

# Contents

<b>Preface</b>	<b>iii</b>
<b>Notations</b>	<b>ix</b>
<b>PART I: PRINCIPLES</b>	
<b>1 Scope</b>	<b>1</b>
1.1 Aim of the Model Code	1
1.2 Main innovating aspects	1
<b>2 Terminology</b>	<b>4</b>
2.1 Definitions	4
2.2 References	25
<b>3 Basic principles</b>	<b>26</b>
3.1 General	26
3.2 Performance-based design and assessment	27
3.2.1 General approach	27
3.2.2 Basis for verification	28
3.3 Performance requirements for serviceability and structural safety	30
3.3.1 Performance criteria for serviceability and structural safety	30
3.3.2 Service life	36
3.3.3 Reliability	38
3.4 Performance requirements for sustainability	43
3.4.1 General	43
3.4.2 Performance requirements for environmental impact	45
3.4.3 Performance requirements for impact on society	46
3.4.4 Performance requirements for aesthetics	47
3.5 Life Cycle Management	48
3.5.1 General	48
3.5.2 Quality Management	49
3.5.3 Quality Management in Design	53
3.5.4 Quality Management in Construction	65
3.5.5 Quality Management in Conservation	66
3.5.6 Quality Management in Dismantlement	68
<b>4 Principles of structural design</b>	<b>69</b>
4.1 Design situations	69
4.2 Design strategies	70
4.3 Design methods	71
4.3.1 Limit state design principles	71
4.3.2 Safety formats	71
4.4 Probabilistic safety format	43
4.4.1 General	43
4.4.2 Basic rules for probabilistic approach	74
4.5 Partial factor format	75
4.5.1 General	75
4.5.2 Basic rules for partial factor approach	90
4.6 Global resistance format	100
4.6.1 General	100
4.6.2 Basic rules for global resistance approach	100

4.7	Deemed-to-satisfy approach	103
4.7.1	General	103
4.7.2	Durability related exposure categories	104
4.8	Design by avoidance	106

## **PART II: DESIGN INPUT DATA**

<b>5</b>	<b>Materials</b>	<b>107</b>
5.1	Concrete	107
5.1.1	General and range of applicability	107
5.1.2	Classification by strength	108
5.1.3	Classification by density	108
5.1.4	Compressive strength	110
5.1.5	Tensile strength and fracture properties	111
5.1.6	Strength under multiaxial states of stress	114
5.1.7	Modulus of elasticity and Poisson's ratio	117
5.1.8	Stress-strain relations for short-term loading	120
5.1.9	Time effects	128
5.1.10	Temperature effects	142
5.1.11	Properties related to non-static loading	150
5.1.12	Transport of liquids and gases in hardened concrete	156
5.1.13	Properties related to durability	164
5.2	Reinforcing steel	170
5.2.1	General	170
5.2.2	Quality control	171
5.2.3	Designation	171
5.2.4	Geometrical properties	171
5.2.5	Mechanical properties	173
5.2.6	Technological properties	176
5.2.7	Special types of steel	177
5.2.8	Sustainability aspects	177
5.2.9	Assumptions used for design	177
5.3	Prestressing steel	180
5.3.1	General	180
5.3.2	Quality control	181
5.3.3	Designation	181
5.3.4	Geometrical properties	182
5.3.5	Mechanical properties	183
5.3.6	Technological properties	187
5.3.7	Special types of prestressing steel	190
5.3.8	Sustainability aspects	191
5.3.9	Assumptions used for design	192
5.4	Prestressing systems	194
5.4.1	General	194
5.4.2	Post-tensioning system components and materials	195
5.4.3	Protection of tendons	200
5.4.4	Stresses at tensioning, time of tensioning	201
5.4.5	Initial prestress	202
5.4.6	Value of prestressing force	207
5.4.7	Design values of forces in prestressing tendons	208
5.4.8	Design values of tendon elongations	209
5.4.9	Detailing rules for prestressing tendons	209

5.5	Non-metallic reinforcement	211
5.5.1	General	211
5.5.2	Quality control	212
5.5.3	Designation	212
5.5.4	Geometrical properties	212
5.5.5	Mechanical properties	214
5.5.6	Technological properties	217
5.5.7	Assumptions used for design	218
5.6	Fibres and fibre-reinforced concrete	220
5.6.1	Introduction	220
5.6.2	Material properties	221
5.6.3	Classification	225
5.6.4	Constitutive laws	226
5.6.5	Stress-strain relationship for SLS	229
5.6.6	Partial safety factors for ULS	230
5.6.7	Orientation factor	231
<b>6</b>	<b>Interface characteristics</b>	<b>232</b>
6.1	Bond of embedded steel reinforcement	232
6.1.1	Local bond-slip relationship	232
6.1.2	Influence on serviceability	238
6.1.3	Anchorage and lapped joints of reinforcement	239
6.1.4	Anchorage and lapped joints of welded fabric	247
6.1.5	Special circumstances	249
6.1.6	Conditions of service	250
6.1.7	Degradation	250
6.1.8	Anchorage of prestressing tendons	253
6.2	Bond of non-metallic reinforcement	257
6.2.1	Local bond stress-slip model	257
6.2.2	Bond and anchorage of internal FRP reinforcement	259
6.2.3	Bond and anchorage of externally bonded FRP reinforcement	259
6.2.4	Mechanical anchorages for externally bonded FRP reinforcement	264
6.3	Concrete to concrete	265
6.3.1	Definitions and scope	265
6.3.2	Interface roughness characteristics	265
6.3.3	Mechanisms of shear transfer	267
6.3.4	Modelling and design	270
6.3.5	Detailing	274
6.4	Concrete to steel	276
6.4.1	Classification of interaction mechanisms	276
6.4.2	Bond of metal sheeting and profiles	277
6.4.3	Mechanical interlock	281

