BMN

Building Metrication News

Consultant editor
Anthony Williams, AADipl, FRIBA, MSIA

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.

CONTENTS

Metric Report

The pressure on the British Standards Institution caused through their involvement with the metric changeover has been evident for some time. Earlier this year, in an interview with BMN, Michael Clarke, BSI's metric co-ordinator, expressed regret that, with their total resources taken up, a lot of desirable work such as the introduction of performance specifications and the revision of standards had had to be put aside. Now, the metric working party of the MPBW's National Consultative Committee, formed last summer to examine the effects of the change on the construction industry, says in its latest report that there are signs that BSI could become a bottleneck in the whole programme unless it can receive assistance from industry with some of its work on metric.

To put the situation in its true perspective, BSI is not, at the moment, behind in its programme for dimensional co-ordination and the subsequent dimensioning of products (although it might be argued that it would have been better if going metric and going modular had been planned to take place simultaneously). But although BSI is on target, there is always a danger that the sheer volume of work, particularly that which it has had to accept for the promotion of metric, could eventually retard its progress.

The metric working party has made two suggestions for providing BSI with help. The first is for more small technical working parties to assist in preparing draft standards. This appears to be a version of the Bowlby procedure which envisaged authoritative groups within individual industries setting up drafts in their initial stages. Provided the groups themselves are well balanced, i.e. consisting of users as well as manufacturers, and kept under the aegis of BSI, this could be a useful device for relieving BSI of some of the preliminary work.

The second suggestion of the working party is that they would be prepared to take over part of BSI's co-ordinating rôle, as we understand it at the operating level where suppliers and contractors will need help in phrasing in their changeover. This would be a valuable contribution since BSI's sphere of control was not intended to extend, and in practice could not, to field work of this type.

An even more practical aid, but we imagine outside the mandate of the working party, would be to put more finances at BSI's disposal. Appeals for subscriptions from industry have so far met with a disappointing response and we must therefore hope that the government can be persuaded to increase its share. There are organisations that receive £2 of government money for every £1 provided by industry. BSI receives half this and whilst we would not expect the government to accept the establishment of a 2 to 1 ratio for every measure of support it offers, we think in this instance, and for the limited period over which the change to metric is taking place, the extra money directed towards the Institute would pay very big dividends in ensuring a smooth changeover. The change may have been asked for by industry in the first place but it has now, in essence, become a national affair.

Other points

Elsewhere in its report the working party welcomes the setting up of the Metrication Board on whose composition, we understand, an announcement is to be expected very soon. It has now become a matter of urgency that a firm programme of metric change for every sector of the economy should be announced, and particularly for the distributive trades, if the construction industry's own programme is not to be impeded.

Progress on the public sector is well in hand, the MPBW having some £125m construction work planned in metric. Cost implications have not yet been assessed but it seems to be recognised by government departments that some rise in costs will be inevitable and that they will not have to be rigid towards cost rises since the alternative will be to defer the change to metric design.

A construction group prepares for metric

Although only a minority of designers may be immediately affected by the change to metric, within a few years it will overtake everyone in the industry. Therefore, because of the importance of making adequate preparation, the British Standards Institution is encouraging active organisations to report on the steps they are taking, using the guidelines at present available. This article, on John Laing, was written at BSI's request. Due to the diverse activities of the Laing Group, the problems encountered by it are in some ways typical of the industry as a whole, since it includes not only construction but design as well as manufacturing and property activities.

Organisation for metrication

Early in 1967 an administrative organisation was set up in the Laing Group to investigate the implications of the change. It consisted of the formation of a metric steering committee, and the appointment of a metrication officer. The purpose of the metric steering committee is to make policy recommendations to the directors in regard to the change to the metric system, and to facilitate effective co-ordination and control of approved policy. The retraining of staff and operatives in the use of the metric system was listed as a matter requiring specific attention. The work of the committee is, however, concentrated on the construction and design activities of the group, and it only provides an information service for the manufacturing and property sides. The committee membership was chosen to include representatives of key management and technical activities. Some additional members, including a training specialist, have joined it as its work has developed. The job of the metrication officer is essentially that of informing and advising the committee about all significant developments in regard to the change, and of assisting in the policy interpretation and communication.

Preliminary work

As the committee was set up at the time when the British Standards Institution's programme for the change to the metric system in the construction industry had only just been published, its first task was to investigate its implications for the group. This took time, and it was not until the beginning of 1968 that a formal policy was promulgated, indicating that the group would comply with the programme for the change, and would actively encourage other companies and sectors of the industry to do likewise. It may now seem a little surprising that the programme was not accepted automatically, but in 1967 the point of no return in respect of the industry's commitment to the programme had not been reached, and there were those who had grave misgivings over its timing. This initial study had the advantage of establishing that, in spite of some reservations, it would be in the best interest of all sectors of the industry, including contractors, to comply with the programme if confusion and the unavoidable additional costs of the change were to be kept to a minimum.

The preliminary work of the committee emphasised that, as the change is being used as an opportunity to accelerate the rationalisation of component sizes, and as decimal currency is to be introduced in 1971, every aspect of the group's activities will be affected. Obviously the involvement will vary according to the activity, but no one will remain unaffected. Even labourers will have to understand enough of the metric system to appreciate how their bonus is calculated, and typists will have to become conversant with the new system of notation for metric measure.

As the change has proceeded, specific effects have been considered in detail, and this process is still continuing as new information becomes available. The way in which this has been tackled can best be shown by some examples.

Cost implications

Retraining employees in the metric system, replacing imperial measuring equipment with metric, and re-writing data such as estimating and costing in metric terms, will involve positive costs. It was vital that some idea of the magnitude of these and other costs should be established, so that they could be taken into account in both long and short term planning, and in tendering for individual contracts. A cost appraisal exercise was, therefore, carried out in respect of the construction and design activities. As the other group activities might need a different approach, they were not directly included but were kept informed.

The increase in the total contract price for a project, which may occur as a result of the unavoidable short term increases in costs, can be attributed to three different sources. First, there are those costs in which the main contractor will be directly involved, including items such as retraining; second, there are the increased costs of sub-contractors, including material or components which they supply; and third, there will be the increases in costs of many components and materials purchased by the main contractor. This does not necessarily imply that all manufacturing firms will necessarily increase their prices. There may be some who will be able to foresee and evaluate the long term benefits due to rationalisation sufficiently to enable them to absorb the short term additional costs until the benefit accrue. The cost assessment carried out was concerned only with the first group of costs mentioned above, i.e. those which the contracting company is directly involved.

A fringe benefit of the cost appraisal was that it made those who had been delegated to carry it out, and the regional and departmental managers to whom they reported, aware to more than just a superficial extent of what the change involves. The appraisal revealed that two of the most significant causes of additional cost will be due to the loss of production during the period when employees are acquiring familiarity with working in the new system, and the cost of making good additional errors, which will undoubtedly occur until that familiarity is acquired. These costs are, of course, not ones which can be quantified accurately. Each manager had to use his own judgment, based on experience, to estimate an appropriate figure.

The appraisal did not reveal that the costs directly attributable to a main contractor would be of astronomical proportions, but would probably amount to something of the order of a ½ to 1% of the total contract price. To this percentage must, of course, be added the increased sub-contractors' and component costs to assess the full order of increase in contract prices. The cost of the change included in an individual contract will, of course, vary according to the way in which firms decide to allocate these costs. It will depend on whether the costs of the change will be allocated only to metric contracts, or to all contracts, and if to all contracts whether in equal proportion to their total value or not. It is, of course, possible that some methods of allocation may result in percentages higher than the range mentioned above. It should be noted that the increase of ½ to 1% in the total contract price, to cover the main contractors own additional costs, is, when added to increases in sub-contract and component costs, in general accord with an overall rise in total contract prices of about 3-6% recently suggested in the National Press as the cost of going metric.

As experience is gained from the first metric contracts the additional metrication costs may need to be revised and should gradually decrease as the change proceeds until eventually they disappear altogether when the industry has completed the change. This percentage increase in main contractors' direct costs may seem small, but in the present industrial climate, with small profit margins, it is certain that it will have to be passed on to the client.

Retraining

It was not possible to make much progress on retraining until information became available on the training aids which the Construction Industry Training Board was producing. As soon as these were known, however, rapid progress was made in producing recommendations for management on the overall policy to be adopted. The group

had, however, experience of using programmed learning texts of the type which the CITB has produced, and it had been realised that these were likely to offer the most practical way of carrying out retraining. It is intended that the maximum practicable use will be made of these aids, although they may have to be supplemented to some extent to meet the special requirements of the group. Work on ascertaining what additional aids may be necessary is still in progress. In establishing the training policy, the CITB's recommendation that training should only be carried out just before those who are being trained require to put their knowledge to practical use, has been followed.

Materials and components

Although components are continually being introduced in new sizes as a result of changing demands and technical development, the change to metric will result in vast numbers of new sizes being produced. It was, therefore, necessary to establish a means of monitoring the published information on these new metric sizes as and when they appear, and of keeping management, estimators and buyers informed of any special considerations which they may need to take into account. A small working party was set up under the metric steering committee, and has already ensured that those who may be affected by the introduction of metric sizes of steel bar reinforcement are acquainted with what it involves.

Effect on design

As the Laing Group is marketing a number of building systems, some of which are applicable to office, health and educational buildings, as well as housing, documents produced by the British Standards Institution and Government Departments which are concerned with building have been carefully studied. The implications of these, particularly those produced by the Ministry of Housing, may be very far reaching.

Other factors

So far the metric steering committee's work has been concentrated on recommending overall policies with particular reference to costs and retraining. Other matters, such as the effect on industrial relations, and possible effects on the conditions of contract, have been considered and are being kept under review. As the change progresses, new tasks and problems will be revealed, and the committee foresees that it will still have an important function to play for a considerable time ahead.

In addition to their committee work, several of its members have given introductory talks within the group. The object of these talks has been to give managers who are accountable for the work of departments or subsidiary companies an appreciation of what the change involves, so that they can ensure that proper account of it is taken wherever it affects their activities.

Conclusion

Obviously while staff are engaged in studying the implications of the change and planning for it, time spent on some of their other activities will have to be correspondingly curtailed. The question whether all this advance planning and work is really necessary must, therefore, be answered. Advance planning does, however, have benefits which although difficult to evaluate in terms of money can, nevertheless, be critical to commercial operation. It is, however, important to continually remember what the objectives of such planning are. They must be:

i) to avoid confusion, with its consequent waste of time, effort and money,

ii) to minimise unavoidable additional costs which will inevitably occur,

iii) to ensure that the benefits of the change, which should occur as a result of the rationalisation of building components sizes, as well as from the use of a simpler system of measurement, are realised as quickly as possible.

On this basis the Laing Group considers that advanced planning and preparation, although not necessarily solving every problem, is worthwhile.

Thinking metric

Brixton symposium

Practical steps being taken by the construction industry in preparing for the metric changeover were discussed by staff and students at a one-day symposium last month at the Brixton School of Building. The symposium was concerned with design, production and manufacture. Some variance with continental practice was underlined by Anthony Blee, an associate partner in Sir Basil Spence, Bonnington & Collins, who has worked on the design for the British Embassy building in Rome. Besides the use of the comma as the full stop, the centimeter tended to be used as a unit in much the same way as the inch is used in the UK.

He admitted to some measure of cynicism regarding the introduction of metric as he has found that imperial sizes are used on the Continent to a considerable extent, particularly with regard to plumbing and timber. He referred to the Italian use of the term 'English workmanship' in connection with certain plumbing jointing to indicate that a high standard is required.

He emphasised, however, that for preparation of design drawing, metric was eminently suited and that as the decision to go metric had been made we should make every effort to 'think metric' and learn from the mistakes which had been made on the Continent. After quoting Sir Basil Spence's dictum that 'good building is like good tailoring in that you can judge it at its seams,' he suggested that close study should be given to the provision of joint allowances between components and that components should be designed from the joints outwards. Mr. Blee said there was the opportunity of providing really good designs whilst redesigning in metric terms. A start could be made by designing smaller components—ceramic tiles, baths, etc.—rather than large components so that the architect could be given some freedom of design and flexibility. In this connection he thought the brick an extremely flexible component as considerable tolerance was obtained to the thickness of jointing between units.

The builder's view

The builder's point of view was given by P. B. Chaston, who is responsible for co-ordinating all aspects of metrication in the Gilbert Ash Group. He reminded the audience that at one and the same time we would be going metric using the systeme internationale, changing to decimal coinage and making further moves towards dimensional co-ordination. He suggested that care should be taken to monitor actual against planned progress with regard to the change, pointing out that BSI are experiencing considerable difficulty in keeping up to the programme which they had set. Some of the problems likely to be experienced in the next few years could be seen from the change in sizes of steel reinforcement where a number of different sizes, both imperial and metric, will be in use at the same time for a considerable period. He thought that the changeover posed considerable problems for the system builder, particularly with regard to stocking of components.

Mr. Chaston outlined the method which his own group of companies had adopted to smooth out the difficulties. Steering committees had been formed to examine the problems in advance and to disseminate information to the different companies. He said that there was, if anything, too much rather than too little information and one of the tasks before the committees was sifting the information so that relevant information could be passed on to those concerned. He thought that a considerable amount of 'self education' would be required by employees and that there would be a major training problem at site level.

BUILDING METRICATION NEWS

With regard to tendering, he suggested that more time should be allowed by the architect for the contractor to prepare his tender and that due to the lack of familiarity with metric sizes, etc., it was particularly important that complete and accurate drawings, specifications and bills of quantities were provided at tender stage. He added that estimators in particular have a large subconscious store of knowledge 'in imperial' which it will take them a long time to convert to metric terms. Contractors might require greater estimating strength particularly during the early stages. Mr. Chaston questioned if suppliers and sub-contractors would keep pace with the change to metric to match general contractors and he wondered if they would be fully aware of the implications of enquiries from contractors. He thought that there would be increased risk in tendering during the early stages of the changeover and that this increased risk, coupled with the minimal margins at which contractors work, might result in an increase in the already high bankruptcy rate which builders experience. Nevertheless, the problems would be the worst for the first two or three tenders after which time contractors would adjust themselves to the new circumstances.
In connection with the running of the contract, Mr. Chaston reminded students that it would be necessary to revise bonus constants, that safety regulations would be changed with regard to the height of guard rails, etc., and that tools and plant would have to be re-calibrated. Particular tribute was due to the CITB booklets on metrication as a way of preparing supervisors and operatives for the change to metric. Contracts running over a considerable period of time would present particular problems as it would be possible to have SI and imperial units in operation on different sites under the same umbrella.
The programme prepared by the mechanical engineers for their change to metric is considerably longer than that prepared by the construction industry and it will be 1975 before mechanical plant will be geared to metric terms. Careful planning was needed if the change to metric is to be accomplished smoothly.
Peter Gardiner, a director of Gardiner Sons & Co. Ltd., thought that students entering the construction industry in the near future would, in many respects, be ahead of those who had been established in the industry as their training, being in metric terms, would help them avoid the problems of re-adjusting and re-thinking in metric. Nevertheless, he sympathised with students who were at present having to cope with both imperial and SI units. He did not think the manufacturer had particularly onerous problems to overcome and he cited his own company as having worked with both imperial and SI units for a considerable period. The merchant on the other hand had stocking problems as it was necessary for him to handle large numbers of items. Initially these items would probably be in imperial and SI dimensions.
Mr. Gardiner endorsed Mr. Blee's remarks regarding the flexibility of brickwork but asked that the various ministries responsible for agreeing standards (for instance standard cill levels), should come to decisions promptly so that the manufacturers could plan their production. He expressed surprise at the prospect of bricks being manufactured in metric sizes, particularly considering the cost of re-tooling.
Mr. Gardiner asked for consideration to be given to 'overlap' at joints and he applauded the DC8 system which has recognised this requirement.
The computer, thought D. R. Urwin, quantity surveyor, a partner with Monk & Dunstone, would be a major factor in easing the change. However, from his experience to date the change to metric presented little problem. Metrication made the use of scales simple and dimensioning became easier.
At the present time certain components such as doors were not produced in metric sizes so that it became necessary to use direct metric equivalents, but these problems would disappear in time.
He urged students to forget the centimeter and endorsed Mr. Blee's remarks that there are in fact a number of different metric systems in existence on the Continent at the present time. It is not in fact 'UK versus Europe.'
There appears to be some confusion on the part of architects who are using non-standard and on the part of engineers who have designed in metric only to realise that the materials were not available in metric sizes so that it had been necessary to redesign in imperial.
Mr. Urwin thought quantity surveyors were experienced in converting their cost thinking to SI but it would take a considerable time before their 'thinking unit' became instinctive.
In the near future it would be possible to have four different systems running in parallel; imperial measure with current currency, imperial measure with decimal coinage, metric measure with current currency and metric measure with decimal coinage. Mr. Urwin did not anticipate that it would take long for takers-off to work in metric; indeed, he thought the time would be a fortnight.

Coming Events

WEDNESDAY, 2 APRIL
Metrication with regard to the construction industry: a one-day symposium in which speakers representing different specialist fields in the construction industry will describe the solutions to practical problems they have experienced. Organised by the north west branch of the Concrete Society and held at Lesser Free Trade Hall, Peter-street, Manchester, 10.0-4.30. Tickets, £3 for members, £4 for non-members, are available from H. Bagshaw, GKN Reinforcements Ltd., Woodhouse-lane, Wigan, Lancs.

FRIDAY, 18 APRIL
'The change to metric'—One-day symposium organised by Manchester and District Branch of the Incorporated Association of Architects and Surveyors at the Roscoe Building, University of Manchester. It is to be chaired by R. Martin Silber, FIAS, CEng, MIStructE. Papers given will cover the more detailed implications of the change to metric for architects, structural engineers, quantity surveyors, and contractors. Speakers are: J. Cane, LIB, DipArch, ARIBA, AIArm, J. Robson, ARTCS, CEng, AMIStructE, N. B. Harries, AIOB, AIQS, and T. G. Williams, FIOB. Programme starts at 9.15 a.m. and fee of 27s. 6d. includes coffee, buffet lunch, and tea. A bookstall is to be installed for the sale of publications by the BSI, HMSO, and CITB. Applications for seats should be sent, with names of all delegates, to: A. E. Brownbill, 90 Mottram Old-road, Stalybridge, Cheshire.

SATURDAY, 19 APRIL
Metrication in the smaller firm: a two-day seminar organised by the British Institute of Engineering Technology, which will include lectures on SI metric, design in metric and planning to go metric. Held at Aldermaston Court (10 miles from Reading), the seminar starts at 10 a.m. Saturday, ends 4 p.m. Sunday. Fee is £45. Applications to Donald Membery, Head of Industrial Training, BIET, Aldermaston Court, Aldermaston, Reading.

TUESDAY, 22 APRIL
THURSDAY, 1 MAY
Training for metrication in the design office—seminar at the Great Northern Hotel, Kings Cross, London, N1. Organised by Northwood Metric Services Ltd., 258 Gray's Inn-road, London, WC1.

THURSDAY, 1 MAY
Going metric: a study conference for senior management. Topics include the rôle and scope of the Metrication Board, decisions to be taken by management, designing in the metric system and staff training and retraining. Conference is held at the Piccadilly Hotel, London, W1, starting 9.15 a.m. Fee—20 guineas. Enquiries should be addressed to the Administrator, Management Studies Centre, 14 Queen Victoria-street, London, EC4.

MPBW lectures
The following lectures on the change to metric have been arranged by the MPBW's Directoriate of Research and Information.

Tuesday, 15 April
Lerwick, Scotland. Speakers: J. Leiper, Head of Building Department of Aberdeen Technical College and M. F. Brake of Scottish Development Department at Isleburgh House Community Centre, 7.30.

Wednesday, 16 April
Kirkwall, Scotland. Speakers: as above, at Kirkwall Hotel, 7.30.
Durham: a short conference under the title 'Metric and the Builder,' will be held at Ramside Hall Hotel, Belmont from 9.45 to 5 p.m. Speakers include M. F. Chaplin of MPBW; W. J. Slater, Department of Construction and Related Professional Studies, Charles Trevelyan Technical College; M. H. Brooke of J. B. Brooke & Sons Ltd.; V. L. Cox of AIBCM; W. J. Pinfold of MHLG; and D. F. Dennis of CITB. For further particulars apply to G. Hartley, MPBW, Government Buildings, Lawnswood, Leeds LS16 5PX.

Thursday, 17 April
Thurso, Scotland. Speakers: J. Leiper and M. F. Brake at Thurso Town Hall, 7.30.
Braintree. Speaker: D. Percival, chief architect, City of Norwich, at Braintree College of Further Education, Church-lane, 3 p.m.

Monday, 28 April
Short conference provisionally arranged under the title Construction goes Metric, White Hart Hotel, St. John-street. Further particulars from J. J. Carr, MPBW, The Pithay, Bristol BS1 2NJ.

News from the industry

BWMA proposals

Because the BSI is not expected to announce until the latter part of the year final standard dimensionally co-ordinated metric sizes for individual components, the BWMA has circulated its proposals as general guidance to architects in the interim. They comply in general terms with BS 4011, 'Basic sizes for building components and assemblies,' and in particular with the recommendations of BS 4330, 'Recommendations for the co-ordination of dimensions in buildings, controlling dimensions,' the framework of controlling dimensions. Within this framework reference to the dimensional co-ordination for building statements—DC's 4, 5, 6 and 8, together with Design Bulletin 16, 'Co-ordination of components in houses,' will provide detailed dimensions of components.

The internal door set is, perhaps, one of the easier components for which to establish overall sizes on the basis of BS 4011 and BS 4330. The current proposals are to fill basic spaces 600, 700, 800 and 900 mm wide x 2 100 mm high for door height sets. Where the set is required to ceiling height the same sized units with a separate panel above the door can be used for the heights anticipated in BS 4176:1967. It is anticipated that these are the most likely sizes to be adopted at least for dwellings. For external door sets for all types of buildings the BWMA's proposals are to fill basic spaces 900, 1 000, 1 500 and 1 800 mm wide x 2 100, 2 400, 2 700 and 3 000 mm high.

The current proposals in relation to windows envisage a standard range to fill most basic spaces 600, 1 200, 1 800 and 2 400 mm wide x 500, 1 100, 1 300 and 1 500 mm high. 900 mm is a height which may also be included.

For kitchen units the BWMA are currently envisaging widths of 400, 500 and 600 for single units and some double units 1 000 and 1 200 mm wide. They are proposing that the worktop and sinktop to floor units should be 600 mm deep and wall units 300 mm deep. Normal worktop height will be 850 mm and sinktop height 900 mm.

Proposals for external wall panels, internal partitions and stairs are under consideration.

Mechanical handling report

Progress towards Britain's change over to the metric system of measurement is reviewed in a report on metrication issued by the Mechanical Handling Engineers' Association, Glen House, Stag-place, London, SW1, as part of its technical intelligence service to members. The 35-page report was researched and written by H. G. Harwood, an honorary member of the association's executive committee.

It first traces developments to date and decisions so far reached on metrication, both in the UK and overseas, then looks more closely at present and projected future availability of metric dimensioned engineering materials and components—rolled and re-rolled steel products, conveyor and elevator belting, troughed belt conveyors, electric motors, worm gear units, bolts, nuts and rivets, taps and dies, and spanners.

Existing publications on the subject and reference sources are listed in detail, as are lectures, seminars and symposia to be held over the coming months.

Lectures from management

Over 700 people have attended at a series of management appreciation lectures on the change to metric which the NFBTE's Eastern Region has arranged at ten centres throughout the Eastern Counties. The lecturers were drawn from the Building Centre Metric Lecturers Panel and the intention was to enable builders in the Eastern Counties to appreciate the full significance of the change to metric.

The lectures were specially designed for senior management, and it is intended that these shall be followed up with systematic instruction through the technical colleges, etc., for contract supervisors, foreman estimators, surveyors and craftsmen.

Cubage goes metric

Exporters and their shipping agents now have metric cubage capacity calculation tables at their disposal. Produced by Imray Laurie Norie & Wilson Ltd. in collaboration with Frederick Warne & Co. Ltd., the 'Metric cubage reckoner' contains 244 pages of tables. It has been compiled with the European market in mind. Preface notes explaining the use of the tables have been translated into seven languages. Price of the reckoner is £2 5s.

Concrete blocks

A number of manufacturers of concrete blocks will, during 1969, make available blocks measuring 200 mm x 400, 500 and 600 mm long and thicknesses will include 100 mm, and others to meet performance requirements. Other dimensions are also being considered and details will be announced as soon as a decision is reached. In addition block manufacturers will also during 1969 continue to produce blocks in accordance with BS 2028, 1364:1968.

Concrete bricks

The Brick Product Section of the British Precast Concrete Federation has announced the following proposals for the change to metric of concrete facing bricks: manufacturers have been recommended to supplement their present imperial sizes (which include a metrically equivalent format of 225 x 112.5 x 75 mm) by a metrically co-ordinated size of 200 x 100 x 75 mm nominal. In addition it is anticipated that a number of manufacturers will also produce concrete bricks in other co-ordinated sizes such as 200 x 100 x 100 mm, 300 x 100 x 75 mm, and 300 x 100 x 100 mm.

On completion of a current research programme in the summer of 1969 proposals will be submitted to the BSI for a new range of compressive strengths to be incorporated in a revision of BS 1180 in metric terms.

The concrete brick section is currently producing some 314m bricks per annum.

NJCC link proposed

Amongst the future riddles of the metric changeover were material and component supplies according to Philip Bennett, chairman of the National Joint Consultative Committee of Architects, Quantity Surveyors and Builders, at a meeting earlier this month at Cambridge. If the manufacturers were following the BSI programme at all closely, they should already be making their preparations for the change. 'For instance,' said Mr. Bennett, 'the manufacturers of steel reinforcement have announced that after 1 June next only metric sizes will be rolled as standard. Nine months from now the brick industry is proposing to switch to a new metric format, fractionally smaller than the present imperial one. I do not know whether this fresh capital expenditure for the brick-makers will prove worthwhile, but the fact that the brick industry has chosen a new format not based on either 300 or 100 mm modules could itself create problems.'

This is one of the reasons, went on Mr. Bennett, why a link-up by the material and component manufacturers with the NJCC in an advisory capacity would be welcomed. 'We have already established an Engineering (Structural and Services) Advisory Group and this has got away to an enthusiastic start.'

Publications

Friction grip bolts

As a further consequence of the decision to adopt the ISO metric screw thread system in the UK and as an aid to the changeover in the construction industry, the BSI has recently published BS 4395 : Part 1 : 1969—**Specification for high strength friction grip bolts and associated nuts and washers for structural engineering — Metric Series: Part 1, General grade.**

This first part gives requirements for one grade. Dimensions cover a range of nominal sizes from 12 mm (M12) to 36 mm (M36) inclusive and mechanical properties are specified. Full details of tests, inspection procedure, and provisions for marking, are also included. Price 12s. (15s. including postage to non-subscribers).

Structural use of pre-stressed concrete

A metric version of CP 115, **The structural use of pre-stressed concrete in buildings,** has now been published as CP 115 Part 2 1969, **Metric units.** It gives the values of the original code in terms of SI units rounded to convenient numbers. The availability of this document separately from CP 115 should be greatly appreciated by designers. Price 14s. (17s. to non-subscribers).

Copies of these documents are obtainable from the BSI Sales Branch at 101/113 Pentonville-road, London, N1.

Letters

Metric in surveying

Sir,—I think attention should be drawn to the use of the metre and decimals for survey measurement. The recent publication of the revised PD 6031, and articles in the 'AJ' etc., have promoted the idea of quoting all dimensions on building working drawings in either *millimetres,* or alternatively in *metres* to three decimals. It is publicly stated that this may give a false impression of accuracy—who would seriously take the thickness of brick walls to 1 mm? —but it is said that the use of millimetres or three decimals of a metre will avoid mistakes. I have my own reservations about this, however.

While I can accept this as a *convention* for the expression of dimensions an architect wishes to use on his drawings, I am disturbed that the impression appears to be gaining ground that all dimensions or measurements in building work must be stated to three decimals of a metre. Where one is doing a survey of a site, and measuring the physical features and then recording them in field notes for later calculation or plotting, then the dimensions must be recorded in metres and decimals, and *the number of decimals indicates the precision of the measurement.* Survey measurements and field notes are mathematical information, and the rules of mathematics must apply, including full use of decimals and rounding-off to indicate the relative precision of a measurement. Quite simply—use the metre and decimals as appropriate to the job and never omit the decimal marker.

Some typical values in surveying might be as follows:

Chain line measurements in an ordinary chain survey to 0.1 or 0.01 m as suitable—79.4 or 79.35

Detail measured to 0.1 m—5.3 (offsets, etc.)

Individual members, posts, RSJs, etc., to 1 mm—525 × 345

Building surveys (for 1:100 scale) to 0.01 m—5.32

Tacheometer distance to 0.1 m—231.4

Height information:

Ordinary levelling, broken ground, perhaps to 0.01 or 0.005 m—79.23, 79.225

Careful levelling, to 0.001 m—79.227

Precise levelling, to 0.0001 or 0.000 01 m—79.2265, 79.22647

Tacheometer heights to 0.1 or 0.01 m—79.2, 79.23

There is, I think, a fear of decimals in the older hands in the industry. This is quite groundless, we have worked with all sorts of multipliers in the past —43 560ft.^{2} to the acre, 5 280ft. to the mile, and the nightmare (to me) of the quantity surveyor's duodecimal calculations. It is already evident in education that life is easier with the metric system and decimals, but it is essential that it be used as a true decimal system and that people try to think in metres rather than simultaneously in metres and millimetres. In addition, the simple rules of mathematics about significant figures, accuracy, etc., which have been ignored in construction work in the past when using $\frac{1}{4}$in., $\frac{1}{8}$in., etc., must be followed carefully if we are to benefit properly from the new system.

W. S. WHYTE [ARICS, AIAS, FRSA],
Senior Lecturer,
Leicester College of Art & Design.

Metric in advertisements

Sir,—With reference to the letter on the use of metric in advertisements ('Building,' 14 March, p. 150), I would like to point out a mistake that Mr. Alan E. Fowler has made. He states that one advertiser in 'Building' on 21 February erroneously equated −40°C with −40°F. If Mr. Fowler will apply the appropriate formula for converting °F to °C he will find that −40°F does in fact equal −40°C. This value is the only one which is common in the whole of the Centigrade and Fahrenheit scales.

P. NORTON,
Cromer-street,
London, WC1.

* * *

Sir,—In reply to Alan Fowler it is hardly surprising that an advertiser 'appeared to equate −40°C with −40°F' as these are in fact the same temperature! However, this does not detract from his main point that manufacturers are largely ignoring the recommendations of PD 6031 in the timing of the changeover. The question is *whose* responsibility is it to ensure that metric is used? The manufacturer? The Government? BSI? Ourselves as the customer? Or each of these?

DAVID BRUCE,
East End Green,
Nr. Hertford.

* * *

Sir,—No doubt Mr. Fowler has now been told by his most junior trainee that −40°C is, in fact, equivalent to −40°F. However, I, too, am curious about this lack of metric information in advertisements; especially so with regard to his point concerning metric rules, as even the CITB, in their training manual No. B11, appear to have committed the same error.

Any explanations?

J. M. BRADFORD,
37 Shacklewell-lane, London, E8.

Reaction to different temperatures in °C is shown in one of the latest CITB 'Think Metric' posters (No. 4). No. 5, entitled 'Superficial,' is intended to put across area in metres. Both are available, A1 size, at 1s. 3d. from CITB, Radnor House, London, SW16.

Metrication the computer and SI

This series of conversion tables, compiled by R. M. E. Diamant and B. A. L. Hart, appears in this section periodically. 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 12

Square metres per metric tonne to square yards per ton
1 m^2/tonne = 1.2151862 $yd.^2$/ton
Note: diff signifies single units so that the reading for any number required is taken at the intersection of the horizontal 10 unit line and the vertical single unit column

diff	0	1	2	3	4	5	6	7	8	9
m^2/tonne					yd^2/ton					
0		1.22	2.43	3.65	4.86	6.08	7.29	8.51	9.72	10.94
10	12.15	13.37	14.58	15.80	17.01	18.23	19.44	20.66	21.87	23.09
20	24.30	25.52	26.73	27.95	29.16	30.38	31.59	32.81	34.03	35.24
30	36.46	37.67	38.89	40.10	41.32	42.53	43.75	44.96	46.18	47.39
40	48.61	49.82	51.04	52.25	53.47	54.68	55.90	57.11	58.33	59.54
50	60.76	61.97	63.19	64.40	65.62	66.84	68.05	69.27	70.48	71.70
60	72.91	74.13	75.34	76.56	77.77	78.99	80.20	81.42	82.63	83.85
70	85.06	86.28	87.49	88.71	89.92	91.14	92.35	93.57	94.78	96.00
80	97.21	98.43	99.65	100.86	102.08	103.29	104.51	105.72	106.94	108.15
90	109.37	110.58	111.80	113.01	114.23	115.44	116.66	117.87	119.09	120.30
100	121.52	122.73	123.95	125.16	126.38	127.59	128.81	130.02	131.24	132.46
110	133.67	134.89	136.10	137.32	138.53	139.75	140.96	142.18	143.39	144.61
120	145.82	147.04	148.25	149.47	150.68	151.90	153.11	154.33	155.54	156.76
130	157.97	159.19	160.40	161.62	162.83	164.05	165.27	166.48	167.70	168.91
140	170.13	171.34	172.56	173.77	174.99	176.20	177.42	178.63	179.85	181.06
150	182.28	183.49	184.71	185.92	187.14	188.35	189.57	190.78	192.00	193.21
160	194.43	195.64	196.86	198.08	199.29	200.51	201.72	202.94	204.15	205.37
170	206.58	207.80	209.01	210.23	211.44	212.66	213.87	215.09	216.30	217.52
180	218.73	219.95	221.16	222.38	223.59	224.81	226.02	227.24	228.46	229.67
190	230.89	232.10	233.32	234.53	235.75	236.96	238.18	239.39	240.61	241.82
200	243.04	244.25	245.47	246.68	247.90	249.11	250.33	251.54	252.76	253.97
210	255.19	256.40	257.62	258.83	260.05	261.27	262.48	263.70	264.91	266.13
220	267.34	268.56	269.77	270.99	272.20	273.42	274.63	275.85	277.06	278.28
230	279.49	280.71	281.92	283.14	284.35	285.57	286.78	288.00	289.21	290.43
240	291.64	292.86	294.08	295.29	296.51	297.72	298.94	300.15	301.37	302.58
250	303.80	305.01	306.23	307.44	308.66	309.87	311.09	312.30	313.52	314.73
260	315.95	317.16	318.38	319.59	320.81	322.02	323.24	324.45	325.67	326.89
270	328.10	329.32	330.53	331.75	332.96	334.18	335.39	336.61	337.82	339.04
280	340.25	341.47	342.68	343.90	345.11	346.33	347.54	348.76	349.97	351.19
290	352.40	353.62	354.83	356.05	357.26	358.48	359.70	360.91	362.13	363.34
300	364.56	365.77	366.99	368.20	369.42	370.63	371.85	373.06	374.28	375.49
310	376.71	377.92	379.14	380.35	381.57	382.78	384.00	385.21	386.43	387.64
320	388.86	390.07	391.29	392.51	393.72	394.94	396.15	397.37	398.58	399.80
330	401.01	402.23	403.44	404.66	405.87	407.09	408.30	409.52	410.73	411.95
340	413.16	414.38	415.59	416.81	418.02	419.24	420.45	421.67	422.88	424.10
350	425.32	426.53	427.75	428.96	430.18	431.39	432.61	433.82	435.04	436.25
360	437.47	438.68	439.90	441.11	442.33	443.54	444.76	445.97	447.19	448.40
370	449.62	450.83	452.05	453.26	454.48	455.69	456.91	458.13	459.34	460.56
380	461.77	462.99	464.20	465.42	466.63	467.85	469.06	470.28	471.49	472.71
390	473.92	475.14	476.35	477.57	478.78	480.00	481.21	482.43	483.64	484.86
400	486.07	487.29	488.50	489.72	490.94	492.15	493.37	494.58	495.80	497.01
410	498.23	499.44	500.66	501.87	503.09	504.30	505.52	506.73	507.95	509.16
420	510.38	511.59	512.81	514.02	515.24	516.45	517.67	518.88	520.10	521.31
430	522.53	523.75	524.96	526.18	527.39	528.61	529.82	531.04	532.25	533.47
440	534.68	535.90	537.11	538.33	539.54	540.76	541.97	543.19	544.40	545.62
450	546.83	548.05	549.26	550.48	551.69	552.91	554.12	555.34	556.56	557.77
460	558.99	560.20	561.42	562.63	563.85	565.06	566.28	567.49	568.71	569.92
470	571.14	572.35	573.57	574.78	576.00	577.21	578.43	579.64	580.86	582.07
480	583.29	584.50	585.72	586.93	588.15	589.37	590.58	591.80	593.01	594.23
490	595.44	596.66	597.87	599.09	600.30	601.52	602.73	603.95	605.16	606.38
500	607.59	608.81	610.02	611.24	612.45	613.67	614.88	616.10	617.31	618.53

Table 12. Square metres per metric tonne to square yards per ton. This table is to be used for the calculation of the rate of coverage of such materials as chippings, concrete screed, etc.

BUILDING 28 MARCH 1969
BMN Building Metrication News

Metrication the computer and SI

Table 13

Density of heat flow rate
1kJ/m² = 0.0879194 Btu/ft.²

Note: diff signifies single units so that the reading for any number required is taken at the intersection of the horizontal 10 unit line and the vertical single unit column

diff	0	1	2	3	4	5	6	7	8	9
kJ/m²						Btu/ft²				
0		0.088	0.176	0.264	0.352	0.440	0.528	0.615	0.703	0.791
10	0.879	0.967	1.055	1.143	1.231	1.319	1.407	1.495	1.583	1.670
20	1.758	1.846	1.934	2.022	2.110	2.198	2.286	2.374	2.462	2.550
30	2.638	2.726	2.813	2.901	2.989	3.077	3.165	3.253	3.341	3.429
40	3.517	3.605	3.693	3.781	3.868	3.956	4.044	4.132	4.220	4.308
50	4.396	4.484	4.572	4.660	4.748	4.836	4.923	5.011	5.099	5.187
60	5.275	5.363	5.451	5.539	5.627	5.715	5.803	5.891	5.979	6.066
70	6.154	6.242	6.330	6.418	6.506	6.594	6.682	6.770	6.858	6.946
80	7.034	7.121	7.209	7.297	7.385	7.473	7.561	7.649	7.737	7.825
90	7.913	8.001	8.089	8.177	8.264	8.352	8.440	8.528	8.616	8.704
100	8.792	8.880	8.968	9.056	9.144	9.232	9.319	9.407	9.495	9.583
110	9.671	9.759	9.847	9.935	10.023	10.111	10.199	10.287	10.374	10.462
120	10.550	10.638	10.726	10.814	10.902	10.990	11.078	11.166	11.254	11.342
130	11.430	11.517	11.605	11.693	11.781	11.869	11.957	12.045	12.133	12.221
140	12.309	12.397	12.485	12.572	12.660	12.748	12.836	12.924	13.012	13.100
150	13.188	13.276	13.364	13.452	13.540	13.628	13.715	13.803	13.891	13.979
160	14.067	14.155	14.243	14.331	14.419	14.507	14.595	14.683	14.770	14.858
170	14.946	15.034	15.122	15.210	15.298	15.386	15.474	15.562	15.650	15.738
180	15.825	15.913	16.001	16.089	16.177	16.265	16.353	16.441	16.529	16.617
190	16.705	16.793	16.881	16.968	17.056	17.144	17.232	17.320	17.408	17.496
200	17.584	17.672	17.760	17.848	17.936	18.023	18.111	18.199	18.287	18.375
210	18.463	18.551	18.639	18.727	18.815	18.903	18.991	19.079	19.166	19.254
220	19.342	19.430	19.518	19.606	19.694	19.782	19.870	19.958	20.046	20.134
230	20.221	20.309	20.397	20.485	20.573	20.661	20.749	20.837	20.925	21.013
240	21.101	21.189	21.276	21.364	21.452	21.540	21.628	21.716	21.804	21.892
250	21.980	22.068	22.156	22.244	22.332	22.419	22.507	22.595	22.683	22.771
260	22.859	22.947	23.035	23.123	23.211	23.299	23.387	23.474	23.562	23.650
270	23.738	23.826	23.914	24.002	24.090	24.178	24.266	24.354	24.442	24.530
280	24.617	24.705	24.793	24.881	24.969	25.057	25.145	25.233	25.321	25.409
290	25.497	25.585	25.672	25.760	25.848	25.936	26.024	26.112	26.200	26.288
300	26.376	26.464	26.552	26.640	26.728	26.815	26.903	26.991	27.079	27.167
310	27.255	27.343	27.431	27.519	27.607	27.695	27.783	27.870	27.958	28.046
320	28.134	28.222	28.310	28.398	28.486	28.574	28.662	28.750	28.838	28.925
330	29.013	29.101	29.189	29.277	29.365	29.453	29.541	29.629	29.717	29.805
340	29.893	29.981	30.068	30.156	30.244	30.332	30.420	30.508	30.596	30.684
350	30.772	30.860	30.948	31.036	31.123	31.211	31.299	31.387	31.475	31.563
360	31.651	31.739	31.827	31.915	32.003	32.091	32.179	32.266	32.354	32.442
370	32.530	32.618	32.706	32.794	32.882	32.970	33.058	33.146	33.234	33.321
380	33.409	33.497	33.585	33.673	33.761	33.849	33.937	34.025	34.113	34.201
390	34.289	34.376	34.464	34.552	34.640	34.728	34.816	34.904	34.992	35.080
400	35.168	35.256	35.344	35.432	35.519	35.607	35.695	35.783	35.871	35.959
410	36.047	36.135	36.223	36.311	36.399	36.487	36.574	36.662	36.750	36.838
420	36.926	37.014	37.102	37.190	37.278	37.366	37.454	37.542	37.630	37.717
430	37.805	37.893	37.981	38.069	38.157	38.245	38.333	38.421	38.509	38.597
440	38.685	38.772	38.860	38.948	39.036	39.124	39.212	39.300	39.388	39.476
450	39.564	39.652	39.740	39.827	39.915	40.003	40.091	40.179	40.267	40.355
460	40.443	40.531	40.619	40.707	40.795	40.883	40.970	41.058	41.146	41.234
470	41.322	41.410	41.498	41.586	41.674	41.762	41.850	41.938	42.025	42.113
480	42.201	42.289	42.377	42.465	42.553	42.641	42.729	42.817	42.905	42.993
490	43.081	43.168	43.256	43.344	43.432	43.520	43.608	43.696	43.784	43.872
500	43.960	44.048	44.136	44.223	44.311	44.399	44.487	44.575	44.663	44.751

Table 13. Density of heat flow rate. This table is to be used for thermal radiation on surfaces, heat flow through areas, etc.