

Table 2.2 Values of E_c

SI units		Inch - pound units	
f'_c (MPa)	E_c (MPa)	f'_c (psi)	E_c (psi)
20.67	21368	3000	3,122,018
24.11	23077	3500	3,372,165
27.56	24673	4000	3,604,996
31.00	26168	4500	3,823,676
34.45	27586	5000	4,030,508

Table 2.3 Values of modular ratio, n

SI units		Inch - pound units	
f'_c (MPa)	n	f'_c (psi)	n
20.67	9.3 \approx 9.0	3000	9.2 \approx 9.0
24.11	8.6 \approx 8.5	3500	8.6 \approx 8.5
27.56	8.1 \approx 8.0	4000	8.04 \approx 8.0
31.00	7.6 \approx 7.5	4500	7.56 \approx 7.5
34.45	7.2 \approx 7.0	5000	7.2 \approx 7.0

Table 2.4 Reinforcing bar dimensions.⁴

Bar Number	Diameter		Area		Nominal weight	
	in	mm	in ²	mm ²	Ib/ft	kg/m
3	0.375	9.5	0.11	71	0.376	0.559
4	0.500	12.7	0.20	129	0.668	0.995
5	0.625	15.9	0.31	200	1.043	1.552
6	0.750	19.1	0.44	284	1.502	2.235
7	0.875	22.2	0.60	387	2.044	3.041
8	1.000	25.4	0.79	510	2.670	3.973
9	1.128	28.7	1.00	645	3.400	5.059
10	1.270	32.3	1.27	819	4.303	6.403
11	1.410	35.8	1.56	1006	5.313	7.906
14	1.693	43.0	2.25	1451	7.65	11.38
18	2.257	57.3	4.00	2580	13.60	20.24

Table 2.5 Area of cross- section of U. S. bars (in²)

Bar No.	Nominal Diameter (in)	Number of bars										Weight lb/ft
		1	2	3	4	5	6	7	8	9	10	
3	0.375	0.11	0.22	0.33	0.44	0.55	0.66	0.77	0.88	0.99	1.10	0.376
4	0.500	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	0.668
5	0.625	0.31	0.62	0.93	1.24	1.55	1.86	2.17	2.48	2.79	3.10	1.043
6	0.750	0.44	0.88	1.32	1.76	2.20	2.64	3.08	3.52	3.96	4.40	1.502
7	0.875	0.60	1.20	1.80	2.40	3.00	3.60	4.20	4.80	5.40	6.00	2.044
8	1.000	0.79	1.58	2.37	3.16	3.95	4.74	5.53	6.32	7.11	7.90	2.670
9	1.128	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	3.400
10	1.270	1.27	2.54	3.81	5.08	6.35	7.62	8.89	10.16	11.43	12.70	4.303
11	1.410	1.56	3.12	4.68	6.24	7.80	9.39	10.92	12.48	14.04	15.60	5.313
14	1.693	2.25	4.50	6.75	9.00	11.25	13.50	15.75	18.00	20.25	22.50	7.650
18	2.257	4.00	8.00	12.00	16.00	20.00	24.00	28.00	32.00	36.00	40.00	13.60

* Number 3 and 4 are generally used in stirrups

* Number 14 and 18 are generally used in columns.

Table 2.7 Minimum cross- section width for bars in single layer (in)

Bar size	Number of bars						
	2	3	4	5	6	7	8
5	7.2	8.8	10.5	12.0	13.5	15.2	16.8
6	7.3	9.0	10.6	12.4	14.1	15.9	17.6
7	7.4	9.4	11.2	13.2	15.0	17.0	19.0
8	7.5	9.5	11.4	13.4	15.5	17.5	19.4
9	7.6	9.7	12.3	14.5	16.7	19.1	21.2
10	7.9	10.3	13.2	15.6	18.1	20.6	23.2
11	8.2	11.0	13.9	16.7	19.5	22.3	25.1
14	8.8	12.1	15.5	19.0	22.4	25.8	29.0
18	10.5	15.0	19.5	24.0	28.4	33.0	37.5

* Number 3 and 4 assumed as stirrups

Table 2.6 Area of cross- section of SI bars (mm²)

ϕ mm	Number of bars										Weight mg/m
	1	2	3	4	5	6	7	8	9	10	
6	28.3	56.6	84.8	113	141	170	198	226	254	283	0.222
8	50.3	101	151	201	251	302	352	402	452	503	0.395
10	78.5	157	236	314	393	471	550	628	707	785	0.617
12	113	226	339	452	565	679	792	905	1020	1130	0.888
14	154	308	462	616	770	924	1080	1230	1390	1540	1.21
16	201	402	603	804	1005	1206	1407	1608	1810	2010	1.58
18	254	509	763	1020	1270	1530	1780	2040	2290	2540	2.00
20	314	628	942	1260	1570	1880	2200	2510	2830	3140	2.47
22	380	760	1140	1520	1900	2280	2660	3040	3420	3800	2.98
25	491	982	1470	1960	2450	2950	3440	3930	4420	4910	3.85
28	616	1230	1850	2460	3080	3700	4310	4930	5540	6160	4.83
30	707	1410	2120	2830	3535	4240	4950	5660	6360	7070	5.55
32	804	1610	2410	3220	4020	4830	5630	6430	7240	8040	6.31
34	908	1820	2720	3630	4540	5450	6360	7260	8170	9080	7.13

To obtain area in cm² divide mm²/100

Table 2.8 Properties of U. S. bars and metric bars

Metric Bar No.	U.S Bar No.	Metric diameter (mm)	U.S diameter (in)	Metric area (mm ²)	U.S area (in ²)	Perimeter	
						mm	in
10	3	9.52	0.375	71.2	0.11	30	1.18
13	4	12.7	0.500	126.7	0.20	40	1.571
16	5	15.87	0.625	197.8	0.31	50	2.0
19	6	19.05	0.750	285	0.44	60	2.36
22	7	22.22	0.875	387.5	0.6	70	4.75
25	8	25.4	1.000	506.7	0.79	80	3.142
29	9	28.65	1.128	644.7	1.00	90	3.544
32	10	32.26	1.270	817.3	1.27	101.5	4.00
39	11	35.81	1.41	1007.2	1.56	112.5	4.430
43	14	43.0	1.693	1452.2	2.25	135	5.32
57	18	57.33	2.257	2581	4.00	180	7.1