Book reviews

Concrete constituents and mix proportions

B. W. Shacklock

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Since the author is well known for his knowledge and experience of concrete materials and mix design, it comes as no surprise that this book contains a great deal of useful information on these subjects. Parts of the book have been seen in other guises in the past, but there is a considerable amount of new information, particularly in relation to the requirements of CP 110.

The opening chapter deals with the background to mix design and the author makes it clear that the mix design procedures favoured in the book are those in which data, obtained from a wide range of mixes, are collated in such a way as to enable an estimate to be made of the required mix proportions in as simple a manner as possible. The concept of characteristic strength is explained and coupled with the requirement of CP 110 that not more than 5% of results should fall below the characteristic strength.

The specification of concrete is dealt with in the second chapter and the various main methods are comprehensively described. Many concrete users would echo the opening sentence, which makes the point that some ways of specifying concrete are illogical and lead to unnecessary confusion and redundant requirements which can, in the extreme, be irreconcilable. Tables of weights of cement and aggregates for prescribed mixes are reproduced from CP 110 and it is helpful to have these values given in both metric and imperial form in separate tables. Indeed there are several tables and figures throughout the book where the author has taken the view that it is still helpful at the present time to have units in both metric and imperial form. The continuing use of nominal mixes in spite of their limitations is recognized, and a useful figure is given for converting nominal mix proportions to aggregate/cement ratios and cement contents.

Chapter 3 covers the constituents of concrete and sections are devoted to cements, aggregates, water and admixtures. The main characteristics of the various types of cement are clearly described and a table sets out the relative properties of concrete made with different types of cement. However, one would have hoped for more information on cements, and also guidance on the classification of American cements would have been helpful for those concerned with work abroad. Admixtures are well covered both in this chapter and in Chapter 6 dealing with mix design for particular properties and purposes. The use of pulverized-fuel ash is included in the section on admixtures, but it seems surprising that no mention is made of ground blastfurnace slag as a partial substitute for cement.

In addition to the considerable amount of information given in Chapter 4 for design procedures for compressive strengths up to about 45 N/mm^2 and in the range from 45 to 80 N/mm^2, there is a welcome section giving data from which guidance can be gained regarding mix proportions for compressive strengths between 80 and 110 N/mm^2. Strength margins are also discussed, the information given being based on CP 110 requirements; these include a minimum margin of 15

N/mm^2 when less than 40 previous test results are available. This margin is, however, considered by many to be unduly high and too onerous for most situations.

Further aspects of mix design are covered in the next two chapters, Chapter 5 covering durability aspects and Chapter 6 covering requirements for particular properties and purposes. The author states the factors which influence durability and explains the importance of water/cement ratios and minimum cement contents for different environments.

The beginning of the chapter on mix design for particular properties and purposes comprises a welcome section on flexural and tensile strengths of concrete. This section is short, but very much to the point and includes useful figures relating flexural and indirect tensile strengths to compressive strengths. The chapter goes on to cover many interesting aspects of mix design for special purposes, including appearance, air-entrained concrete, lightweight concrete, large maximum-size aggregate, low drying shrinkage, lean concrete bases, concrete blocks, and concrete for pumping. For readers wishing to obtain the essential points of information on these subjects, this chapter provides a very good source of reference.

The final chapter describes clearly methods of combining aggregates to give desired gradings, and discusses the implication of results from trial mixes and the factors influencing adjustments to mix proportions during production.

The book, which is of A4 size, contains 102 pages and includes 82 well chosen references at the end. There is a lot more information in the book than appears at first sight and it is presented very clearly. It can be strongly recommended to everyone engaged in the specification and quality control of concrete construction, and in particular, those concerned with designing concrete mixes. At a cost of £3, it represents good value.

K. M. BROOK

Fresh concrete: important properties and their measurement

Proceedings of a RILEM Seminar held on 22–24 March 1973 in Leeds, England

Editors: A. M. Neville and D. Slater

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Forty-one invited participants from seventeen countries representing many different points of view attended this Seminar, which was held in Leeds in March last year. They presented 34 papers on the following topics.

(1) Definitions of workability and allied properties.
(2) Measurement of workability and allied properties of cement paste and concrete.
(3) Influence of properties of cement (powder) on workability and segregation.
(4) Influence of properties of aggregate on properties of fresh concrete.
(5) General properties of fresh concrete with special reference to homogeneity.
(6) Segregation in mixing, transporting, placing and under vibration.
(7) Special problems of ready-mixed concrete. Pumped concrete.

These papers and the written contributions to the discussions on each topic are contained in the Proceedings; the languages of the Seminar were English and French and nine of the papers are in French.

The raison d'être of the Seminar is described by Professor Neville in his summary as "a realisation of the importance of the role of the properties of concrete when still fresh, coupled with an awareness of the inadequacy of the existing published knowledge". The concrete construction engineer is familiar with the important bearing which fresh concrete properties have upon the handling, placing and compaction of concrete and, indeed, upon its final quality. He knows all too well the problems which can arise when unsuitable fresh concrete is used: the occurrence of poor compaction, segregation, blockages during pumping, scouring on surfaces, and so on. He may not be fully conversant with existing published knowledge, but he is aware of the difficulties involved in choosing appropriate levels of consistence and cohesion for special applications, in measuring and controlling these, and in designing satisfactory concrete mixes. There is much in these Proceedings which will increase his understanding of the behaviour of fresh concrete and of the factors affecting its important properties. The papers reflect the divergent interests and views of the authors; evidently they do not constitute a systematic study from which practical procedures can be adopted immediately. They do, however, present the most recent thoughts of the acknowledged experts in this field.