

Precast bearing

Bearing length of a precast member · EN 1992-1-1 §10.9.5 · UK NA / PN-EN

Reference	NAE-RC-034 · 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	29 October 2026

What it does

Nominal bearing length of a simply supported precast slab, rib or beam on its support: the net bearing for the bearing stress, the ineffective lengths at the support and at the end of the member, and the allowances for the deviations of the spacing of the supports and of the member length.

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

Connected (non-isolated) members only, 10.9.5.2; an isolated member needs 20 mm more and its movements allowed for (10.9.5.3), not covered. EN 1992-1-1 10.9.5.2 (10.6): $a = a_1 + a_2 + a_3 + \sqrt{(\Delta a_2^2 + \Delta a_3^2)}$. $a_1 = F_{Ed} / (b_1 f_{Rd})$ with $f_{Rd} = 0.4 f_{cd}$ for a dry joint and the bedding strength ($\leq 0.85 f_{cd}$) for a bedded one, not less than Table 10.2 for the relative bearing stress σ_{Ed} / f_{cd} at that a_1 (the smallest a_1 meeting both, so the band always matches the final stress). b_1 at most 600 mm unless measures spread the pressure evenly or a more accurate analysis is made (10.9.5.2(3)), entered. A slab bears on a line support and a beam on a concentrated one; a ribbed floor or purlin either, entered. α_{cc} of the NA (UK 0.85, allowed for all phenomena, conservative; PL 1.0). The concrete class entered is the weaker of the two members. a_2 from Table 10.3 for the support material at that stress and a line or concentrated support (brickwork above 0.4 f_{cd} needs a concrete padstone: FAIL here), a_3 from Table 10.4 for the detailing at the end of the member and the support type, Δa_2 from Table 10.5 with l the span, $\Delta a_3 = l_n / 2500$ with l_n the member length. Tables 10.2 – 10.5 as in EN 1992-1-1 with AC:2010 (no nationally determined parameter here). $f_{cd} = \alpha_{cc} f_{ck} / \gamma_c$ of the weaker of the two concretes. The bearing stress on the support itself, the bearing pad and the reinforcement at the end (10.9.5.1, 10.9.5.2(4)) are not checked here. The second-generation EN 1992-1-1:2023 is not yet implemented.

Further reading and independent cross-check

- The Concrete Centre, Concise Eurocode 2, 13 (precast concrete).
 - IStructE, Manual for the design of concrete building structures to Eurocode 2 (precast elements).
- 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	29 Oct 2026 · First issue
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Project
Element
Date

Job no.
Made by
Checked

Inputs · member and support

Shaded cells only

	National Annex		UK NA (BS EN)	
Table 3.1	Concrete strength class		C32/40	
10.9.5.2	Member connected to others (isolated members: 10.9.5.3, not covered)		Yes	
<i>The concrete class above is the weaker of the supported and supporting members.</i>				
Table 10.2	Supported member		Slab or roof on a linear support	
Table 10.3	Support material		Reinforced concrete ≥ C30/37	
Tables 10.3, 10.4	Support type (ribbed floor or purlin; slab: line, beam: concentrated)		Line	
Table 10.4	Reinforcement at the end of the member		Straight bars or horizontal loops near the end	
Table 10.4	End cover of the bars (for Table 10.4)	c_{end}	20	mm
	Inner bend radius of a vertical loop (Table 10.4)	r_i	40	mm
10.9.5.2(2)	Joint		Dry	
10.9.5.2(2)	Bedding: design strength (bedded joint)	f_{bed}	10	MPa
Table 10.5	Concrete support: precast or cast in situ (steel, brickwork: by material)		Steel or precast concrete	
10.9.5.2(1)	Bearing width	b_1	1200	mm
10.9.5.2(3)	Pressure spread evenly over $b_1 > 600$ (measures or analysis)		No	
	Depth of the member (drawing)	h	200	mm
Table 10.5	Clear span between the supports	l	6000	mm
10.9.5.2(1)	Length of the member	l_n	6200	mm
	Nominal bearing length provided	a	100	mm

Inputs · design action

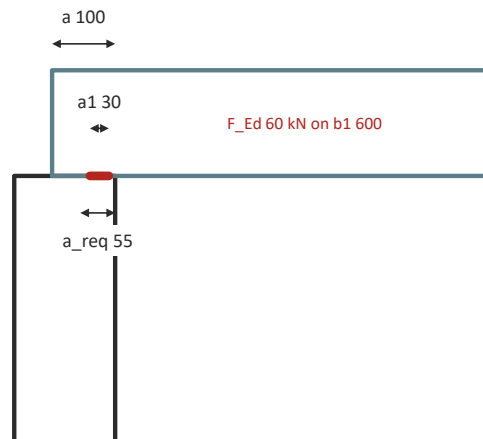
Ultimate limit state

Support reaction	F_{Ed}	60.0	kN	
Inputs valid and consistent				OK

Results

Bearing length $a_{req} / a_{provided}$ (10.6)		0.55		OK
Nominal bearing length needed	a_{req}	55	mm	
Net bearing (strength / Table 10.2)	a_1	30	mm	
Relative bearing stress	σ_{Ed} / f_{cd}	0.18		

Your bearing · section along the supported member: support (left), the net bearing a_1 of the calculation (red, after a_2 from the support edge), nominal length needed and p



Calculation

2.4.2.4(1)

3.1.6(1)

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 $\alpha_{cc} f_{ck} / \gamma_c$	f_{cd}	18.13	MPa
10.9.5.2(2)	Bearing strength dry 0.4 fcd; bedded min(fbed; 0.85 fcd)	f_{Rd}	7.25	MPa
10.9.5.2(3)	Effective width (≤ 600 mm unless the pressure is spread)	b_1	600	mm
(10.6)	For strength $F_{Ed} / (b_1 f_{Rd})$	$a_{1,F}$	13.8	mm
10.9.5.2(1), Table	Net bearing smallest $a_1 \geq a_{1,F}$ and $\geq$ Table 10.2 at its own σ_{Ed}/f	a_1	30.0	mm
	Relative bearing stress $F_{Ed} / (b_1 a_1 f_{cd})$	σ_{Ed}/f_{cd}	0.184	
Table 10.2	Band of that stress (1: ≤ 0.15 , 2: ≤ 0.4 , 3: above)		2	

Calculation · ineffective lengths and tolerances

Table 10.3	At the support a_2 (brickwork above 0.4 fcd: padstone needed)	a_2	10	mm
Table 10.4	At the end of the member a_3	a_3	5	mm
Table 10.5	Spacing deviation Δa_2 (steel, precast: $l/1200$ in 10 – 30; brickw	Δa_2	10.0	mm
10.9.5.2(1)	Length deviation $\Delta a_3 = l_n / 2500$	Δa_3	2.5	mm
(10.6)	Nominal length $a_1 + a_2 + a_3 + \sqrt{(\Delta a_2^2 + \Delta a_3^2)}$	a_{req}	55.3	mm
(10.6)	Provided $\geq$ needed	a	100	mm

Where the support or the member has a chamfer or a recess, measure a from the effective edges (Figure 10.6).

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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)
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
$v_{Rd,max}$ factor ($v_{Rd,max} = \text{factor} \cdot v \cdot f_{cd}$)	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 ($v_{Ed} \leq k_{max} \cdot v_{Rd,c}$ at u1)	6.4.5	2	1.5	UK NA 6.4.5(3): 2 $v_{Rd,c}$. 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, $\delta \geq k_1 + k_2 x_u/d$)	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