Foreword

Since 1960 the Research Institute of the Cement Industry has used the “Concrete Technology Reports” to publish the results of its work on current concrete technology and chemico-mineralogical problems that arise from the large number of practical applications of cement and concrete. The present 32nd volume comprises the concrete technology reports for the years 2010 to 2012. Contributions that have previously appeared only in German have been translated into English for this collected volume.

Modern concretes are complex systems made up of various concrete constituents that have to prove successful under widely differing ambient conditions. The durability of a construction material plays an important part in the erection of sustainable structures, which is where concrete construction can make full use of its performance. For this reason a substantial part of the research by VDZ is devoted to this central topic. Professional construction work is based on qualified building materials that are being continuously refined. One of the focal points of the research work by VDZ therefore deals with the interactions between cement and admixtures. In this volume of reports the emphasis is not only on the interactions between superplasticisers and the main cement constituents, namely granulated blastfurnace slag and limestone, but also on air-entraining agents. Their re-activation potential and their interactions with superplasticisers have been investigated. The Research Institute has carried out pioneering work in both areas. This applies both to the basic understanding of the reaction mechanisms and to practical applications.

Long-term research work has dealt with the complex aspects of the alkali-silica reaction (ASR) with the aim of safely avoiding harmful ASRs. It is necessary to ensure the durability of concrete, especially in areas with special ambient conditions and high stresses. Concrete roads of the construction classes SV and I to III as defined in the RStO (Guidelines for the standardisation of the bearing course of traffic areas) (moisture class WS) and concrete airfields are exposed to the action of de-icing salt or de-icing agents and at the same time have to take heavy dynamic loads from the traffic. A procedure was developed for these areas at the FIZ (Research Institute of the Cement Industry) in Düsseldorf in the form of the 60 °C concrete test with external supply of alkalis. This test is recognised by the Federal Ministry for Transport, Building and Urban Development and therefore provides safe and practical solutions.

During the European standardisation work on revision of EN 206 there was a discussion about the question to what extent the durability properties of concrete can be obtained from the compressive strengths of the cement, of the combination of cement and additions or of the concrete. Extensive practical experience has justified this approach for the respective national application regulations. This procedure cannot be applied to new materials without durability testing, which has provided a focal point for research by the VDZ in the coming years. The aim is to be able to estimate the durability potential of new cements containing reduced levels of clinker prior to the procedure for furnishing proof that is required by the building inspectorate.

The concrete technology reports in this 32nd collected volume represent the current state of knowledge in important fields of concrete technology and current standardisation in compressed form. When taken together, the 32 volumes constitute a comprehensive and dependable reference work for researchers and users.

I would like to thank the authors and all those involved who have contributed to the success of this volume.

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