PD 6687-1:2020



**BSI Standards Publication** 

Background paper to the National Annexes to BS EN 1992-1, BS EN 1992-3 and BS EN 1992-4



## Publishing and copyright information

The BSI copyright notice displayed in this document indicates when the document was last issued.

© The British Standards Institution 2020

Published by BSI Standards Limited 2020

ISBN 978 0 539 14252 5

ICS 91.010.30; 91.080.40

The following BSI references relate to the work on this document: Committee reference B/525/2

## Amendments/corrigenda issued since publication

Date Text affected

© THE BRITISH STANDA

Contents		Page
	Foreword	iii
	Introduction	1
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	BS EN 1992-1-1:2004+A1, Eurocode 2: Design of concrete structures – Part 1-1: General rules an	ıd
	rules for buildings	1
4.1	Partial factors for materials [BS EN 1992-1-1:2004+A1, 2.4.2.4]	1
4.2	Elastic deformation properties of concrete [BS EN 1992-1-1:2004+A1, 3.1.3]	2
4.3	Value of $\alpha_{cc}$ [BS EN 1992-1-1:2004+A1, 3.1.6 (1)P]	2
	Figure 1 — Stress-strain relationship for axial compression for different durations of loading	3
	Figure 2 — Average stress in compression zone and location of the centroid of the	
	compressive force	4
	Figure 3 — Comparison of experimental and calculated ultimate moments for over-	_
	reinforced beams	5
	Figure 4 — Comparison of experimental and calculated strengths of axially loaded columns	
	- Parabolic rectangular diagram for a maximum stress of 0,85 $f_{\rm c}$ and a maximum strain of 0,002	6
4.4	Value of $\alpha_{ct}$ [BS EN 1992-1-1:2004+A1, 3.1.6 (2)P]	6
4.5	Reinforcement type [BS EN 1992-1-1:2004+A1, 3.2.2 (2)P]	7
4.6	Welding of reinforcement bars [BS EN 1992-1-1:2004+A1, 3.2.5 (2)P]	7
4.7	Cover to reinforcement for durability [BS EN 1992-1-1:2004+A1, 4.4.1.2 (5)]	7
4.8	Allowance in design for deviation in cover to reinforcement [BS EN 1992-1-1:2004+A1, 4.4.1.3]	8
4.9	Simplified load combinations [BS EN 1992-1-1:2004+A1, 5.1.3 (1)P]	8
4.10	Redistribution of bending moments [BS EN 1992-1-1:2004+A1, 5.5]	9
4.11	Calculation of effective length of columns [BS EN 1992-1-1:2004+A1, 5.8.3.1, 5.8.3.2 (4) and (5)]	9
4.12	Design moment in columns [BS EN 1992-1-1:2004+A1, 5.8.7.3 and 5.8.8.2]	10
4.13	Effect of prestressing at ultimate limit state [BS EN 1992-1-1:2004+A1, 5.10.8]	10
4.14	Design shear – Point loads close to support [BS EN 1992-1-1:2004+A1, 6.2.2 [6]]	10
4.15	Maximum shear resistance [BS EN 1992-1-1:2004+A1, 6.2.3 [3]]	11
4.16	Basic control perimeter for loaded areas close to edge of slabs [BS EN 1992-1-1:2004+A1,	12
417	0.4.2(4)] The value of maximum nunching resistance adjacent to column [BS EN 1002 1 1.2004+A1	12
4.17	6.4.5(3)]	12
4.18	Location of nunching shear reinforcement with respect to perimeter <i>II</i> or <i>II</i>	12
4.10	The Fix 4002 4 4 2024 A4 C 4 5 (4)	40
4.10	[BS EN 1992-1-1:2004+A1, 6.4.5[4]]	12
4.19	Design with strut-and-tie models [BS EN 1992-1-1:2004+A1, 6.5]	12
4.20	Stress initiation in serviceability initi state [DS EN 1992-1-1:2004+A1, 7.2]	10
4.21	Crack control [BS EN 1992-1-1:2004+A1, 7.3]	15
	Figure 5 — Typical cases of crack whath calculations	15
1 22	Prigure 6 - Crack what calculations - non-rectangular tension	10
4.22	Checking deflections by calculation [BS FN 1992-1-1:2004+A1, 7.4]	10
4.23	Longitudinal reinforcement [RS FN 1992-1-1:2004+A1 9.5.2]	18
4 25	Transverse reinforcement [BS EN 1992-1-1.2004+A1 9 5 3(3)]	18
4 26	Tving systems [BS EN 1992-1-1:2004+A1 9 10]	18
4 27	Tying requirements to comply with building regulations throughout the IIK [RS EN 1992-1-	10
1.47	1:2004+A1.9.10.2]	18
		10

4.28	Values of $\alpha_{cont}$ [BS EN 1992-1-1:2004+A1, 12.3.1]	19
4.29	Values of $e_{0}$ [BS EN 1992-1-1:2004+A1, Expression 12.12]	19
4.30	Modification of partial factors for materials [BS EN 1992-1-1:2004+A1, Annex A]	19
4.31	Detailing rules for particular situations [BS EN 1992-1-1:2004+A1, Annex J]	20
5	BS EN 1992-1-2:2004+A1, Eurocode 2: Design of concrete structures – Part 1-2: General rules –	-
	Structural fire design	20
6	BS EN 1992-3:2006, Eurocode 2: Design of concrete structures – Part 3: Liquid retaining or	
	containing structures	20
7	BS EN 1992-4:2018, Eurocode 2: Design of concrete structures – Part 4: Design of fastenings for	r use
	in concrete	21
7.1	General	21
7.2	Combined pullout and concrete failure in the case of post-installedbonded fasteners [BS EN	
	1992-4:2018, 7.2.1.6]	21
Annex A	(informative) <b>Detailing rules for particular situations</b>	22
	Figure A.1 — Frame corner with closing moment – Model and reinforcement	23
	Figure A.2 — Frame corner with moderate opening moment $(A_s f_{yd} / A_c f_{ck}) \le 0.25$	23
	Figure A.3 — Frame corner with large opening moment $(A_s f_{yd} / A_c f_{ck}) > 0,25$	24
	Figure A.4 — Corbel strut-and-tie model	24
	Figure A.5 — Corbel detailing	25
Annex B	(informative) Appraisal and testing of structures	25
Annex C	(informative) Effect of temperature on the properties of concrete	28
	Table C.1 — Creep coefficient multipliers to take account of temperature where the concrete is	
	heated prior to loading	29
	Bibliography	30

## Summary of pages

This document comprises a front cover, and inside front cover, pages i to iv, pages 1 to 32, an inside back cover and a back cover.

II © THE BRITISH STA