

Contents

Chapter 1: Introduction —JOSEPH F. LAMOND AND JAMES H. PIELERT	1
---	---

PART I
GENERAL

Chapter 2: The Nature of Concrete —RICHARD A. HELMUTH AND RACHEL J. DETWILER	5
Chapter 3: Techniques, Procedures, and Practices of Sampling of Concrete and Concrete Making Materials —TOY S. POOLE	16
Chapter 4: Statistical Considerations in Sampling and Testing —GARLAND W. STEELE	22
Chapter 5: Uniformity of Concrete-Making Materials —ANTHONY E. FIORATO	30
Chapter 6: Virtual Testing of Cement and Concrete —DALE P. BENTZ, EDWARD J. GARBOCZI, JEFFREY W. BULLARD, CHIARA FERRARIS, NICOS MARTYS, AND PAUL E. STUTZMAN	38
Chapter 7: Quality Cement, Concrete, and Aggregates—The Role of Testing Laboratories —JAMES H. PIELERT	51

PART II
FRESHLY MIXED CONCRETE

Chapter 8: Factors Influencing Concrete Workability —D. GENE DANIEL	59
Chapter 9: Air Content, Temperature, Density (Unit Weight), and Yield —LAWRENCE R. ROBERTS	73
Chapter 10: Making and Curing Concrete Specimens —JOSEPH F. LAMOND	80
Chapter 11: Time of Setting —BRUCE J. CHRISTENSEN	86
Chapter 12: Bleed Water —STEVEN H. KOSMATKA	99

PART III
HARDENED CONCRETE

Chapter 13: Concrete Strength Testing —CELIK OZYILDIRIM AND NICHOLAS J. CARINO	125
Chapter 14: Prediction of Potential Concrete Strength at Later Ages —NICHOLAS J. CARINO	141
Chapter 15: Freezing and Thawing —CHARLES K. NMAI	154
Chapter 16: Corrosion of Reinforcing Steel —NEAL S. BERKE	164
Chapter 17: Embedded Metals and Materials Other Than Reinforcing Steel —BERNARD ERLIN	174
Chapter 18: Abrasion Resistance —KARL J. BAKKE	184
Chapter 19: Elastic Properties, Creep, and Relaxation —JASON WEISS	194
Chapter 20: Petrographic Examination —BERNARD ERLIN	207
Chapter 21: Volume Change —FRED GOODWIN	215
Chapter 22: Thermal Properties —STEPHEN B. TATRO	226
Chapter 23: Pore Structure, Permeability, and Penetration Resistance Characteristics of Concrete —NATALIYA HEARN, R. DOUGLAS HOOTON, AND MICHELLE R. NOKKEN	238
Chapter 24: Chemical Resistance of Concrete —M. D. A. THOMAS AND J. SKALNY	253
Chapter 25: Resistance to Fire and High Temperatures —STEPHEN S. SZOKE	274
Chapter 26: Air Content and Density of Hardened Concrete —KENNETH C. HOVER	288
Chapter 27: Analyses for Cement and Other Materials in Hardened Concrete —WILLIAM G. HIME	309
Chapter 28: Nondestructive Tests —V. MOHAN MALHOTRA	314

PART IV
CONCRETE AGGREGATES

Chapter 29: Grading, Shape, and Surface Texture —ROBIN E. GRAVES	337
Chapter 30: Bulk Density, Relative Density (Specific Gravity), Pore Structure, Absorption, and Surface Moisture —JOHN J. YZENAS, JR.	346
Chapter 31: Soundness, Deleterious Substances, and Coatings —STEPHEN W. FORSTER	355
Chapter 32: Degradation Resistance, Strength, and Related Properties of Aggregates —RICHARD C. MEININGER	365
Chapter 33: Petrographic Evaluation of Concrete Aggregates —G. SAM WONG.....	377
Chapter 34: Alkali-Silica Reactions in Concrete —DAVID STARK.....	401
Chapter 35: Alkali-Carbonate Rock Reaction —MICHAEL A. OZOL	410
Chapter 36: Thermal Properties of Aggregates —D. STEPHEN LANE.....	425

PART V
OTHER CONCRETE MAKING MATERIALS

Chapter 37: Hydraulic Cements—Physical Properties —LESLIE STRUBLE	435
Chapter 38: Hydraulic Cement-Chemical Properties —SHARON M. DEHAYES AND PAUL D. TENNIS	450
Chapter 39: Mixing and Curing Water for Concrete —JAMES S. PIERCE.....	462
Chapter 40: Curing and Materials Applied to New Concrete Surfaces —BEN E. EDWARDS	467
Chapter 41: Air-Entraining Admixtures —ARA A. JEKNAVORIAN.....	474
Chapter 42: Chemical Admixtures —BRUCE J. CHRISTENSEN AND HAMID FARZAM.....	484
Chapter 43: Supplementary Cementitious Materials —SCOTT SCHLORHOLTZ.....	495
Chapter 44: Slag as a Cementitious Material —JAN R. PRUSINSKI	512

PART VI
SPECIALIZED CONCRETES

Chapter 45: Ready Mixed Concrete —COLIN L. LOBO AND RICHARD D. GAYNOR	533
Chapter 46: Lightweight Concrete and Aggregates —THOMAS A. HOLM AND JOHN P. RIES	548
Chapter 47: Cellular Concrete —FOUAD H. FOUAD	561
Chapter 48: Concrete for Radiation Shielding —DOUGLAS E. VOLKMAN	570
Chapter 49: Fiber-Reinforced Concrete —PETER C. TATNALL.....	578
Chapter 50: Preplaced Aggregate Concrete —EDWARD P. HOLUB	591
Chapter 51: Roller-Compacted Concrete (RCC) —WAYNE S. ADASKA	595
Chapter 52: Polymer-Modified Concrete and Mortar —D. GERRY WALTERS	605
Chapter 53: Shotcrete —JOHN H. PYE	616
Chapter 54: Organic Materials for Bonding, Patching, and Sealing Concrete —RAYMOND J. SCHUTZ.....	625
Chapter 55: Packaged, Dry, Cementitious Mixtures —DENNISON FIALA	631
Chapter 56: Self-Consolidating Concrete (SCC) —JOSEPH A. DACZKO AND MARTIN VACHON	637

INDEXES

Index	647
--------------------	-----