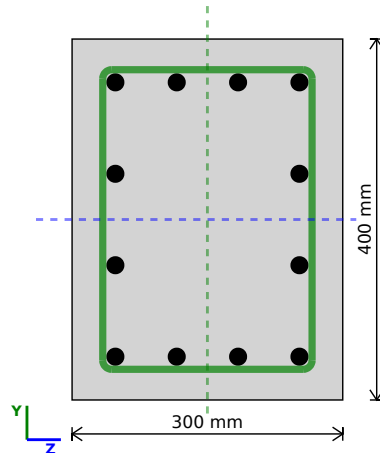


AS 3600:2018 Concrete Column Design



Input	Description	Value
Ref	Member Label	C1
Shape	Section Shape	Rectangular



LOCATION	NO. BARS	DIAMETER	COVER	C/C SPACING
TOP & BOTTOM	4	20 mm	38 mm	68 mm
SIDES	2	20 mm	38 mm	101.3 mm
EXT. SHEAR LIGS	1	8 mm	30 mm	N/A

Material Properties

Input	Description	Value
f'_c	Concrete characteristic compression strength.	40 MPa
f_{sy}	Characteristic yield strength of steel.	500 MPa

Span

Input	Description	Value
L	Unsupported length of column.	3000 mm
k_z	Effective length factor for compression buckling about Z-axis (10.5.3).	1
k_y	Effective length factor for compression buckling about Y-axis (10.5.3).	1

REFERENCES	CALCULATIONS	RESULTS																																																																																							
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Axial Capacity (Clause 10.6.2.2)

A_c (mm ²)	f'_c (MPa)	α_1	A_{st} (mm ²)	f_{sy} (MPa)
116e3	40	0.85	3770	500
Φ_c	ΦN_{uo} (kN)	$N^* / \Phi N_{uo}$ (utility)	Φ_t	ΦN_{ut} (kN)
0.65	3794	0.356	0.85	-1602

Design Moments, Z-Axis

First Order Moments (Clauses 10.1.2 & 10.3.1(b))

M_{Min} (kNm)	M^*_1 (kNm)	M^*_2 (kNm)	M^*_1 / M^*_2
27	50	100	-0.5

Slenderness (Clause 10.5)

α_c	Limit 10.3.1(1)	Adopted Limit	L_e / r	Slender?
1.166	20.61	25	25.98	Slender

Moment Magnification (Clause 10.4)

k_{uo}	Φ	ΦM_c (kNm)	β_d	d_0 (mm)	L_e (mm)	N_c (kN)
0.545	0.65	240e6	0.5	352	3000	11244

$M^*_z / M_{c,z}$ (utility)	k_m	δ_b	M^*_z (kNm)
0.12	0.8	1	100

Design Moments, Y-Axis

First Order Moments (Clauses 10.1.2 & 10.3.1(b))

M_{Min} (kNm)	M^*_1 (kNm)	M^*_2 (kNm)	M^*_1 / M^*_2
20.25	-50	50	1

Slenderness (Clause 10.5)

α_c	Limit 10.3.1(1)	Adopted Limit	L_e / r	Slender?	M^*_y (kNm)
1.166	82.42	82.42	34.64	Not Slender	50

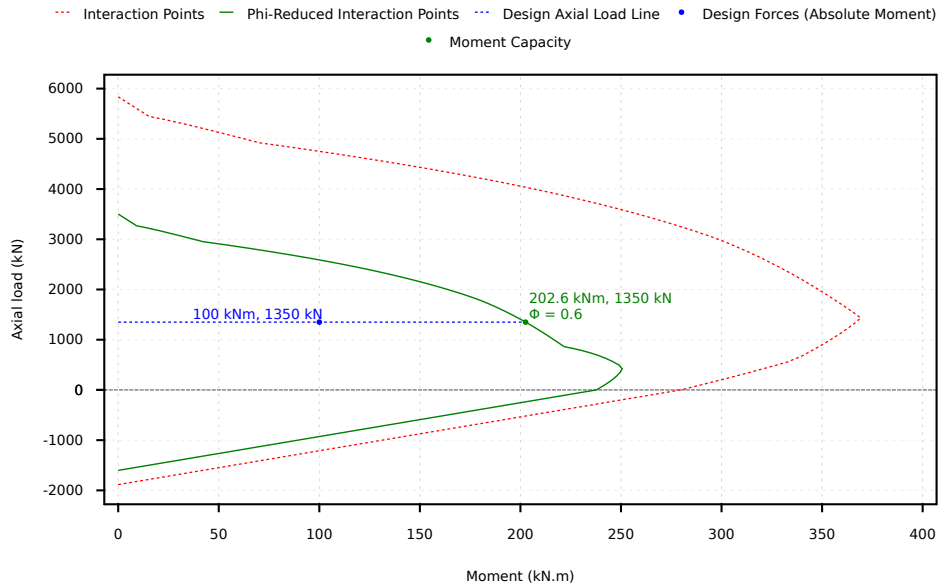
Moment Capacity (Clause 10.6)

Interaction points are calculated for various depths of the neutral axis, $k_u d$. Depth of concrete stress block calculated as $\gamma k_u d$, where $\gamma = 0.87$. Strength of concrete stress block calculated as $\alpha_2 f'_c$, where $\alpha_2 = 0.79$.

Z-Axis Interaction Diagram

k_{uo}	Φ_b	k_Φ	N_u	N_u / N_{ub}	Φ_z
0.276	0.85	0.923	1350	0.939	0.6

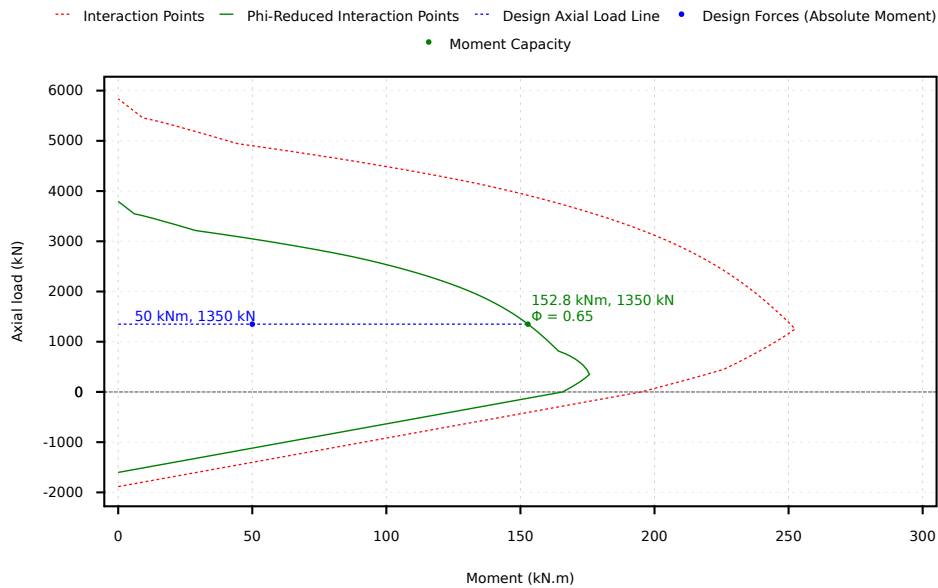
Interaction Diagram



Y-Axis Interaction Diagram

k_{uo}	Φ_b	k_ϕ	N_u	N_u / N_{ub}	Φ_y
0.312	0.85	1	1350	1.075	0.65

Interaction Diagram



Bi-Axial Check (Clause 10.6.4)

M_z^* (kNm)	$\Phi M_{u,z}$ (kNm)	$M_z^* / \Phi M_{u,z}$ (utility)	M_y^* (kNm)	$\Phi M_{u,y}$ (kNm)	$M_y^* / \Phi M_{u,y}$ (utility)	α_n	$M_{Biaxial}$ (utility)
100	202.6	0.494	50	152.8	0.327	1.305	0.631

Shear Capacity, Y-Axis

Mid-Depth Strain (Clause 8.2.4.2.2)

M^* (kNm)	d_v (mm)	V^* (kN)	N^* (kN)	E_s (MPa)	A_{st} (mm ²)	ϵ_x	E_c (MPa)	A_{ct} (mm ²)	ϵ_x
100	288	100	1350	200e3	1885	-0.0003	32800	60000	-4.857e-5

Shear Web Crushing Strength (Clause 8.2.3.3)

k_v	θ_v	b_v (mm)	$\cot(\theta_v)$	$\cot(\alpha_v)$	$V_{u,max}$ (kN)
0.431	28.66	300	1.83	0	720

Concrete and Reinforcement Shear Capacity (Clauses 8.2.4 & 8.2.5)

V_{uc} (kN)	A_{sv} (mm ²)	f_{sy} (MPa)	s (mm)	V_{us} (kN)
235.8	100.5	500	150	176.6

Column Shear Capacity (Clause 8.2.3)

V^* (kN)	s_{max} (mm)	Φ	V_u (kN)	ΦV_u (kN)	$V_y^* / \Phi V_{u,y}$ (utility)
100	331.2	0.75	412.3	309.2	0.323

Shear Capacity, Z-Axis

Mid-Depth Strain (Clause 8.2.4.2.2)

M^* (kNm)	d_v (mm)	V^* (kN)	N^* (kN)	E_s (MPa)	A_{st} (mm ²)	ϵ_x	E_c (MPa)	A_{ct} (mm ²)	ϵ_x
50	216	50	1350	200e3	1885	-0.00052	32800	60000	-8.391e-5

Shear Web Crushing Strength (Clause 8.2.3.3)

k_v	θ_v	b_v (mm)	$\cot(\theta_v)$	$\cot(\alpha_v)$	$V_{u,max}$ (kN)
0.458	28.41	400	1.848	0	715.9

Concrete and Reinforcement Shear Capacity (Clauses 8.2.4 & 8.2.5)

V_{uc} (kN)	A_{sv} (mm ²)	f_{sy} (MPa)	s (mm)	V_{us} (kN)
250	100.5	500	150	133.8

Column Shear Capacity (Clause 8.2.3)

V^* (kN)	s_{max} (mm)	Φ	V_u (kN)	ΦV_u (kN)	$V_z^* / \Phi V_{u,z}$ (utility)
50	248.4	0.75	383.8	287.9	0.174

Results Summary

Result Name	Results
MEMBER UTILITIES	
Compression	0.36
Bending Z-Axis	0.49
Bending Y-Axis	0.33
Biaxial Bending	0.63
Shear Y-Axis	0.32
Shear Z-Axis	0.17
Biaxial Shear	0.37
MEMBER CAPACITIES	
$\Phi N_{u,t}$	-1602.21 kN
$\Phi N_{u,o}$	3793.91 kN
$\Phi M_{u,z}$	202.57 kN.m
$\Phi M_{u,y}$	152.80 kN.m
$\Phi V_{u,y}$	309.24 kN
$\Phi V_{u,z}$	287.88 kN
MEMBER DETAILING	
Core Confinement	PASS
Min Reinforcement	PASS
Max Reinforcement	PASS
Min Shear Reinforcement Ratio	PASS
Min Shear Bar Diameter	PASS

Result Name	Results
Shear Bar Max Spacing	PASS
Shear Bar Min Spacing	PASS
Min Long Bars	PASS
Min Long Bar Restraint	PASS

About this Calculator



Calculator Name: AS 3600:2018 Concrete Column Design

Description: Design of reinforced concrete columns as per AS 3600:2018 for axial and flexural forces.

Powered by



URL: https://platform.skyciv.com/quick-design?uid=3027-au-concrete-column&member_label=C1&shape=rectangular&D=400&W=300&cover=30&size_bar_s_z=4&n_bar_s_y=4&reinforcement_class_long=N&size_shear_bars=8&n_shear_bars_y=2&n_shear_bars_z=2&s=150&reinforcement_class_shear=N&L=3000&k_y=1&k_z=1&f_c=40&f_y=500&V_y=100&V_z=50&N=1350&G=500&O=500&second_order=first&braced_or_unbraced=ZY&M_z_top=100&M_z_bot=50&M_y_top=50&M_y_bot=-50

Contact: jimmy.Lyons@skyciv.com