

Bar areas

Reinforcement areas · bars at a spacing or in a group · mm² and cm²

Reference	NAE-RC-010 · version 1.0
Standards	Nominal bar sizes of BS 4449 / PN-EN 10080 (ribbed bars B500)
National Annex	Not applicable
Issued	29 October 2026

What it does

A quick reference for reinforcement areas: bars at a spacing (slabs, walls) and groups of bars (beams, columns), with the reverse look-up from a required area and full tables for 6 to 40 mm bars.

How to use

1. Pick a bar size and a spacing: the area per metre width is shown in mm²/m and cm²/m.
2. Pick a bar size and a number of bars: the area of the group in mm² and cm².
3. Enter the area you need: the sheet gives the largest spacing and the smallest number of bars that provide it. The Tables sheet lists every size.

Scope and limitations

Nominal cross-sectional areas $\pi \phi^2 / 4$ and nominal masses $0.00617 \phi^2$ kg/m. Spacings are centre to centre. Minimum and maximum spacing and the bar size rules of EN 1992-1-1 (8.2, 9.2, 9.3) are not checked here.

Further reading and independent cross-check

- BS 4449 Table 7 (nominal areas and masses).
- The Concrete Centre, Standard method of detailing structural concrete.

NA Engineering is not affiliated with The Concrete Centre or CIRIA; their publications are referenced for information only.

About NA Engineering

NA Engineering is a structural engineering consultancy delivering structural design, reinforced concrete modelling and detailing, and steel detailing for residential, commercial, infrastructure, energy and refurbishment projects. We share tools like this one because good engineering should be transparent: every formula here is visible and referenced. If you need a design, a check or a full detailing package, talk to us.

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Disclaimer

This spreadsheet is provided free of charge, as is, for use by competent engineers. It does not replace engineering judgement. The user is responsible for the input, for checking that the method suits the element being designed and for verifying the results. NA Engineering accepts no liability for any loss arising from its use. Sheets are password-protected and the workbook structure is locked so that the formulas and the NA Engineering details cannot be changed; only the shaded input cells can be edited.

Revision history

v1.0	29 Oct 2026 · First issue
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Project
Element
Date

Job no.
Made by
Checked

Bars at a spacing · slabs and walls

Shaded cells only

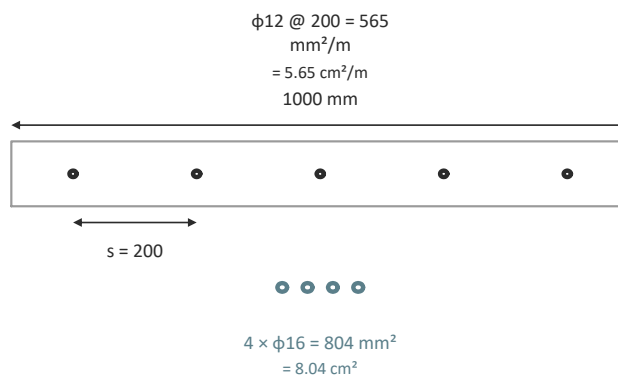
Bar diameter	φ	12	mm
Spacing (centre to centre, 50 – 500)	s	200	mm
Area per metre width	A_s	565	mm ² /m
Area per metre width	A_s	5.65	cm ² /m
Area of one bar $\pi \phi^2 / 4$	A_1	113.1	mm ²
Area per metre 1000 A_1 / s	A_s	565.5	mm ² /m
Bars per metre 1000 / s	n	5.00	/m
Mass per square metre, one layer 0.00617 $\phi^2 \cdot 1000 / s$	m	4.44	kg/m ²

A group of bars · beams and columns

Bar diameter	φ	16	mm
Number of bars (1 – 20)	n	4	
Area of the group	A_s	804	mm ²
Area of the group	A_s	8.04	cm ²
Area $n \pi \phi^2 / 4$	A_s	804.2	mm ²
Mass per metre 0.00617 $n \phi^2$	m	6.32	kg/m

From a required area

Required area per metre (for the bar size above)	$A_{s,req}$	500	mm ² /m
Required area of a group (for the bar size above)	$A_{s,req}$	900	mm ²
8.2(2) Largest spacing 1000 $A_1 / A_{s,req}$ (down to 25 mm, ≤ 500 , clear)	s_{max}	225	mm
Area at that spacing	A_s	503	mm ² /m
Smallest number of bars $A_{s,req} / A_1$, rounded up	n_{min}	5	
Area of those bars	A_s	1005	mm ²
Inputs valid and consistent			OK

Your bars, to scale · top: 1 m strip at spacing s · bottom: n bars


Area per metre width (mm²/m)

Bars at spacing s : $A_s = 1000 \pi \varphi^2 / (4 s)$. Divide by 100 for cm²/m. Your bar and spacing are shaded.

spacing (mm)	φ6	φ8	φ10	φ12	φ16	φ20	φ25	φ32	φ40
75	377	670	1047	1508	2681	4189	6545	10723	16755
100	283	503	785	1131	2011	3142	4909	8042	12566
125	226	402	628	905	1608	2513	3927	6434	10053
150	188	335	524	754	1340	2094	3272	5362	8378
175	162	287	449	646	1149	1795	2805	4596	7181
200	141	251	393	565	1005	1571	2454	4021	6283
225	126	223	349	503	894	1396	2182	3574	5585
250	113	201	314	452	804	1257	1963	3217	5027
300	94	168	262	377	670	1047	1636	2681	4189

Area of a group of bars (mm²)

n bars: $A_s = n \pi \varphi^2 / 4$. Divide by 100 for cm². Your bar and number are shaded.

number	φ6	φ8	φ10	φ12	φ16	φ20	φ25	φ32	φ40
1	28	50	79	113	201	314	491	804	1257
2	57	101	157	226	402	628	982	1608	2513
3	85	151	236	339	603	942	1473	2413	3770
4	113	201	314	452	804	1257	1963	3217	5027
5	141	251	393	565	1005	1571	2454	4021	6283
6	170	302	471	679	1206	1885	2945	4825	7540
7	198	352	550	792	1407	2199	3436	5630	8796
8	226	402	628	905	1608	2513	3927	6434	10053
9	254	452	707	1018	1810	2827	4418	7238	11310
10	283	503	785	1131	2011	3142	4909	8042	12566
11	311	553	864	1244	2212	3456	5400	8847	13823
12	339	603	942	1357	2413	3770	5890	9651	15080
13	368	653	1021	1470	2614	4084	6381	10455	16336
14	396	704	1100	1583	2815	4398	6872	11259	17593
15	424	754	1178	1696	3016	4712	7363	12064	18850
16	452	804	1257	1810	3217	5027	7854	12868	20106
17	481	855	1335	1923	3418	5341	8345	13672	21363
18	509	905	1414	2036	3619	5655	8836	14476	22619
19	537	955	1492	2149	3820	5969	9327	15281	23876
20	565	1005	1571	2262	4021	6283	9817	16085	25133

Prepared with NA Engineering tools · naengineering.uk. Nominal bar areas; masses per metre to BS 4449 / PN-EN 10080 are on the Calculation sheet.