

# Concrete In The Service Of Mankind Appropriate Concrete Technology Vol 3

This book presents a number of studies on the molecular dynamics of cement-based materials. It introduces a practical molecular model of cement-hydrate, delineates the relationship between molecular structure and nanoscale properties, reveals the transport mechanism of cement-hydrate, and provides useful methods for material design. Based on the molecular model presented here, the book subsequently sheds light on nanotechnology applications in the design of construction and building materials. As such, it offers a valuable asset for researchers, scientists, and engineers in the field of construction and building materials.

Whether or not, you are on the job site or back in the office, this book will help you to avoid mistakes, code violations, and wasted time and money. The book's four part treatment begins with constituent materials followed by self contained parts on Concrete Properties, Processes, and Concrete Repair and Rehabilitation. Designed to be an "all in one" reference, the author includes a wealth information for the most popular types of testing. This includes: Analysis of Fresh Concrete; Testing Machines; Accelerated Testing Methods; Analysis of Hardened Concrete and Mortar; Core Sampling and Testing; Assessment of Concrete Construction ; Repair; Quality Concepts; Quality Control; Statistics; Standards, Specifications, and Codes of

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Practice. With this book in hand, construction engineers and even technicians find valuable information regarding Exposed Concrete Finishes, Repairing Concrete, Formwork, Precast Concrete, Concrete Roads, and Industrial Floors. Project managers and owners will find this reference a valuable guide to concrete both in terms of its applications in construction projects and the science and chemistry of concrete for its own sake.

Fundamentals of Concrete Chemistry Handy at your figure tip calculations Tips for working with all types of concretes Covers Roads, floors, and finishes Principles of Precast, Reinforced and Prestressed Concrete

One of the most pressing problems facing the construction industry globally is the deterioration of major concrete infrastructure in marine and other chloride-containing environments. While recent advancements in concrete technology have made it easier to control the negative impact of deteriorating processes such as alkali-aggregate reaction, freezing and thawing and chemical attack, chloride-induced corrosion of embedded steel continues to pose the biggest threat to structure durability and performance. The second edition of *Durability Design of Concrete Structures in Severe Environments* focuses on enhancing the durability and service life of concrete structures. The text describes field experience and deteriorating processes of concrete structures in severe environments, and includes current data based on extensive field investigations. It presents a durability design based on calculation of corrosion probability, and outlines additional protective strategies and measures. The text also describes procedures for

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performance-based concrete quality control and quality assurance with documentation of achieved construction quality and compliance with specified durability. The text further covers calculation of life cycle costs and life cycle assessment, and includes some new recommended job specifications. What's New in the Second Edition: This second edition delivers more results and experience from practical applications of the probability-based durability design and the performance-based concrete quality control. It includes recent commercial projects both for Oslo Harbor KF and Nye Tjuvholmen KS in Oslo, and contains some preliminary results from the more comprehensive research program "Underwater Infrastructure and Underwater City of the Future" at Nanyang Technological University in Singapore. The book serves as an essential guide both for the owners and the consulting and construction engineers involved in new and major concrete infrastructure design and construction.

Handbook of Low Carbon Concrete brings together the latest breakthroughs in the design, production, and application of low carbon concrete. In this handbook, the editors and contributors have paid extra attention to the emissions generated by coarse aggregates, emissions due to fine aggregates, and emissions due to cement, fly ash, GGBFS, and admixtures. In addition, the book provides expert coverage on emissions due to concrete batching, transport and placement, and emissions generated by typical commercially produced concretes. Includes the tools and methods for reducing the emissions of greenhouse gases Explores technologies,

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such as carbon capture, storage, and substitute cements  
Provides essential data that helps determine the unique factors involved in designing large, new green cement plants

Lea's Chemistry of Cement and Concrete deals with the chemical and physical properties of cements and concretes and their relation to the practical problems that arise in manufacture and use. As such it is addressed not only to the chemist and those concerned with the science and technology of silicate materials, but also to those interested in the use of concrete in building and civil engineering construction. Much attention is given to the suitability of materials, to the conditions under which concrete can excel and those where it may deteriorate and to the precautionary or remedial measures that can be adopted. First published in 1935, this is the fourth edition and the first to appear since the death of Sir Frederick Lea, the original author. Over the life of the first three editions, this book has become the authority on its subject. The fourth edition is edited by Professor Peter C. Hewlett, Director of the British Board of Agreement and visiting Industrial Professor in the Department of Civil Engineering at the University of Dundee. Professor Hewlett has brought together a distinguished body of international contributors to produce an edition which is a worthy successor to the previous editions.

This fourth volume of Concrete in the Service of Mankind focuses on radical concrete technology. Concrete is ubiquitous and unique, and is found in every developed and developing country. Indeed, there are no alternatives to concrete as a volume construction material for

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infrastructure. This raises important questions of how concrete should be designed and constructed for cost effective use in the the short and long term, and to encourage further radical development. Equally, it must be environmentally friendly during manufacture, in an aesthetic presentation in structures and in the containment of harmful materials. This book should be of interest to concrete technologists; contractors; civil engineers; consultants; government agencies; research organizations.

Whilst most structures made using concrete and cement-based composites have not shown signs of premature degradation, there have been notable exceptions. In addition, there is increasing pressure for new structures to remain in serviceable condition for long periods with only minimal maintenance before being recycled. All these factors have highlighted the issues of what affects the durability of these materials in different circumstances and how material properties can be measured and improved. Durability of concrete and cement composites summarises key research on these important topics. After an introductory chapter, the book reviews the pore structure and chemistry of cement-based materials, providing the foundation for understanding the particular aspects of degradation which are discussed in the following chapters. These include dimensional stability and cracking processes, chemical and microbiological degradation of concrete, corrosion of reinforcing and prestressing steels, deterioration associated with certain aggregates, effects of frost and problems involving fibre-reinforced and

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polymer-cement composites. With its distinguished international team of contributors, *Durability of concrete and cement composites* is a standard reference for all those concerned with improving the service life of structures using these materials. Analyses a range of materials such as reinforced steel in concrete, pre-stressed concrete and cement composites Discusses key degradation phenomena such as cracking processes and the impact of cold weather conditions A standard reference for those concerned with improving the service life of structures using concrete and cement based composites

*Eco-efficient concrete* is a comprehensive guide to the characteristics and environmental performance of key concrete types. Part one discusses the eco-efficiency and life cycle assessment of Portland cement concrete, before part two goes on to consider concrete with supplementary cementitious materials (SCMs). Concrete with non-reactive wastes is the focus of part three, including municipal solid waste incinerator (MSWI) concrete, and concrete with polymeric, construction and demolition wastes (CDW). An eco-efficient approach to concrete carbonation is also reviewed, followed by an investigation in part four of future alternative binders and the use of nano and biotech in concrete production. With its distinguished editors and international team of expert contributors, *Eco-efficient concrete* is a technical guide for all professionals, researchers and academics currently or potentially involved in the design, manufacture and use of eco-efficient concrete. The first part of the book examines the eco-efficiency and life

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cycle assessment of Portland cement concrete Chapters in the second part of the book consider concrete with supplementary cementitious materials, including properties and performance Reviews the eco-efficient approach to concrete carbonation

This volume contains the proceedings of the 8th International PhD Student Workshop on Service Life and Durability of Reinforced Concrete Structures that was held in Marne-la-Vallée, France, on September the 26th and 27th 2016. Topics discussed in the book are related to durability performance of reinforced concrete, service life modelling, prevention, protection and repair.

Reinforced concrete structures may prove to be very durable, however, their gradual degradation over time impairing both serviceability and structural safety is still a matter of great practical concern in view of the large economic consequences for assessment, maintenance and repair. Corrosion of steel reinforcement is considered to be the most detrimental process responsible for structural deterioration. Many studies are in progress to develop a comprehensive engineering approach for assessment of the initiation and the propagation period of corrosion in both uncracked and cracked concrete. Modelling of chloride penetration and carbonation has attracted a great deal of attention in recent years, however, there is still much debate on several essential aspects such as the chloride threshold level. ASR, and acid, sulphate and frost attack and other mechanisms remain important areas of study. In addition, the interaction between different degradation mechanisms requires further understanding. The

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worskhop was organised under the auspices of RILEM EAC (Educational Activities Committee), with the aim to bring together young researchers in the field of durability of concrete.

This book summarizes the latest advances in understanding chloride ingress and steel corrosion in concrete under service loads. Unlike the existing literature, it focuses specifically on the effect of service loads on chloride-induced durability issues in reinforced concrete structures. It discusses how service loads affect the moisture and chloride penetration rate, corrosion kinetics and rust distribution, as well as the structural performance of concrete components (e.g. beams and columns) in a systematic and hierarchical way. Given its scope, the book is chiefly intended for researchers and industry practitioners in structural engineering, particularly those whose work involves the durability design of concrete structures.

Reinforced concrete is the most widely used construction material in the world, and extended performance is rightly expected. Many structures are in aggressive environments, of critical importance and may be irreplaceable, so repair and protection are vital. This book surveys deterioration of concrete, particularly corrosion of the steel reinforcement, and the various chemical, biological, physical and mechanical causes of deterioration. It outlines condition survey and diagnosis techniques by on-site and laboratory measurements. It sets out mechanical methods of protection and repair, such as patching, inhibitors, coatings, penetrants and structural strengthening as well as cathodic protection

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and other electrochemical methods. This book also gives guidance on preventative measures including concrete technology and construction considerations, coatings and penetrants, alternate reinforcement, permanent corrosion monitoring and durability planning aspects. Asset managers, port engineers, bridge maintenance managers, building managers, heritage structure engineers, plant engineers, consulting engineers, architects, specialist contractors and construction material suppliers who have the task of resolving problems of corrosion of steel reinforced concrete elements will find this book an extremely useful resource. It will also be a valuable reference for students at postgraduate level. Authors The late Professor Brian Cherry of Monash University, Melbourne, Australia was one of the world's leading corrosion science and engineering educators and researchers. Warren Green of Vinsi Partners, Sydney, Australia is a corrosion engineer and materials scientist. He is also an Adjunct Associate Professor.

This third volume of Concrete in the Service of Mankind focuses on appropriate concrete technology. Concrete is ubiquitous and unique, and is found in every developed and developing country. Indeed, there are no alternatives to concrete as a volume construction material for infrastructure. This raises important questions of how concrete should be designed and constructed for cost effective use in the the short and long term, and to encourage further radical development. Equally, it must be environmentally friendly during manufacture, in an aesthetic presentation in structures and in the

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containment of harmful materials. This book should be of interest to concrete technologists; contractors; civil engineers; consultants; government agencies; research organizations.

In this book, a critical analysis is made on service life models related to reinforcement corrosion. The contributors are on the frontier of knowledge in the field of durability of reinforced concrete. Topics covered in the book include: causes and mechanisms of deterioration, transport mechanisms in concrete, numerical modeling of concrete behavior, durability modeling and prediction, reliability approach to structural design for durability, structural behavior following degradation of concrete structures, deterioration and repair of concrete structures, and corrosion measurement techniques.

Science and Technology of Concrete Admixtures presents admixtures from both a theoretical and practical point-of-view. The authors emphasize key concepts that can be used to better understand the working mechanisms of these products by presenting a concise overview on the fundamental behavior of Portland cement and hydraulic binders as well as their chemical admixtures, also discussing recent effects in concrete in terms of rheology, mechanics, durability, and sustainability, but never forgetting the fundamental role played by the water/binder ratio and proper curing in concrete technology. Part One presents basic knowledge on Portland cement and concrete, while Part Two deals with the chemical and physical background needed to better understand what admixtures are chemically, and through which mechanism they modify the properties of the fresh and hardened concrete. Subsequent sections present discussions on admixtures technology and two particular types of concrete, self-consolidating and ultra-high strength concretes, with final remarks on their future. Combines the knowledge of two

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leading authors to present both the scientific and technology of admixtures Explains what admixtures are from a chemical point-of-view and illustrates by which mechanisms they modify the properties of fresh and hardened concrete Presents a fundamental, practical, and innovative reference book on the topic Contains three detailed appendices that can be used to learn how to use admixtures more efficiently Permeable framework is a special class of lined formwork used to produce improvements in the strength and durability of concrete. The bracing and the liner in the formwork are engineered to resist the pressure of plastic (or fresh) concrete, but to allow trapped air and excess water to pass through and be removed during concrete placement and consolidation. The objective in using permeable formwork is to eliminate voids on the surface of the concrete (bug holes) and to increase the strength and durability of the concrete surface immediately behind the formwork. A review of permeable formwork and its use in placing concrete was conducted. Methods, techniques, and materials are discussed, and example applications are described. Benefits of using permeable formwork include a reduction in bug holes and surface defects, improved resistance to freezing and thawing, reduced rates of surface carbonation and chloride-ion infiltration, increased surface strength, reduced form coating requirements, reduced efforts in curing, and reduced surface preparation for coating. The cost of using permeable formwork varies greatly among job sites. However, the cost of using permeable formwork will generally be double that for conventional impermeable formwork. Cost savings can be realized in the extended life of any wooden formwork used behind the filter fabric, the ability to proceed without applying form-release compounds, the decreased cost of final surface preparation (if coatings are to be applied to the finished concrete), and the increased service life of the finished

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concrete.

Textbook and design guide for the structural design of post-tensioned concrete.

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