

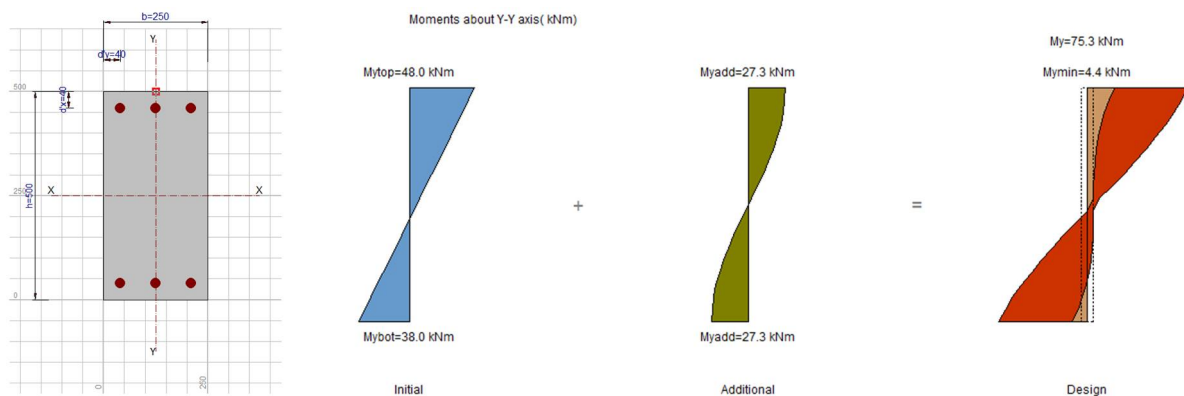
# RECTANGULAR COLUMN

DESIGN OF RECTANGULAR REINFORCED  
CONCRETE COLUMNS  
DESIGN | DETAILING | C11

## Summary

**Rectangular Column** designs solid rectangular concrete columns subjected to axial forces and bi-axial bending moments. The simplified design approach set out in most codes is used for the design.

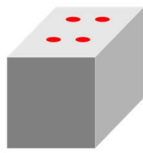
The module can be used independently, or as a Design Link from **Sumo**. The Design Links automate data entry by linking analysis results and geometry with the design module.



Load Case	Description	ULS Design Loads				
		P (kN)	Mx Top (kNm)	My Top (kNm)	fx Bottom (kNm)	fy Bottom (kNm)
1	DL	245	15	4.5	7.5	2.25
2	DL	284	13	3.5	6.5	
	LL	143	32	8	16	-2
3	DL	243	10	2	4	20
	LL	123	27	6	14	-2
	WL	-15	35	40	17.5	20

## What makes this module special?

- Automated bending schedules
- Axial forces and bi-axial bending are considered for the design
- Groups of columns analysed in **Sumo** can be linked into these modules for rapid design and detailing



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## Minimum Moments for Design:

Check for minimum eccentricity:

For bi-axial bending, it is only necessary to ensure that the eccentricity exceeds the minimum about one axis at a time.

For the worst effect, apply the minimum eccentricity about the minor axis:

$$\begin{aligned} e_{minx} &= 0.05 \cdot h \\ &= 0.05 \times .5 \\ &= 0.0250 \text{ m} \end{aligned}$$

$$\begin{aligned} e_{miny} &= 0.05 \cdot b \\ &= 0.05 \times .25 \\ &= 0.0125 \text{ m} \end{aligned}$$

$$\begin{aligned} M_{min} &= e_{minx} \cdot N \\ &= .0125 \times 351 \\ &= 4.388 \text{ kNm} \end{aligned}$$

Check if the column is slender:

$$\lambda_x = 12.5 > 10$$

$$\lambda_y = 25.0 > 10$$

∴ The column is slender.

Check slenderness limit:

$$L_o = 4.800 \text{ m} < 60 \cdot b' = 15.000 \text{ m}$$

∴ Slenderness limit not exceeded.

MEMBER	No OF	BARS PER MEMB	DIA	LENGTH	TOTAL NUM-BERS	MARK	S.C	BENDING					
								A	B	C	D	E <sub>p</sub>	
	1	4	Y25	8000	4	A	41	1170	300			75	
		2	Y18	5950	2	B	20						
		33	R8	1400	33	C	60	190	440				
		33	R8	400	33	D	35	190					
		3	R8	1200	3	E	60	190	340				

	8	10	12	16	20	25	32	40	TOT	Date
R	25								25	25
Y				15		50			111	111
TOT	25			15		50			136	136

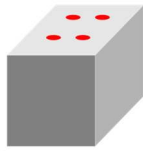
<b>PROKON</b> Software Consultants (Pty) Ltd <a href="http://www.prokon.com">http://www.prokon.com</a>		Revision	
		Schedule No	Roofbe

## Detailed Description

Design and detail solid rectangular concrete columns. Columns can be short or slender in one or both directions, and different fixity conditions at the bottom and top. You can enter multiple load cases comprising of axial loads and moments about one or both axes at the bottom or top of the column. The module compiles column design charts and provides complete design calculation sheets. Generating reinforcement bending schedules is easy; the main bars and the stirrups can be customised. You can open the bending schedules in **Padds** or **Probar 2D** for final editing and printing.

## Theory used in this module

- The design codes give simplified procedures for designing columns of which the ratio of the larger to the smaller dimension does not exceed 1:4.
- The procedure used for the design of rectangular columns is applied to the design of circular columns.
- The reinforcement layout is assumed to be symmetrical.



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## Workflow

Columns and their applied loading and properties can either be defined in the module or imported from **Sumo**.

## Comments

For columns of general shapes see **General Column**.

## Supported Design Codes

### Design Codes

- ACI 318 - 1999
- ACI 318 - 2005
- ACI 318 - 2011
- ACI 318 - 2014
- AS 3600 - 2001
- AS 3600 - 2009
- AS3600 - 2018
- ACI 318 - 2019
- BS 8110 - 1985
- BS 8110 - 1997
- CP 65 - 1999
- CSA A23.3-04 - 2010
- CSA-A23.3:2019
- Eurocode 2 - 2004
- HK Concrete - 2004
- HK Concrete - 2013
- IS:456 - 2000
- NZ 3101 - 2006
- SABS 0100 - 2000
- SP 63.13330.2018