Index
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidental action 49</td>
<td>Aramid 139, 141</td>
</tr>
<tr>
<td>Accidental situations 49</td>
<td>Arch action 218, 219</td>
</tr>
<tr>
<td>Action</td>
<td>Area</td>
</tr>
<tr>
<td>- accompanying variable 63, 64</td>
<td>- effective area of concrete tension 285</td>
</tr>
<tr>
<td>- combinations 65, 68</td>
<td>As-built documentation 38, 45, 372</td>
</tr>
<tr>
<td>- leading variable 63, 64</td>
<td>Assembly and placing of the reinforcement 357</td>
</tr>
<tr>
<td>Actions</td>
<td>Assessment</td>
</tr>
<tr>
<td>- accidental 57</td>
<td>- existing structures 51</td>
</tr>
<tr>
<td>- direct or indirect 55</td>
<td>- performance-based 23</td>
</tr>
<tr>
<td>- fixed or free 55</td>
<td>- probabilistic 51</td>
</tr>
<tr>
<td>- permanent 56</td>
<td>Attack</td>
</tr>
<tr>
<td>- permanent, variable or accidental 55</td>
<td>- chemical 71, 72</td>
</tr>
<tr>
<td>- seismic 57</td>
<td>- freezing and thawing 71, 72</td>
</tr>
<tr>
<td>- static, quasi-static or dynamic 55</td>
<td></td>
</tr>
<tr>
<td>- variable 56</td>
<td></td>
</tr>
<tr>
<td>Adhesion 172, 183, 184</td>
<td></td>
</tr>
<tr>
<td>Adhesive bond resistance 224</td>
<td></td>
</tr>
<tr>
<td>Adhesive bonding 178</td>
<td></td>
</tr>
<tr>
<td>AFRP 142</td>
<td></td>
</tr>
<tr>
<td>Alkali-aggregate reaction 108</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
</tr>
<tr>
<td>- plastic 197</td>
<td></td>
</tr>
<tr>
<td>- structural 194</td>
<td></td>
</tr>
<tr>
<td>Anchorage</td>
<td></td>
</tr>
<tr>
<td>- capacity 173, 174</td>
<td></td>
</tr>
<tr>
<td>- meshes of reinforcing steel 336</td>
<td></td>
</tr>
<tr>
<td>- ribbed reinforcing bars 336</td>
<td></td>
</tr>
<tr>
<td>- zones 337</td>
<td></td>
</tr>
<tr>
<td>Anchorage and coupling device performance</td>
<td></td>
</tr>
<tr>
<td>- fatigue test 126</td>
<td></td>
</tr>
<tr>
<td>- load transfer test 126</td>
<td></td>
</tr>
<tr>
<td>- tensile test 126</td>
<td></td>
</tr>
<tr>
<td>Anchorage and lapped joints 159</td>
<td></td>
</tr>
<tr>
<td>- alkali silicea reaction (ASR) 168</td>
<td></td>
</tr>
<tr>
<td>- basic bond strength 160</td>
<td></td>
</tr>
<tr>
<td>- bentonite walling 166</td>
<td></td>
</tr>
<tr>
<td>- bundled bars 165</td>
<td></td>
</tr>
<tr>
<td>- corrosion 167</td>
<td></td>
</tr>
<tr>
<td>- cryogenic conditions 167</td>
<td></td>
</tr>
<tr>
<td>- design anchorage length 162</td>
<td></td>
</tr>
<tr>
<td>- design bond strength 161</td>
<td></td>
</tr>
<tr>
<td>- electrochemical extraction of chlorides (ECE) 167</td>
<td></td>
</tr>
<tr>
<td>- elevated temperatures 167</td>
<td></td>
</tr>
<tr>
<td>- fire 168</td>
<td></td>
</tr>
<tr>
<td>- frost 168</td>
<td></td>
</tr>
<tr>
<td>- headed reinforcement 163</td>
<td></td>
</tr>
<tr>
<td>- hooks and bends 163</td>
<td></td>
</tr>
<tr>
<td>- post-installed reinforcement 166</td>
<td></td>
</tr>
<tr>
<td>- slipform construction 166</td>
<td></td>
</tr>
<tr>
<td>- welded fabric 165</td>
<td></td>
</tr>
<tr>
<td>Anchorage length 337, 340</td>
<td></td>
</tr>
<tr>
<td>Anchorage of pretensioned prestressing tendons</td>
<td></td>
</tr>
<tr>
<td>- design bond strength 169</td>
<td></td>
</tr>
<tr>
<td>Anchorage zone 348</td>
<td></td>
</tr>
<tr>
<td>Anchorages 350</td>
<td></td>
</tr>
<tr>
<td>- coupling devices 125</td>
<td></td>
</tr>
<tr>
<td>- fixed anchorages 125</td>
<td></td>
</tr>
<tr>
<td>- stressing anchorages 125</td>
<td></td>
</tr>
<tr>
<td>Appearance 281</td>
<td></td>
</tr>
<tr>
<td>Approximation</td>
<td></td>
</tr>
<tr>
<td>- Levels-of-approximation approach 21</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- B-regions 234
- Bar
- minimum 335
- spacing 335, 342, 344
- Bar spacing
- maximum 288
- Bars
- cold-rolled 118
- hot-rolled 118
- plain 118
- ribbed 118
- Basic variables
- representative value 55
- Bayesian approach 328
- Beams 341
- with shear and longitudinal reinforcement 300
- without longitudinal and shear reinforcement 298
- without shear reinforcement 298
- Bearing
- length 345
- stress 345
- Bearings 340, 341, 345
- Behaviour in tension 145
- Behaviour under extreme thermal conditions 114
- Bendability 114
- Bending 215
- biaxial 239
- Bending resistance
- interaction 180
- simultaneous bending 180
- Bends 335
- Bent-up bars 230
- Birth certificate 370, 372
- - document 38, 45
- Bond
- chemical adhesive 184
- creep 157
- cyclic loading 155
- fatigue 157
- FRP reinforcement 171, 172
- local bond-slip relationship 153
- longitudinal cracking 155
- transverse cracking 155
- transverse stress 155
- yielding 155
- Bond characteristics 121
- Bond length 336, 338
Bond length factors 337
Bond strength 284
Box principle 365
Box-girders 226
Brief
  – client 39
  – owner 39
Briefing phase 39
Buckling
  – local 344
  – out-of-plane 238
Bursting 348

C
Cages 342
Camber 289, 290
Capacity design 255 ff
  – bridge pier 256
  – foundation elements 258
  – frame beam 256
  – frame column 256
  – joint 257
  – sensitive components 258
  – structural wall 257
Carbon 139, 141
Carbonation 71, 106
  – depassivation 305
  – design model 306
  – influence of cracks 310
  – weather function 306
CFRP 142
  – epoxy bonded 174
Chemical attack
  – acid attack 312
  – alkali-aggregate reactions 314
  – ettringite 314
  – sulphate 313
Chloride induced corrosion
  – ageing-factor 309
  – apparent coefficient of chloride diffusion 308
  – critical chloride content 309
  – design model 308
  – Fick’s second law 308
  – influence of cracks 310
Chlorides 71
Chord rotation 252, 263
Class of ductility 234
Classes of condition control
  – no conversation
    – CCL0 374
  – proactive conservation
    – CCL3 374
  – reactive conservation
    – CCL, CCL2 374
Classes of conservation strategy
  – no conversation
    – CCL0 374
  – proactive conservation
    – CCL3 374
  – reactive conservation
    – CCL1, CCL2 374
Classification 146, 296
  – devices 185
Coating
  – metallic coating 117
  – organic coating 117
Coefficient
  – thermal expansion 142
Coefficient of eccentricity 230
Coefficient of thermal expansion 114, 122
Coefficient of variation 62
Columns 215
Compartmentation 275
Composite action 183
Compression 82
Compression members 343
Compressive flanges 223
Compressive meridian 79
Compressive strength 100
Conceptual design 191 ff
Concrete
  – material properties 75 ff
Concrete overlay
  – delaminating 182
Concreting
  – compaction 364
  – curing 364
  – curing class 364
  – geometrical tolerances 364
  – placing 364
  – self compacting concrete 364
  – specification of concrete 363
Condition assessment 372, 378
  – deterioration level and rate 379
  – deterioration mechanism 378
  – factors influencing deterioration 379
Condition based conservation 368
Condition control 367, 372, 378
Condition control inspections and surveys
  – detailed investigation 375, 376
  – extraordinary inspection or survey 375, 377
  – initial inspection or survey 375, 376
  – routine inspection or survey 375, 376
Condition control level/inspection regimes
  – CCL0 369
  – CCL1 369
  – CCL2 369
  – CCL3 368
Condition evaluation 372
Condition evaluation and decision-making 379
Condition monitoring 372
Condition survey 372, 373
Conditions
  – environmental 71, 72
Conductivity
  – thermal 268
Confined concrete 203
Confined core 261
Confinement 203
Confinement effectiveness factor 261 ff
Connecting devices 183
Connections
  – loop 347
Connectors 179, 224
  – headed 188
  – headed stud 187
  – monolithic behaviour 181
  – opening of the joint 179
  – shear 189
  – shear strength 177
CONREPNET project 381
Conservation 45
Conservation activities 368
Conservation management
  – condition assessment 370
  – condition evaluation 370
  – condition survey 370
  – execution of preventative or remedial work 370
  – recording of the information 370
Conservation objectives 367
Conservation plan
  – documentation of condition control section 9.8 373
  – estimating degree and rate of deterioration section 9.5 373
  – evaluating structural performance section 9.6 373
  – interventions section 9.7 373
  – specification for inspection, testing and condition monitoring section 9.4 373
Conservation strategies
  – no conservation 368, 369
  – proactive conservation 368
  – reactive conservation 368
Conservation strategy 367, 372
Conservation tactics
  – condition based conservation 368
  – time based conservation 368
Constitutive laws 146
Constitutive relations 84
Construction 352 ff
Construction documents - reinforcement 357
Container
  – primary 276
  – secondary 276
Contamination 388
Control perimeter
  – basic 227, 228, 229
  – reduced basic 229
  – shear-resisting 229
Control section 217, 218
Cooling down phase 264
Corrosion 71
  – chlorides 72
Cover 338
  – concrete 334
  – minimum 335, 337, 349
  – reinforcement 334
  – tolerance 60
Crack 78 ff
  – band 294
  – design width 286
  – discrete model 294
  – formation stage 283, 285
  – opening 79
  – propagation 294
  – smeared model 294, 295
  – width in prestressed concrete members 286
  – calculation 283
  – design 284
  – limit values 282
  – limitation 282
  – surface 284, 302
Crack control 302
Crack spacing 284
Crack width
  – control 287
  – limit state 281
  – stabilized stage 284, 285, 287
  – stages 284
  – width control 288
Cracking stage
  – stabilized 283
Cracks
  – longitudinal 280
Creep
  – steady state 267
  – transient 269
Cryogenic
  – design 276
  – liquids 276
Cryogenic conditions 119
Cryogenic temperature 98
Curvature 237, 290
  – due to shrinkage 291
Curvatures 339
Cutting and bending 355
Cyclic loading 244, 261
D
D-regions 234
Damage 26, 323
Damage formulation 85
Debonding
  – concrete rip-off 175
  – intermediate 175
Decompression
  – limit state 280
Deemed-to-satisfy 71
  – approach 51
Deflected tensile behaviour 122
Deflection
  – long term 291
  – simplified calculation 291
Deflections
  – excessive 293
  – instantaneous 289, 290
  – long term 290
  – time-dependent 290
Deformations
  – due to bending 289
  – imposed 283, 285
  – instantaneous 289
  – limit state 279, 288
  – long term 289
  – parameter 290
Degradation 26
Degradation by acids 108
Demolition 388
Demounting 388
Density
  – density classes 76
  – in-situ density 76
Design 190 ff
  – alkali-aggregate reactions 314
  – avoidance 51, 73
  – avoidance-of-deterioration approach 304
  – basis 40
  – capacity 317
  – carbonation induced corrosion 305
  – chemical attack 312
  – chloride induced corrosion 308
  – condition 53
  – cross-sections 201
  – deemed-to-satisfy approach 304
  – detailed phase 44
  – durability 304
  – file 39
  – final phase 43
  – final report 44
  – freeze-thaw 311
  – ISO 16204 304
  – methods 50
  – partial safety factor format 304
  – performance-based 23
  – phase 40
  – probabilistic safety format 304
  – seismic 73
  – service life design 304
  – situations 49
  – strategies 49
  – values of basic variables 53
  – verification of limit states associated with durability 304
Design drawings 45
Design file 372
Design of anchorages 350
Design principles 296
Design shear force 227
Design situation
  – accidental 64
  – persistent/ transient 64
Design values
  – action 53, 54
  – basic variables 53
  – geometrical quantities 53, 54
  – material and soil properties 53
  – model uncertainties 53, 54
  – product property 54
Design values of forces in prestressing
  – design values for SLS and fatigue verifications 137
  – design values for ULS verification 137
  – design values of tendon elongations 137
Detailed investigation 378
Detailed rules
  – minimum radii of tendon curvature 138
Detailing 334
Deterioration
  – avoidance 73
  – deterioration mechanism
    – factors influencing deterioration 379
  – deviation forces 339
  – deviations 339
  – diffusivity
    – thermal 268
  – dimensioning 44, 194, 248
  – dimensioning values 199
  – dismantlement 46, 388
  – document 38, 47
  – technique 389
  – dissipation of energy 250
  – documentation
    – as-built 353
    – birth certificate 353
    – ductility 113, 250
    – requirements 240
  – ducts 127
    – corrugated metal ducts 127
    – corrugated plastic ducts 127
    – smooth plastic pipes 127
    – smooth steel pipes 127
  – durability 21, 71, 106, 281, 335
  – dynamic increase factors 248

E
Earthquake
  – damage 25
  – EBR (externally bonded reinforcement) 172, 175
Eccentricities
  – unintentional 59
Eccentricity
  – first order 237
ECOV 326
Effect
  – favourable 63, 64
  – unfavourable 63, 64
Effect of strain rate 114, 120
Effect of temperature 120
Effective cross-section 226
Effective cross-sectional area 226
Effective elastic stiffness 252
Effective panel thickness 226, 227
Effective width 196
  – slab 195
Effects
  – second order 236
Elasticity
  – linear 196
  – theory of linear 194
Elasto-plastic formulation 84
Elongation
  – restrained thermal 273
Emergency measures 378
Energy
  – energy dissipation 251
Environmental performance 310
Equal displacement rule 253
Evaluation 378
Execution classes 354
Execution management
  – documentation 353
High strength concrete 99 ff
High temperature 98, 120
Hydrocodes 247
Hysteresis rules 259

I
Idealized stress-strain diagram 115
Idealized stress-strain relation 124
Identification 327, 354
Impact 67, 246
- environmental 34
Imperfections
- geometric 195
- geometrical 236
Inclination
- unintended 195
Ingress of chlorides 107
Initial prestress
- initial prestressing force 130
Inspection 354
Inspection plan 354
Inspection regime 372
Inspection/survey 378
Instability
- lateral 239
Installation of tendons 358
Insulation
- requirements 274
Integration factor 238
Integrity reinforcement 234
Interaction 183
Interaction diagram 237
Interface
- strength 184
Interfaces
- shear forces 176
Interlock
- frictional 183
- interface 184
- mechanical 183, 185
Intervention 372, 378
- selection of interventions 380
Interventions
- execution of interventions 384
- maintenance interventions 381
- other activities and measures
  - dismantling and removal 384
  - emergency measures 383
  - intensified inspection, survey or monitoring 383
  - usage restriction 383
- preventative interventions
  - materials 382
  - methods 382
- rebuild, reconstruction and replacement 382
- remedial interventions
  - materials 382
  - methods 382
- strengthening or upgrading interventions
  - materials 383
  - methods 383
- thinking intervention 384
Inverse analysis 145

Inverse method 327
ISO 319
ISO 22965 363
ISO 22966 353
Isotherm
- reference method 269, 270, 275
- isothermal stress relaxation
  - relaxation 121
J
Joints 357
- expansion 341
- lapped 338
- mortar 347
- shrinkage 340
L
Ladders 342
Lap length 338
Layers
- membrane 216
Leaching 109
Length
- effective 237
Level I approximation 220, 221
Level II approximation 220, 221
Level III approximation 222
Level IV approximation 222
Levels of approximation 231
Life cycle
- file 37, 38
- management 35
Limit
- life safety 28
- near-collapse 28
- partial damage 25
Limit state 25, 50
- cracking 67
- deformations 67
- design 30
- design principles 50
- excessive compression 67
- immediate use 27
- life safety 27
- near-collapse 27
- probabilistic structural 30
- serviceability 26, 67
- ultimate 28, 61
- ultimate use 27
- vibrations 67
Linear model 147
Load
- dynamic loads 249
Load paths 316
Load-time curves 247
Loading
- loading velocities 246
Loading path
- alternative 317
Loop
- radius 347
Loops 335
Losses
- caused by seating of tensile elements 131
- due to friction 130
- due to instantaneous deformation of concrete 130
- effect of heat treatment curing 132
- effect of initial stress on relaxation loss 133
- effect of temperature on relaxation loss 135
- effect of time on relaxation loss 134
- immediate losses 130
- relaxation losses 132
Lubricating filler
- grease 117
- wax 117

M
Maintenance plan 354
Management
- life cycle 35
- quality 35, 36
Mandrel
- diameters 336
Mandrel diameters
- minimum 335
Material softening 323
Maximum size of the aggregate 230
Mechanical interlocking 178
Mechanical properties 111, 117, 118
Members
- compression 236
Members with reinforcement 301
Members with shear of reinforcement 220
Members without reinforcement 301
Members without shear of reinforcement 219
Mesh reinforcement 337
Mesh sensitivity tests 323
Metal sheeting 183
Methods
- least square 332
- maximum likelihood 332
Microplane 323
Minimum mandrel diameter 355
Minimum reinforcement 302, 342
Minimum shear reinforcement 300
Model uncertainty factor 324
Modelling
- structural 194
Modular ratio 280, 285
Modulus of elasticity 101, 115, 117, 119
- lightweight aggregate concrete 81
- normal weight concrete 81
- self-compacting concrete (SCC) 82
Mohr’s
- circles 240

N
New concrete layers 176
No conservation 369
Node 234, 236
Non-conformity 354
Non-linear analysis 199
Non-linear solution 322
Non-linear solution
- caused by seating of tensile elements 131
- due to friction 130
- due to instantaneous deformation of concrete 130
- effect of heat treatment curing 132
- effect of initial stress on relaxation loss 133
- effect of temperature on relaxation loss 135
- effect of time on relaxation loss 134
- immediate losses 130
- relaxation losses 132
Lubricating filler
- grease 117
- wax 117

O
Orientation factor 150

P
Packaging 358
Palmgren-Miner 99 ff, 245
Partial coefficients 65
Partial factor
- approach 60
- format 52
Partial factor method 326
Partial safety factors 61, 62, 63, 64, 150
Partially loaded areas 203
Performance 21
- criteria 23
- environmental impact 34
- requirement 24, 33, 34, 42
- sustainability 33, 42
Performance of punching shear reinforcing systems 231
Performance requirement 320
Performance requirements 25
- CO2 34
- environmental impact 34
- impact on society 34, 35
Periodic inspection 378
Permanent corrosion protection 128
Persistent situations 49
Plane section analysis 260
Plastic hinge 198, 259 ff
Plastic hinge length 261 ff
Plastic rotation 198
Plasticity 323
- theory 194, 197
Poisson’s ratio 82
Post-cracking residual tensile strength 144
Post-tensioning systems 125
Post-tensioning tendons
- minimum radii of tendon curvature 138
Post-yield stiffness 259
Precast concrete elements 345
- execution with 364
Prepreg
- systems 140
Pressure-time curves 247
Prestress 58
Prestressed members 219
Prestressed slabs 232
Prestressing steel
- bars 117
- strands 117
- wires 117
Prestressing systems 125
Prestressing tendons
- bonded 125
- external 125
- extradosed tendons 125
- internal 125
- post-tensioned 125
- pretensioned 125

R
Regional parameter 332
Relaxation losses 179
Reliability 329
- approach 34
- criteria 35
- model 35
- requirement 23, 35
- theory 35
- uncertainty 35
- worst case 35
Reinforced concrete 33
Reinforcement
- bending 117
- flat bars 119
- grid 117
- hoop 117
- hooks 117
- loops 117
- reinforcing bars 117
- woven grids 117
- wire mesh 117
- wires 117
- yield 117
Residual shear force 266
Resilience 300
Restrain 239
Restrain load 239
Retained load 239
Rinetti 310
Robustness 329
- approach 34
- criteria 35
- model 35
- requirement 23, 35
- theory 35
- uncertainty 35
- worst case 35
Rotation factor 323
- theory 194, 197
Rouvière-Sendron 320
Redistribution 296
- limited 196
Redundancy 316, 317
Reference period 31
Regions
- continuity 199
Regression analysis
- Bayesian 332
Regular flat slabs 231
Reinforced concrete
- textile reinforced concrete 251
Reinforcement 110 ff
- bond 171
- combined 286
- confining 338
- high bond 336
- horizontal 345
- non-metallic 139, 171
  - pre-cured 140
  - pre-impregnated 140
  - wet lay-up 140
- ordinary 60
- orthogonal 285
- prestressing 60
- welded 336
Reinforcement minimum 344
Reinforcement ratio
- effective 283
Reinforcing steel 110 ff
- bars 110
- epoxy coated steels 115
- galvanized steels 115
- stainless steels 115
- welded fabric 110
- wires 110
Reinforcing steel works 354
Relaxation
- amplification factor 136
- relaxation loss at 1000 hours 123
Relaxation class 117
Release of tendons 362
Reliability 25, 49, 52
- component 32
- constraints 41
- index 30, 324
- level 24, 30
- system 32
- target 24, 30, 41
Replacement of tendons 362
Report
- laboratory 331
Requirements for condition control
- Category A
  - proactive condition control 373
- Category B
  - reactive condition 373
- Category C
  - no condition control 373
Residual stresses 122
Resin
- polymerized 140

Q
Quality
- assurance 36
- control 36
- dismantlement 46
- management 35, 38, 45, 46
- plan 37
- planning 36
Quality assurance 384
Quality control 384
- factory production control 110 ff
Quality management 353
- execution classes 354
- inspection 354
- inspection plan 354
- ISO 2394 354
- maintenance plan 354
- non-conformity 354
Quality plan
- project 36

R
Range of applicability 75
Re-birth
- certificate 46, 370, 372
Re-design 372, 383
Reactive conservation strategy 369
Recording information 372
Recording of information
- birth certificate 385
- conservation record 385
- life cycle file 385
- quality management 385
- re-birth certificate 385
Resistance
- format 69
- global 69
- torsional 226
- ultimate bending 215
- uncertainty 69
Rigid bond-slip 179
Rigid-plastic model 147
Robustness 21, 316, 317
- criteria 25, 28
Rotation 230, 231, 233
- plastic rotation 250
Rotation capacity 196, 197, 198
Roughness
- average roughness 177
- mean roughness 176
- peak-to-valley height 176
- rough 177
- smooth 177
- very rough 177
- very smooth 177

S
S-N curves 244 ff, 245
S-N relation 245 ff
S-N relations 99
Safety
- formats 49
- structural 21
Safety factor
- global 70
Safety format
- global resistance 51
- partial 50
- probabilistic 50, 51
Safety formats 324
Sandwich cross-sections 250
Scale
- effects 330
Scouting
- phase 40
Sealing 362
Sealing of anchorages 361
Secant stiffness to the yield point 252
Second order effects 238, 239
Second order moments 239
Seismic design
- complete quadratic combination 253
- cyclic shear resistance 263
- effective modal mass 253 ff
- effective slab width 251
- equivalent static analysis 254
- global safety factor $g_R^*$ 260
- ground motion 259
- immediate use limit state 263
- joints 263
- life safety limit state 260
- linear elastic analysis 253
- modal response spectrum analysis 253 ff
- modelling 251
- near collapse (NC) limit state 260
- non-linear analysis 259
- operational limit state 263
- SLS verification 263
- square root of the sum of squares 255
- time histories 259
- ULS verification 263
- verifications 251, 260
Seismic situations 49
Self-compacting concrete (SCC) 99, 364
Sensitivity
- factor 62
Service life
- constraints 41
- file 38
- residual 23, 28, 29
- specified 28, 29, 41
- verification 29
Service life design
- alkali-aggregate reactions 314
- avoidance-of-deterioration approach 304
- carbonation induced corrosion 305
- chemical attack 312
- chloride induced corrosion 308
- collapse 306
- concrete cover 307
- cracking 306
- deemed-to-satisfy approach 304
- exposure classes 304
- freeze-thaw 311
- Guidance Paper F 304
- ISO 16204 304
- ISO 22965 304
- ISO 22965 312
- partial safety factor format 304
- probabilistic safety format 304
- spalling 306
- torture tests 304
Service life file 372
Serviceability 25, 30, 279
- limit state 279
SFRC 144
Shear 217 ff
Shear depth 217, 218
Shear friction
- confining stress $\sigma_c$ 178
- friction $\mu$ 178
Shear in beams 298
Shear reinforcement 230
Shear resisting effective depth 227, 228
Shear slip
- adhesive bonding 179
- dowel action 179
- loss of adhesion 179
- mechanical interlocking 179
- shear friction 179
Shear span 252
Shear-span-to-depth ratio 262
Shearheads 233
Sheathing
- exterior sheeting 117
Shells 215
Situations
- accidental 64
- persistent 63
- seismic 64, 65
- transient 63
Size 111
Slabs 301, 215
- hollow core
- prestressed 222
Slip 187, 188, 284
Softening and hardening behaviour 144
Solids 240
Spacing
- maximum 343
- Spall 269, 348, 349
- Span/depth ratio 280
- limits 292
Span/effective depth
- basic ratios 293
Specification of concrete
- ISO 22965 363
- sieve size D 363
Specification of intervention 372
Splices
- lap 338
Splitting 348, 349
Stakeholder 23, 29, 39, 41
State of strain 219, 220
States of stress
- multiaxial 79
Steel
- prestressing 204
- reinforcing 204
- reinforcing steel 250
Steel grades 112
Strands 335, 342
Storage 358
Strain
- localization 294
- thermal 272
Strain at maximum force 111
Strain at maximum stress 118
Strain at rupture 261
Strain rate 100
Strain rates
- dynamic strain rates 249 246
Struts 340
Strength 75
- biaxial 79
- characteristic compressive 77
- characteristic tensile 77
- compressive 76 ff, 201
- concrete compressive 76
- concrete grades 76
- flexural tensile 77
- lightweight aggregate concrete 76 ff
- multiaxial 80
- normal weight concrete 76 ff
- splitting tensile 77
- tensile 77, 201
- triaxial 79
Strength classes
- concrete 200
Strengthening 251
Stress
- fields 199
- limitation 279
- ultimate stress 250
Stress corrosion 118
Stress corrosion resistance
- solution A 122
- solution B 122
Stress distribution
- rectangular 202
Stress field 234, 235
Stress field inclination 221
Stress limitation 302
Stress rate 100
Stress-strain diagram 112, 118
Stress-strain relation 201, 202
Stress-strain relations for short term loading 82
Stress-strain relationship 148
Structural analysis
- non-linear 201 44
Structural characteristic length, lch 148
Structural concept 193
Structural effects of time-dependent behaviour of concrete 205
- ageing coefficient 212
- approximate algebraic formulation (AAEM method) 212
- effective homogeneous concrete structures with additional steel structural elements 211
- effective homogeneous concrete structures with rigid or stress-independent yielding restraints 208
- imposed deformations 210
- imposed loads 209
- incremental numerical solution based on hereditary integral 214
- incremental numerical solution based on rate-type creep laws 214
- levels of refinement of the analysis 206
- modification of restraint conditions after loading 210
- multiple changes in the structural system 211
- prediction models for concrete 207
- probabilistic and deterministic approach 207
- time-dependent analysis based on ageing linear viscoelasticity 208
Structural Safety 25
Structures
- composite 290
Strut and tie 198
- models 199
Strut-and-tie model 234, 235
Struts 235
Support strip 231, 232, 233
Supported areas 227
Surface characteristics
- indented 111, 117
- plain 111, 117
- ribbed 111, 117
Surface roughness 177
Surveys and monitoring 374
Sustainability 33, 42
- CO2 34, 319
- environmental impact 34
– environmental performance 318, 319, 320
– impact on environment 318, 319
– impact on society 34, 35, 320
– ISO
  – ISO 13315 series 318
  – ISO 13315-1 318, 319
  – ISO 14000 series 318
  – ISO 14040 318
  – ISO 14041 318
  – ISO 14042 318
  – ISO 14043 318
  – ISO 14044 318
– life cycle assessment (LCA) 318, 319
– performance 33
– performance requirement 33, 34, 35, 319, 320
– retained performance 319, 320
Sustained tensile strength 88

T

T-beams 341
Target 30
Target reliability index 31, 32
Technical approval 127, 340
Technical report 45
Temperature
  – transient conditions 267
Temperature effects
  – compressive strength 95
  – creep 96 ff
  – fracture properties 95
  – maturity 94
  – modulus of elasticity 96
  – shrinkage 96 ff
  – tensile strength 95
  – thermal expansion 94 94 ff
Temporary corrosion protection 128
Tendon elongation 359
Tendon force 359
Tendon protection levels 129
Tendons
  – bonded 58
  – prestressing 336
  – unbonded 58
Tensile flanges 223
Tensile properties 111
Tensile strength 100, 110 ff
  – axial 200
Tension 83
Tension stiffening 289, 290
  – based models 295
Tensioning 129
Tensioning operations 359
Tensor
  – stress 240
Test
  – compression 78
  – flexural 78
  – procedure 77
  – specimens 76 ff
  – splitting 78
  – tension 78
  – unaxial tension 78
Testing 185, 189, 328
  – equipment 76 ff
  – unaxial tensile 77
Tests
  – destructive 328
  – non-destructive 328
Thermal
  – extreme conditions 264
  – Thermal strain 268
  – load-induced 269
Three-point bending 145
Through-life conservation process 370, 372
Through-life performance 371
Ties 235, 342
Time dependent conservation 369
Time effects 86 ff
  – creep 88 ff
    – basic creep 90
    – creep coefficient 89, 90
    – creep function 89
    – drying creep 90
    – load-dependent strain 88
    – principle of superposition 89
    – time-dependent behaviour of concrete 90
  – development of strength with time 86
  – modulus of elasticity 88
  – shrinkage 88 ff, 92 ff
    – activation energy 94
    – basic creep 90
    – creep coefficient 89, 90
    – creep function 89
    – drying creep 90
    – load-dependent strain 88
    – principle of superposition 89
    – time-dependent behaviour of concrete 90
  – sustained loads 86 ff
    – sustained compressive strength 87
    – sustained tensile strength 88
Time-dependent analysis based on ageing linear viscoelasticity
  – ageing coefficient 212
  – approximate algebraic formulation (AAEM method) 212
  – compliance function 208
  – constitutive laws 208
  – creep problem 209
  – effective homogeneous concrete structures with additional steel
    structural elements 211
  – effective homogeneous concrete structures with rigid or
    stress-independent yielding restraints 208
  – first theorem of ageing linear viscoelasticity 209
  – fourth theorem of ageing linear viscoelasticity 211
  – imposed deformations 210
  – imposed loads 209
  – incremental numerical solution based on hereditary
    integral 214
  – incremental numerical solution based on rate-type creep
    laws 214
  – modification of restraint conditions after loading 210
  – multiple changes in the structural system 211
  – redistribution function 210
  – relaxation function 208
  – relaxation problem 210
  – second theorem of ageing linear viscoelasticity 210
– simplified approaches 208
– third theorem of ageing linear viscoelasticity 210
Tolerances 59, 60
– allowance 346
Torsion 226, 227
Torsion in beams 300
Total elongation at ultimate tensile strength 117
Trajectories
– compressive stress 199
Transient situations 49
Transmission length 340, 348
Transport of liquids and gases 101 ff
– capillary suction 105
– diffusion 103 ff
– diffusion of chloride ions 105
– diffusion of gases 104
– diffusion of vapour 103
– permeation 102 ff
– gas permeability 102
– water permeability 102
– transport characteristics 101 ff
Transportation 358
Transmission and storage 354
Transverse reinforcement 335, 342

U
UHPPRC 144
ULS 298
Ultimate chord rotation
– (mean) value 260 ff
– characteristic value 260 ff
Ultimate curvature 260 ff
Ultimate strain 261
Ultimate tensile strength (UTS) 117
Uncertainties
– geometrical 62
Uncertainty
– factor 70
– model 70

Unreinforced structural members 341
UTS 118

V
Value 30
– combination 56
– frequent 56
– quasi-permanent 56
– representative 58
Variables
– basic 52
Verification
– assisted by testing 328, 329
Verification of safety and serviceability of FRC structures 296
Vibrations 26, 279, 293

W
Walls 300
– with conventional reinforcement 301
– without conventional reinforcement 300
Waste
– disposal 388, 389
Weldability 114
Welded joints 113
Welded wired fabric 342
Welding
– spot welding 356
Wire
– indented 118
– plain 118

Z
Zone
– method 270