

DIN EN 1992-2:2007-02 (E)

Eurocode 2: Design of concrete structures - Part 2: Concrete bridges - Design and detailing rules

Contents	Page
SECTION 1 General	7
1.1 Scope	7
1.1.2 Scope of Part 2 of Eurocode 2	7
1.106 Symbols	7
SECTION 2 Basis of Design	13
SECTION 3 Materials	13
3.1 Concrete	13
3.1.2 Strength	13
3.1.6 Design compressive and tensile strengths	13
3.2 Reinforcing steel	14
3.2.4 Ductility characteristics	14
SECTION 4 Durability and cover to reinforcement	15
4.2 Environmental conditions	15
4.3 Requirements for durability	15
4.4 Methods of verifications	15
4.4.1 Concrete cover	15
4.4.1.2 Minimum cover, c_{min}	15
SECTION 5 Structural analysis	17
5.1 General	18
5.1.1 General requirements	18
5.1.3 Load cases and combinations	18
5.2 Geometric imperfections	18
5.3 Idealisation of the structure	18
5.3.1 Structural models for overall analysis	18
5.3.2 Geometric data	18
5.3.2.2 Effective span of beams and slabs	18
5.5 Linear elastic analysis with limited redistribution	19
5.6 Plastic analysis	19
5.6.1 General	19
5.6.2 Plastic analysis for beams, frames and slabs	20
5.6.3 Rotation capacity	20
5.7 Non-linear analysis	20
5.8 Analysis of second order effects with axial load	21
5.8.3 Simplified criteria for second order effects	21
5.8.3.3 Global second order effects in buildings	21
5.8.4 Creep	21
5.10 Prestressed members and structures	21
5.10.1 General	21
5.10.8 Effects of prestressing at ultimate limit state	21
SECTION 6 Ultimate Limit States (ULS)	22
6.1 Bending with or without axial force	22

6.2	Shear	24
6.2.2	Members not requiring design shear reinforcement	24
6.2.3	Members requiring design shear reinforcement	25
6.2.4	Shear between web and flanges of T-sections	28
6.2.5	Shear at the interface between concrete cast at different times	29
6.2.106	Shear and transverse bending	29
6.3	Torsion	29
6.3.2	Design procedure	29
6.7	Partially loaded areas	32
6.8	Fatigue	32
6.8.1	Verification conditions	32
6.8.4	Verification procedure for reinforcing and prestressing steel	33
6.8.7	Verification of concrete under compression or shear	33
6.109	Membrane elements	34
SECTION 7 Serviceability Limit States (SLS)		36
7.2	Stresses	36
7.3	Crack control	36
7.3.1	General considerations	36
7.3.2	Minimum reinforcement areas	37
7.3.3	Control of cracking without direct calculation	39
7.3.4	Calculation of crack widths	39
7.4	Deflection control	39
7.4.1	General considerations	39
7.4.2	Cases where calculations may be omitted	39
SECTION 8 Detailing of reinforcement and prestressing tendons -- General		40
8.9	Bundled bars	41
8.9.1	General	41
8.10	Prestressing tendons	41
8.10.3	Anchorage zones of post-tensioned members	41
8.10.4	Anchorage and couplers for prestressing tendons	41
SECTION 9 Detailing of members and particular rules		43
9.1	General	43
9.2	Beams	43
9.2.2	Shear reinforcement	43
9.5	Columns	44
9.5.3	Transverse reinforcement	44
9.7	Deep beams	44
9.8	Foundations	44
9.8.1	Pile caps	44
9.10	Tying systems	44
SECTION 10 Additional rules for precast concrete elements and structures		45
10.1	General	45
10.9	Particular rules for design and detailing	45
10.9.7	Tying systems	45
SECTION 11 Lightweight aggregate concrete structures		46
11.9	Detailing of members and particular rules	46
SECTION 12 Plain and lightly reinforced concrete structures		46
SECTION 113 Design for the execution stages		47
113.1	General	47

113.2	Actions during execution	47
113.3	Verification criteria	47
113.3.1	Ultimate limit states	47
113.3.2	Serviceability limit states	48
ANNEX A (informative) Modification of partial factors for materials		49
ANNEX B (informative) Creep and shrinkage strain		49
ANNEX C (normative) Properties of reinforcement suitable for use with this Eurocode		55
ANNEX D (informative) Detailed calculation method for prestressing steel relaxation losses		55
Annex E (informative) Indicative strength classes for durability		55
Annex F (Informative) Tension reinforcement expressions for in-plane stress conditions		56
Annex G (informative) Soil structure interaction		58
Annex H (informative) Global second order effects in structures		58
Annex I (informative) Analysis of flat slabs and shear walls		59
Annex J (informative) Detailing rules for particular situations		60
Annex KK (informative) Structural effects of time dependent behaviour of concrete		63
Annex LL (informative) Concrete shell elements		68
Annex MM (informative) Shear and transverse bending		75
Annex NN (informative) Damage equivalent stresses for fatigue verification		77
ANNEX OO (informative) Typical bridge discontinuity regions		86
Annex PP (informative) Safety format for non linear analysis		92
Annex QQ (informative) Control of shear cracks within webs		95