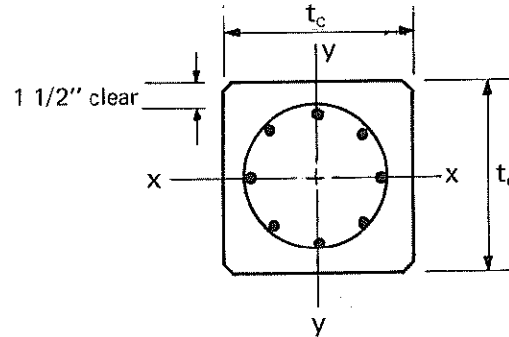
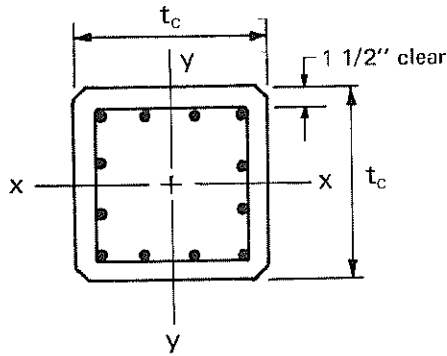


COLUMNS

Table 3.4.1 Ultimate capacity of precast, reinforced concrete columns

- P_U = design (ultimate) axial load, kips
- M_b, P_b = ultimate moment capacity and axial load capacity at simultaneous assumed ultimate strain of concrete and yielding of tension steel (balanced conditions), ft-kips and kips, respectively
- P_{U0} = design (ultimate) concentric axial load, kips
- M_U = design (ultimate) moment about x or y axis, ft-kips
- $e = M_U/P_U$
- $\phi = 0.90$ when $P_U = 0$
- $\phi = 0.75$ for spiral reinforced columns when $P_U \geq P_b$
- $\phi = 0.70$ for tied columns when $P_U \geq P_b$
- $f'_c = 5000$ psi
- $f_y = 60,000$ psi



TIED								
Column size	Percent steel	$M_U=0$		$e = 0.1 t_c$		Balance		$P_U=0$
		P_{U0}	P_U	M_U	P_b	M_b	M_U	
12"x12"	1.22	497	380	38	151	69	38	
	8.00	878	652	65	59	151	177	
14"x14"	1.22	677	519	61	216	116	61	
	8.00	1195	897	105	116	265	300	
16"x16"	1.03	864	666	89	293	169	79	
	8.00	1561	1183	158	183	424	468	
18"x18"	1.09	1101	851	127	378	248	120	
	8.00	1975	1508	226	264	636	688	
20"x20"	1.00	1346	1039	174	469	332	153	
	8.00	2439	1872	312	356	910	970	
22"x22"	1.05	1638	1268	232	573	454	214	
	8.00	2951	2274	417	461	1249	1318	
24"x24"	1.04	1947	1509	303	695	598	281	
	8.00	3512	2715	543	578	1665	1742	

SPIRALLY REINFORCED								
Column size	Percent steel	$M_U=0$		$e = 0.05 t_c$		Balance		$P_U=0$
		P_{U0}	P_U	M_U	P_b	M_b	M_U	
12"x12"	1.29	537	463	23	160	64	40	
	3.29	657	560	28	139	79	76	
14"x14"	1.11	716	618	36	218	101	57	
	3.89	944	802	47	201	139	140	
16"x16"	1.09	933	806	54	303	154	83	
	4.27	1273	1082	72	242	228	239	
18"x18"	1.05	1175	1018	76	400	222	115	
	4.17	1598	1365	103	374	326	329	
20"x20"	1.01	1444	1251	105	508	306	154	
	3.94	1934	1653	138	426	457	455	
22"x22"	1.02	1750	1519	140	634	412	208	
	3.72	2295	1969	180	615	598	594	
24"x24"	1.02	2082	1808	182	758	538	271	
	4.17	2840	2440	243	722	814	817	

For more complete information on capacities of reinforced concrete columns see: "Ultimate Strength Design of Reinforced Concrete Columns," PCA Engineering Bulletin EB 0009.01, Portland Cement Association, Skokie, Illinois; and "Columns by Ultimate Strength Design," by R. C. Reese, Concrete Reinforcing Steel Institute, Chicago, Illinois.