Contents

Part 1 · Concrete in architecture
Friedbert Kind-Barkauskas 8
The concrete surface 65
Design concepts 65
The constituents of the concrete mix 65
The effects of formwork 65
Finishing the concrete surface 65
The use of coatings 65
The effects of the weather 65
References 65

Friedbert Kind-Barkauskas 65
Bruno Kauhsen 66
Stefan Polónyi 68
Jörg Brandt 73

74 Loadbearing internal wall 183
77 Non-loadbearing facade 184
8 Flat roof of impermeable concrete 185
78 Solid roof 186
78 Joints 187
78 Fixing of facade panels 189
78 Stairs 191

Lime mortar applications in antiquity 9
Roman buildings with opus caementitium 10
The production of cement and concrete 11
First trials with reinforced concrete 13
The development of prestressed concrete 17
Reinforced concrete in the Modern Movement 18
Early industrial and commercial structures 18
The early 20th century 20
The development of stressed skin structures 22
Expressionism 24
The early Modern Movement 25
Frank Lloyd Wright 27
Le Corbusier 28
Shell structures 30
Pier Luigi Nervi 31
Architecture at the height of the Modern Movement 32
Late-Modern and Postmodern Dutch structuralism 38
The use of precast concrete 39
Contemporary architecture 41
References 44

Part 2 · Fundamentals
Friedbert Kind-Barkauskas 46
Jörg Brandt 46
Concrete – the material
The composition of concrete 47
Types of concrete 50
Properties of concrete 51
Exposure classes 51
Reinforcement 60
Concrete masonry 61
Application 61
References 64

Part 3 · Reinforced concrete in buildings
Stefan Polónyi 106
Claudia Austermann 106
Multistorey structures 108
Aspects of industrial production 108
Joints in structures 110
Roofs 112
Floors 113
Walls 128
Columns 129
Service cores, stairs 134
Facade 135
High-rise buildings 138
Suspended high-rise buildings 140
Single-storey sheds 142
Single-storey sheds of trusses and frames 143
Stressed skin structures 151
Suspended roofs 165
Foundations 168
Shallow foundations 168
Deep foundations, pile foundations 172
Securing excavations 173
Building below the water table 174
References 175

Part 4 · Construction details
Friedbert Kind-Barkauskas 178
Bruno Kauhsen 180
Stefan Polónyi 183
Jörg Brandt 184

185 Flat roof of impermeable concrete 185
186 Solid roof 186
187 Joints 187
189 Fixing of facade panels 189
191 Stairs 191

Part 5 · Built examples
Bruno Kauhsen 194

195 Built examples in detail – overview
Examples 1 – 33

Appendix
Index and glossary 280
Index of names 293
Picture credits 294

References
5