

Concrete Masonry Design Tables

Concrete Masonry - Allowable Flexural Tensile stresses, psi (kPa)				
Direction of flexural tensile stress and masonry type	Mortar Types			
	Portland cement/ lime or mortar cement		Masonry cement or air-entrained Portland cement/ lime	
	M or S	N	M or S	N
Normal to bed joints:				
Solid units	53 (366)	40 (276)	32 (221)	20 (138)
Hollow units – ungrouted	33 (228)	25 (172)	20 (138)	12 (83)
Hollow units – fully grouted	86 (593)	84 (579)	81 (550)	77 (531)
Parallel to bed joints in running bond:				
Solid units	106 (731)	80 (552)	64 (441)	40 (276)
Hollow units – ungrouted/partially grouted	66 (455)	50 (345)	40 (276)	25 (172)
Fully grouted	106 (731)	80 (552)	64 (441)	40 (276)
Parallel to bed joints in masonry not laid in running bond:				
Continuous grout section parallel to bed joints	133 (917)	133 (917)	133 (917)	133 (917)
Other	0 (0)	0 (0)	0 (0)	0 (0)

Concrete Masonry – Allowable Column Reinforcement								
	Number of reinforcing bars permitted, ($0.0025A_n \leq A_{st} \leq 0.04A_n$), for bar sizes:							
Column size, in (mm)	No. 4 (M 13)	No. 5 (M 16)	No. 6 (M 19)	No. 7 (M 22)	No. 8 (M25)	No. 9 (M29)	No. 10 (M 32)	No. 11 (M 36)
8x8 (203x203)	4 - 10	4	4	N/A	N/A	N/A	N/A	N/A
8x16 (203x406)	4 - 12	4 - 12	4 - 10	4 - 8	4 - 6	4	N/A	N/A
8x24 (203x610)	4 - 12	4 - 12	4 - 12	4 - 12	4 - 8	4 - 6	4	4
10x16 (254x406)	4 - 12	4 - 12	4 - 12	4 - 10	4 - 6	4 - 6	4	N/A
10x24 (254x610)	4 - 12	4 - 12	4 - 12	4 - 12	4 - 10	4 - 8	4 - 6	4
12x12 (305x305)	4 - 12	4 - 12	4 - 12	4 - 8	4 - 6	4	4	N/A
12x16 (305x406)	4 - 12	4 - 12	4 - 12	4 - 12	4 - 8	4 - 6	4	4
12x24 (305x610)	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 10	4 - 8	4 - 6
12x32 (305x813)	6 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 10	4 - 8
16x16 (406x406)	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 8	4 - 6	4 - 8
16x24 (406x610)	6 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 10	4 - 8
16x32 (406x813)	8 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12
24x24 (610x610)	8 - 12	6 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12
24x32 (610x813)	10 - 12	8 - 12	6 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12
24x40 (610x1016)	12	8 - 12	6 - 12	4 - 12	4 - 12	4 - 12	4 - 12	4 - 12

MSJC Code – Allowable Steel Stresses (tension)	
Reinforcement Bar	Tensile Stress, F_s, psi (MPa)
Grade 60	32000 (220.7)
Grade 50	20000 (137.9)
Grade 40	20000 (137.9)
Wire joint reinforcement	30000 (206.9)

Compressive Strength of Concrete Masonry (f'_m)		
net area compressive strength of concrete masonry units, psi (MPa)		net area compressive strength of masonry psi (MPa)
type M or S mortar	type N mortar	dry stack
1250 (8.6)	1300 (9.0)	1000 (6.9)
1900 (13.1)	2150 (14.8)	1500 (10.3)
2800 (19.3)	3050 (21.0)	2000 (13.8)
3750 (25.8)	4050 (27.9)	2500 (17.2)
4800 (33.1)	5250 (36.2)	3000 (20.1)

Reinforcing Steel Areas, A_s, sqin/ft							
Bar Spacing (in)	Reinforcing Bar Size						
	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9
8	0.166	0.295	0.460	0.663	0.902	1.178	1.491
16	0.083	0.147	0.230	0.331	0.451	0.589	0.746
24	0.055	0.098	0.153	0.221	0.301	0.393	0.497
32	0.041	0.074	0.115	0.166	0.225	0.295	0.373
40	0.033	0.059	0.092	0.133	0.180	0.236	0.298
48	0.028	0.049	0.077	0.110	0.150	0.196	0.249
56	0.024	0.042	0.066	0.095	0.129	0.168	0.213
64	0.021	0.037	0.058	0.083	0.113	0.147	0.186
72	0.018	0.033	0.051	0.074	0.100	0.131	0.166