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This section appears in the second and fourth issues 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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BMN
Building Metrication News

Designers Start Here

The count down for metric change appears a little pathetic compared with that for a lunar expedition, no trumpets, no TV coverage. But in fact we have just quietly slipped into probably the most important and irrevocable stage in the BSI programme. The simple black line on the bar chart shows that the bulk of the change for designers and quantity surveyors should be completed by 31 December 1971, in three years' time. If one were to develop the bar chart it might best be done in the form of a game of snakes and ladders. By now most players are aware of the rules, but none of us has played the game before and the BMN guide that follows may help you to avoid some of the pitfalls.

1 Take it easy, do not rush into metric measurement, there are advantages to be gained by waiting a short while.

2 Have another look at the BSI programme (it is on page 116), see what others are meant to be doing and when they are meant to be doing it.

3 Make your decision on when to change on the basis of when your first job will go on the ground. On no account should this be before 1 January 1970 or after 31 December 1972.

4 Make certain that you use the recommended scales, symbols and notation. Get a copy of the *revised* PD 6031 from BSI which is a guide to the use of the metric system. To avoid confusion with other offices and the site, see that everyone in your office uses it without reservation.

5 The main advantage, for the construction industry, will be the adoption of dimensional co-ordination. Brush up your knowledge, have another look at BS 4330 Controlling Dimensions. Better still buy a few copies of the MPBW Going Metric Bulletin No. 2 : Dimensional Co-ordination, which has just been published, as well.

6 Do not plague manufacturers with questions about when they are going to produce metric dimensionally co-ordinated components. Have a look at the BSI programme first and see when they are due.

7 Keep an eye on BMN. We shall be publishing lists of metric components, compiled by the Building Centre and checked by BSI, just as soon as they become available.

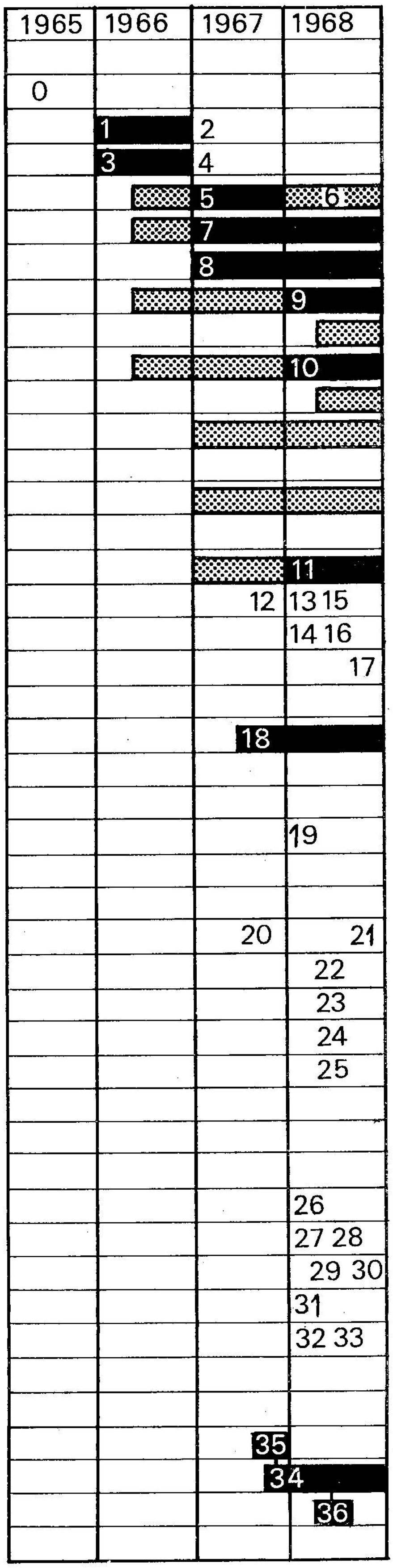
8 If, when you are ready to go metric the components aren't, lay out all designs in accordance with BS 4330; manufacturers will be using the same dimensions. If this seems dicey to you and you can afford to wait then do so.

9 Whatever date you decide to change on, remember that decimal currency comes in at the beginning of 1971. Perhaps you would find that a good moment to make both changes at one time?

10 Good luck. Keep an eye on BMN, let us know of your problems and successes, and particularly if there is any information you would like us to publish.

Metric change in progress

A review of 3 years' planning with estimates up to 1972



Before 1 January 1969

0 Government intentions announced.

British Standards Institution

1 Time taken to prepare the programme.
2 Publication of PD 6030, Programme for the change to the metric system in the construction industry.
3 Time programmed for the preparation of a metric guide.
4 Publication of PD 6031, a guide for the use of the metric system in the construction industry.
5 Time programmed for the preparation of key dimensional recommendations based on user studies.
6 Publication of BS 4330, recommendations for the co-ordination of dimensions in building, controlling dimensions.
7 Time programmed for essential reference publications to be made available in metric terms.
(So far only half the listed publications have been published with metric equivalents).
8 Time programmed for manufacturers to prepare technical information in metric equivalent terms (only 14% produced by July 1968).
9 Time programmed for the preparation of metric dimensional recommendations and British Standards for products for which dimensional co-ordination is essential.
10 Time programmed for the production of metric dimensional recommendations and British Standards for products dependent on item 9.
11 Time programmed for manufacturers to produce measuring instruments calibrated in metric terms.
12 Publication of PD 6249, estimate of timing for BSI work.
13 Publication of draft BS, site instruments for linear measurement, Part 1 gradation and figuring.
14 Establishment of functional group panels.
15 Publication of draft BS, joints and jointing.
16 Publication of draft BS (revision of BS 2900).
Glossary of terms.
17 Publication of draft BS (revision of BS 3626).
Tolerances and fits for building.

BSI/Building Centre

18 Pool of speakers gave 500 lectures in 18 months.

Decimal currency board

19 Publication of decimal currency, expression of amounts in printing, writing and speech.

Ministries

MPBW

20 Going Metric No. 1, Why and when.
21 Going Metric No. 2, Dimensional co-ordination.

MHLG

22 Design Bulletin No. 16, co-ordination of components in housing, metric dimensional framework.
23 Building regulations 1965, metric equivalents of dimensions.

Ministry of Health.

24 Design note No. 5, co-ordination of components for health buildings.

DES

25 Building bulletin No. 42, the co-ordination of components for educational building.

Associations, etc

RIBA

26 The architect and the change to metric.

RICS

27 Metric guide.
28 Standard method of measurement.

NFBTE

29 The change to metric, a guide to building contractors.

Construction Industry Training.

30 Re-training aids.
31 Recommendations for lighting building interiors.

IHVE

32 Change to metric, reference manual.

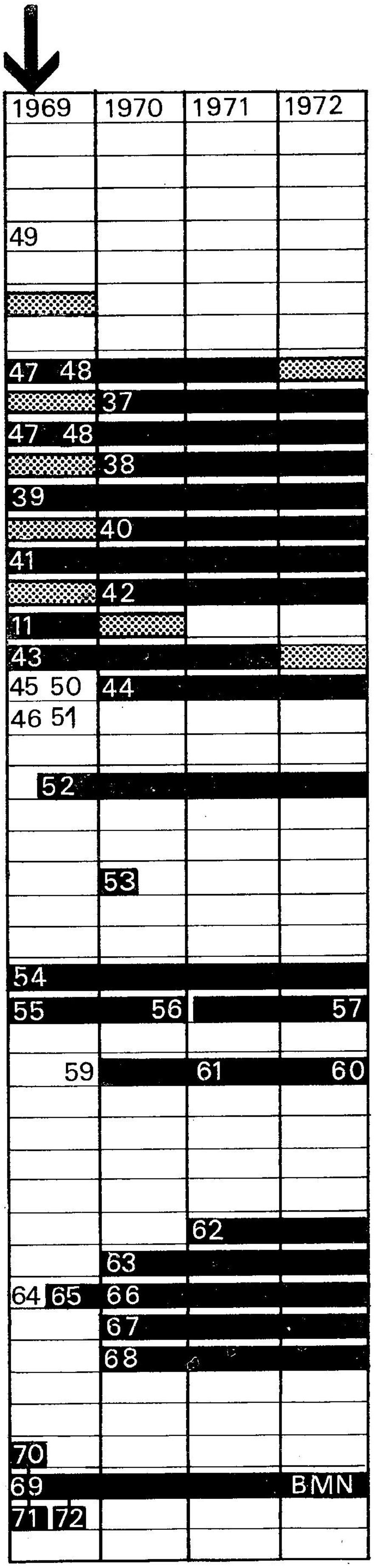
Architects Journal.

33 Metric handbook.

Building Metrication News

34 Start to publish with Modular Society.
35 First draft BS published.
36 First bibliography published.

BMN Building Metrication News



After 1 January 1969

British Standards Institution

37 Time programmed for manufacturers to change to full production of new dimensionally co-ordinated products (item 9 opposite).

38 Time programmed for manufacturers to change to full production of new dimensionally co-ordinated products (item 10 opposite).

39 Time programmed for the preparation of metric dimensional recommendations and British Standards for products not related to item 9.

40 Time programmed for manufacturers to change to full production of new dimensionally co-ordinated components (item 36).

41 Time programmed for the preparation of metric British Standards for products which only require sensible metric sizes and values.

42 Time programmed for manufacturers to change to full production of sensible metric size products.

43 *Time programmed for designers and quantity surveyors to change to the production of drawing and documents in metric terms.*

44 Time programmed for main contractors to change to construction based on metric drawings and documents.

45 Publication of revised BS for drawing office practice.

46 Publication of a PD: Arrangement of building components and assemblies within functional groups.

47 Draft BS for comment: Recommedations of functional group panels 1, 2 and 3.

48 Draft BS for comment: Recommendations of functional group panels 4 and 5.

49 Publication of PD 6031 revised.

50 Publication of a PD on Combination of sizes.

51 Publication of a PD on the present state of work on joints and tolerances.

BSI/Building Centre

52 Preparation of the authoritative list of new metric products.

Decimal currency board

53 Change to decimal currency.

Ministries

MPBW

54 New projects to be designed in metric measure.

MHLG

Scottish Development Department.

55 Before 1 January 1969 schemes at layout stage not to be metric.

56 Before 1 January 1970 schemes at tender stage not to be metric.

57 After 1 January 1972 all schemes to be metric.

58 Metric edition of building regulations.

Ministry of Health.

59 Schemes to go on ground before 1 January 1970 to be imperial.

60 Schemes to go on ground after 31 December 1972 to be metric.

61 Schemes falling between these dates to be reviewed individually.

Industry

62 **Cement industry:** deliveries as from 1 January 1971 to be in metric tonnes or 50 kg bags, invoices in decimal currency.

63 **Softwood:** from 1970 to be imported in metric sizes.

Steel reinforcement.

64 Before 1 March 1969 no metric size will be standard.

65 After 1 June 1969 metric size only to be rolled.

66 After 1 January 1970 metric sizes to be standard.

67 **Metal fixing association for ceilings:** change 1970.

68 **Gypsum plaster board:** change 1970.

Building metrication news

69 Publication fortnightly.

70 Publication of key components.

71 Publication of manufacturers technical information sheets for new metric products.

72 Publication of authoratitive lists of new metric products.

Key components

This is the 1st of a series of data sheets prepared by The Modular Society under the editorship of Brian Jolly, ARIBA, to be published monthly in BMN.

The Modular Society is concerned to bring about a concentration of resources within the manufacturing industry. As a result of practical experience of modular building a number of Key Components have been identified. These components taken together provide an inter-related set. The Society's view is that each Key Component should be included in its appropriate standard or manufacturer's range.
The Society's proposals for Key Components are put forward as a basis for discussion and are described in this article, which will be followed by data sheets for the Key Components listed below.

- Internal doorsets and door panels
- External doorsets and door panels
- Floor tiles
- Wall tiles
- Blocks
- Sheets
- Ceiling tiles
- Roof lights
- Ceiling panels
- Windowsets
- Windowpanels
- Partition panels
- External wall panels

The purpose of this introduction is to describe the nature of Key Components as an essential requirement for an inter-related vocabulary of building components. This will be followed by a series of data sheets to examine each Key Component in detail.

Dimensional standardisation

The objectives and theory of modular co-ordination have been established for a number of years. The present change to the metric system of measurement has provided the opportunities for their adoption in practice on a national scale. The current task is the standardisation of component sizes and the selection of appropriate modular sizes for each range of components.

British Standard ranges of sizes

The British Standards Institution is responsible for the planning of the metric change and the issue of British Standards for the ranges of metric co-ordinated component sizes. BS 4011: Recommendations for the co-ordination of dimensions in building; basic sizes for components and assemblies, and BS 4330: Recommendations for the co-ordination of dimensions in building; controlling dimensions, have already been issued. At present six Functional Group Panels are studying dimensional requirements for components. Their recommendations will be passed to Technical Committees whose job it will be to select sizes for inclusion in the metric revisions of British Standards. The recommendations will also be published for the information of manufacturers, in particular for those manufacturers of components for which no British Standard exists. It is not the responsibility of the Functional Group Panels to recommend ranges of sizes for specific components. This will be the job of the Technical Committees who will need to select ranges of reasonable extent to satisfy the recommendation.

Key components

Among the many components which are used in building there are some which are of particular significance in planning, if the co-ordination of sizes is to be achieved. Of necessity the ranges of sizes for these specific components must be of an extent to satisfy user requirements. Since these component ranges will be modular there will be a valuable degree of dimensional inter-relationship. In addition, however, within any range of components there will be certain sizes which relate directly to sizes in other ranges. These components taken together provide an inter-related set, and have been called Key Components. The Society's view is that each Key Component should be included in its appropriate standard or manufacturer's range. If these proposals are accepted, then the building component manufacturer will know that these components are likely to form the bulk of the demand. The building designer will know that within the ranges of component sizes on the market there is one particular set of sizes that will form the basis of a highly integrated range of components and that this range will be readily available in a wide variety of performances, finishes, costs, etc. The building contractor will know that there is a range of sizes which is compatible and which is likely, therefore, to reduce the difficulties encountered due to variations during the course of construction.

Various factors have been taken into account in determining the Key Components. Since each component has its own raison d'etre the factors vary according to the component under consideration. However, the size for a Key Component needs to be:

1. A modular metric size: the co-ordinated component size should be in accordance with the requirements of BS 4011, which are: first preference: multiples of 300mm. (a multi-module); second preference: multiples of 100mm. (the international basic module); third preference: multiples of 50mm. (a sub-module), up to 300mm.; fourth preference: multiples of 25mm. (a sub-module), up to 300mm.
2. Dimensionally co-ordinated with other Key Components: the co-ordinated component size should relate directly to the sizes of adjacent Key Components and, where applicable, to the sizes of controlling dimensions as set out in BS 4330.
3. Appropriate to the component in question: the co-ordinated component size should take account of user requirements, functional requirements, planning requirements, production requirements and building economics.
4. Compatible with current practice: the co-ordinated component size should be such that current methods of construction, handling and transport may continue to be employed. The size should fall within the range of sizes currently accepted for the component in question.
5. Compatible with recommendations of International Organisation for Standardisation (ISO).

Working papers

In the past few months there has been quite a lot of discussion about the need to establish a name for a category of working papers in which proposals are put forward, by one or more organisations, for general comment and discussion before being finalised. The Society's proposals come within this category and comments, criticisms or even approval would be welcomed.

Subject to comments received it would be the Modular Society's intention to feed this information into the British Standards Institution for consideration by the Functional Group Panels and in due course by Technical Committees. The Society is considering the possibility of producing practical notes on the many aspects of modular and dimensional co-ordination and if there are any subjects which you would like to see amplified or explained it would welcome suggestions. Please address any suggestions to the editor and if possible notes for guidance will be prepared.

BMN Building Metrication News

KEY COMPONENTS DATA SHEET

Internal doorsets and door panels

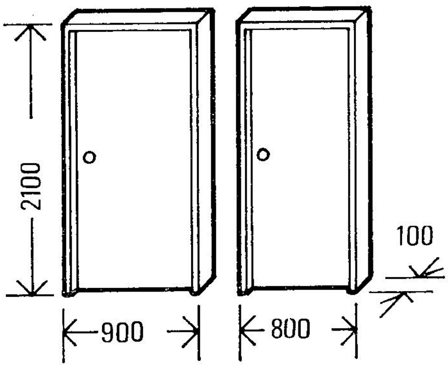
The purpose of this first data sheet is to present the proposals of the Modular Society for the Key internal doorsets and Key internal doorpanels which should be included in any manufacturer's range of these components, to justify their choice as Key Components and to demonstrate their use in current building practice.
Doorsets, encompassing not only the doorleaf but the frame and fittings as well, have only recently become available. These fall into two categories:

1 Those which embrace only the actual door opening.
2 Those which span from floor to ceiling.

To distinguish between the two, the term doorset is used to describe the former and doorpanel the latter. The most common type of door in use today is the single leaf side hung door. Since it is intended that a Key Component shall refer to the most common currently accepted component type, this data sheet is concerned primarily with this type of door.

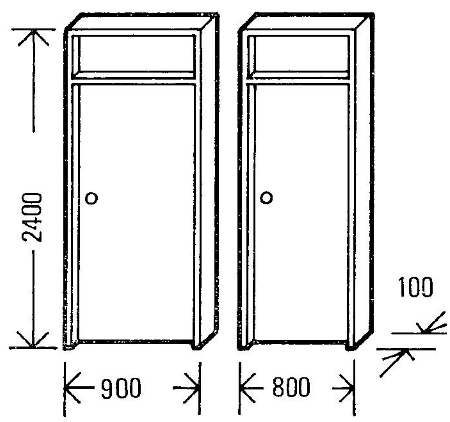
Key internal doorsets

A doorset consists of a doorleaf, frame and door furniture.



Key internal doorpanels

A doorpanel consists of a doorleaf, frame with fanlight and door furniture.

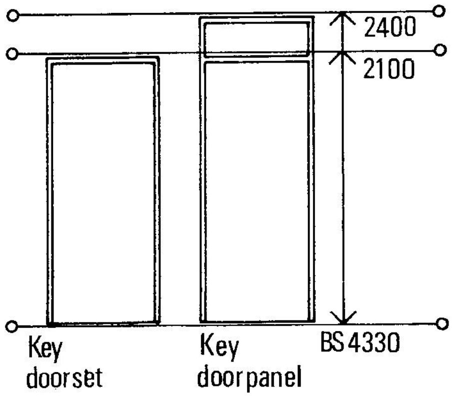


The Key doorsets and doorpanels are intended for light pedestrian traffic exclusively.

Heights

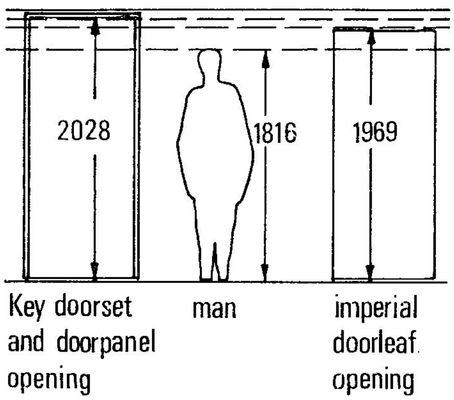
Both the doorset height of 2,100 mm and the doorpanel height of 2,400 mm are first preference metric sizes to BS 4011, being simple multiples of 300 mm. These heights also conform to ISO Draft Recommendations.
The doorset height of 2,100 mm conforms with the single intermediate controlling dimension for doorhead level recommendation of BS 4330. The doorpanel height of 2,400 mm conforms with the lowest floor to ceiling controlling dimension recommendation of BS 4330 which is a multiple of the BS 4011 first preference increment of 300 mm. The doorpanel transome should conform to the 2,100 mm intermediate controlling dimension in order that the door leaf sizes may be standardised.

(Illustration below shows doorset and doorpanel with controlling lines.)



Current imperial British Standards define the size of the door leaf and not the doorset. A single height of 6ft. 6in. (1,981 mm) is specified. This size in conjunction with a ½in. (12 mm) stop provides a clear opening height of 6ft. 5½in. (1,969 mm). The upper height limit of the 90 percentile range of the British male population is 1,816 mm. The Key doorset and doorpanel opening height is 2,028 mm, when based on the use of a 2,040 mm doorleaf height and 12 mm stop, which is 3% larger than the existing size.

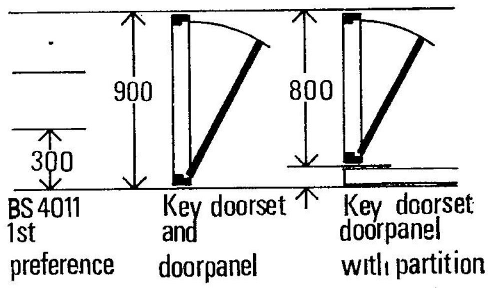
(Illustration below shows imperial door leaf, man, key doorset with heights.)



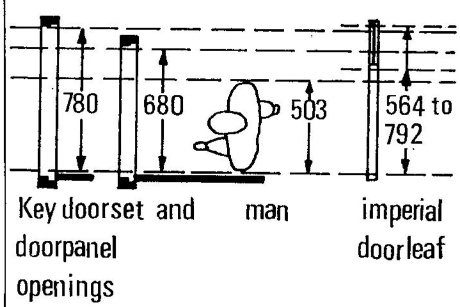
The doorset and doorpanel heights are co-ordinated with the requirements for partitioning. Where partitioning is required over a doorset, its height will conform to BS 4011.

Widths

The two widths for both doorsets and doorpanels conform to BS 4011. The 900 mm width is a first preference size and the 800 mm width a second preference size. These widths also conform with ISO Draft Recommendations.
The 900 mm width conforms directly to the BS 4330 planning grid increment of 300 mm. The 800 mm width relates to this increment in combination with the partition thickness of 100 mm.



The clear openings of the 900 mm and 800 mm component widths, based on the use of 826 mm and 726 mm doorleaf widths and 46 mm for the doorleaf thickness and top, are 780 mm and 680 mm respectively. Current imperial standard doorleaf widths range from 2ft. (610 mm) to 2ft. 9in. (838 mm), giving clear openings of 564 mm to 792 mm. The most common size is 2ft. 6in. (762 mm) giving a 761 mm clear opening. The upper elbow width limit of the 90%ile range of the British male population is 503 mm.

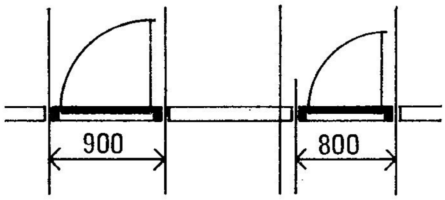


Thickness

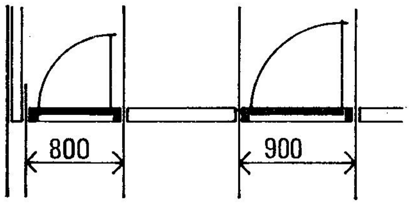
The single thickness of 100 mm for the doorset and doorpanels is a second preference metric size to BS 4011.
This thickness relates to a partition thickness of 100 mm which is likely to be the most commonly used.

Planning with Key internal doorsets and doorpanels

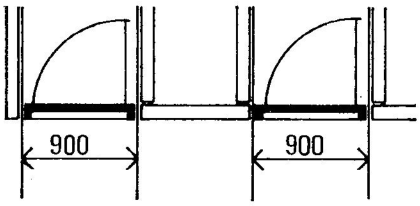
The two sizes of doorset and doorpanel are shown related, for convenience, to a planning grid of 900 mm.



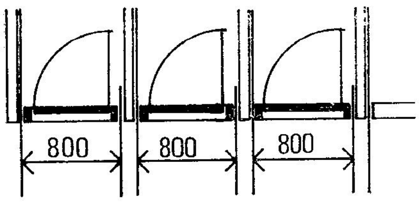
A straight run of partitioning including both 900 mm and 800 mm doorset or doorpanel sizes. The use of the 800 mm size in this condition requires a partition size of other than a simple multiple of the planning increment.
The existence of two sizes is important where the layout requires doorsets or doorpanels in combination with partition intersections in restricted areas.



An 800 mm size positioned in a corner where the partition and doorset or doorpanel are required to occupy the same planning grid space.



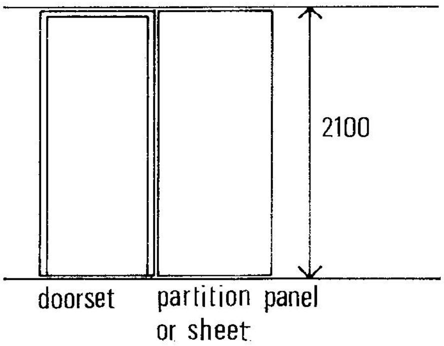
Two 900 mm sizes positioned in a complex partition layout.

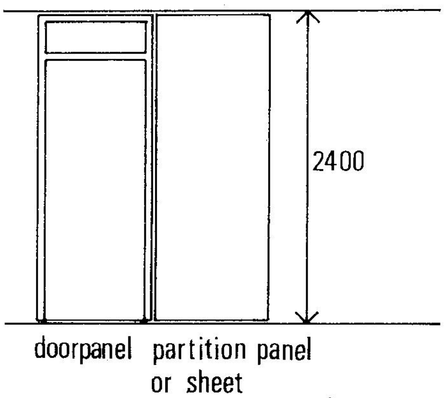


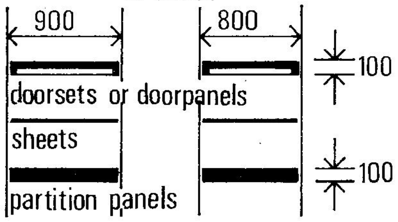
Three 800 mm sizes each positioned between partitions at right angles.

Co-ordination with other Key Components

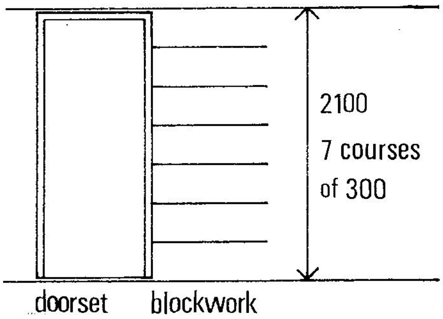
Partition panels and sheets

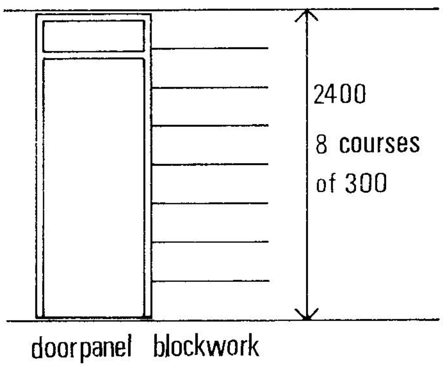


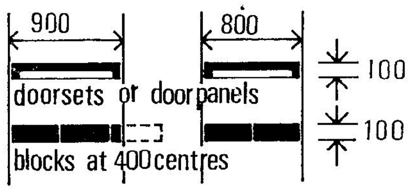




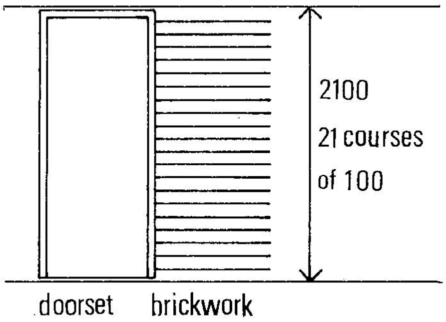
Blocks

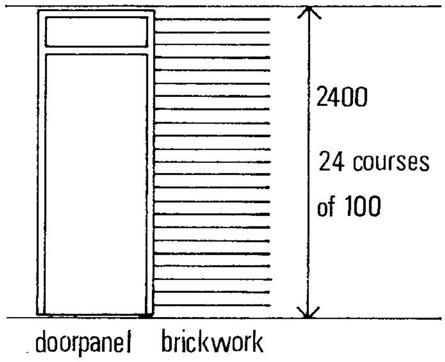


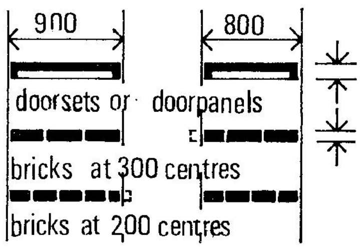




Bricks

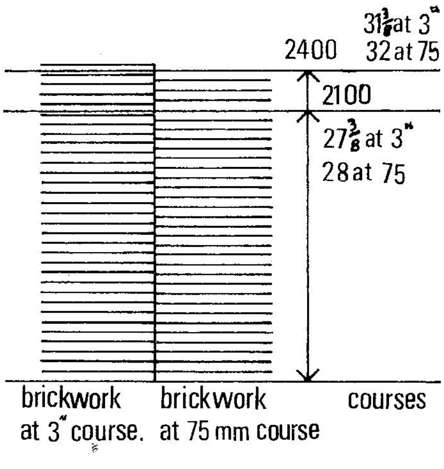






Co-ordination with imperial sizes bricks

Key doorsets and doorpanels will be required to fit openings in existing brickwork of four courses to the foot and in new brickwork using the 3in. brick at four courses to 300 mm. A non-standard lintel will be required for the former.



BMN
Building Metrication News

Metrication, the computer and SI

This is the fourth of a series of conversion tables compiled by R. M. E. Diamant and B. A. L. Hart which appears in this section each month. They are to be used like logarithmic tables, using a ruler to ensure clear distinction of the horizontal lines. The tables have been set with the help of the English Electric KD9F computer at the University of Salford.

Table 6

Kilonewton-metres to foot-tons.
1 kNm = 0.3292691 ft. ton.
Note: DIFF signifies single units so that the reading for any number required is taken at the intersection of the appropriate horizontal 10 unit line and the vertical single unit column.

DIFF	0	1	2	3	4	5	6	7	8	9
kNm					ft ton					
0		0.33	0.66	0.99	1.32	1.65	1.98	2.30	2.63	2.96
10	3.29	3.62	3.95	4.28	4.61	4.94	5.27	5.60	5.93	6.26
20	6.59	6.91	7.24	7.57	7.90	8.23	8.56	8.89	9.22	9.55
30	9.88	10.21	10.54	10.87	11.20	11.52	11.85	12.18	12.51	12.84
40	13.17	13.50	13.83	14.16	14.49	14.82	15.15	15.48	15.80	16.13
50	16.46	16.79	17.12	17.45	17.78	18.11	18.44	18.77	19.10	19.43
60	19.76	20.09	20.41	20.74	21.07	21.40	21.73	22.06	22.39	22.72
70	23.05	23.38	23.71	24.04	24.37	24.70	25.02	25.35	25.68	26.01
80	26.34	26.67	27.00	27.33	27.66	27.99	28.32	28.65	28.98	29.30
90	29.63	29.96	30.29	30.62	30.95	31.28	31.61	31.94	32.27	32.60
100	32.93	33.26	33.59	33.91	34.24	34.57	34.90	35.23	35.56	35.89
110	36.22	36.55	36.88	37.21	37.54	37.87	38.20	38.52	38.85	39.18
120	39.51	39.84	40.17	40.50	40.83	41.16	41.49	41.82	42.15	42.48
130	42.80	43.13	43.46	43.79	44.12	44.45	44.78	45.11	45.44	45.77
140	46.10	46.43	46.76	47.09	47.41	47.74	48.07	48.40	48.73	49.06
150	49.39	49.72	50.05	50.38	50.71	51.04	51.37	51.70	52.02	52.35
160	52.68	53.01	53.34	53.67	54.00	54.33	54.66	54.99	55.32	55.65
170	55.98	56.31	56.63	56.96	57.29	57.62	57.95	58.28	58.61	58.94
180	59.27	59.60	59.93	60.26	60.59	60.91	61.24	61.57	61.90	62.23
190	62.56	62.89	63.22	63.55	63.88	64.21	64.54	64.87	65.20	65.52
200	65.85	66.18	66.51	66.84	67.17	67.50	67.83	68.16	68.49	68.82
210	69.15	69.48	69.81	70.13	70.46	70.79	71.12	71.45	71.78	72.11
220	72.44	72.77	73.10	73.43	73.76	74.09	74.41	74.74	75.07	75.40
230	75.73	76.06	76.39	76.72	77.05	77.38	77.71	78.04	78.37	78.70
240	79.02	79.35	79.68	80.01	80.34	80.67	81.00	81.33	81.66	81.99
250	82.32	82.65	82.98	83.31	83.63	83.96	84.29	84.62	84.95	85.28
260	85.61	85.94	86.27	86.60	86.93	87.26	87.59	87.91	88.24	88.57
270	88.90	89.23	89.56	89.89	90.22	90.55	90.88	91.21	91.54	91.87
280	92.20	92.52	92.85	93.18	93.51	93.84	94.17	94.50	94.83	95.16
290	95.49	95.82	96.15	96.48	96.81	97.13	97.46	97.79	98.12	98.45
300	98.78	99.11	99.44	99.77	100.10	100.43	100.76	101.09	101.41	101.74
310	102.07	102.40	102.73	103.06	103.39	103.72	104.05	104.38	104.71	105.04
320	105.37	105.70	106.02	106.35	106.68	107.01	107.34	107.67	108.00	108.33
330	108.66	108.99	109.32	109.65	109.98	110.31	110.63	110.96	111.29	111.62
340	111.95	112.28	112.61	112.94	113.27	113.60	113.93	114.26	114.59	114.91
350	115.24	115.57	115.90	116.23	116.56	116.89	117.22	117.55	117.88	118.21
360	118.54	118.87	119.20	119.52	119.85	120.18	120.51	120.84	121.17	121.50
370	121.83	122.16	122.49	122.82	123.15	123.48	123.81	124.13	124.46	124.79
380	125.12	125.45	125.78	126.11	126.44	126.77	127.10	127.43	127.76	128.09
390	128.41	128.74	129.07	129.40	129.73	130.06	130.39	130.72	131.05	131.38
400	131.71	132.04	132.37	132.70	133.02	133.35	133.68	134.01	134.34	134.67
410	135.00	135.33	135.66	135.99	136.32	136.65	136.98	137.31	137.63	137.96
420	138.29	138.62	138.95	139.28	139.61	139.94	140.27	140.60	140.93	141.26
430	141.59	141.91	142.24	142.57	142.90	143.23	143.56	143.89	144.22	144.55
440	144.88	145.21	145.54	145.87	146.20	146.52	146.85	147.18	147.51	147.84
450	148.17	148.50	148.83	149.16	149.49	149.82	150.15	150.48	150.81	151.13
460	151.46	151.79	152.12	152.45	152.78	153.11	153.44	153.77	154.10	154.43
470	154.76	155.09	155.41	155.74	156.07	156.40	156.73	157.06	157.39	157.72
480	158.05	158.38	158.71	159.04	159.37	159.70	160.02	160.35	160.68	161.01
490	161.34	161.67	162.00	162.33	162.66	162.99	163.32	163.65	163.98	164.31

Table 6. Kilonewton-metres to foot-tons.
This table is to be used for the calculation of moments when designing steel and concrete structures. It can also be used for crane loading.

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Table 7

kilogramme metre^2 to pound foot^2

1 kg. m.^{2} = 23.7303661 lb. ft.^{2}

Note: DIFF signifies units of ten so that the reading for any number required is taken at the intersection of the appropriate horizontal 100 unit line and the vertical ten unit column.

DIFF	0	10	20	30	40	50	60	70	80	90
kg m^2					lb ft^2					
0		237	475	712	949	1187	1424	1661	1898	2136
100	2373	2610	2848	3085	3322	3560	3797	4034	4271	4509
200	4746	4983	5221	5458	5695	5933	6170	6407	6645	6882
300	7119	7356	7594	7831	8068	8306	8543	8780	9018	9255
400	9492	9729	9967	10204	10441	10679	10916	11153	11391	11628
500	11865	12102	12340	12577	12814	13052	13289	13526	13764	14001
600	14238	14476	14713	14950	15187	15425	15662	15899	16137	16374
700	16611	16849	17086	17323	17560	17798	18035	18272	18510	18747
800	18984	19222	19459	19696	19934	20171	20408	20645	20883	21120
900	21357	21595	21832	22069	22307	22544	22781	23018	23256	23493
1000	23730	23968	24205	24442	24680	24917	25154	25391	25629	25866
1100	26103	26341	26578	26815	27053	27290	27527	27765	28002	28239
1200	28476	28714	28951	29188	29426	29663	29900	30138	30375	30612
1300	30849	31087	31324	31561	31799	32036	32273	32511	32748	32985
1400	33223	33460	33697	33934	34172	34409	34646	34884	35121	35358
1500	35596	35833	36070	36307	36545	36782	37019	37257	37494	37731
1600	37969	38206	38443	38680	38918	39155	39392	39630	39867	40104
1700	40342	40579	40816	41054	41291	41528	41765	42003	42240	42477
1800	42715	42952	43189	43427	43664	43901	44138	44376	44613	44850
1900	45088	45325	45562	45800	46037	46274	46512	46749	46986	47223
2000	47461	47698	47935	48173	48410	48647	48885	49122	49359	49596
2100	49834	50071	50308	50546	50783	51020	51258	51495	51732	51970
2200	52207	52444	52681	52919	53156	53393	53631	53868	54105	54343
2300	54580	54817	55054	55292	55529	55766	56004	56241	56478	56716
2400	56953	57190	57427	57665	57902	58139	58377	58614	58851	59089
2500	59326	59563	59801	60038	60275	60512	60750	60987	61224	61462
2600	61699	61936	62174	62411	62648	62885	63123	63360	63597	63835
2700	64072	64309	64547	64784	65021	65259	65496	65733	65970	66208
2800	66445	66682	66920	67157	67394	67632	67869	68106	68343	68581
2900	68818	69055	69293	69530	69767	70005	70242	70479	70716	70954
3000	71191	71428	71666	71903	72140	72378	72615	72852	73090	73327
3100	73564	73801	74039	74276	74513	74751	74988	75225	75463	75700
3200	75937	76174	76412	76649	76886	77124	77361	77598	77836	78073
3300	78310	78548	78785	79022	79259	79497	79734	79971	80209	80446
3400	80683	80921	81158	81395	81632	81870	82107	82344	82582	82819
3500	83056	83294	83531	83768	84005	84243	84480	84717	84955	85192
3600	85429	85667	85904	86141	86379	86616	86853	87090	87328	87565
3700	87802	88040	88277	88514	88752	88989	89226	89463	89701	89938
3800	90175	90413	90650	90887	91125	91362	91599	91837	92074	92311
3900	92548	92786	93023	93260	93498	93735	93972	94210	94447	94684
4000	94921	95159	95396	95633	95871	96108	96345	96583	96820	97057
4100	97295	97532	97769	98006	98244	98481	98718	98956	99193	99430
4200	99668	99905	100142	100379	100617	100854	101091	101329	101566	101803
4300	102041	102278	102515	102752	102990	103227	103464	103702	103939	104176
4400	104414	104651	104888	105126	105363	105600	105837	106075	106312	106549
4500	106787	107024	107261	107499	107736	107973	108210	108448	108685	108922
4600	109160	109397	109634	109872	110109	110346	110584	110821	111058	111295
4700	111533	111770	112007	112245	112482	112719	112957	113194	113431	113668
4800	113906	114143	114380	114618	114855	115092	115330	115567	115804	116041
4900	116279	116516	116753	116991	117228	117465	117703	117940	118177	118415

Table 7. Kilogramme metre^2 to pound foot.^{2}

To be used for the calculation of moment of inertia, the so-called 'fly-wheel effect,' and similar purposes.

BMN Building Metrication News

Measuring instruments and their metric graduation

by Clifford Walls
(British Standards Institution)

The programme for the change to the metric system in the construction industry was published by the British Standards Institution in February 1967. This programme required the early availability of site measuring instruments, graduated and figured in a metric form.

At first sight this might have appeared to be no great problem, as metrically graduated instruments have long been produced, for export to Europe and other countries, by British manufacturers. Imported measuring tapes and levelling staffs have also been—and still are—readily available from British suppliers.

However, the United Kingdom is changing to the metric system at a time when a rationalised system of metric units, the Système International d'Unités (SI) is coming into international use. In this system the centimetre and the decimetre are non-referred submultiples of the metre, and therefore should not be used for denoting measurement or dimension.

Already some 25 countries, including major European countries, have passed, or are preparing, legislation to make the SI the only legal system of measurement. The United Kingdom has, therefore, a unique opportunity in being the first country to change directly from the old imperial system of measurement to a coherent form of metric system, without having to pass through any intermediate stage.

The acceptance by the UK of SI units is the basis upon which the detail of all metric changes, now being coordinated by BSI, is being made. Building specifications, drawings, measurements, etc., must all relate to this common factor. It is essential, therefore, that the method of marking measuring instruments accords with the manner in which the dimensions appear on the drawings, and that these, in turn, are compatible with the use of SI units, as specifically laid down in the construction industry.*

A specification for the metric graduation of constructional site measuring instruments is currently being produced by a Technical Committee at BSI, and it is hoped that a standard will be published in the spring.

It is very probable that the standard will be produced in two parts. Part 1, because of the urgency, will deal only with specifying the form of graduation and figuring on the most commonly used constructional site measuring instruments. Part 2 will be published later and will deal with all the performance aspects of the instruments, including accuracy. In the meantime, where accuracy is a consideration, reference can be made to BS 4035 'Specification for linear measuring instruments for use in building and civil engineering constructional works.' Accuracy in building is also the subject of a Code of Practice which is shortly to be published.

The opportunity afforded by the need to consider the implications of a new form of graduation has meant that consideration can also be given to the ergonomics of scale layout, and thus to require the instruments to be such as can be read with the maximum simplicity and speed, but with minimum observational error.

Reduction of variation

Studies have shown that, even in a simple imperially graduated instrument such as the boxwood folding rule, there is a great variation between instruments in the manner in which they are figured and graduated. Whilst there are accepted conventions with regard to the division of the units of measurement (1in., $\frac{1}{2}$in., $\frac{1}{4}$in. and $\frac{1}{8}$in.), variations in length and width of graduation mark and the size, thickness and shape of figuring result in a proliferation of instruments varying greatly in their general appearance. Purchasers seem to have their own 'favourites' but this is probably more due to their preference for staying with an instrument which they are used to than selection based upon ergonomic study.

The publication of the new British Standard on graduation and figuring will, therefore, tend to reduce this variety of presentation. There will be a 'sameness' in the appearance of instruments which—it is hoped—will lead to quicker and more accurate reading.

* BSI Document PD 6031, 2nd Edition, 1968. 'The use of the metric system in the construction industry.'

Current thinking

The following description of graduations and figuring of instruments reflects the current thinking of the BSI Committee, but it must not be assumed that decisions so far made may not be changed, or that there will not be requirements in the published document beyond those here given. However, it is thought that the general requirements will be adhered to and any alterations will only be in detail.

One of the main problems, which exercised the early attention of the Committee, related to the number of digits which could appear together, to signify the value of a particular graduation mark, without detracting from the clarity of the instrument. This was particularly important in instruments figured in millimetres. It was decided that three digits was the maximum that could be accommodated. Instruments graduated in millimetres, therefore, which are in excess of one metre in length, should repeat the form of figuring used in the first metre, but with the inclusion of 'quick reading' figures, at every 100mm. interval, to denote in which metre the millimetres are being read (see Fig. 1). This, of course, is similar to the principles currently used in imperial steel tapes.

On the other hand, instruments divided into metres require only the metre numeral and the first decimal place to be figured at each 100mm. interval. Unfigured graduations can then be used for determining the second decimal place, and, when necessary, interpolation will give the third decimal place (see Fig. 2). This form of configuration lends itself to a remarkably clear and uncluttered appearance of the instrument, without detracting from its accuracy or leading to observational error.

Five categories

Generally, then, instruments covered by the Standard will broadly fall into five categories: (1) boxwood instruments, including folding rules, laths, folding and multi-folding rods and graduated squares; (2) steel pocket rules; (3) measuring tapes, including coated and etched steel and synthetic material tapes; (4) land chains and studded band chains; and (5) levelling staffs.

The millimetre has been taken as the basis for the form of numeration used on boxwood instruments, and on pocket

(concluded on page 129)

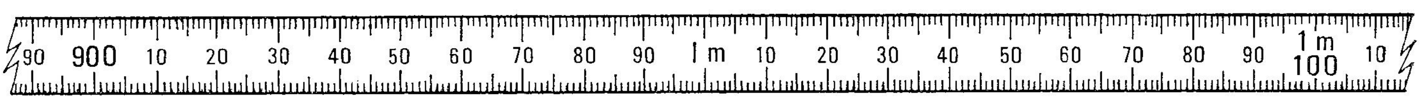
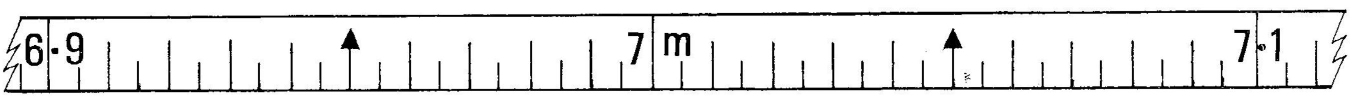


Fig. 1, above, portion of millimetre-figured instrument (e.g. boxwood lath)

Fig. 2, below, portion of metre-figured instrument (e.g. coated steel tape)



Moving into metric

The rôle of BSI and Michael Clarke

Like the moon project, with which there may sometimes have been a whimsical comparison, the building industry's change to metric is off the launching pad. This month, architects have started to design in metric. If all goes according to plan, the changeover will have been largely completed by the end of 1972.

Getting metric into orbit has been the responsibility of the British Standards Institution, and in particular Michael Clarke, the 30-year-old architect who is co-ordinator for the metric change in the construction industry. Clarke's qualifications when he first came to BSI 3½ years ago look tailor-made for his present post. Three years working around Europe for the BEA had already generated an interest in metric. Subsequently he spent a year as Research Architect with Truscon Ltd., when involvement with the company's two industrialised building systems convinced him of the need for an overall dimensional co-ordination policy. It was, in fact, as dimensional co-ordinator that he was first appointed to BSI. Within weeks he had the metric change added to his duties and became the overall co-ordinator for the construction industry.

The start

The initial impetus for the changeover had come from the FBI who, in February 1965, after two polls of its members, wrote to three Ministers urging the adoption of the metric system. This was accepted by the Government in May 1965, surprisingly, in view of its significance, not by a general debate but by a statement by Douglas Jay, then President of the Board of Trade, in an answer to a question in the House. With BSI's special relationship with industry, they were the logical choice as supervisors of the change. What, on the face of it, was less understandable was that the building industry should emerge as pioneers of going metric. Its interests in exports, which had been the cornerstone of the FBI's case for going over to metric, were negligible; what provided the impetus was the once for all opportunity, since changes in size were going to be necessary anyway, to adopt dimensional co-ordination, and thus gain the benefits of mass production of components and easier site assembly.

Even so the issue was not always clear-cut. Under the Building Divisional Council a Metric Panel (B/-/9) was set up under the chairmanship of E. J. Cook. Their first task was to send out a questionnaire to about ten major heads of industry. This was to find out their reaction to metric and establish whether the industry was prepared to make the change. During these early periods of discussion, two divergent opinions on dimensional co-ordination emerged. One was that metric was unimportant whereas d.c. was; the other that d.c. was nearly impossible and that metric had to happen first. 'Neither,' says Clarke, 'was a satisfactory approach' but under Cook's vigorous chairmanship a very quick decision was taken to incorporate both. The replies to the initial questionnaire almost made it look like a rigged exercise says Clarke. There were no dissenters either from going metric or adopting dimensional co-ordination.

Following this a more detailed and searching questionnaire was compiled and, in March 1966, sent to about 200 organisations. The response—some 120 replies—showed evidence of considerable interest: a cockshy programme which was included 'with the idea that it could be shot down,' says Clarke, was particularly liked. 'It gave people something to have a go at.'

Getting out the programme

The pressure to get out a programme was now on. The replies to the second questionnaire were collated by Clarke into a manageable form. The Metric Panel were holding weekly meetings and it was also arranging talks all over the country—primarily, admits Clarke, to pick peoples' brains and to gauge their response to going metric. Again some 200 organisations were circulated and the draft Programme was also available to anyone that wanted it. The response not only confirmed the correctness of the original information but also, from the hundreds of individual replies received, revealed a growing enthusiasm for the metric project.

A matrix of all the replies was made during the winter and in February 1967 the 'Programme for the change to metric in the construction industry,' a document that has come to be the bible of the metric change, made the first of its many appearances. At the same time some guidance on the metric system itself was needed and this was provided with the publication of PD 6031. This, says Clarke, has held up fairly well, its current revision being made necessary by the DCB's decimal marker decision, which ran counter to BSI advice.

Dimensional co-ordination

The basis for the other half of the operation, dimensional co-ordination, had been established in 1966 with the publication of BS 4011, under a committee chaired by Roger Walters. This has been described as one of the smallest but most valuable Standards ever produced; it established an order of preferences for dimensional sizes with 300mm. as the first preference. Further progress now depended on getting agreement between the designers and the manufacturers (i.e. what was needed and what could be made) and between February and June 1967 most of the time was spent building the structure of B/94/4, the BSI committee that was to guide the dimensional co-ordination programme, and setting up the five Functional Group Panels. With the important document, BS 4330: Controlling Dimensions available to them since last December, these panels have been engaged in working out basic spaces into which the new metric components will fit. Looking back, Clarke is astounded that it was done within the time schedule. 'Probably what tipped the scales was that everyone knew that if the chance was lost, it would never recur.'

Fortune and finance

In fact, that the entire operation—the most fundamental change ever undertaken by the building industry—should take only 3½ years to get to the launching pad looks little short of a miracle. Clarke, however, admits to some good fortune. 'We were lucky,' he says, 'to have some fairly high powered brains from industry involved in the programming. At times of boom these men would not have been available but the last four or five years have been a period of holding back and, as a consequence, they have been released to BSI.' In particular Clarke was obviously impressed by the late E. J. Cook, the first chairman of the Metric Panel—'a brilliant man, able to judge exactly what industry could and couldn't do.'

The second piece of good luck has been that the team working on metric at BSI is a young and healthy one. Clarke cannot praise their work highly enough. 'They have been under continual pressure for a long period—to hold the job down some members have even had to resort to breakfast meetings—and if they had not been able to stand the strain the Programme could never have been pushed through.

More finance (i.e. more staff) would have eased this worry but appeals for increased subscriptions from industry have drawn a disappointing response. Clarke is clearly unhappy that from the beginning of this year the construction group has had to abandon their Advisory Information Service. 'We don't want to stop it. We have the information available. But with the best will in the world we simply can't cope with it.'

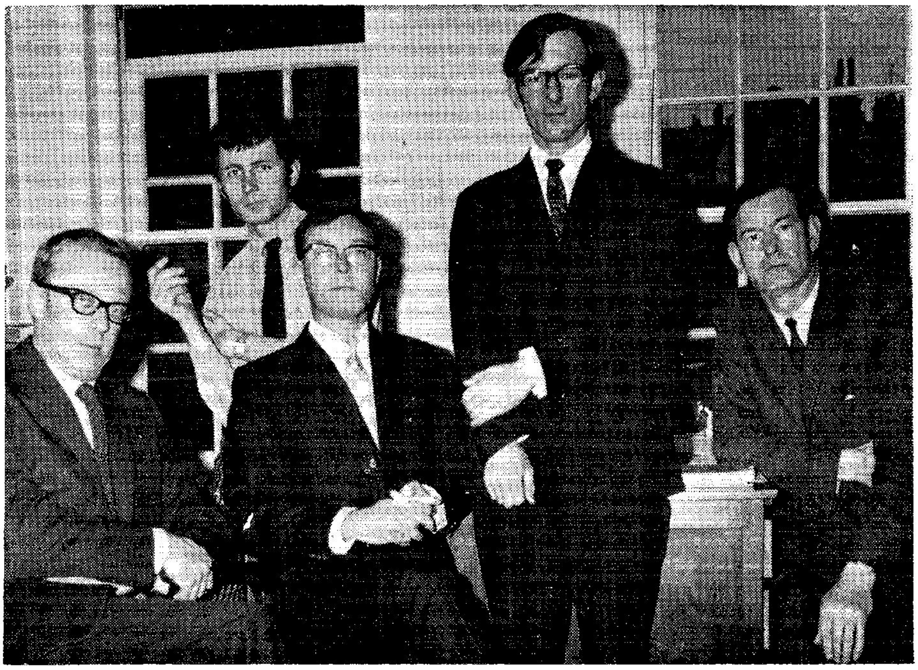
It is unlikely now that a similar service can be set up by anyone else before the summer. 'Yet,' says Clarke, 'if three or four appointments had been made a year ago, we could have continued to run the service much more cheaply than it will cost to set up a new one.'

He is also concerned about the future of BSI. 'We have now done all our sums and we know it will take some four years to metricate all building components. That, plus the new Codes of Practice necessitated by the Ronan Point disaster plus the work of the

Functional Group Panels is going to take up our total resources. But industry will expect BSI to take up new projects, up-date standards, introduce performance specifications and so on. This is all very laudable but I am afraid that they may lose patience with BSI when they find we don't have time to do it and turn to someone else. In a way, by pushing through metric now we may be mortgaging our future.'

Restructuring

Clarke, as Group Manager of the construction side, has in fact a staff of 24, almost all currently engaged on metric. Not long after joining BSI he was put in charge of both the Building Division and the Codes of Practice Division—which up to then had had no link—with the object of welding them together. This was a reflection of the trend towards performance standards in functional terms as opposed to the old standards where materials were streamed according to origin, in other words the emphasis has shifted to what the designer wants to achieve, not just what suits the material. The restructuring that has now taken place divides the Construction Group into four sections: structure, architectural, services, and building science and civil engineering, with Colin Henry as the co-ordinator of the Functional Group Panels. 'Our work on metric' says Clarke, 'has certainly accelerated the change but it would have come about anyway. On the change itself Clarke is emphatic that it has been a good thing. 'By jumping in first, the building industry has been able to dictate the course of events far more than if we had waited to follow other industries. What is more, although there was never any impetus from export potential—it never featured in any of the questionnaires or in discussion—it can now be seen that with more sophisticated methods of building, an overseas market could be built up. We shall be in a very good position by 1970' predicts Clarke. 'We will have had to have made changes to dimensional coordination by then and for two or three years British manufacturers of modular components should have a considerable advantage over their European counterparts, who are not under the same compulsion to make the change. Designers too will have had considerable experience in working with dimensional coordination and will be in a good position to do designs abroad. Thus we may get an export fillip which was never in our minds at the outset.'



Members of the BSI team working on the metric change, from left to right: George Robertson, secretary to Functional Group Panel 2; Colin Henry, FGP3 secretary and co-ordinator; Bob Harrison, secretary to the Metric Panel (B/—/9); Eric Keeble, FGP1 secretary; and Ray Mills, FGP4 secretary. Clifford Walls, secretary to FGP5, was not available when our picture was taken.

On target

At the present time Clarke is satisfied that, by and large, we are on target. Progress in the future, he feels, is dependent on professional organisations getting more involved and directing their members—'it was disappointing to see only the briefest mention of metric in the recent reports of RIBA's four boards.' These 'outer rings,' as Clarke terms them, should now be taking up the programme. BSI, which has for so long been the hub of the metric change still has to get out recommendations on dimensional coordination, and there are some documents to be published on the important subjects of tolerances and accuracy (expected in February) and jointing (where difficulties in getting research work done have been experienced). But, says Clarke, BSI's role is now more the progress chaser than that of the operator. 'If everybody cooperates and sticks to the programme we should be home and dry by 1972.'

MEASURING INSTRUMENTS AND THEIR METRIC GRADUATION

(concluded from page 127)

rules. Thus these instruments should be figured in millimetres and graduated with fine graduations of one millimetre on one edge of the instrument and coarse graduations of five millimetres on the other.

Measuring tapes should be divided into metres with the decimal part of the metre figured at every 100mm. graduation mark. Steel tapes should be further graduated at 100mm. and 5mm. intervals, and the first and last metre should be finely graduated with 1mm. graduation marks; 5mm. and 1mm. graduation marks should not appear on the synthetic materials taps.

Land chains should be in lengths of 20 metres and be composed of links 200mm. in length, tallied probably at every two metres.

Studded band chains should also be in lengths of 20 metres, and should be divided by brass studs at every 200mm. point and figured every five metres. The first and last metre should be further divided into 10mm. intervals. The markings should appear on both sides of the band.

It is expected that two alternative forms of levelling staff configuration will be included in the standard. Both of these will probably be divided into graduation marks 10mm. wide, the first following the 'Sopwith' tradition, and the second based upon the commonly used European 'E-type.'

Field trials

Field trials have already been carried out with some of these instruments. The results, although in no way conclusive in detail, have indicated that the fear expressed in some quarters—that many operatives, used to imperially graduated instruments, will find difficulty in using metrically graduated instruments—is most probably groundless.

COMING EVENTS

The following lectures on the Change to Metric have been arranged by MPBW's Directory of Research and Information:

Wednesday, 15 January
Edinburgh. Speakers: R. S. G. Nicol (Ove Arup & Partners) and A. M. Graham (Scottish Development Department) at Royal Scottish Museum lecture theatre, 7.30.

Tuesday, 21 January
Newport. Speaker: C. P. Travis (Borough Architect's Department, Newport) at the Ballroom, Westgate Hotel, Commercial-street, 7.30.

Wednesday, 22 January
Wakefield. Speaker: A. G. Murcett (Shepherd Design Group) at the Technical and Art College, Margaret-street, 7.15.
Taunton: Instruments for site measurement in metric terms. Speaker: W. J. Pinfold (Building Research Station) at Taunton Technical College, Wellington-road.

Hand this to your secretary

In this open letter to your secretary about the change to metric, Mr. Man-in-the-Construction-Industry, Gillian Stoba (Secretary to Philip Dunstone) points out some of the typographical pitfalls in the path of those who pound the keyboard. She infers, quite rightly, that the correct use of metric expressions will lie mainly in the hands of those who do your typing.

METRIC

	Units and Correct Representation		Notes
Length	metre	m	
	millimetre	mm	
Area	square metre	m^2	Acceptable alternative is sq m
	hectare	ha	
Volume	cubic metre	m^3	Acceptable alternative is cu m
	cubic millimetre	mm^3	
	litre	l	Avoid l (write litre in full)
Mass (weight)	tonne	t	Avoid t (write tonne in full)
	kilogramme	kg	
	gramme	g	
Time	second	s	
Electric Current	ampere	A	
Temperature	degree Celsius	^oC	(Correct name for Centigrade)
Luminous Intensity	candela	cd	
Force	newton	N	
Energy	joule	J	
Power	watt	W	
Electrical Potential	volt	V	
Illumination	lux	lx	
Density	kilogramme per cubic metre	kg/m^3	/ = per
Velocity	metre per second	m/s	
Pressure, Stress	newton per square metre	N/m^2	
Thermal Conductivity	watt per metre degree Celsius	W/m degC	temperature reading = ^oC temperature interval = degC
Luminance	candela per square metre	cd/m^2	
Heat Transfer	watt per square metre degree Celsius	W/m^2 degC	
Prefixes	mega	M	1000000
	kilo	k	1000
	hecto	h	100
	deca	da	10
	deci	d	0.1
	centi	c	0.01
	milli	m	0.001
	micro	μ	0.000001
Quantities	3333 metres	3333 m	
	3 millimetres	3 mm	
	99 kilogrammes	99 kg	
	38744 hectares	38744 ha	

Dear Miss Secretary

If your boss, in spite of your ministrations, is going around with a preoccupied look muttering what sounds like 'newton' under his breath, it's not that he has suddenly become obsessed with gravity but, probably, because he has started to think about METRIC.

From now on an increasing volume of metric expressions is going to appear in his letters, reports, and all his paper work. 'Will this affect me?' did you say? Well really! You should know by now that it is *you* not him who will take the brunt of *any* change!

He, poor darling, will not know whether kg or KG is correct—and care less! It will be for you, as usual, to put him right. Not only, as always, to make impeccable prose out of strangulated syntax, but to unscramble his metric symbols too.

But first I must tell you, in case you don't know, what all this metric change is about. Influenced by British industry, the Government has announced its support for metric, and building is the first major industry to make the change. In February 1967 British Standards Institution, the key organisation in this operation, issued a programme which shows that, beginning now and continuing in 1970, 1971 and 1972, the design and execution of building and civil engineering projects will change to the metric system of weights and measures. BSI have recently published a revised edition of their Guide (PD 6031, 2nd Edition, 1968) and it is this which will be your bible. Why? Because it tells you how metric expressions are to be written. Getting these right is going to be vital to good communications and only by keeping to the rules shall we avoid errors.

You will agree with me, of course, that there's no middle course with bosses; either they couldn't care less or they become frantically pedantic about a thing. Mine has become the latter since he has been 'playing' (my quotes) with metric. In self defence, I've had to make a cheat chart. I've re-written it for you and suggest you cut it out and pin it on the wall. I've tried to keep it to the essentials.

Summarising, the golden rules are:—

1. Symbols must be given as shown. 1.1 *No full stops* etc. may be used with symbols. 1.2 The same symbol is for *singular and plural.* 1.3 *Correct case* of type (mm not MM).
2. Try to *use indices* (m^2 and m^3) rather than the acceptable alternatives of 'sq m' and 'cu m.'
3. *Do not hyphenate* a unit (millimetres, NOT milli-metres).
4. There must be a *single space* after the figures and before the symbol.
5. The decimal marker is the *point.* Write it in the middle if you can (0·03) but otherwise type the full stop 0.03).
6. *Do not use a thousands marker* unless you have to; then use the gap NOT the comma. eg 99874 all blocked together but 1 000 000 perhaps).
7. Use 0 before the decimal point where the quantity is les than unity.
8. Whole numbers may be given without a decimal point.
9. Units must not be mixed (eg 50.752 kg NOT 50 kg 752 g).
10. Always write a unit etc. in full if there is the slightest chance of ambiguity (eg litres, NOT l).

Decimalised money comes in on 15 February 1971 and is quite separate from the metric change; the rules for expressing it are to be found in a Decimal Currency Board publication. Better still see *Metric Memo,* 'Building,' 20 December **1968.**

The best of luck with your boss's conversion; do treat him gently over this difficult time!

Yours symbolically.

Gillian Stoba

BMN Building Metrication News

Building System: A75

A H Anderson Ltd

CI/SfB /(9–)/ /(E1j)

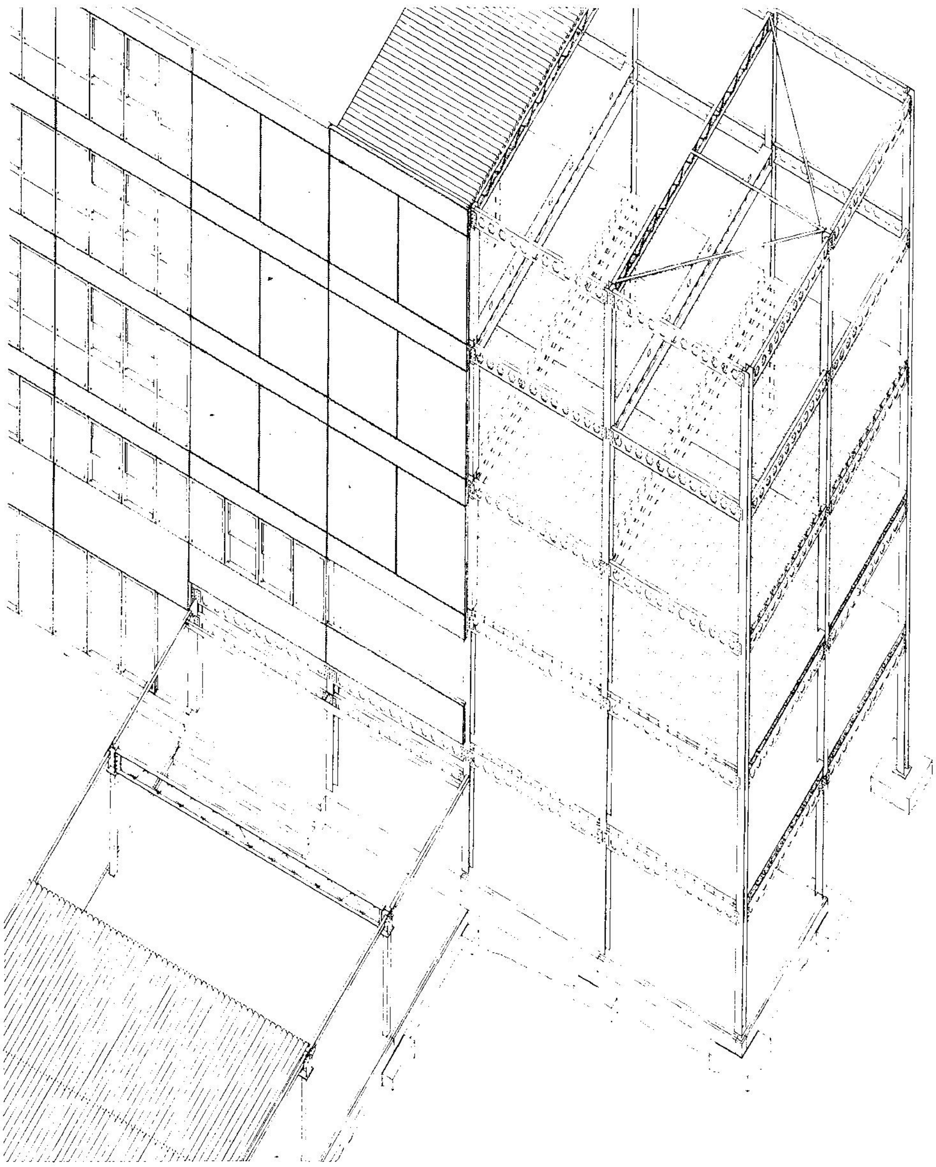
BMN technical information sheet
January 1969

A75 component building

A75 is a system of component building for structures up to five storeys in height complying with The Building Regulations 1965 and other relevant statutory controls.

It is designed to metric dimensions in accordance with the recommendations of BS 4011:1966, Basic Sizes for Building Components and Assemblies. All co-ordinating sizes of components, sub-assemblies and elements are multiples of the basic module M = 100 mm.

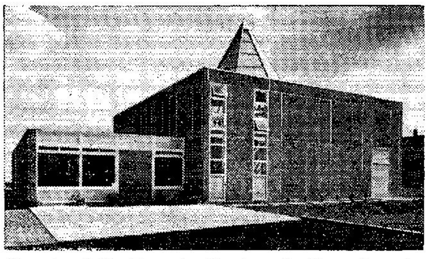
The use of A75 Metric components and elements helps the process of metric familiarisation during the period that the construction industry is co-ordinating its efforts for the change to the metric system. Metric dimensions only apply to the shell of the building, and imperial dimensions can, if necessary, be used for all elements and components, except those provided by A. H. Anderson Limited. So far as the builder is concerned, only the setting out of the building is affected, and the only new instrument required is a metrically calibrated steel tape.



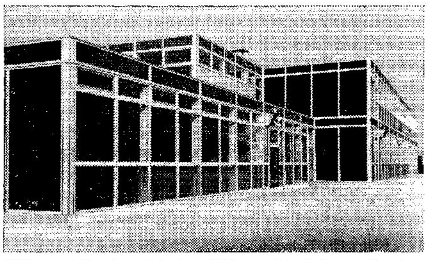
A. H. Anderson Ltd.

A. H. Anderson Limited was founded in 1955 for the purpose of developing and promoting systems of industrialised building. The A75 system was originally developed as an all timber system applicable up to two storeys in height, based on 6ft. 3in. (75in.) structural and planning grid. In 1959 lattice steel beams were adopted in place of box timber, and a steel frame and concrete floor were developed in order to take the system up to five storeys in height.

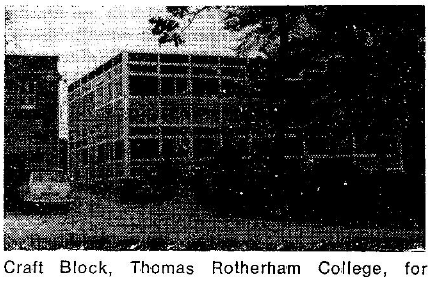
In 1965 it was decided to review the A75 system and to bring it into line with the latest developments in both building technology and dimensional co-ordination. The result is the A75 system of component building which, while breaking new ground in design, is based on 13 years' practical experience with the original system.



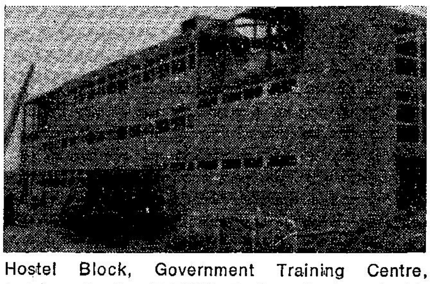
Church of St. Francis, Duston, Northampton, for the Diocese of Peterborough. Architects: Seely & Paget.



Office Block, Post Office Training Centre, Bletchley, for MoPBW, Southern Region. Architect: D. G. Wye, Dip.Arch, ARIBA, Superintending Architect.



Craft Block, Thomas Rotherham College, for the County Borough of Rotherham. Architects: Hadfield, Cawkwell, Davidson and Partners.



Hostel Block, Government Training Centre, Letchworth, for MoPBW, Eastern Region. Architect: G. D. Hamilton, ARIBA, Senior Architect.

BMN Building Metrication News

Building System: A75

A H Anderson Ltd

CI/SfB /(9–)/ /(E1j)

BMN technical information sheet
January 1969

A75 standard components

The A75 standard components comprise the following:

Precast concrete edge beam: as shown.

Structural frame: fabricated from normal rolled steel sections.

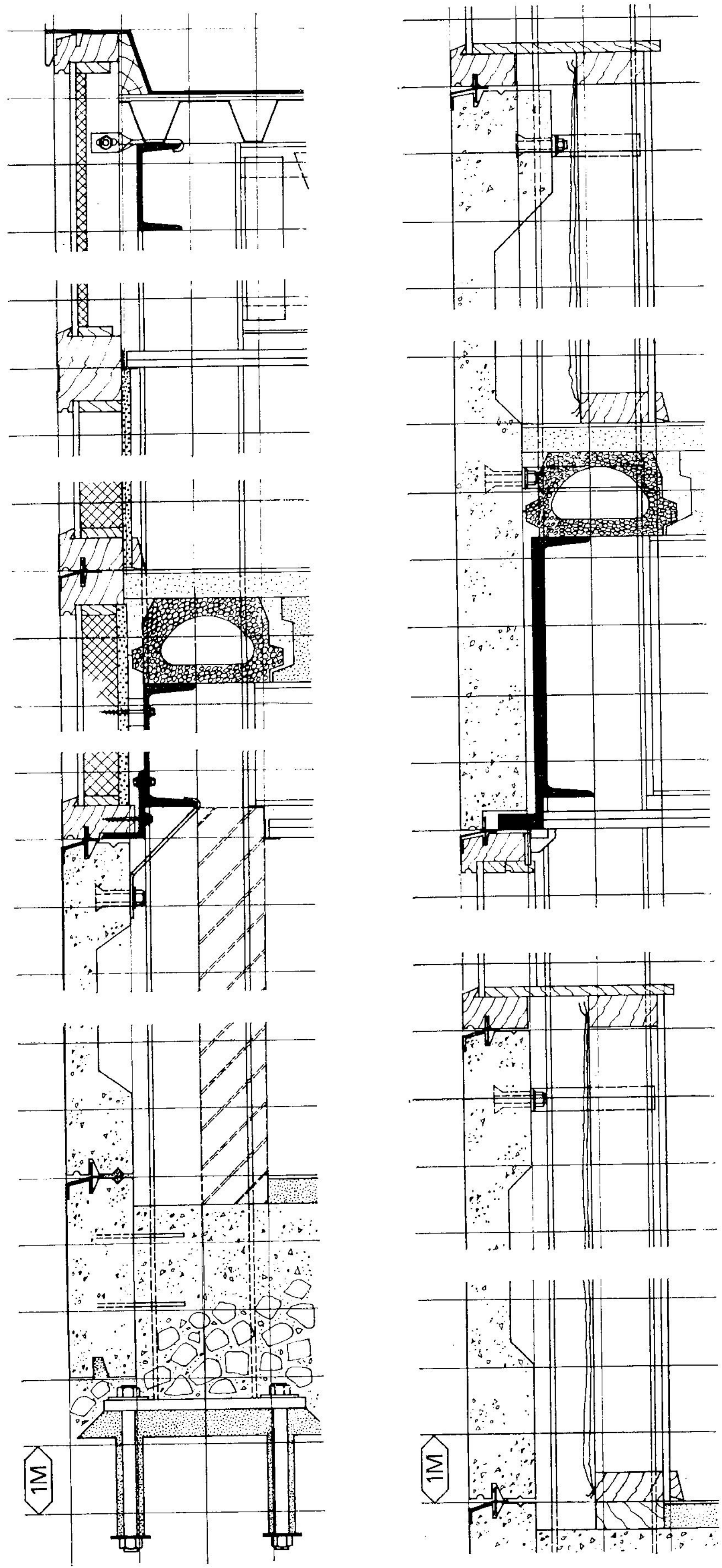
Staircases: consisting of steel channel carriages with cleats supporting treads.

Roof: consisting of a proprietary metal trough deck with alternative weathering.

Suspended floors: of precast concrete beams and light weight concrete hollow block infills.

Column casings: of fibrous plaster, allowing the alternatives of one and two hour fire ratings.

Walling: the alternative specifications are: Softwood, hardwood, or aluminium framed panels, with sub-assemblies to choice, but with a preferred range of asbestos cement, glass or plywood inserts, aluminium framed opening lights of various types, and hardwood doors. Precast concrete panels used in combination with softwood, hardwood, or aluminium framed panels, as described above.



BMN Building Metrication News

Building System: A75

A H Anderson Ltd

CI/SfB /(9–)/ /(E1j)

BMN technical information sheet
January 1969

Modular co-ordination

Sizes in this Design Manual are given in multiples of the basic module M= 100mm.

The horizontal structural grid is 36M. Columns are normally spaced 36M centre to centre around the perimeter of each building. The spacing may be reduced to 18M when necessary. A neutral zone 2M wide is introduced between structural grid bays to provide for thermal movement, sound insulation, etc., when independent structural frames are required adjacent to each other. Vertical dimensions are multiples of 3M which make up the ceiling heights, floor to floor heights, and floor zones.

A number of horizontal planning grids may be used, either individually or in combination. For example, one horizontal planning grid may be used for the entire floor area or different grids may be used as determined by functional requirements. Horizontal planning grids are related to and are factors of the horizontal structural grid of 36M, i.e., 36M, 18M, 12M, 9M, 6M, 4M, 3M and 1M. A tartan horizontal planning grid with grid intervals of 34M and 2M alternately along each axis, relating to 36M, may also prove useful.

Timber or aluminium framed panels for single-storey buildings normally span from finished floor level to roof level. Separate fascias may also be used. Concrete panels cladding a single-storey building with a 24M ceiling height may similarly span from finished floor level to roof level. For ceiling heights above 24M a separate timber or concrete fascia is used. In multi-storey buildings, timber or aluminium framed panels normally span between fascias or between spandrels and fascias. The top storey timber framed panels may, as in single-storey buildings, span from finished floor level to roof level. This arrangement for concrete panels is limited to 24M ceiling height.

Walling panels may be arranged horizontally in many different ways to suit design requirements:

1 To terminate at the centre line of columns.

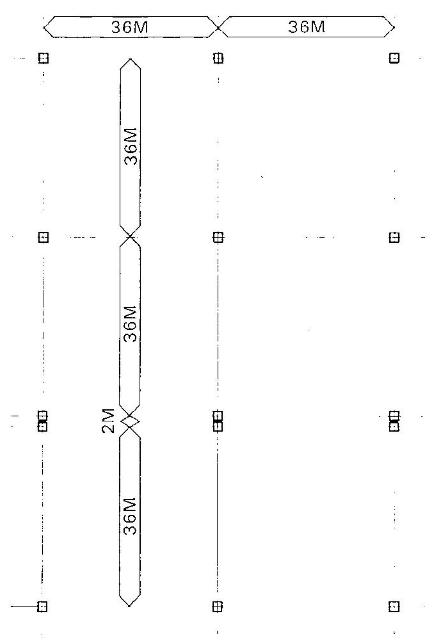
2 To pass across the face of columns.

3 To stop either side of columns.

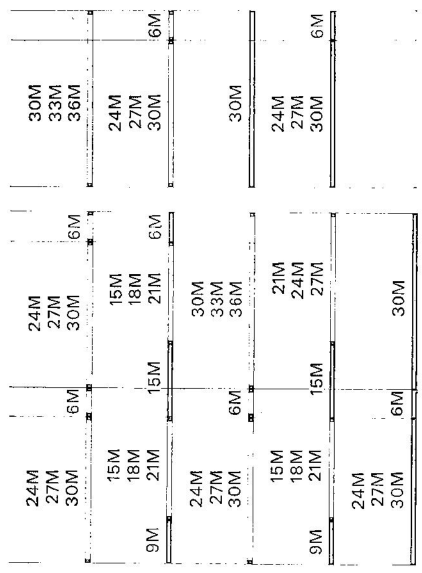
4 To combine any of the above arrangements.

Care should be taken in the location and handing of doors and windows to ensure that columns do not obstruct their opening. They should not be placed in the adjacent faces of an internal corner.

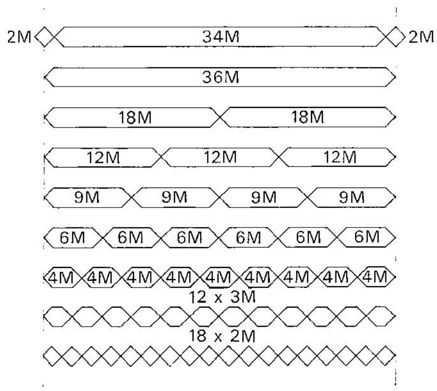
Structural grid



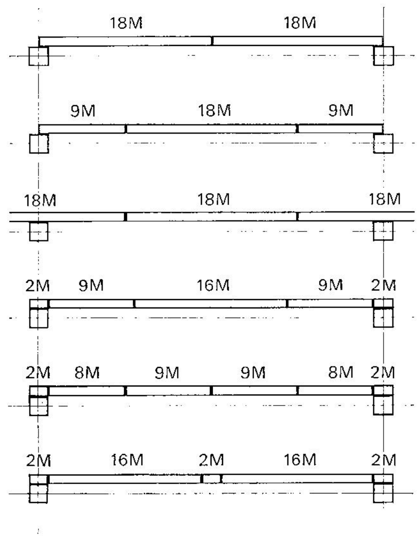
Vertical arrangement



Planning grids



Horizontal arrangement



BMN Building Metrication News

Building System: A75

A H Anderson Ltd

CI/SfB /(9–)/ /(E1j)

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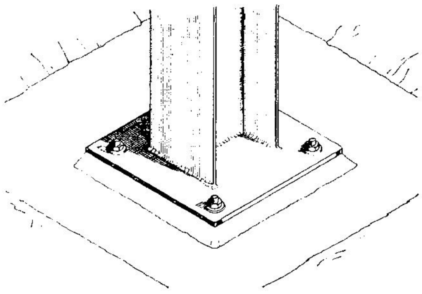
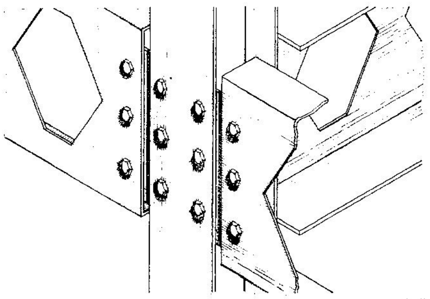
Assembly sequence

The site is stripped and individual holes are excavated to the dimensions required by the structural engineer; concrete bases are then cast with four holding down bolts inserted.

The steel columns are placed in position.

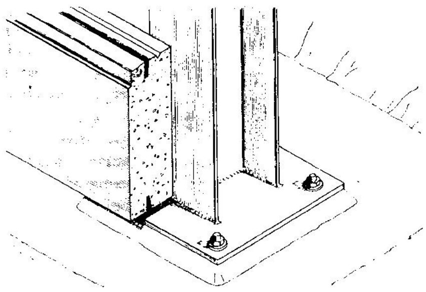


As each column is erected, perimeter ties and beams are connected at floor and roof levels. The frame is then levelled and plumbed, and the bolts are grouted. Temporary steel guys are erected to retain the steelwork plumb and true until structural floors are fixed.



Suspended floor units are laid and grouted, forming working platforms for the fixing of the fascia panels and for the carcassing work of other trades.

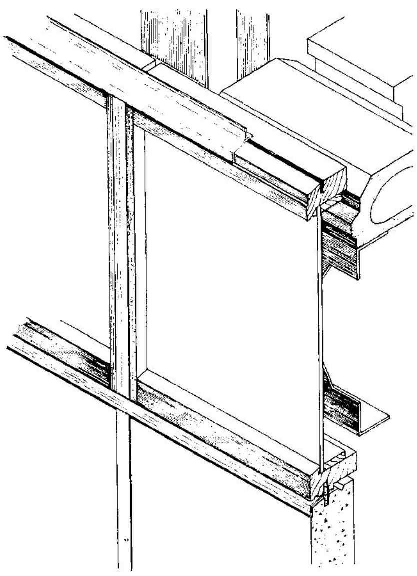
Concrete edge beams are erected omitting these where necessary for the access of mechanical site equipment. Hardcore is placed and the ground floor slab is cast, using the concrete edge beams as permanent shuttering.

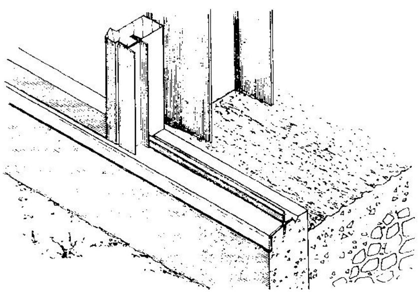


Fascia panels are located and fixed, working from first floor to top floor. Roofing may now start, including the fixing of rainwater sumps and roof lights. Where a cradle is required for subsequent cleaning purposes, it may also be used to aid assembly.

Walling panels are fixed, and column casings are fitted.

Aluminium verge cappings may now be fixed over the heads of panels at roof level. The remaining operations are completed under cover.





Note: This is a preferred assembly sequence; other sequences are possible to suit particular requirements.

Method of operation

The A. H. Anderson Limited service presupposes that the normal procedures for the design and construction of a building are followed, i.e. that the architect and the client's other professional advisers operate in an independent capacity, and that complete building contracts are let either by negotiation or through competition.

The function of A. H. Anderson Limited is to provide the A75 superstructure of buildings and to act as an independent link between architect, manufacturer and builder. To that end, its basic service consists of:

1 Providing full information on the application of its system of construction to enable the architect to execute his production drawings for the shell of the building. The service includes consultation with the architect and all other professional advisers, such as quantity surveyors and engineers and, where possible, with the builder.
2 The scheduling and ordering of all the components selected from the system range for a particular project and the preparation of component location drawings.
3 Ensuring the proper delivery and assembly of components.
4 Accepting responsibility for the stability of the complete structure above the foundations.

To do this, A. H. Anderson Limited normally operates as a nominated sub-contractor for the supply and assembly of the shell of the building concerned, or as a nominated supplier of the components which make up the shell of the building. If required, arrangements can be made for executing the complete building contract.

A. H. Anderson Limited does not itself manufacture, but makes arrangements for the production of all components on a bulk programme basis. The manufacturers are subject to periodic competition and arrangements with them are based on normal commercial considerations.

It is contended that A75 component building is in effect a rationalisation of the architect's normal process brought about by the application of modular coordination, and not just standardisation, to all the components for a complete building. It is further contended that the keynote to A75 is SIMPLICITY, throughout the whole building process.

A Design Manual provides the architect with all the information necessary for a complete design study and for the preparation of production drawings.

A 75

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