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 of the change to metric can be freely discussed. It is published in association with the Modular Society.

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METRIC MONTH

Control and Dimensions

The new British Standard on controlling dimensions* is not quite 'the most important it (the BSI) has ever published for the construction industry' that it is claimed to be in the BSI's enthusiastic Press release. But it is a particularly important standard and one which provides a vital link between the theory of dimensional co-ordination and the immediate objective which is the rationalisation and standardisation of component sizes. BS 4330 is in fact a means to an end and not an end in itself. It is a tool to be used in selecting sizes for standardisation, an aid to variety reduction. It is also an aid to designers who will be using the resulting dimensionally co-ordinated components. But it is not intended to be, nor should it be allowed to become, a straitjacket imposed on design. Once the sizes of components have been agreed and the components themselves are in production it should be up to the designer to use them in the best manner to satisfy his clients and the economics of building.

There are now four British Standards for dimensional co-ordination which every office should not only possess but also digest and put into practise. The head standard, BS 4011, which reflects the agreement of all sectors, recommends basic sizes for building components and assemblies, and their order of preference. It is on this standard that BS 4330 is based. The second and in fact earlier standard is BS 2900 Part 1 in which terms used in modular co-ordination are defined. (The terms modular co-ordination and dimensional co-ordination are in effect being used synonymously at present.) This is at present being revised and a draft for comment is published in this issue of Building Metrication News.

The third standard is BS 3626, Tolerances and fits for building, which is also currently being revised. This is the important standard that describes how to determine the work sizes, which allow for manufacturing tolerances, assembly tolerances and jointing.

The new British Standard, like so much current work on dimensional co-ordination, is derived from studies of and recommendations for user needs undertaken and co-ordinated by government departments. Many of the recommendations were contained in DCs 4, 5, 6 and 7. Without this tremendous contribution it is difficult to see how progress could be made at BSI. But nevertheless it is recognised by the government departments that their interests do not cover all building types and that they cannot seek comment on their work from all sectors of industry. This is a task which BSI is constituted to undertake. In considering comments from different sectors of industry, which was aided by the publication of a draft for comment in BMN, the material in the original DC documents has been considerably modified.

It is the stated policy of at least one ministry, and we hope in fact of all ministries, that their work will now be based on the BS. Indeed, Gordon Wigglesworth, speaking at the Press conference held by BSI, made it quite clear that BS 4330 is now the accepted working tool of the MPBW. His was a welcome statement, which at least one member of the Press asked to be repeated in order to ensure that he had heard correctly.

But the publication of BS 4330 shows up once again the concern that many people have that adoption of British Standards should become mandatory. The objectives of government and industry are similar, the rationalisation and standardisation of components sizes. But people are concerned that Ministers will pre-judge the contents of British Standards and jump the gun. The classic example of this is the adoption of a floor to floor height of 2600mm. as a mandatory requirement for local authority housing. Apart from the fact that this size is not one of the first preferences of BS 4011, it shows up clearly in the new standard that the committees responsible were hindered in their work due to the imposition of this one size. It is unlikely that anyone would object to the inclusion of 2600mm. in the range of sizes to be recommended, but to make it mandatory can only lead to the uneconomic use of many components of which the most obvious is probably plasterboard.

Now that the standard on Controlling Dimensions has been published it would be timely and desirable for the Minister to consider whether it is any longer necessary to impose this restriction on designers and industry.

*BS 4330: 1968. Recommendations for the co-ordination of dimensions in building; Controlling Dimensions.

Metric Overlord?

Statements made at last week's Press launching of the engineering industry's programme for the metric changeover suggest that we may be a step nearer the establishment of an overlord Metrication Board. Gerry Norman, president of the CBI, said that it was an open secret that the Standing Joint Committee on metrication had included in its report to the Government a recommendation that a Metrication Board should be set up. They would like to see it done by this summer. Anthony Wedgwood Benn, Minister of Technology, was predictably more canny. He could not anticipate the Government's response to the report but a statement would be made soon. If we are to ensure a smooth changeover, it can't be soon enough.

Glossary of Terms

DRAFT BRITISH STANDARD FOR COMMENT

This draft BS is for comment only. Comments, or an indication of general acceptance, should be sent to the Committee Secretary, R. J. Roberts, BSI, 2 Park-street, London, W1, not later than 12 August.

DIMENSIONAL CO-ORDINATION IN BUILDING GLOSSARY OF TERMS (METRIC UNITS)

(Revision of BS 2900:Part 1:1957)*

FOREWORD

The Government statement that the metric system is to effectively replace the imperial measurement system in the United Kingdom provides a unique opportunity for technological advancement and rationalisation in the building industry, through the co-ordination of the dimensions of components and those of the buildings incorporating them. The basis for this work is set out in BS 4011†, and in BS 3626‡ and is supplemented by publication of BS 4330 giving recommendations for controlling dimensions in metric units, for dimensionally co-ordinated buildings.

PD 6030§ and PD 6249‖ contain the programme for the change to metric and the estimate of timing for BSI work on dimensional co-ordination respectively. The complexity and urgency of this task, and the limited time available for completion of the associated work, necessitates the fullest possible clarification of the concept involved, and the terms defining these concepts.

For this reason it has been deemed necessary to revise BS 2900 in the light of developments in dimensional co-ordination work that have occurred in the decade since publication of that glossary.

As in BS 2900, this revised glossary contains terms and definitions arranged in groups to cover the separate aspects of the subject, and an alphabetical index to facilitate reference. The terms are given in bold type as a heading. Where two or more synonymous terms are in use, the preferred term is given first with the alternative(s) beneath. The word 'deprecated' against a term means that it is considered to be misleading, and that its use is to be discouraged. All terms in the Glossary are listed in the index.

FOOTNOTES FOR ABOVE

* BS 2900, 'Modular co-ordination in building', Part 1: 'Glossary'.

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

‡ BS 3626, 'Recommendations for a system of tolerances and fits in building'.

§ PD 6030, 'Programme for the change to the metric system in the construction industry'.

‖ PD 6249, 'Dimensional co-ordination in building. Estimate of timing for BSI work.

Words in italic in definitions below are terms that have been defined elsewhere in this glossary.

101
DIMENSIONAL CO-ORDINATION
The application of a range of related *dimensions* for common use in sizing buildings and the *components* which make up those buildings.

102
MODULAR CO-ORDINATION
Dimensional co-ordination using the *preferred module* and the *international basic module.*

103
REFERENCE SYSTEM
A system of points, lines and planes to which sizes and positions of a *building component* may be related.

104
MODULAR REFERENCE SYSTEM
A *reference system* in which the distance between adjacent parallel planes, or between parallel lines of reference is one international basic module.

105
REFERENCE POINT
A point of a *reference system.*

106
MODULAR POINT
A *reference point* on a *modular reference system.*

107
REFERENCE LINE
A line of a *reference system.*

108
MODULAR LINE
A *reference line* in a *modular reference system.*

109
REFERENCE PLANE
A plane of a *reference system.*

110
MODULAR PLANE
A *reference plane* in a *modular reference system.*

111
BASIC SPACE
A space assigned to receive a *building component,* including allowance for joints, bounded by *reference planes,* the distances between which are *basic sizes.*

112
MODULAR SPACE
A space assigned to receive a *modular building component,* including allowance for joints, bounded by *modular planes.*

113
ZONE
A space between *reference planes* which is provided for a *building component* on set of *building components* which do not necessarily fill the space.

114
MODULAR ZONE
A *modular space* between *reference planes* which is provided for a *building component,* or set of *building components* which do not necessarily fill the space.

115
NEUTRAL ZONE
A space between *reference planes* which is not a *modular space.*

201
REFERENCE GRID
A network of *reference lines* in one plane in a *reference system.*

202
MODULAR GRID
A *reference grid* in which the distance between adjacent parallel lines is one module.

203
INTERNATIONAL BASIC MODULE GRID
A *reference grid* in which the distance between adjacent parallel lines is the *international basic module.*

204
GRID LINE
A line in a *reference grid.*

205
MODULAR GRID LINE
A line in a *modular grid.*

206
GRID PLANE
A plane in a *reference grid.*

207
MODULAR GRID PLANE
A plane in a *modular grid.*

208
PLANNING GRID
A *reference grid* used in the preparation of designs for building.

209
MODULAR PLANNING GRID
A *planning grid* in which the distance between adjacent parallel lines is a *modular size.*

210
STRUCTURAL GRID
A *reference grid* used for locating structure.

211
MODULAR STRUCTURAL GRID
A *structural grid* in which the distance between adjacent parallel lines is a *modular size.*

212
SPACE GRID
A three-dimensional network of *reference lines* in a *reference system.*

213
MODULAR SPACE GRID
A *reference space grid* in a *modular reference system.*

214
INTERNATIONAL BASIC MODULE SPACE GRID
A *reference space grid* in a *modular reference system* in which the distance between adjacent parallel lines is the *international basic module.*

301
(BUILDING) PRODUCT
Material used in building, whether formed or unformed.

302
RAW MATERIAL
Unformed *building product.*

303
(BUILDING) COMPONENT
A *building product* formed as a discrete unit.

304
MODULAR (BUILDING) COMPONENT
A *building component* sized to fit a *modular reference system.*

305
ASSEMBLY
An aggregate of *building components* used together.

306
PROFILE
The outline of boundary face of a *building component.*

307
CO-ORDINATING FACE
That part of a *profile* designed to relate to a *reference system.*

401
DIMENSION
A distance (e.g. between two points, lines or planes).
(NOTE 1. The definition relates to the fundamental conception of a dimension. In its broadest sense it is not limited solely to geometric elements in the design, but may also include, for example, weights or capacities.)
(NOTE 2. In ordinary usage the word 'dimension' is sometimes employed to denote the specified size; this reference is made to the 'dimensioning' of a drawing, when the meaning is to enter upon it the specified values of the dimensions.)

402
MODULAR DIMENSION
A *dimension* between any two lines or planes in the *modular reference* system.

403
CONTROLLING DIMENSION
A *dimension* between key *reference planes* (e.g. floor to floor height, centre to centre of columns).

404
AXIAL DIMENSIONS
Horizontal distance between axes of columns or of structural walls.
(NOTE. Axes do not necessarily coincide with centre lines).

405
CO-ORDINATING DIMENSION
A *dimension* which determines the relative location of two or more *building components* used together.

406
PREFERRED DIMENSION
A *dimension* chosen in advance of others for specific purposes, such as a recommended *basic size* of a *building component* (e.g. a preferred dimension may be selected from basic sizes as specified in BS 4011).

407
LENGTH ●
One of two linear horizontal *dimensions* normally the greater.

408
WIDTH ●
One of two linear horizontal *dimensions,* normally the smaller.

409
BREADTH, DEPTH—DEPRECATED
HEIGHT ●
The vertical *dimension.*
(NOTE. In certain contexts 'thickness' may be used as an alternative.

410
FLOOR TO FLOOR HEIGHT
The *height* between the upper reference floor planes of adjacent *zones.*

411
FLOOR TO CEILING HEIGHT
The *height* between the upper reference floor plane and the lower reference ceiling plane of adjacent *zones*

412
FLOOR TO ROOF HEIGHT
The *height* between the upper reference floor plane and the upper reference roof plane of adjacent zones.

501
SIZE
A quantitative statement, in terms of a defined unit, of the magnitude of particular *dimension.*

502
MODULAR (CO-ORDINATING) SIZE
A *size* that is any multiple of the *preferred module* or of the *international basic module.*

503
SPECIAL CO-ORDINATING SIZE
A *size* specified for co-ordinating one *component* with another whose value need not necessarily accord with BS 4011.

504
BASIC SIZE
Fundamental *size* by reference to which the limit of *size* is fixed.
NOMINAL SIZE, NOMINAL DIMENSION—DEPRECATED
(See also BS 3626.)

505
WORK SIZE
Size specified for manufacture so that, allowing for tolerances, the size of the finished *building component* lies between required limits.

601
MODULE
A convenient unit of *size* which is used as an increment or co-efficient in *modular co-ordination.*

● It is considered that these terms should properly be included in BS 3589, 'Glossary of general building terms' when revised. The indiscriminate use of these terms in the building industry, and the rapidly developing work on dimensional co-ordination, necessitates early agreement on definition which cannot await revision of BS 3589. It is deemed desirable to standardise the use of only three terms, for the three respective distances; and it is generally accepted that it would be useful to designate terms that accord with *x, y* and *z* axes.

(concluded on opposite page)

COMING TO TERMS

The publication of the draft Standard, Dimensional Co-ordination in Building: Glossary of Terms, takes us a step further along the road to metric modular. Bruce Martin, chairman of Sub-committee B/94/1 which prepared this standard,

has been travelling that road longer than most. At the same time as Mark Hartland Thomas was thinking about establishing the Modular Society, Martin was appointed by BSI, in late 1953, to take on modular co-ordination studies. His activities were extended to Europe when the possibilities of a similar research project became apparent there and, in the summer of 1954, he became technical secretary of project no. 174 under the aegis of the European Productivity Agency. In two years the first report, Theory of Modular Co-ordination, was written, after which the theory was put into practice by the building of a number of modular structures—the BSI laboratories at Hemel Hempstead were built to a 4in. module during this time as part of the project. As a result a second report was produced in 1960-61, which in part necessitated a rewrite of the original theory, giving recommendations to the governments concerned. One interesting recommendation, in the light of current events, was that foot-inch countries should go metric. As we were the only non-metric country of the 13 involved (although the US and Canada were observers) it seems that the point has been taken.

Looking back over his European experience, Martin says that one of the most satisfying tasks of the project was the publication of a multi-lingual glossary of terms. 'Where there is a multiplicity of languages, the terms need to be very precise. Sometimes you find foreign words for which there is no English equivalent. Because of the great care necessary, the completed glossary was very exact.'

Compared to this the preparation of the BSI glossary was perhaps not too daunting. It is, in effect, a revision of BS 2900 with the addition of terms developed by Government departments to describe the use of grids in buildings—neutral zones, controlling dimensions, axial dimensions, and floor-to-floor heights are some examples. The redefining of somewhat simple and well known terms—building product and raw material—also has its purpose. 'There is some confusion over what a building component is,' says Martin, 'and it is helpful to define allied subjects in order to get the metric modular component across.' Again, the inclusion of length, width and height definitions is an attempt to standardise the usage of terms. 'We were anxious to get these accepted as the three dimensions to use, to the exclusion of depth, breadth and thickness whose employment makes for an obscure situation.' One thing the new standard will do, thinks Martin, is to show that modular co-ordination and dimensional co-ordination come from the same stable. 'Industry has been fogged for a long time, thinking that the Modular Society was proposing one thing and the Government another. In reality this has been nothing more than a verbal confusion.'

Another confusion that Martin hopes the glossary will clear up is the distinction between a controlling dimension, which is simply a distance, basic size, which is a size of it, and work size which is a basic size less the joint width. 'There are still manufacturers who think that the basic size is the size to make their products.'

Jointing

Jointing is another interest of Martin's and he is currently on the BSI's joints and jointing committee where he is the RIBA representative. 'Our aim,' he says (quoting Roger Walters) 'is to produce a code of practice which will set down standard conventions for making joints between metric modular components.' Elaborating on this he says we cannot have standard joints but we can have standard conventions for making joints for a given modular component: a standard joint width and edge profiles. The joint products could vary to meet a performance requirement such as fire resistance and waterproofing.

Looking back he is amazed that we have got by for so long with so few jointing methods: until recently most façades revealed only two types—putty glazing and mortar. In the future there is likely to be a rapid development of new methods and although, at the moment, it is not possible to say what they will be, he believes that the ultimate solution need not be complicated. BRS, for whom he is the

(continued overleaf)

GLOSSARY OF TERMS

602
STANDARD MODULES
Modules selected for the purpose of standardisation as given in BS 4011.
603
PREFERRED MODULE
A *module* with the *size* of 300mm. (First preference of BS 4011.)
604
INTERNATIONAL BASIC MODULE
A *module* with the size of 100mm. (Second preference BS 4011.)
605
PLANNING MODULE
The *modular size* of the *planning* grid.
606
STRUCTURAL MODULE
The *modular size* of the *structural grid.*

APPENDIX A

A.1
MULTIMODULE
A *module* the value of which is a preferred multiple of BS 4011 first preference *standard module* and of the *international basic module.*

A.2
SUB-MODULE
Module the value of which is an integral subdivision of the *international basic module.*

A.3
SUB-MODULAR SIZE
A *size* that is less than the *international basic module.*

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

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consultant on joints and jointing, is doing a great deal of basic work for the committee and there are a number of industrial firms such as RAPRA, Unibond, Redfern Polymers and Expandite who are carrying out useful jointing research. Meanwhile the committee has already produced a bibliography and a draft standard on terminology ('Building,' 26 April).

Going Well

On the general front, Martin thinks the metric change is going well. 'We are keeping up with the timetable laid down, which is an outstanding achievement in an enterprise of this complexity.' He also finds the acceptance of dimensional co-ordination itself as part of Government policy a remarkable breakthrough. 'The theory of dimensional co-ordination had been well worked out by the Modular Society (of which he was chairman from 1961-64) and the European project by 1958, since when activity has largely been confined to the field of education. It is a very short period in which to get acceptance of such a radical change in ideas.' We are now moving to the stage, he thinks, when industry committees will be starting work on metric modular sizes and work sizes. This will require a great deal of understanding on the part of manufacturers because there are many sectors of industry which do not yet comprehend dimensional co-ordination theory and the proper way to size components so that they will fit into a building.

Nevertheless he is adament about the ultimate benefits. Like Thomas Sibthorp, he believes savings through rationalisation will offset the costs of making the change. Dimensional co-ordination, he says, is only a tool for standardisation, and standardisation, in its turn, can be regarded as a tool for efficient, and therefore cheaper, production.

Bricks and Brickwork

One issue which has proved contentious is whether bricks should be made to modular sizes or remain at their present nominal 9 by 4½ by 3in. Because of his association with dimensional co-ordination, Martin feels that he has sometimes been wrongly accused of wanting to see bricks go modular at once. It is, he says, perfectly feasible to fill a modular space with non-modular English bricks: in fact it was done as long ago as 1954 in the Hammersmith School of Building. It is also possible to build metric modular brickwork with UK bricks, as the Modular Society did in their 1966 Ibsac pavilion. Martin's view is that over the long term it will be desirable for bricks to change to modular sizes, but it will not matter very much for the next 20 years. He foresees the brick industry making a gradual move towards metric modular anyway, simply because of the need to produce different types of brick to keep up with advances in sitework, i.e. larger bricks to increase the speed of laying. As these changes are made it will be convenient to go over to metric modular sizes.

Architectural Effects

For the architect's office, faced with an organised industry working to a common set of principles, Martin believes there will be considerable transformation. 'The architect has to decide whether to join or not.' Those operating in the public sector had no choice and would have to change in accordance with Government policy. In private practice the architect had to choose whether to do alterations in a traditional way or gradually make use of the new standards. These standards will require new concepts in design. More attention will be paid to the functioning of buildings and the functions that go on in them. What we will see, he believes, is a development of the techniques used for factory floor spaces, the Burolandschaft office and similar approaches to schools being applied to houses. Architects, says Martin, will eventually be designing building shells which are capable of having internal arrangements easily altered. Martin's own 'covered space' is a 16th century cottage near Bishops Stortford, with two floors, one under thatch. Practical application of his open planning theories resulted originally in pulling down most of the dividing walls but, he says, these are gradually being built up again to tame the sounds of violin, 'cello and piano practised by his two children.

METRICATION INDEX

An index of references to metrication published in 'Building' since Building Metrication News last appeared.

MPBW's metrication working party met for first time and determined programme for immediate attention. (28 June, p56).

A programmed learning course to prepare drawing office staff for working in metric terms is being started by a building consultancy firm. (5 July, p152).

In line with the coming change to metric the BSI are re-issuing standards quoting dimensions in metric terms. (12 July, p127).

New British Standard for controlling dimensions is largely based on the DC series of documents published by the MPBW and the original Draft Standard. Some important differences are noted. (12 July, p60).

Additional comment on BS4330 and its role in providing a dimensional framework for the eventual sizing of components. (12 July, p80).

Portrait of L. J. F. Stone, the MPBW's new Metrication Officer. His views on metric and the nature of his work is described. (12 July, p80).

Concern over the Government's delay in setting up a Metrication Board to direct the overall changeover to metric is expressed by Peter Cocke, acting chairman of the Construction Industry Metric Change Liaison Group. (19 July, p83).

Tabulated data on SI units for insulation

Produced by V. C. Launder, ARIBA, and presented at a Modular Society meeting

Application	Present unit	S.I. unit	Conversion factor*
Temperature (level)	°F	°C	$\frac{5\ (°F-32)}{9}$
Temperature (range or difference)	°F	°C	0·556
Heat	Btu	kJ	1·055
Heat flow	Btu/hr	W	0·293
Density of heat Flow rate	Btu/sq. ft/hr	W/sq. metre	3·155
Thermal conductivity	Btu/in/ft²/hr/°F	W/m°C†	0·144
Thermal conductance	Btu/ft²/hr/°F (U-value)	W/m² °C	5·678
Thermal resistivity	ft²/hr/°F/Btu/in	m°C/W‡	6·93
Thermal diffusity	ft²/S	m²/S	0·0929
Thermal capacity per unit mass	Btu/lb/°F	kJ/kg °C	4·187
Thermal capacity per unit volume	Btu/ft³/°F	kJ/m³ °C	67·066
Calorific value (wt. basis)	Btu/lb	kJ/kg	2·32
Calorific value (vol. basis)	Btu/ft³	kJ/m³	37·26
Refrigeration	Ton	W	3516·85

* Present unit value × conversion factor = S.I. unit value.

† (Jm/m²s °C —The correspondence of imperial and S.I. units in these cases may be made clearer in

‡ (m²s °C/Jm) —each case by comparing imperial and S.I. units with these expressions

Metric Bibliography
Part 1: Official

The first list of metric publications, compiled by Sylvia Locke, is concerned with those issued by BSI and Government department. Further lists will be published.

The assistance of the Librarians of the Ministry of Housing and Local Government and of the Royal Institute of British Architects is gratefully acknowledged.

General

These are of general interest to all those in the construction industry.

1 PD 6245 *Going metric: First stages.* BSI, August 1967.
The programme for the change is presented in the form of a bar chart with explanatory notes. Typical building products are listed according to their dimensional priority.

2 PD 6030 *Programme for the change to the metric system in the construction industry.* BSI, February, 1967.
Describes the events leading to the decision to change to metric together with some of the problems involved in the change and the general programme to be followed.

3 PD 6249 *Dimensional Co-ordination in building. Estimate of timing of BSI work.* BSI, October 1967.
A detailed timetable in the form of bar charts for the production by BSI of controlling dimensions, dimensional recommendations for particular components and the metrication of relevant British Standards.

4 *Going metric in the construction industry 1. Why and when.* MPBW: A. Williams and Burles (HMSO) 1967.
An account of the historical development of the metric system, its growing international acceptance, the basic units of measure, the need to co-ordinate dimensions at the time of change in the construction industry, and the programme for the change.

5 *Education and training in the construction industry for the change to the metric system, a survey.* MPBW: ('Building,' 22 March 1968, p. 122,125).
A survey of what action has been taken, by government departments, education and training organisations, professional and other institutions and trade organisations, to prepare programmes and provide training in the use of metric units for operative, technical and management staff.

6 *'Going Metric.' Leaflet and Poster.* MinTech, 1968.
An eye-catching A2 size poster, and a leaflet with a light-hearted introduction to the more common metric units, designed for the engineering industry but applicable to the construction industry.

Decimal Currency

1 *Decimal Currency.* The Treasury (HMSO) 1966.
A statement of the decision to adopt decimal currency in February 1971. The background to the decision and the benefits to be expected from it described. The £ to be retained and divided into 100 new pence with the arguments given for the choice. A description of the coinage proposed, and the programme for the change during the intervening years.

2 *Decimal currency. Expression of amounts in printing, writing and speech.* Decimal Currency Board (HMSO) 1968.
A small pamphlet describing the new pound and the new penny, the symbols and abbreviations, and the methods of expression to be used.

Guides and Aides

These are of interest to members of the design team.

1 *Changing to the metric system. Conversion factors, symbols and definitions.* National Physical Laboratory, Pamela Anderton and P. H. Bigg (HMSO) 1967.
Information in SI units and other metric terms are given with metric conversion factors for both commonly used and specialised units.

2 PD 5686 *The use of SI Units.* BSI, April 1967.
An account of the metric system leads to a description of the SI system. The recommended SI units, with their multiples are listed with a few definitions.

3 BS : 3763 *The International System (SI).* BSI, 1964.
The basic units and some derived units are listed with their definitions. A selection of multiples, sub-multiples and supplementary units is also included.

4 BS : 350 *Conversion factors and tables Part I: 1959 Basis of tables. Conversion factors Part II: 1962 Detailed conversion tables PD 6203 Supplement No. 1 (1967) to BS : 350: Part II Additional tables for SI conversions.* BSI.
Part I is a list of metric conversion factors, amended to include reference to the SI units, and forms the basis of the detailed conversion tables that are contained in Part II and PD 6203.

5 BS : 2856 *Precise conversion of inch and metric sizes on engineering drawings.* BSI, 1957.
Gives the basis and rules for the conversion of inch and millimetre sizes which will provide the degree of accuracy required for precise dimensional interchangeability.

Of interest to designers of heating and hot water installations.

6 *Metrication. The International system of metric units.* By H. M. Glass (The Gas Council) 1968.
Introduces the SI system of units with detailed descriptions of those units relevant to the gas industry with a list of conversion factors, units and symbols.

Of interest to members of the design team concerned with drainage and water supply.

7 *Metric units with reference to water, sewerage and related subjects. Report of working party.* MHLG (HMSO) 1965.
Lists recommended units and their application in the field of water, sewerage and all related subjects, together with the basic conversion factors and a selection of multiples and sub-multiples.

8 *Metrication. TN 9 (revised).* By A. Gerard Boulton (Water Resources Board), October 1967.
Sets out the units in most frequent use, their application and the basic conversion factors with selected conversion tables.

Of interest to those preparing recommendations for dimensions and methods of expressing them.

9 *Current Papers Design Series 44,* Building Research Station. H. W. Harrison. November 1966.
Reviews the practice of other countries in the use of the metric system, as to which units are used for differing kinds of documents and discovers no significant trend. Possible metric storey heights for dwellings are considered, but as no data is available on which to base a decision, suggestions and arguments are put forward for reaching a decision in the UK. An appendix summarises European practice and standard storey heights for each country.

10 BS : 1957. *The presentation of numerical values.* BSI, 1953.
General principles and working rules are set out for the expression of numerical values, including the number of figures to be used and a procedure for rounding the last figure.

Of interest to all members of the construction industry.

11 PD 6031 *A guide for the use of the metric system in the construction industry.* BSI, 1967.
Gives some general guidance on the use of units, scales and the conversion of existing values, with illustrations of some basic design data.
(This guide is at present being revised.)

12 PD 6421 *The change to metric in the*

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construction industry; are you on the critical path . . . a guide to the programming of your change over. NBA, BSI, 1968.
A network diagram illustrating the requirements leading to the start of the construction of a building using dimensionally co-ordinated products and involving all sectors of the construction industry.

13 *Public Health Act 1961. The Building Regulations 1965. Metric equivalents of dimensions.* MHLG (HMSO), 1968.
In Part I metric equivalents are given for each value referred to in each regulation and table. In Part II, 16 tables summarise in numerical order the values of the different units used.

14 BS : 3176 *Printed matter and stationery. A and B series of trimmed sizes.* BSI, 1959.
Gives the basis of the ISO standard sizes of trimmed paper, which increase in a ratio of two to one and are geometrically similar to one another. A sizes and B sizes are listed and a method given for determining long sizes.

Of interest to the engineering industry.

15 BS : 4318 *Recommendations for preferred metric basic sizes for engineering.* BSI, 1968.
A list of preferred metric basic sizes for the mechanical engineering industry from 1mm. to 300mm. and guidance on the choice of sizes larger than 300mm.
16 *BS Handbook No. 18 Metric standards for engineering.* BSI, 1966.
Starting with the basic information on SI units the handbook contains summaries or extracts of 83 British Standards, ISO Standards or ISO draft proposals, and 55 standards adopted by certain European countries, together with a further list of 55 ISO recommendations or draft recommendations of interest to particular sections of the engineering industry.

Dimensional Co-ordination

Of interest to members of the design team and manufacturers.

1 BS : 2900 *Modular Co-ordination in building Part I Glossary.* BSI, 1957.
Contains terms which are used in the dimensional co-ordination of buildings with their descriptions and an alphabetical index.

2 BS : 3626 *Recommendations for a system of tolerances and fits for building.* BSI, 1963.
Describes, with diagrams, a system of stating tolerances and the location and dimensioning of building components by relation to grid lines and planes.

3 BS : 4011 *Recommendations for the co-ordination of dimensions in building. Basic sizes for building components and assemblies.* BSI, 1966.
Recommends a series of basic sizes in descending order of preference based on the 100mm. module.

4 BS : 4176 *Specification for floor to floor heights. Metric units.* BSI, 1967.
A range of dimensions for all but single storey buildings and excluding top storeys.

5 BS : 4330 *Recommendations for the co-ordination of dimensions in building. Controlling dimensions. Metric units.* BSI, 1968.
To provide a framework for controlling dimensions for use in the design of buildings. Tables of dimensions are given covering floor to floor and floor to ceiling heights, changes in level, zones for floors, roofs, loadbearing walls and columns and the spacing of such walls and columns. Advice is given on the selection of dimensions and on intermediate controlling dimensions for window sill and window head heights and a door set height.

6 *Dimensional Co-ordination for building, DC 4 Recommended vertical dimensions for educational, health, housing, office and single-storey general purpose industrial buildings.* MPBW (HMSO), 1967.
Recommended standard dimensions for floor to floor and floor to ceiling heights, the zones controlling the thickness of floors and roofs, and changes in level within and between buildings.

7 *Dimensional Co-ordination for building DC5. Recommended horizontal dimensions for educational, health, housing, office and single storey general purpose industrial buildings.* MPBW (HMSO), 1967.
Recommended standard dimensions for the spacing of load bearing walls and columns and the zone controlling the size and thickness of columns and walls.

8 *Dimensional co-ordination for building DC6. Guidance on the application of recommended vertical and horizontal dimensions for educational, health, housing, office and single storey general purpose industrial buildings.* MPBW (HMSO) 1968.
Gives advice on selecting dimensions from the standards recommended in DC4 and DC5, with notes, illustrated by diagrams, on methods of using grids and zones for the location of building components and assemblies.

9 *Dimensional co-ordination for building DC7. Recommended intermediate vertical dimensions for educational, health, housing and office buildings and guidance on their application.* MPBW (HMSO), 1968.
Recommended standard dimensions for window sill and window head heights and a single door head height.

10 PD 6286 *Metric standards published and in progress.* BSI, 1967.
Standards are listed in four sections; those expressed in both inch and metric units, those independent of any unit, e.g. colour code, those being revised and those next in priority for revision. Standards used by the construction industry can be found in the different sections, sub-divided into BSI industry divisions.

Housing

1 *Housing standards, costs and subsidies. Circular 36/67.* MHLG (HMSO), 25 April 1967.
Introduces the raising of housing standards to a new minimum for space and heating, which however is not to be exceeded. The standards will become mandatory on 1 January 1969 and are outlined in Appendix I. The amount of subsidy will be determined by a new method of calculation based on costs yardsticks and the method with the tables to be used are set out in Appendix II.

2 *Vertical Dimensional Standards in Housing. Circular 31/67 (MHLG) and 27/67 (Welsh Office).* MHLG (HMSO), 1967.
States the floor to floor and floor to ceiling heights that will be mandatory for schemes submitted for subsidy after 1 January 1972.

3 *Metrication of Housebuilding, Circular 1/68 (MoHLG), 1/68 (Welsh Office).* MHLG (HMSO) 1 January 1968.
The BSI programme for the change to metric is outlined and dates are given when the Ministry will expect or require the submission of metric plans. Local Authorities are asked to report the number of dwellings programmed for 1969 and 1970 to enable demands on the industry to be assessed. They are also asked to specify standard housing components to the new metric standards where possible, and this recommendation is likely to become mandatory on 1 January 1972.
Appendix I gives the metric equivalents of housing standards to become mandatory on 1 January 1969, and set out in Circular 36/67.
Appendix II gives the method of conversion for density so that metric schemes can be calculated using Appendix II of Circular 36/67.

4 *Scottish Development Department Circular 27/68.*
Introduces the appendix in which is set out for Scotland the information and recommendations given in the Ministry of Housing and Local Government Circular 1/68 but omitting the two English appendices.

5 *Space in the Home. Metric edition.* MHLG (HMSO) 1968.
A new edition of the original bulletin based on the recommendations of the Parker Morris report. The text and illustrations remain the same but in all cases metric dimensions are given.

6 *Metric House shells. Two storey.* NBA, April 1968.
The booklet argues the advantages of greater variety reduction in house plans. Using the standard set out in MHLG circular 1/68, a diagram illustrates all possible rectangles for 4, 5 and 6 person, two storey houses. From this a selection is made of 22 standard shells and diagrams illustrate 31 different ground floor plans which are possible within the 7 five-person house shells.

Controlling Dimensions

NEW BS FOR THE CO-ORDINATION OF DIMENSIONS IN BUILDING

This is an extract from the new British Standard on controlling dimensions. It provides a framework from which the basic sizes of dimensionally co-ordinated components will be derived. The full standard is available from BSI, price 15s.

British Standard 4330:1968, Recommendations for the Co-ordination of Dimensions in Building; Controlling Dimensions.

3. VERTICAL CONTROLLING DIMENSIONS

3.1 Selection of sizes should be made from:

Table 1. Floor to ceiling heights.

Table 2. Heights of zones for floors and roofs.

Table 3. Floor to floor and floor to roof heights.*

Table 4. Changes in level.

Sizes in these tables refer to the distance between controlling lines bounding the zone

NOTE. The floor to floor heights in Table 3 accord with BS 4176, 'Floor to floor heights'.

3.2 The following considerations should be taken into account when selecting sizes from Tables 1 to 3 (see Fig. 1):

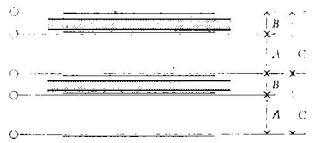


Fig. 1

(1) The user requirement for floor to ceiling height *A* (Table 1).

(2) The space required within the zone for floors and roofs *B* (Table 2) for finishes, structure, services and suspended ceilings, with due allowance for camber and deflection.

(3) The floor to floor and floor to roof heights *C* (Table 3).

(4) In selecting heights for dimensions *A* and *B* first preference should be given to those that add up to the heights *C* in Table 3, since this will facilitate the maximum use of dimensionally co-ordinated components.

NOTE. A roof may extend beyond the upper limit of the zone provided that it does not affect the controlling dimensions of any part of the building above this level.

3.3 The heights in Table 4 refer to the vertical distances between controlling lines bounding the top of the zones for floors and roofs within buildings (see Fig. 2).

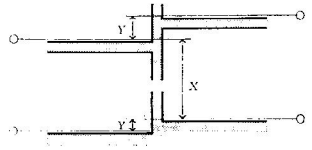


Fig. 2

For full use to be made of dimensionally co-ordinated components both dimensions *X* and *Y* must be selected from sizes in Table 4 and must also add up to a height given in Table 3.

TABLE 1: FLOOR TO CEILING HEIGHTS

Heights in multiples of 300mm	100mm
mm	mm
1,500*	
1,800*	
2,100†	
	2,300
2,400	
	2,500
	2,600
2,700	
	2,800
	2,900
3,000	

Greater heights in multiples of 300 from 3,000 to 6,600 and thereafter in multiples of 600.

NOTE. In addition to the values in the table, 2,350mm may be used, for housing only, in conjunction with a floor to floor height of 2,600mm.

* Applies only to farm buildings.

† Applies only to domestic and lock-up garages, multi-storey carparks, and farm buildings.

TABLE 2: HEIGHTS OF ZONES FOR FLOORS AND ROOFS

Heights in multiples of 300mm	100mm	50mm
mm	mm	mm
	100	
	200	
		250*
300		
	400	
	500	
600		
900		
1,200		
1,500		
1,800		
2,100		

Greater heights in multiples of 300 from 2,100.

* Applies only to housing for use in conjunction with the floor to floor height of 2,600mm and floor to ceiling height of 2,350mm.

TABLE 3: FLOOR TO FLOOR AND FLOOR TO ROOF HEIGHTS

Heights in multiples of 300mm	100mm
mm	mm
	2,600*
2,700	

Greater heights in multiples of 300 from 2,700 to 8,400 and thereafter in multiples of 600.

* Applies only to housing to accord with Circular No. 31/67 of the Ministry of Housing and Local Government.

TABLE 4: CHANGES IN LEVEL

Range	Heights to be in multiples of
mm	mm
From 300 to 2,400	300
Above 2,400 for the smaller dimension *X* or *Y* (see 3.3) and for the larger when numerically possible	600

Changes in level of 1,300, 1,400, 1,700, 2,000 and 2,300 may be used for housing in conjunction with a floor to floor height of 2,600

4. HORIZONTAL CONTROLLING DIMENSIONS

There are two principal methods of locating controlling lines in relation to loadbearing walls and columns:

A. On the axial lines of loadbearing walls or columns;

B. On the boundaries of zones.

These are illustrated in Fig. 3.

The two methods are not exclusive if zones are multiples of 300mm since in such cases the controlling dimensions both between axes and between boundaries will be multiples of 300mm. If the two methods are combined and zones are not multiples of 300mm, either the dimension between axes or that between boundaries of zones will be a multiple of 300mm, and the other is unlikely therefore to be a controlling dimension. To ensure the maximum use of co-ordinated components, the dimension that is not a controlling dimension should be a multiple of 100mm.

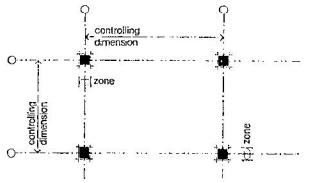
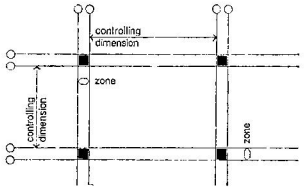


Fig. 3, Method A, above, controlling lines on the axial lines of loadbearing walls and columns and, Method B, below, on the boundaries of zones



4.1 Controlling dimensions for zones. The sizes of controlling zones should be selected from Table 5. These sizes refer to the distances between the boundaries of zones and to both horizontal dimensions of column zones

TABLE 5: WIDTHS OF ZONES FOR COLUMNS AND LOADBEARING WALLS

Widths in multiples of 300mm	100mm
mm	mm
	100
	200
300	
	400
	500
600	

If greater widths are required they should be in multiples of 300 as first preference, or of 100 as second preference, in accordance with BS 4011*

4.2 Controlling dimensions for the spacing of zones. Selection of sizes should be made from Table 6, whether Method A (the distance between axial lines) or Method B (the distance between boundaries of zones) is adopted. It should be noted that the space between loadbearing walls and columns will vary according to which of these methods is used for locating controlling lines. The sizes refer to the horizontal distances between controlling lines.

TABLE 6: SPACING OF ZONES FOR COLUMNS AND LOADBEARING WALLS

Range	Sizes of spacings to be in multiples of
mm	mm
From 900	300

NOTE. 800mm may be used for housing only.

5. INTERMEDIATE CONTROLLING DIMENSIONS

Intermediate controlling lines indicate where joints are most likely to occur between and within building components and assemblies. In the case of vertical dimensions the sizes given are the vertical distances from the controlling line bounding the top of the floor zone.

5.1 Window sill heights. The height of the controlling line for a window sill should be selected in accordance with BS 4011*, i.e. $n \times 300$mm as first preference and $n \times 100$mm as second preference.†

5.2 Window head heights. The height of the controlling line for a window head should be selected in accordance with BS 4011*, i.e. $n \times 300$mm as first preference and $n \times 100$mm as second preference†.

5.3 Door set head heights. The first preference for the height of the controlling line for a door set head should be 2,100mm. Other heights if required should be selected in accordance with BS 4011*, i.e. $n \times 300$mm as first preference and $n \times 100$mm as second preference†.

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

† n is any integer, including unity

The full Standard consists of 16 pages plus a pull-out appendix giving imperial equivalents of relevant metric amounts. Another appendix gives some interesting background information from which the recommendations of the Standard were derived, showing, in tabulated form, vertical, horizontal and intermediate dimensions for various building types. A further appendix gives some examples showing the relation of controlling lines to grids. The Standard is available from BSI, Sales Branch, 101-113 Pentonville-road, London, N1, price 15s.

Scottish Programme for Metric

The Scottish Development Department have recently issued a circular, of which extracts are printed below, setting out a programme for metrication and the introduction of co-ordinated components in public sector housing. From 1 January 1972, local authorities will be required to submit all plans for their houses in metric terms.

A programme for metrication and the introduction of co-ordinated components in public sector housing is outlined in a circular issued by the Scottish Development Department.

The essence of the changeover, it says, is that the BSI timetable should be adhered to and authorities should not, therefore, invite house contracts in metric terms prior to 1 January 1970. Metric plans being developed for such schemes may be submitted as necessary to the department but not normally before 1 January 1969. Exceptionally, e.g. where an authority wishes to introduce a new standard plan to be used for a period of years, there may be special justification for the earlier submission of metric plans but the prior agreement of the department will be necessary in every case and this will be given only in special cases.

Guidance on the preparation of metric plans can be sought in the DC statements 4, 5, 6 and 7; a new MHLG Design Bulletin; and revised accommodation standards which will be published in metric terms as soon as possible this year. Approval may be withheld if plans depart unreasonably from these recommendations. After 1 January 1972 schemes submitted for subsidy or borrowing consent must be in metric terms.

Floor-to-floor Height

It has been decided that a single floor-to-floor height of 2.60m. should be used for local authority housing. It will apply from finished floor to finished floor. In the case of the top storey a dimension should be chosen to suit the use of standard components, and the clear floor-to-ceiling height should then normally be the same as the floor-to-ceiling heights of the lower storey or storeys. The 2.60m. floor-to-floor height is intended to be used with only three standard floor zones of 200, 250 and 300mm., giving ceiling heights of 2.40, 2.35 or 2.30m. The floor-to-floor height of 2.60m. will be fixed, and the floor-to-ceiling height of 2.30m. will be a minimum. Subject to these requirements, the thickness of a floor need not necessarily fill a floor zone completely so long as it is not incompatible with the use of standard components.

For schemes submitted for subsidy or borrowing consent on or after 1 January 1972 a floor-to-floor height of 2.60m. will be mandatory.

For schemes submitted for subsidy or borrowing consent before that date, it is recommended that whenever possible authorities should adopt:

a) for schemes in metric form a floor-to-floor height of 2.60m.;

b) for non-metric schemes using industrialised construction a floor-to-floor height of 8ft. 4in. (the preferred dimension recommended in MHLG Bulletin No. 8).

Information on Change

The difficulties inherent in the transitional period during which authorities change to metric dimensions will be reduced if manufacturers and contractors can be kept informed of the pace at which the change is expected to proceed. Authorities are, therefore, asked to inform the department by 3 October 1968 of the number of dwellings they expect to design in metric dimensions during 1969, the types of construction and when they expect to invite tenders and begin work for these, and to provide similar information for the following years in October 1969 and 1970. The department will thus establish a clearing house of information for the benefit of contractors and manufacturers, and of local authorities. The National Building Agency will collaborate with the department in processing information and in making available to local authorities and to industry both day-to-day information and an evaluation of progress in design and building works. Detailed advice on the form in which this information is required will be issued later by the department.

Standard Metric Components

All authorities must make the fullest use of the opportunity provided by metrication for rationalising design, production and site operations by the use of standard components. The department will be associated with the production of metric British Standards, based on user requirements, for the main components used in housing, and will wish in this to draw on the help and advice of local authorities. It will then be for the manufacturers to design components to the metric standards and the department, assisted by the National Building Agency, will be ready to advise manufacturers at this stage on user needs. It will be necessary to test certain new standard metric components in practice, and the department may ask authorities to co-operate with manufacturers and contractors in incorporating such practical tests in their schemes. The aim will be to promulgate metric British Standards for all components and to ensure that the new components are developed in accordance with these standards.

It is essential for the success of metrication that, once a British Standard has been promulgated for a component, components designed in accordance with the standard should be used. The production of new standard components often involves heavy investment in production facilities, which must be planned long in advance, and manufacturers require some reasonable assurance that the standard product will be used at once on an economic scale. Only such an assured market makes possible the potential reductions in cost which can be obtained from standardisation. All schemes submitted at tender stage on or after 1 January 1972 will, therefore, be required to specify metric British Standards for all components for which such standards exist. Authorities are also recommended to specify the metric British Standard wherever possible for metric schemes submitted before 1 January 1972. More detailed guidance will be issued in due course, and the department will ensure that those standard components which it will be mandatory to use are available in the quantities required.

Until metric components conforming to a new metric British Standard are available, authorities should continue to specify the existing components which, by the end of 1968, will be described also in metric terms. Authorities are urged not to develop their own local standards for metric components. Such local standards may well prove to be different from the relevant British Standard and will, therefore, not be acceptable for schemes submitted at tender stage on or after 1 January 1972.

Metric schemes, like those using imperial measurements, will be subject to compliance with indicative cost limits. The indicative costs will be adjusted as necessary to take account of metric standards.

NBA's Rôle

It is to be expected that the first metric schemes may bring to light problems which could profitably be brought to the attention of local authorities not yet experienced in the effects of the change to metric. The National Building Agency will keep in touch with the metric schemes as they progress and provide an information service to authorities on problems arising out of metrication. As part of this service the agency will arrange lectures and seminars to familiarise local authorities with the practical application of the new dimensional framework and the recommendations of the Design Bulletin. The department's professional advisers will also of course be very willing to assist authorities in case of difficulty.

NEWS FROM THE INDUSTRY

Australian Commerce Support

The president of the Associated Chambers of Commerce of Australia, Bruce R. Macklin, said in June that the Senate Select Committee's report on the metric system showed that there was an overwhelming body of opinion favouring the adoption by Australia of the metric system of weights and measures.

'Having completed an exhaustive inquiry, the committee's report deserves early consideration and action by the Federal Government,' he said. 'It has been pointed out that the UK is actively converting to metric weights and measures and expects to be predominantly metric by 1975. Moreover, 75% of world trade is being carried on in metric measurements and consequently Australia, as an important trading nation, has a vital interest in a measurement system which is more internationally acceptable.

'The benefits of conversion, as the committee has indicated, will go far beyond this in view of the increased simplicity and efficiency of working in a decimal system across the whole field of commercial transactions.

'There are, however, areas where the cost of conversion will impose a heavy burden on individual industries and the Government will need to consider fair and reasonable forms of compensation. To enable the Government to have expert advice on this and other problems raised by conversion to the metric system, Australian business would support the early appointment of a Metric Conversion Board.'

Foreign Practices

A review of the co-ordinated dimensioning practices in countries using metric systems is being undertaken by the Building Research Station. Writing in the current edition of BRS News, George A. Atkinson says that much of the preliminary work has been completed. But if the change to the SI methods of measurement is to be anything more than an expensive academic exercise, it is vital that the next stage—component co-ordination—should succeed. In the past, standardisation has been achieved to some extent, but co-ordination has been lacking, and the change to a metric system has therefore provided an opportunity for the re-examination and rationalisation of the ranges of standard components. It is anticipated that some practical development work on a wide range of components manufactured to new metric sizes will soon take place at the Station.

The problems caused by the dimensional variations in buildings are also being studied by BRS, and the draft Code of Practice, The control of inaccuracy in building—published last year—is being reviewed to determine the effect of metrication on its recommendations. One basic problem is the minimum dimension to which it is practicable to work on site; at present this is assumed to be $\frac{1}{8}$in. but will the practical metric equivalent be 1mm. or 5mm.? Similar problems in the determination of metric equivalents occur in other aspects of the construction industry which the Station is studying. In building services, for example, although the diameter of a standard 4in. soil drain pipe is sufficiently close to 100mm., what will be the metric equivalent of a $\frac{1}{2}$in. tap —will it be 10mm. or 15mm.? And what effect will a change to one or other of these have on the present performance standard? The Station is currently evaluating complex problems such as these, and is conducting an extensive survey of continental drainage facilities, taps, pipes and fittings to determine both the metric equivalents and the effect of their adoption on present design and performance regulations. Sometimes, such comparisons may be made fairly easily, but on other occasions, unexpected results occur; a BRS survey of European tap and pipe sizes has shown that in some countries—notably West Germany and Holland—diameters and bores are quoted in inches and thread size is commonly given in BSP! This amusing anomaly merely indicates the lack of international standardisation in the construction industry, and it is clear that Britain will not be the only country experiencing problems in converting to SI. In fact, just at the time that this country changes from imperial measures, the more rational form of the metric system is being adopted internationally. Britain should therefore be able to take the lead in the use of SI units, and many countries will be looking with interest at the way in which the change is made, and at the results of metric thinking in the British construction industry.

Solving Own Problems

Industries affected by the changeover to decimal coinage, due to start in February 1971, cannot expect all their individual problems to be solved by the Decimal Currency Board, the board says in its first annual report published earlier this month.

The board emphasises that its rôle is one of setting the general framework within which individual organisations must make their own decimalisation plans. Its general strategy, the report says, is to concentrate on management for the next year or so, then on the retail trade and other cash handling organisations during the middle period and on the general public only in the second half of 1970.

Dealing with the changeover period after 'D-Day' on 15 February, the board warns against the common assumption that this will last as long as two years. During the next year, the report says, the board hopes to examine the shopping patterns of the changeover period and to determine policy on such matters as conversion tables and dual pricing.

The biggest physical task of the changeover will be the replacing or converting of the 5m machines affected. On this the board says that, because in the business world the competitive advantage lies with the firm which decimalises early and because not all machines can be converted quickly, users would do well to look carefully into the merits of 'preconversion' schemes.

On the question of compensation, the board states that it will not consider making recommendations to the Government for compensation unless, for example, the representations are in respect of costs which are necessarily and directly incurred as a result of decimalisation.

Metric Wall Charts

Almost 1,000 of the specially designed metric wall charts have been sold by The Building Centre since they introduced them last October. The charts, with comparative metric and imperial measures up to two metres, have been popular not only in the UK, but also abroad. Charts have been sent to Malta, Australia, South Africa and Brunei.

They are obtainable, price 21s., on application to The Building Centre, 26 Store-street, London, WC1.

Design Disciplines

Discussion at a Modular Society Standards Committee meeting held recently in Scotland distinguished between two points:

1 What design disciplines are intrinsic to modular co-ordination as such.

2 What design disciplines are likely to be imposed by variety reduction in component sizes under the metric BS and under the metrication programme generally.

On the first, the aesthetic neutrality of modular co-ordination was accepted without much discussion, as was the claim that the ease of assembly of co-ordinated components will free the designer from the chore of working every assembly detail for every new building from scratch.

The second provoked an examination of the DC documents and the draft British Standard, Recommendations for the Co-ordination of Dimensions in Building, Controlling Dimensions (Metric Units). No specific additions to the list of controlling dimensions was made, and although there was some criticism of certain of the dimensions included, none was recommended for deletion, but it was generally agreed that the dangers of over-reduction of controlling dimensions was greater than that of over-pro-

vision, because while over-provision would allow for future reduction by a process of natural selection no such process could easily add to the range once it was standardised.

As a postscript, the meeting gave consideration to the situation regarding specifications, bills of quantities, production drawings and contract administration during the period when metric contracts using both dimensionally co-ordinated and current-size components will be used. It was pointed out that whilst the bills of quantities and production drawings might be wholly in metric terms, it will be legally necessary for the specification to be in imperial and metric terms and this will inevitably mean the use of dual measures in ordering and on site. Legislation defining the accuracy of equivalence between imperial and metric measures is urgently necessary if this situation is to be avoided.

At an earlier meeting of the Standards committee, two problems arising in architects' offices dealing with a wide range of public and private building when introducing a programme of changes based on PD6030 and the RIBA programme were discussed. It was felt that the lack of metric components and necessary data about metric components to be made available will soon develop into a dead-lock between architects and manufacturers. Until this situation has been clarified many architects will not voluntarily change over to metric but will wait until compelled to do so by law or economic pressure.

The forum agreed that a co-ordinated statement should be made by all controlling authorities—such as DES, UGC, etc.—in respect to planning and building regulations. A date should be set after which only complete metric applications would be considered. The Metric Change Board should have the necessary power to do this. At present DES and UGC only require forms of application to be in metric terms from April 1969—*not* drawings.

It was not thought that the change to metric would present major difficulties in architects' offices provided that clear guidance in printed documents was available. Re-education and formal courses in the schools may be necessary.

South African Journey

With South Africa on the way to going metric, Michael Clarke, chief co-ordinator of the change to metric in the British construction industry, is to visit the South African Building Exhibition. At the same time he will be having discussions with the SA Bureau of Standards concerning the metric change in construction and, on the same subject, will be addressing an SABS conference at the exhibition as well as recording a radio talk. The exhibition opens on 20 August.

Pilot Scheme

As a prelude to the building industry going over to the metric system in 1972 the Scottish Special Housing Association is to start erecting Scotland's first metric houses shortly. The pilot scheme is being undertaken to provide practical experience in the use of metric standards before the changeover. The scheme is being sponsored by SLASH—Scottish Local Authorities Special Housing group and the NBA.

Engineering Programme

A programme for going metric in the engineering industry was launched last week by the BSI with the publication of PD 6424:1968—The adoption of the metric system in engineering: Basic programme and guide (price 15s.).

The programme was introduced by the Minister of Technology, Anthony Wedgwood Benn, who affirmed the Government's support of metrication. He also indicated that the report of the Standing Joint Committee on metrication would soon be published.

A six-year change bracket—1970-75 inclusive—is given in the programme, within which trade associations and individual firms can establish optimum timings for achieving a substantial change to metric working. The national framework is deliberately broad to allow firms with different manufacturing requirements and order commitments some flexibility in developing their own timetables. The programme recognises the need for a small but decreasing proportion of imperial working after 1975 for maintenance purposes.

Before 1970, the date agreed by the majority of industry for getting the move to metric production really under way, BSI will have published the most essential metric standards for basic engineering commodities (materials, tools and components). The suppliers of these commodities have given their assurance that they can meet the demand for metric supplies, starting in 1970 with a 15 to 20% swing from imperial to metric over the majority of the range.

Metric for Finals

Students at the Scott Sutherland School of Architecture, Aberdeen, switched over to metric for their final year thesis this month. Each of the 14 students involved had to design a building or complex of buildings according to the new system and their work is to be put on show.

Conversion Aid

CIRIA, the Construction Industry Research and Information Association, has published a new low-cost set of conversion factors to assist in the change to metric measurement in January 1969. Pocket-sized and printed on thin board. They are priced at 2s. 6d. each and are available from Harvey Pictorial Services, 4 Alfred-square, Deal, Kent.

PUBLICATIONS

Reference Manual

A reference manual on metric has been prepared by the Institution of Heating and Ventilating Engineers with particular reference to the environmental services industry. It therefore covers an extremely wide range of parameters. The manual brings up-to-date and expands on information published up to now. As well as a list of selected units and conversion factors from British and other units to the new SI units, it also contains ranges of equivalent values for design temperatures, water consumption and discharge rates, boiler capacities, U-values, air flow rates and velocity, etc., and notes on meteorological and other common standard values. Worked examples illustrating the application of the new units to basic engineering equations, thermal transmittance, psychrometrics and refrigeration are also included together with an air flow chart which uses both sets of units.

With this information it is possible to assess with greater accuracy all the implications within the design office of the change of units scheduled to take place during the next few years.

Copies can be ordered from the Secretary, IHVE, 49 Cadogan-square, London, SW1, price 15s.

House Shells Supplement

A technical supplement to 'Metric house shells—two-storey' has been published by the National Building Agency.

The supplement amplifies the proposals in 'Metric house shells—two-storey.'

The technical supplement is concerned particularly with the way that the minimum space standards set out in the Ministry of Housing circular 1/68 'The metrication of house building' can be related to a 300mm. planning grid. The total range of shells permitted by these dimensional constraints are considered in the first section of the supplement.

The second section explains some of the factors taken into account in choosing the selected range of shells and illustrates ways in which they can satisfy basic user requirements in layout.

The third part includes in tabular form information on all the shells in the total range. Seven-person houses are considered as well as those for four, five and six persons. The tables take into account the different space standards for end-terrace four- and five-person houses and the minus tolerance of 1½% on net space which is permitted when houses are designed on a planning grid.

The technical supplement can be obtained, price 12s. 6d. post free, from the Publications Department, The National Building Agency, NBA House, Arundel-street, London, WC2.