in A0-A4 sheets; polyester film in A0-A4 sheets and in continuous section.

Supplied by Hall Harding Ltd.

Silver sensitised materials in A0-A5 sizes; 'Verifax' materials in A3, A4 and A5 sizes.

Supplied by Kodak Ltd.

Microfilm-making, duplicating and printing-out equipment. Print-outs from A1-A4 provided.

Supplied by Caps Equipment Ltd.

METRIC PRODUCTS

Paving System

A new paving system called Pentahex is based on metric measurements. It has a pattern built up from a single pentagonal unit. Four of these identical slabs, grouped together, form a large elongated hexagon. An entire paved area built of these units produces the overall effect of large hexagons interlaced and running in two directions at right angles.

The system has a minimal number of components, only whole slabs and handed half slabs being required. The basic grid is 1.5 metres and individual slabs have the nominal dimensions 750 mm x 500 mm x 50 mm. The build-up of the grid is simple, and Mono Concrete Ltd. issues lay-out charts to assist architects and designers.

Drafting Paper

Drafting paper produced by Recorder Charts Ltd. (P.O. Box 774, Clyde Vale, London, SE23) includes grids mm x 5 mm x cm; 2 mm x cm x 2 cm; 2 mm x 6 mm; and 2 mm x cm x 3 cm. The first of these was omitted from our Metrication Instruments list in the 22 December issue. The last two are modular, specially designed for dimensional co-ordination.

Information Sheets

As the changeover to metric progresses we shall be including, within this section, details of metric products, and manufacturers will be invited to support these with information sheets. Manufacturers wishing further information on this service are invited to contact the Advertisement Director of 'Building.'

The Metric Change

5. THE STEEL INDUSTRY

For this article in our series on preparations being made for the metric change we switch from Government bodies to industry. The implications and problems of the change for the steel industry are described.

In common with other industries, the steel industry has been examining both internally and in consultation with the BSI, the implications and problems it will meet when the metric system is adopted. In an industry which provides such a wide variety of products, the effects are obviously going to be varied. The main concern, however, will be to respond as efficiently and economically as possible to the changing demands of customers, while at the same time encouraging the maximum degree of rationalisation.

At this time, the general position is that demand for metric sizes in most flat products would normally be met by producers in accordance with usual commercial practice, taking into account quantities required, as there are no intrinsic technical problems involved in adjusting the plant to produce metric sizes.

For bars, the position is rather more complicated, but, according to quantity and the particular sizes required, the present limited demand is being met. As the move to the metric system progresses, however, standard ranges of metric sizes will be necessary to meet the increasing demand. The BSI, in consultation with the steel industry, is therefore preparing a list of preferred sizes covering round, square, and hexagonal bars related to various steel types and end usage.

International Considerations

In the case of sections (included in item 7 of PD. 6030), such as the BS4 range, there are two special problems. Firstly, the adoption of a new range of sections involves large capital expenditure. Secondly, there is the importance of adopting a metric range aligned with European practice which will, in turn, be influenced by the work at present taking place under ISO auspices. Thus, a change cannot be justified before the choice of sections can be clearly identified as both meeting the technical requirements of customers and matching, as far as possible, European practice.

It will be seen, therefore, that an essential prerequisite of a change to metric sections is the outcome of the discussions now taking place in the ISO. In this connection, considerable progress is now being made, the latest meeting of the relevant Working Group having taken place in Moscow in June of last year, at the same time as the ISO General Assembly.

Nevertheless, it is likely to be some years before a full range of co-ordinated metric sizes based on a revision of BS4 will be in production. In the meantime, metric equivalent sizes and properties are, of course, already incorporated in the Standard as published and can be employed by building designers to preserve uniform terminology when the metric change-over commences in 1969.

Consideration is being given to the revision of the Safe Load Tables produced by the BCSA in co-operation with the steel makers. A revision may initially be based on the metric equivalents in BS4 and will take account of changes in BS 449 which will be necessary to allow for metrication, including the use of SI stress units. There will also be changes in permissible stresses arising from the new comprehensive British Standard for Weldable Structural Steels now in an advanced stage of preparation by the BSI. The supply of material to metric lengths will, of course, generally present no problem.

Regarding rationalisation, the steel industry naturally welcomes any moves in this direction which will result in a reduction in the range of sizes needed. Such rationalisation is bound to reduce costs, if only initially to offset the inherent expense of a change-over. Moreover, the necessity of having to produce both metric and inch sizes for a period, until the change-over is complete, has to be borne in mind. A further potential problem is that some customers, after the change-over, may wish to maintain the physical size of their material as nearly as possible to the present size and will, therefore, tend to order the metric size nearest to the equivalent inch size, rather than from a metric preferred range. It is, therefore, of the first importance that steel users themselves should co-operate fully with the BSI in efforts to maximise the advantages to be gained from the unique opportunity for rationalisation. At the same time, both the steel industry and users in the construction industry and elsewhere will necessarily have to work to detailed plans for the change-over, in a similar manner to the consultations which took place during the preparation of the general programme for the change to the metric system in the construction industry. This will be facilitated by the work of the panels dealing with dimensional co-ordination operating under the auspices of BSI committee B/94/4.

NEWS FROM BSI

Warning on Metric Designs

A warning against 'jumping the gun' on metric project designs and building contracts is delivered in the second progress report on the change to the metric system in the construction industry published last month by the British Standards Institution. The starting date for metric designs is 1 January 1969; 'only in the most exceptional circumstances should metric schemes be prepared in advance of this date' says the report.

Relaxation of this requirement may be supported in cases where designs are being prepared now for long term projects not to be built until well into the period for change, and in such instances advice should be sought from Government Departments so that resulting confusion might be reduced to a minimum.

In a very few cases, the report goes on, special metric projects are being prepared in advance of the dates to obtain research data. These cases are being organised by Government Departments or with their full approval.

'Not even the most closed of closed systems of building are capable of operating entirely alone—that is to say without affecting others in the industry. There are always specialists and subcontractors to be considered. There are the approvals authorities and their staffs, consultants and the clients themselves, all who will be making their changeover in accordance with PD6030.

'Precipitate action on the part of any sector of the industry can only serve to throw the rest of the industry into confusion' the report stresses. 'There is very little chance at all of firms or companies and offices or authorities making commercial capital or gaining individual prestige out of precipitate action in this respect.' Not only would they confuse others, but they were likely to run into serious difficulties themselves.

There is a warning too for manufacturers against deciding future sizes too quickly.

'It is recognised that at each stage of the dimensional co-ordination process, the resulting BSI publications will serve as indications and guidances to product and component manufacturers as they consider what metric sizes to make in the future,' says the report. Few manufacturers would be so unwise as to decide those future sizes before the present stage, that of controlling dimensions, is complete. Many will require to await the publication of the dimensional recommendations of the functional group panels, and for those who require still further assurance, the final stage—that of the individual BS's for products—should set the seal on the work of B/94/4 and its panels.

NEWS FROM THE INDUSTRY

Standard Method of Measurement

Proposals for rewriting the 5th edition of the Standard Method of Measurement in metric terms have resulted from a study of the metric change by a sub-committee appointed by the Standing Joint Committee for the SMM. It is emphasised that this is a conversion and not a revision since the contents will be the same but expressed in metric. Proposals have been circulated to SMM constituent bodies for comment, most of which are expected in fairly soon. The target date for the publication of the 5th (Metric) edition and the 2nd (Metric) edition of the Code for the Measurement of Minor Works in Small Buildings is June 1968. This will enable Bills of Quantity to be prepared in metric in 1969 in accordance with the programme of BSI.

BRS Goes Metric

To encourage others to keep pace with the BSI programme, the Building Research Station has decided, for its part, to make the changeover to metric immediately and from 1 November all BRS publications will give SI metric equivalents. Since experience suggests that prolonged use of both sets of units has little advantage—from 1 November, 1968, metric units alone will be used.

Cost of Change

Additional building costs which will emerge from the change to metric are outlined in a memorandum issued by the NFBTE. Some, such as the training of staff and the purchase of new equipment are, the Federation feels, calculable; others such as the making good of errors and loss of production due to unfamiliarity with metric units are difficult to assess.

These immediate costs, whatever their origin, will have to be met or offset against probable future gains (when metric dimensionally co-ordinated components become available).

How will manufacturers, clients and builders be affected? asks the Federation. Manufacturers of components will have to decide whether the benefits, expected from the rationalisation of component sizes which will permit longer production runs, will be sufficient to cover all their short-term costs. Should they decide on higher charges, these will be passed on to the industry's clients.

Clients for new works fall into two categories: those who require a single building, such as an office or factory, and those with long-term construction programmes spread over many years, such as local housing authorities. The first category are obviously only concerned with the cost at the time of purchase. Those in the second category are, however, in the position where the off-setting of short-term costs against long-term gains from cheaper building must be faced.

The building contractor is in an intermediary position. He can only participate in long-term gains if his assembly work is made simpler and less costly. The question must thus be asked how real is this benefit to be and when is it likely to be realised? Unfortunately, the Federation says, it is difficult to provide an answer with any degree of certainty. Although the BSI and government departments are already very much involved in work on dimensional co-ordination, the vitally important work on jointing techniques and tolerances in construction is only just starting. The contractor cannot be expected to take such factors into account until he is more sure of their substance. It seems likely, therefore, that the contractor will inevitably have to pass at least some and probably most of his short-term costs on to the client.

The Federation suggests that government departments, during the critical years of 1970, should make special allowances for these costs, for example, in housing this could be done by adding a percentage to the cost yardsticks until the full economics of the change are known.

CBI Proposes Metric Board

The Confederation of British Industry has proposed to the Government the setting up of a Metrication Board to co-ordinate research and planning for the change to metric in all Government Departments and economic sectors. The CBI also believes that there should be a clearly laid down timetable for teaching metric units in schools, and that the change in industry should be phased with a parallel change in the retail trades.

Registered Builders' Handbook

The Standards sub-committee of the National House-Builders' Registration Council is to consider what effect the change to metric will have on the registered builder's handbook. It is thought that, as a first step the equivalent metric measurements might be bracketed after existing measurements, the amendment sheets to be ready for insertion into the handbook by the beginning of 1969.

The timing of further changes will depend upon the speed with which metric is adopted by manufacturers.

Surveying Discussion

A meeting to discuss the problems arising from the metric change was held at the RICS on 12 December, when representatives of leading professional societies spoke on their activities in the field to date. The organisations represented were: Chartered Auctioneers and Estate Agents' Institute, Chartered Land Agents' Society, Faculty of Architects and Surveyors, Incorporated Society of Auctioneers and Landed Property Agents, Institute of Building, Institute of Quantity Surveyors, Institution of Municipal Engineers, Institution of Structural Engineers, Royal Institute of British Architects and the Royal Institution of Chartered Surveyors. M. D. Clarke of the BSI was also present as an observer. The discussion was concluded with an agreement that further meetings would be held in May 1968 and at quarterly intervals thereafter.

Common Grammar for Metrication

A report published recently by the MHLG and the Welsh Office provides grammar for metrication in the field of water, sewage and related subjects. The units listed are those which occur most frequently but the list is not intended to be exhaustive. 'Metric Units with reference to Water, Sewage and Related Subjects' is available from HMSO, price 1s. 6d.

In an additional circular (2/68 HMSO, price 6d.), authorities are asked to continue using the present system of weights and measures during 1968 for all schemes of water supply, sewerage and sewerage disposal submitted for their consent. Thereafter, until end-December 1971, schemes submitted may use either imperial or metric. After this date all schemes should be in metric units.

COMING MEETINGS

MONDAY, 19 FEBRUARY

An evening seminar at the Glasgow College of Building, 60 North Hanover-street, Glasgow, C1, aimed primarily at employers, directors and executives. Six speakers, including Michael Clarke of BSI and Miss U. R. Part, training adviser (Research Group) of the CITB. Fee is £1. Application forms obtainable from the Registrar of the college.

THURSDAY, 7 MARCH

Royal Society of Health (Building and Estates Group).—'Metrication of the building and allied industries' by P. Martin, P. Benton and D. W. Wiseman. RSH, 90 Buckingham Palace-rd., London SW1. 6.30 p.m.

METRICATION INDEX

Initially the change to metric would involve every builder in higher costs. There were difficulties, however, in quoting a meaningful figure of what they would be, said W. Kirby Laing, the NFBTE president at Cambridge. **(12 Jan., p 66).**

Effect on local authority housing schemes of metric change is discussed in a circular issued jointly by the MHLG and the Welsh Office. **(12 Jan., p 101).**