

Circular column

Circular columns · EN 1992-1-1 §5.8, §6.1, §9.5 · UK NA / PN-EN

Reference	NAE-RC-041 · version 1.0
Standards	BS EN 1992-1-1:2004 with UK NA · PN-EN 1992-1-1:2008 with Polish NA (NDP sources listed on the NDP sheet)
National Annex	Selectable: UK NA to BS EN 1992-1-1 or Polish NA to PN-EN 1992-1-1
Issued	30 October 2026

What it does

Ultimate limit state design of a circular reinforced concrete column under an axial force and a bending moment: slenderness, imperfections, second order effects by the nominal curvature method, and the resistance from N-M interaction curves worked out by strain compatibility, with the detailing rules for columns.

How to use

1. Open the Calculation sheet and select the National Annex.
2. Fill in the shaded input cells. Everything else is calculated.
3. Read the Results block; every step below it quotes its clause. Print or save as PDF for your calculation package.

Scope and limitations

Circular section of diameter D with n bars of one size equally spaced on a circle inside circular links or a spiral. A circular section resists the same moment in every direction except for the position of the bars: the strain plane is set at five orientations, from a bar on the compression face (A) to half a bar spacing round (B) in quarter steps, plus one refining the nearest chord; MRd is the distance from the origin to the chords between their moment points (both components), on the safe side of the resistance in every direction (0 to 0.5 % below a fine scan of the angle in the tests). Bending in one plane; for moments about two axes work out MEd for each axis and enter the governing combination as one plane, the imperfection taken in one direction only (5.8.9). End moments only: loads between the ends of the column are outside the scope. Compression only (NEd > 0). Isolated member: imperfection $\theta_i = \theta_0$ at h with $\theta_0 = 1/200$ and $\alpha_m = 1$ (5.2(5), (6)). Slenderness limit from (5.13N) with A, B and C from the inputs, $i = D/4$; effective length l_0 from the user (5.8.3.2, see RC-037). Second order moment by nominal curvature (5.8.8) with $d = D/2 + i$ (5.8.8.3(2)) and $c = 10$, or 8 for a constant first order moment. The imperfection moment NEd e_i is added at both ends in the direction of M02; where it is not smaller than M02 the moments are taken as due to imperfections and $C = 0.7$. Concrete classes up to C50/60, $f_{yk} \leq 500$ MPa. At least four bars (9.5.2(4)); bars inside circular links or a spiral are taken as restrained (9.5.3(6)). Link spacing to 9.5.3; the 0.6 reduction near beams, slabs and laps is the user's to apply. Confinement by the links is not counted. Section resistance by strain compatibility with the parabola-rectangle diagram of 3.1.7(1) ($\epsilon_{c2} = 0.002$, $\epsilon_{cu2} = 0.0035$) for every neutral axis depth, under the strain limits of 6.1(5) (pivot at ϵ_{c2} , $3D/7$ from the compressed face, once the whole section is compressed); see the Interaction sheet.

The second-generation EN 1992-1-1:2023 is not yet implemented.

Further reading and independent cross-check

- The Concrete Centre, How to design concrete structures using Eurocode 2: Columns.
 - The Concrete Centre, Concise Eurocode 2, design charts for circular columns.
 - The Concrete Centre, RC Spreadsheets v4, TCC54 Circular column charting (licensed product) can be used as an independent cross-check.
- NA Engineering is not affiliated with The Concrete Centre or CIRIA; their publications are referenced for information only.

About NA Engineering

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Disclaimer

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Revision history

v1.0	30 Oct 2026 · First issue
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Project
Element
Date

Job no.
Made by
Checked

Inputs · section

Shaded cells only

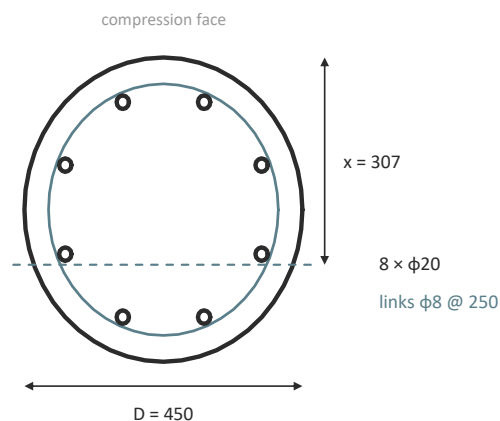
	National Annex		UK NA (BS EN)	
Table 3.1	Concrete strength class		C32/40	
3.2.2	Reinforcement characteristic yield strength (≤ 500 MPa)	f_{yk}	500	MPa
8.2(2)	Maximum aggregate size	d_g	20	mm
	Diameter	D	450	mm
4.4.1	Nominal cover to links	c_{nom}	35	mm
	Link or spiral diameter	ϕ_w	8	mm
9.5.3	Link spacing (spiral pitch)	s_w	250	mm
9.5.2(1)	Bar diameter	ϕ	20	mm
9.5.2(4)	Number of bars (at least 4)	n	8	

Inputs · actions and length

ULS design values

	Design axial force (compression)	N_{Ed}	2000	kN
5.8.8.2(2)	Larger first order end moment M02	M_{02}	80.0	kNm
5.8.8.2(2)	Smaller end moment M01 (negative in double curvature)	M_{01}	30.0	kNm
5.8.3.1	Bracing		Braced	
5.2(5)	Clear height of the column (for αh)	l	5000	mm
5.8.3.2	Effective length	l_0	4250	mm
5.8.4	Effective creep ratio	φ_{ef}	1.50	
5.8.8.2(4)	Curvature factor (10; 8 for a constant moment)	c	10	
	Inputs valid and consistent			OK

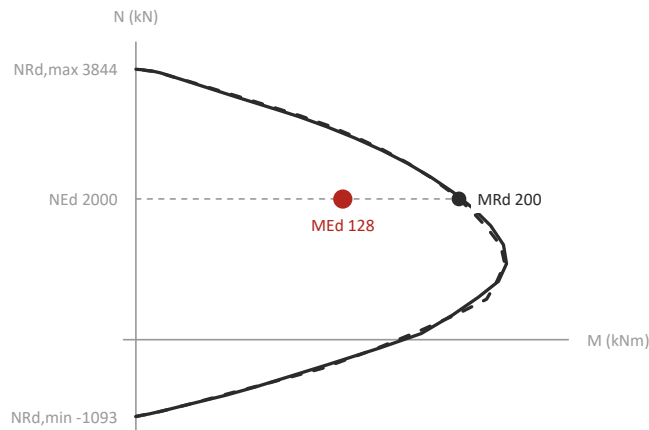
Your section, to scale · compression face on top · bars turned to the sampled strain plane with the least resultant · its neutral axis at NEd (dashed)



Results

Bending at NEd	MED / MRd	0.64		OK
Axial force	NEd / NRd,max	0.52		OK
Design moment (with second order effects when slender)	M_{Ed}	127.9	kNm	! Slender
Moment resistance at NEd (every direction, see Interactio	M_{Rd}	199.8	kNm	
Detailing (bar size, areas, spacing, links) · As provided	A_s	2513	mm ²	OK

N-M interaction curves · orientation A (solid) and B (dashed) · design point (red) · resistance at NEd



Calculation · materials and section

2.4.2.4(1)	Partial factor, concrete	γ_c	1.50		NDP sheet
2.4.2.4(1)	Partial factor, reinforcement	γ_s	1.15		NDP sheet
3.1.6(1)	Coefficient on compressive strength (flexure)	α_{cc}	0.85		NDP sheet
9.5.2(1)	Minimum diameter of longitudinal bars	φ_{min}	12	mm	NDP sheet
Table 3.1	Characteristic cylinder strength	f_{ck}	32	MPa	
Table 3.1	Mean tensile strength	f_{ctm}	3.02	MPa	
3.1.6(1)	Design compressive strength $\alpha_{cc} f_{ck} / \gamma_c$ ($\eta = 1$)	f_{cd}	18.13	MPa	
3.2.7	Design yield strength	f_{yd}	434.8	MPa	
3.2.7(4)	Modulus of elasticity of reinforcement	E_s	200000	MPa	
	Gross area $\pi D^2 / 4$	A_c	159043	mm ²	
	Reinforcement area $n \pi \phi^2 / 4$	A_s	2513	mm ²	
	Radius of the bar centres $D/2 - c - \phi_w - \phi/2$	r_s	172.0	mm	
5.8.8.3(2)	Radius of gyration of the bars $r_s / \sqrt{2}$	i_s	121.6	mm	
	Mechanical reinforcement ratio $A_s f_{yd} / (A_c f_{cd})$	ω	0.379		
(5.13N)	Relative axial force $N_{Ed} / (A_c f_{cd})$	n	0.693		

Calculation · slenderness and design moment

5.8.3.2	Radius of gyration $D / 4$	i	112.5	mm	
(5.14)	Slenderness l_0 / i	λ	37.8		
(5.13N)	$A = 1 / (1 + 0.2 \phi_{ef})$	A	0.769		
(5.13N)	$B = \sqrt{1 + 2\omega}$	B	1.326		
(5.13N)	Moment ratio M_{01} / M_{02}	r_m	0.375		
(5.13N)	$C = 1.7 - r_m$ (braced); 0.7 unbraced or $M_{02} \leq N_{Ed} e_i$ (imperfectio	C	1.325		
(5.13N)	Slenderness limit $20 A B C / \sqrt{n}$	λ_{lim}	32.5		
5.2(5)	$\alpha_h = 2 / \sqrt{l}$, $2/3 \leq \alpha_h \leq 1$ (l in m)	α_h	0.894		
(5.1)	Inclination $\theta_i = \theta_0 \alpha_h \alpha_m$, $\theta_0 = 1/200$, $\alpha_m = 1$	ϑ_i	0.00447		
(5.2)	Eccentricity from imperfections $\theta_i l_0 / 2$	e_i	9.5	mm	

5.8.8.2(2)	End moments with imperfections M02 + NEd ei	$M_{02'}$	99.0	kNm
5.8.8.2(2)	M01 + NEd ei	$M_{01'}$	49.0	kNm
6.1(4)	Minimum eccentricity $\max(D / 30; 20 \text{ mm})$	e_0	20.0	mm
(5.36)	$K_r = (n_u - n) / (n_u - n_{bal}) \leq 1, n_u = 1 + \omega, n_{bal} = 0.4$	K_r	0.700	
(5.37)	$\beta = 0.35 + f_{ck}/200 - \lambda/150$	β	0.258	
(5.37)	$K_\phi = 1 + \beta \phi_{ef} \geq 1$	K_ϕ	1.387	
5.8.8.3(2)	Effective depth $D/2 + i_s$	d	346.6	mm
(5.34)	Curvature $K_r K_\phi \epsilon_{yd} / (0.45 d)$	$1/r$	1.35E-05	1/mm
(5.33)	Second order eccentricity $(1/r) l_0^2 / c$	e_2	24.5	mm
(5.31)	Second order moment NEd e2 (slender columns only)	M_2	48.9	kNm
(5.32)	Equivalent first order moment $0.6 M_{02} + 0.4 M_{01} \geq 0.4 M_{02}$	M_{0e}	79.0	kNm
5.8.8.2	Design moment $\max(M_{0e} + M_2; M_{02}; M_{01} + M_2/2; NEd e_0)$	M_{Ed}	127.9	kNm

Calculation · resistance (see the Interaction sheet)

6.1	Axial resistance in compression (uniform strain $\epsilon_{c2} = 0.002$)	$N_{Rd,max}$	3844	kN	
6.1	Axial resistance in tension –As fyd	$N_{Rd,min}$	-1093	kN	
	Largest moment on the curves	M_{max}	229.3	kNm	
6.1	Moment resistance at NEd, orientation A (bar on the compress	$M_{Rd,A}$	201.7	kNm	
6.1	Moment resistance at NEd, orientation B (turned by π / n)	$M_{Rd,B}$	199.8	kNm	
6.1	Least resultant at NEd, turned by $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ of π / n and refined ($\sqrt{}$)	$M_{Rd,Q}$	199.9	kNm	
6.1	Sampled strain plane with the least resultant, turned by ($\times \pi / n$)		1.00		
6.1	Neutral axis depth with $N = NEd$, that strain plane	x	307	mm	
6.1	Axial force at that depth (check: = NEd)	N	2000.0	kN	
6.1	Moment resistance at NEd, every direction (chords between th	M_{Rd}	199.8	kNm	
6.1	Axial force $NEd \leq N_{Rd,max}$	N_{Ed}	2000	kN	OK
6.1	Moment $MEd \leq MRd$	M_{Ed}	127.9	kNm	OK

Calculation · detailing (9.5)

(9.12N)	Minimum reinforcement $\max(0.10 NEd / f_{yd}; 0.002 A_c)$	$A_{s,min}$	460	mm ²	
9.5.2(3)	Maximum reinforcement $0.04 A_c$ (outside laps)	$A_{s,max}$	6362	mm ²	
8.2(2)	Minimum clear gap $\max(\phi; d_g + 5; 20)$	a_{min}	25	mm	
	Clear gap between bars $2 r_s \sin(\pi / n) - \phi$	a	112	mm	
9.5.3(1)	Minimum link diameter $\max(6; \phi / 4)$	$\phi_{w,min}$	6.0	mm	
9.5.3(3)	Maximum link spacing $\min(20 \phi; D; 400)$	$s_{cl,tmax}$	400	mm	
(9.12N)	Reinforcement $A_s \geq A_{s,min}$	A_s	2513	mm ²	OK
9.5.2(3)	Reinforcement $A_s \leq A_{s,max}$	A_s	2513	mm ²	OK
9.5.2(1)	Bar diameter $\phi \geq \phi_{min}$	ϕ	20	mm	OK
8.2(2)	Clear gap $a \geq a_{min}$	a	112	mm	OK
9.5.3(1)	Link diameter $\phi_w \geq \phi_{w,min}$	ϕ_w	8	mm	OK
9.5.3(3)	Link spacing $s \leq s_{cl,tmax}$	s	250	mm	OK

Not in the detailing status: reduce the link spacing by 0.6 within a distance equal to the larger dimension of the column above and below a beam or slab, and at laps of bars over 14 mm, with at least three links in the lap length (9.5.3(4)). Bars inside circular links or a spiral are restrained (9.5.3(6)). ϕ_{min} : UK NA 12 mm, PL NA.6 6 mm.

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N-M interaction · strain compatibility, EN 1992-1-1 §6.1

Concrete: parabola-rectangle diagram of 3.1.7(1), $\sigma_c = f_{cd} [1 - (1 - \epsilon_c/\epsilon_{c2})^2]$ up to $\epsilon_{c2} = 0.002$, f_{cd} up to $\epsilon_{cu2} = 0.0035$, for every neutral axis depth. Strain limits of 6.1(5), Fig 6.1: ϵ_{cu2} at the compressed face while $x \leq D$; with the whole section compressed the strains turn about ϵ_{c2} at $3D/7$ from the compressed face, down to ϵ_{c2} everywhere (NRd,max). Over the compressed depth $z_c = \min(x, D)$ the stress is $f_{cd} (1 - \mu^2)$; $\mu = 0$ down to $z_1 = 3z_c/7$, $\mu = (z - z_1)/(x - z_1)$ below. f_{cd} over the segment of depth z_c is exact; the deficit $f_{cd} \mu^2$ is integrated by Simpson's rule with 12 strips in the angle ϑ , $z = D/2 (1 - \cos \vartheta)$ (hidden columns; within 0.01 % of an exact integration). Bars elastic-plastic, $E_s = 200$ GPa, horizontal top branch; the concrete they displace is deducted as $A_s \sigma_c$ at the bar centre. Curves: orientation A, a bar on the compression face, and B, turned by half a bar spacing. MRd at NEd: the strain plane at A, B and $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ of the way between, the moments in and across the plane, taken as points on the boundary of the resistance domain at NEd. MRd is the distance from the origin to the chords

	x (mm)	ϵ_c top (‰)	N A (kN)	M A (kNm)	N B (kN)	M B (kNm)
1	tension	–	-1092.7	0.0	-1092.7	0.0
2	5	3.50	-1089.1	0.8	-1089.1	0.8
3	14	3.50	-1074.1	4.1	-1074.1	4.1
4	23	3.50	-1052.9	8.5	-1052.9	8.5
5	34	3.50	-1009.0	17.0	-1020.1	15.1
6	45	3.50	-884.2	39.2	-914.7	33.1
7	56	3.50	-790.4	55.8	-742.4	61.5
8	68	3.50	-671.7	74.3	-610.0	83.2
9	90	3.50	-357.7	118.4	-405.3	115.7
10	113	3.50	-118.8	150.9	-137.1	147.7
11	135	3.50	85.5	176.5	133.1	176.3
12	158	3.50	350.4	196.0	369.0	199.4
13	180	3.50	600.7	211.7	577.5	216.9
14	203	3.50	830.4	224.2	838.0	223.5
15	225	3.50	1081.1	229.3	1078.1	228.2
16	248	3.50	1347.4	227.4	1333.7	225.8
17	270	3.50	1621.3	219.4	1603.3	216.8
18	293	3.50	1864.5	208.7	1853.8	206.7
19	315	3.50	2091.2	196.5	2085.7	195.4
20	338	3.50	2304.8	183.0	2303.9	182.6
21	360	3.50	2504.4	168.2	2509.2	168.2
22	383	3.50	2691.2	152.2	2701.8	152.6
23	405	3.50	2865.2	135.3	2879.4	136.2
24	428	3.50	3025.1	117.9	3040.1	119.0
25	450	3.50	3169.1	100.9	3179.1	101.8
26	473	3.38	3257.5	88.6	3267.6	89.5
27	495	3.28	3328.5	78.8	3338.6	79.7
28	540	3.11	3434.3	64.2	3444.5	65.0
29	608	2.93	3538.1	50.0	3547.0	50.6
30	675	2.80	3605.2	40.8	3611.3	41.1
31	788	2.65	3675.1	31.3	3678.0	31.4
32	900	2.55	3717.8	25.5	3718.5	25.4
33	1125	2.41	3766.4	19.0	3764.3	18.6
34	1350	2.33	3790.5	15.1	3789.1	15.0
35	1800	2.24	3812.7	10.8	3812.7	10.8
36	2700	2.15	3826.3	6.6	3826.3	6.6
37	4500	2.09	3834.7	3.7	3834.7	3.7
38	11250	2.03	3840.6	1.4	3840.6	1.4
39	compression	2.00	3843.7	0.0	3843.7	0.0

The table draws the curves. MRd at NEd is solved exactly below for each orientation: bisection on the neutral axis depth until $N = N_{Ed}$ (N rises with

Resistance at NEd by orientation

	turn (π/n)	x (mm)	N (kN)	M (kNm)	M _L (kNm)	MRd (kNm)
A	0.00	306	2000.0	201.7	0.0	201.7
Q1	0.25	306	2000.0	201.8	1.1	201.8
Q2	0.50	306	2000.0	200.7	0.8	200.7
Q3	0.75	306	2000.0	200.0	0.4	200.0
B	1.00	307	2000.0	199.8	0.0	199.8
P	0.90	307	2000.0	199.9	0.2	199.9

MRd in every direction: distance from the origin to the chords between the moment points (convex domain)

chord	from	to	t	distance (kNm)
1	A	Q1	0.433	201.5
2	Q1	Q2	1.000	200.7
3	Q2	Q3	0.832	200.0
4	Q3	B	0.606	199.7
split	Q3	P	0.744	199.8
split	P	B	0.606	199.8
MRd				199.8

Orientation A · turned by 0 π/n

step	u low	u high	x (mm)	ϵ_c top (‰)	N (kN)	M (kNm)	M _L (kNm)
1	0.000000	1.000000	450.0	3.50	3169.1	100.9	0.0
2	0.000000	0.500000	150.0	3.50	260.7	190.1	0.0
3	0.250000	0.500000	270.0	3.50	1621.3	219.4	0.0
4	0.375000	0.500000	350.0	3.50	2417.6	174.9	0.0
5	0.375000	0.437500	307.9	3.50	2021.1	200.5	0.0
6	0.375000	0.406250	288.5	3.50	1822.3	210.7	0.0
7	0.390625	0.406250	298.1	3.50	1921.7	205.8	0.0
8	0.398437	0.406250	302.9	3.50	1971.4	203.2	0.0
9	0.402344	0.406250	305.4	3.50	1996.2	201.9	0.0
10	0.404297	0.406250	306.7	3.50	2008.7	201.2	0.0
11	0.404297	0.405273	306.0	3.50	2002.5	201.5	0.0
12	0.404297	0.404785	305.7	3.50	1999.4	201.7	0.0
13	0.404541	0.404785	305.9	3.50	2000.9	201.6	0.0
14	0.404541	0.404663	305.8	3.50	2000.1	201.7	0.0
15	0.404541	0.404602	305.8	3.50	1999.7	201.7	0.0
16	0.404572	0.404602	305.8	3.50	1999.9	201.7	0.0
17	0.404587	0.404602	305.8	3.50	2000.0	201.7	0.0
18	0.404587	0.404594	305.8	3.50	2000.0	201.7	0.0
19	0.404591	0.404594	305.8	3.50	2000.0	201.7	0.0
20	0.404591	0.404593	305.8	3.50	2000.0	201.7	0.0
21	0.404592	0.404593	305.8	3.50	2000.0	201.7	0.0
22	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
23	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
24	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
25	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
26	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
27	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
28	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
29	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
30	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0

31	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
32	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
33	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
34	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
35	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
36	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
37	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
38	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
39	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
40	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
41	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
42	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
43	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
44	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
45	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
46	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
47	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
48	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
49	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
50	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
51	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
52	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
53	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
54	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
55	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
56	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
57	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
58	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
59	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0
60	0.404592	0.404592	305.8	3.50	2000.0	201.7	0.0

Orientation Q1 · turned by $0.25 \pi/n$

step	u low	u high	x (mm)	ϵ_c top (‰)	N (kN)	M (kNm)	M _L (kNm)
1	0.000000	1.000000	450.0	3.50	3170.1	101.0	-0.3
2	0.000000	0.500000	150.0	3.50	259.2	190.7	-3.2
3	0.250000	0.500000	270.0	3.50	1613.7	218.4	0.3
4	0.375000	0.500000	350.0	3.50	2418.5	175.0	0.6
5	0.375000	0.437500	307.9	3.50	2022.6	200.5	1.1
6	0.375000	0.406250	288.5	3.50	1818.9	210.2	0.7
7	0.390625	0.406250	298.1	3.50	1921.1	205.6	0.9
8	0.398437	0.406250	302.9	3.50	1972.2	203.2	1.0
9	0.402344	0.406250	305.4	3.50	1997.7	201.9	1.1
10	0.404297	0.406250	306.7	3.50	2010.2	201.2	1.1
11	0.404297	0.405273	306.0	3.50	2004.0	201.6	1.1
12	0.404297	0.404785	305.7	3.50	2000.9	201.7	1.1
13	0.404297	0.404541	305.6	3.50	1999.3	201.8	1.1
14	0.404419	0.404541	305.6	3.50	2000.1	201.8	1.1
15	0.404419	0.404480	305.6	3.50	1999.7	201.8	1.1
16	0.404449	0.404480	305.6	3.50	1999.9	201.8	1.1
17	0.404465	0.404480	305.6	3.50	2000.0	201.8	1.1
18	0.404472	0.404480	305.6	3.50	2000.0	201.8	1.1
19	0.404472	0.404476	305.6	3.50	2000.0	201.8	1.1

20	0.404474	0.404476	305.6	3.50	2000.0	201.8	1.1
21	0.404475	0.404476	305.6	3.50	2000.0	201.8	1.1
22	0.404475	0.404476	305.6	3.50	2000.0	201.8	1.1
23	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
24	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
25	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
26	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
27	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
28	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
29	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
30	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
31	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
32	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
33	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
34	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
35	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
36	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
37	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
38	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
39	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
40	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
41	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
42	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
43	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
44	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
45	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
46	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
47	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
48	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
49	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
50	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
51	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
52	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
53	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
54	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
55	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
56	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
57	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
58	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
59	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1
60	0.404475	0.404475	305.6	3.50	2000.0	201.8	1.1

Orientation Q2 · turned by 0.5 π/n

step	u low	u high	x (mm)	ϵ_c top (‰)	N (kN)	M (kNm)	M _L (kNm)
1	0.000000	1.000000	450.0	3.50	3173.1	101.3	-0.6
2	0.000000	0.500000	150.0	3.50	277.5	191.7	-2.4
3	0.250000	0.500000	270.0	3.50	1608.0	217.5	0.5
4	0.375000	0.500000	350.0	3.50	2421.8	175.2	1.1
5	0.375000	0.437500	307.9	3.50	2018.1	199.8	0.8
6	0.375000	0.406250	288.5	3.50	1813.5	209.4	0.7
7	0.390625	0.406250	298.1	3.50	1915.9	204.8	0.8
8	0.398437	0.406250	302.9	3.50	1967.0	202.3	0.8

9	0.402344	0.406250	305.4	3.50	1992.5	201.1	0.8
10	0.404297	0.406250	306.7	3.50	2005.3	200.4	0.8
11	0.404297	0.405273	306.0	3.50	1998.9	200.8	0.8
12	0.404785	0.405273	306.3	3.50	2002.1	200.6	0.8
13	0.404785	0.405029	306.2	3.50	2000.5	200.7	0.8
14	0.404785	0.404907	306.1	3.50	1999.7	200.7	0.8
15	0.404846	0.404907	306.1	3.50	2000.1	200.7	0.8
16	0.404846	0.404877	306.1	3.50	1999.9	200.7	0.8
17	0.404861	0.404877	306.1	3.50	2000.0	200.7	0.8
18	0.404861	0.404869	306.1	3.50	2000.0	200.7	0.8
19	0.404865	0.404869	306.1	3.50	2000.0	200.7	0.8
20	0.404867	0.404869	306.1	3.50	2000.0	200.7	0.8
21	0.404868	0.404869	306.1	3.50	2000.0	200.7	0.8
22	0.404868	0.404869	306.1	3.50	2000.0	200.7	0.8
23	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
24	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
25	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
26	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
27	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
28	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
29	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
30	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
31	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
32	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
33	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
34	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
35	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
36	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
37	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
38	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
39	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
40	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
41	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
42	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
43	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
44	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
45	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
46	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
47	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
48	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
49	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
50	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
51	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
52	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
53	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
54	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
55	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
56	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
57	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
58	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
59	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8
60	0.404868	0.404868	306.1	3.50	2000.0	200.7	0.8

Orientation Q3 · turned by 0.75 π/n

step	u low	u high	x (mm)	ϵ_c top (‰)	N (kN)	M (kNm)	M.L (kNm)
1	0.000000	1.000000	450.0	3.50	3177.9	101.7	-0.8
2	0.000000	0.500000	150.0	3.50	289.2	192.1	-1.1
3	0.250000	0.500000	270.0	3.50	1604.7	216.9	0.4
4	0.375000	0.500000	350.0	3.50	2420.6	174.9	0.8
5	0.375000	0.437500	307.9	3.50	2015.2	199.3	0.4
6	0.375000	0.406250	288.5	3.50	1810.6	208.8	0.4
7	0.390625	0.406250	298.1	3.50	1913.1	204.2	0.4
8	0.398437	0.406250	302.9	3.50	1964.2	201.8	0.4
9	0.402344	0.406250	305.4	3.50	1989.8	200.5	0.4
10	0.404297	0.406250	306.7	3.50	2002.5	199.9	0.4
11	0.404297	0.405273	306.0	3.50	1996.2	200.2	0.4
12	0.404785	0.405273	306.3	3.50	1999.3	200.1	0.4
13	0.405029	0.405273	306.5	3.50	2000.9	200.0	0.4
14	0.405029	0.405151	306.4	3.50	2000.1	200.0	0.4
15	0.405029	0.405090	306.4	3.50	1999.7	200.0	0.4
16	0.405060	0.405090	306.4	3.50	1999.9	200.0	0.4
17	0.405075	0.405090	306.4	3.50	2000.0	200.0	0.4
18	0.405075	0.405083	306.4	3.50	2000.0	200.0	0.4
19	0.405079	0.405083	306.4	3.50	2000.0	200.0	0.4
20	0.405079	0.405081	306.4	3.50	2000.0	200.0	0.4
21	0.405080	0.405081	306.4	3.50	2000.0	200.0	0.4
22	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
23	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
24	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
25	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
26	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
27	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
28	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
29	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
30	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
31	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
32	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
33	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
34	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
35	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
36	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
37	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
38	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
39	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
40	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
41	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
42	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
43	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
44	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
45	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
46	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
47	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
48	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
49	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4

50	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
51	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
52	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
53	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
54	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
55	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
56	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
57	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
58	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
59	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4
60	0.405080	0.405080	306.4	3.50	2000.0	200.0	0.4

Orientation B · turned by $1 \pi/n$

step	u low	u high	x (mm)	ϵ_c top (‰)	N (kN)	M (kNm)	M _L (kNm)
1	0.000000	1.000000	450.0	3.50	3179.1	101.8	0.0
2	0.000000	0.500000	150.0	3.50	293.1	192.2	0.0
3	0.250000	0.500000	270.0	3.50	1603.3	216.8	0.0
4	0.375000	0.500000	350.0	3.50	2419.5	174.8	0.0
5	0.375000	0.437500	307.9	3.50	2014.0	199.1	0.0
6	0.375000	0.406250	288.5	3.50	1810.3	208.6	0.0
7	0.390625	0.406250	298.1	3.50	1912.3	204.0	0.0
8	0.398437	0.406250	302.9	3.50	1963.2	201.6	0.0
9	0.402344	0.406250	305.4	3.50	1988.6	200.4	0.0
10	0.404297	0.406250	306.7	3.50	2001.3	199.8	0.0
11	0.404297	0.405273	306.0	3.50	1994.9	200.1	0.0
12	0.404785	0.405273	306.3	3.50	1998.1	199.9	0.0
13	0.405029	0.405273	306.5	3.50	1999.7	199.8	0.0
14	0.405151	0.405273	306.6	3.50	2000.5	199.8	0.0
15	0.405151	0.405212	306.5	3.50	2000.1	199.8	0.0
16	0.405151	0.405182	306.5	3.50	1999.9	199.8	0.0
17	0.405167	0.405182	306.5	3.50	2000.0	199.8	0.0
18	0.405174	0.405182	306.5	3.50	2000.0	199.8	0.0
19	0.405174	0.405178	306.5	3.50	2000.0	199.8	0.0
20	0.405174	0.405176	306.5	3.50	2000.0	199.8	0.0
21	0.405175	0.405176	306.5	3.50	2000.0	199.8	0.0
22	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
23	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
24	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
25	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
26	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
27	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
28	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
29	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
30	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
31	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
32	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
33	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
34	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
35	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
36	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
37	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
38	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0

39	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
40	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
41	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
42	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
43	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
44	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
45	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
46	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
47	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
48	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
49	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
50	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
51	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
52	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
53	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
54	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
55	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
56	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
57	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
58	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
59	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0
60	0.405176	0.405176	306.5	3.50	2000.0	199.8	0.0

Orientation P · splitting the nearest chord, turn_P π/n

step	u low	u high	x (mm)	ϵ_c top (‰)	N (kN)	M (kNm)	M _⊥ (kNm)
1	0.000000	1.000000	450.0	3.50	3179.3	101.8	-0.5
2	0.000000	0.500000	150.0	3.50	292.7	192.2	-0.4
3	0.250000	0.500000	270.0	3.50	1603.6	216.8	0.1
4	0.375000	0.500000	350.0	3.50	2419.7	174.8	0.3
5	0.375000	0.437500	307.9	3.50	2014.2	199.1	0.2
6	0.375000	0.406250	288.5	3.50	1810.2	208.6	0.2
7	0.390625	0.406250	298.1	3.50	1912.5	204.1	0.1
8	0.398437	0.406250	302.9	3.50	1963.4	201.7	0.1
9	0.402344	0.406250	305.4	3.50	1988.8	200.4	0.2
10	0.404297	0.406250	306.7	3.50	2001.5	199.8	0.2
11	0.404297	0.405273	306.0	3.50	1995.1	200.1	0.2
12	0.404785	0.405273	306.3	3.50	1998.3	199.9	0.2
13	0.405029	0.405273	306.5	3.50	1999.9	199.9	0.2
14	0.405151	0.405273	306.6	3.50	2000.7	199.8	0.2
15	0.405151	0.405212	306.5	3.50	2000.3	199.8	0.2
16	0.405151	0.405182	306.5	3.50	2000.1	199.8	0.2
17	0.405151	0.405167	306.5	3.50	2000.0	199.9	0.2
18	0.405159	0.405167	306.5	3.50	2000.0	199.9	0.2
19	0.405159	0.405163	306.5	3.50	2000.0	199.9	0.2
20	0.405161	0.405163	306.5	3.50	2000.0	199.9	0.2
21	0.405161	0.405162	306.5	3.50	2000.0	199.9	0.2
22	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
23	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
24	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
25	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
26	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
27	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2

28	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
29	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
30	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
31	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
32	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
33	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
34	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
35	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
36	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
37	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
38	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
39	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
40	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
41	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
42	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
43	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
44	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
45	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
46	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
47	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
48	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
49	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
50	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
51	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
52	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
53	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
54	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
55	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
56	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
57	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
58	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
59	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2
60	0.405161	0.405161	306.5	3.50	2000.0	199.9	0.2

Nationally Determined Parameters

Values used by the Calculation sheet for the selected National Annex. Sources: UK NA to BS EN 1992-1-1:2004, Table NA.1; PN-EN 1992-1-1:2008, Załącznik krajowy NA. Edit only if your project specifies different values.

Parameter	Clause	UK NA	PL NA	Notes
Partial factor, concrete γ_c	2.4.2.4(1)	1.5	1.4	Persistent & transient. UK NA: recommended; PL: NA.2, Table NA.2
Partial factor, reinforcement γ_s	2.4.2.4(1)	1.15	1.15	UK NA: recommended; PL: NA.2, Table NA.2
α_{cc} (compression in flexure / axial)	3.1.6(1)	0.85	1	UK NA: 0.85; PL: recommended (NA.9)
$\alpha_{cc,pl}$ (plain concrete, compression)	12.3.1(1)	0.6	0.8	UK NA Table NA.1: 0.6; PL: recommended (NA.9)
α_{cc} (shear and punching)	3.1.6(1)	1	1	UK NA: 1.0 for other phenomena; PL: recommended (NA.9)
α_{ct} (design tensile strength)	3.1.6(2)	1	1	Recommended value in both annexes
CRd,c numerator (CRd,c = value / γ_c)	6.2.2(1), 6.4.4(1)	0.18	0.18	Recommended value in both annexes
k1 (axial stress term, punching)	6.4.4(1)	0.1	0.1	Recommended value in both annexes
vRd,max factor (vRd,max = factor · v · fcd)	6.4.5(3)	0.5	0.4	UK NA: 0.5 v fcd; PL: recommended value (NA.9), 0.4 v fcd since EN 1992-1-1 AC:2010 (PN-EN 1992-1-1:2008)
kmax (vEd ≤ kmax · vRd,c at u1)	6.4.5	2	1.5	UK NA 6.4.5(3): 2 vRd,c. PL: no limit in PN-EN 1992-1-1:2008; 1.5 (A1:2014 recommendation) applied conse
ϕ_{large} (large bar threshold, mm)	8.8(1)	40	32	UK NA: 40 mm; PL: 32 mm recommended (NA.9)
cot θ upper limit (variable strut)	6.2.3(2)	2.5	2	UK NA: 2.5 (1.25 with axial tension); PL: NA.4, $1 \leq \cot \theta \leq 2.0$
k1 (x/d limit, $\delta \geq k1 + k2 x_u/d$)	5.5(4)	0.4	0.44	UK NA for $f_{yk} \leq 500$ MPa; PL: recommended (NA.9)
k2 (x/d limit, $\epsilon_{cu2} = 0.0035$)	5.5(4)	1	1.25	UK NA: $0.6 + 0.0014/\epsilon_{cu2}$; PL: $1.25(0.6 + 0.0014/\epsilon_{cu2})$
Upper limit on the (310/ σ_s) factor (0 = none)	7.4.2(2)	1.5	0	UK NA Table NA.5 Note 5: (310/ σ_s) or (500/ f_{yk})($A_s,prov/A_s,req$) ≤ 1.5; PL: none
L/d not to exceed 40 K (1 = applies)	7.4.2(2)	1	0	UK NA Table NA.5 Note 6; not in EN text
ϕ_{min} (longitudinal bars in columns, mm)	9.5.2(1)	12	6	UK NA: 12 mm; PL: NA.6, 6 mm
k3 (crack spacing)	7.3.4(3)	3.4	3.4	Recommended value in both annexes
k4 (crack spacing)	7.3.4(3)	0.425	0.425	Recommended value in both annexes
k1 (concrete stress, characteristic; XD, XF, XS)	7.2(2)	0.6	1	UK NA: recommended; PL: NA.5, $k1 = 1.0$
k2 (concrete stress, quasi-permanent; linear cr)	7.2(3)	0.45	0.45	Recommended value in both annexes (UK NA; PL NA.9)
k3 (steel stress, characteristic)	7.2(5)	0.8	0.8	Recommended value in both annexes (UK NA; PL NA.9)
k4 (steel stress, imposed deformation)	7.2(5)	1	1	Recommended value in both annexes (UK NA; PL NA.9)