

Square and Hex Bolts, Screws, and Nuts.—The dimensions for square and hex bolts and screws given in the following tables have been taken from American National Standard ANSI B18.2.1-1981 (R1992) and for nuts from American National Standard ANSI/ASME B18.2.2-1987. Reference should be made to these Standards for information or data not found in the following text and tables.

Designation: Bolts and screws should be designated by the following data in the sequence shown: nominal size (fractional and decimal equivalent); threads per inch (omit for lag screws); product length for bolts and screws (fractional or two-place decimal equivalent); product name; material, including specification, where necessary; and protective finish, if required. Examples: (1) $\frac{1}{2}$ -16 $\times$ 1 $\frac{1}{2}$ Square Bolt, Steel, Zinc Plated; (2) $\frac{1}{2}$ -13 $\times$ 3 Hex Cap Screw, SAE Grade 8 Steel; and (3) .75 $\times$ 5.00 Hex Lag Screw, Steel. (4) $\frac{1}{2}$ -13 Square Nut, Steel, Zinc Plated; (5) $\frac{1}{2}$ -16 Heavy Hex Nut, SAE J995 Grade 5 Steel; and (6) 1.000-8 Hex Thick Slotted Nut, ASTM F594 (Alloy Group 1) Corrosion-Resistant Steel.

Table 1. American National Standard and Unified Standard Square Bolts and American National Standard Heavy Hex Structural Bolts
(ANSI B18.2.1-1981, R1992)

Nominal Size* or Basic Product Diam.	Body Diam.† E	Width Across Flats F		Width Across Corners G		Height H		Thread Length‡ L _T	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
$\frac{1}{4}$	0.2500	0.260	0.250	0.362	0.498	0.188	0.188	0.750	0.750
$\frac{3}{8}$	0.3125	0.324	0.312	0.454	0.605	0.220	0.220	0.875	0.875
$\frac{1}{2}$	0.3750	0.388	0.375	0.500	0.665	0.260	0.260	1.000	1.000
$\frac{5}{8}$	0.4375	0.452	0.438	0.562	0.735	0.316	0.316	1.125	1.125
$\frac{3}{4}$	0.5000	0.515	0.500	0.625	0.828	0.375	0.375	1.250	1.250
$\frac{7}{8}$	0.6250	0.642	0.625	0.750	0.995	0.444	0.444	1.500	1.500
1	0.7500	0.768	0.750	0.875	1.125	0.524	0.524	1.750	1.750
1 $\frac{1}{4}$	0.8750	0.895	0.875	1.000	1.275	0.620	0.620	2.000	2.000
1 $\frac{1}{2}$	1.0000	1.022	1.000	1.125	1.425	0.684	0.684	2.250	2.250
1 $\frac{3}{4}$	1.1250	1.149	1.125	1.250	1.562	0.780	0.780	2.500	2.500
1 $\frac{7}{8}$	1.2500	1.277	1.250	1.375	1.750	0.876	0.876	2.750	2.750
1 $\frac{1}{2}$	1.3750	1.404	1.375	1.500	1.938	0.940	0.940	3.000	3.000
1 $\frac{3}{4}$	1.5000	1.531	1.500	1.625	2.125	1.036	1.036	3.250	3.250

All dimensions are in inches. See diagram on page 1418. Bolt type shows bolts unified dimensionally with British and Canadian Standards. Threads, when rolled, shall be Unified Coarse, finer than 8 UNR series (UNR, UNF, or 8 UNR Series), Class 2A. Threads produced by other methods may be Unified Coarse, Fine, or 8-thread series (UNC, UNF, or 8 UN Series), Class 2A. * Where specifying nominal size in decimals, zeros before the decimal point and in the fourth decimal place are omitted. † See Body Diameter footnote in Table 2. ‡ Thread lengths, L_T, shown are for bolt lengths 6 inches and shorter. For longer bolt lengths add 0.250 inch to thread lengths shown.

American National Standard Square and Hexagon Bolts and Nuts

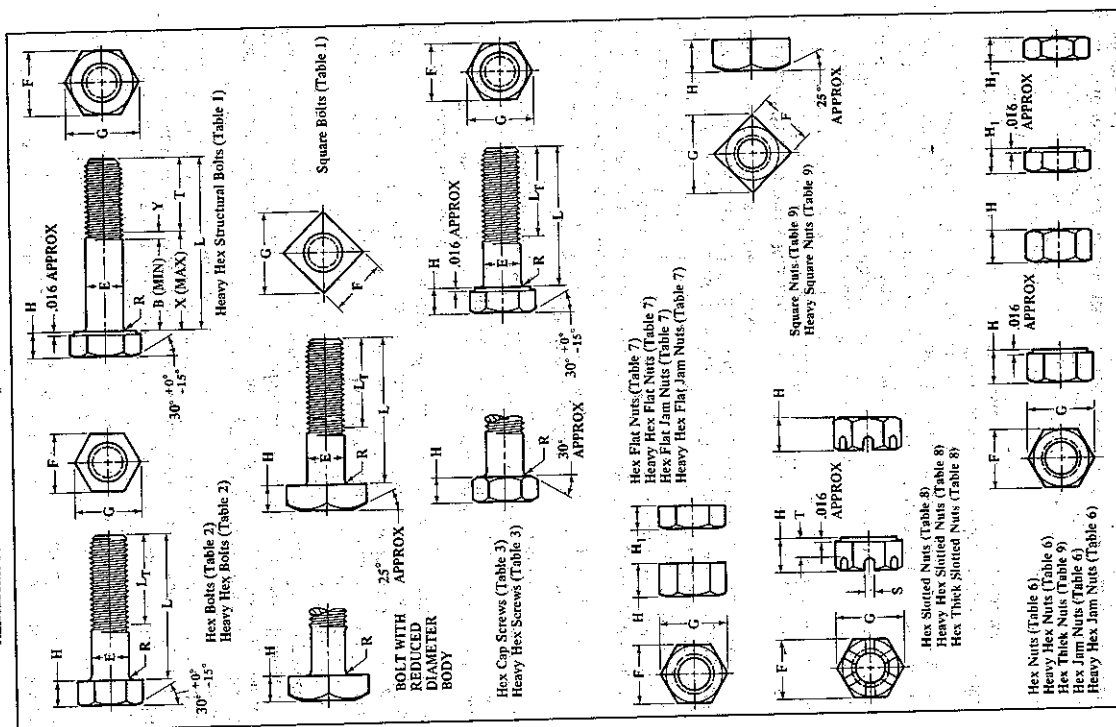


Table 2. American National Standard and Unified Standard Hex and Heavy Hex Bolts (ANSI B18.2.1-1981, R1992)

Nominal Size* or Basic Diam.	Body Diam. E	Width Across Flats F		Width Across Corners G		Height H		Thread Length L _T
		Basic	Max.	Min.	Max.	Basic	Max.	
HEX BOLTS								
1/4	0.2500	0.260	0.438	0.425	0.505	0.484	0.188	0.150
5/16	0.3125	0.324	0.500	0.484	0.577	0.552	0.232	0.195
3/8	0.3750	0.388	0.562	0.544	0.650	0.620	0.268	0.226
1/2	0.5000	0.515	0.625	0.603	0.722	0.687	0.316	0.272
5/8	0.6250	0.642	0.750	0.725	0.866	0.826	0.364	0.302
3/4	0.7500	0.768	0.938	0.906	1.083	1.033	0.444	0.378
1	1.0000	1.022	1.250	1.208	1.499	1.440	0.524	0.455
1 1/4	1.2500	1.277	1.562	1.516	1.875	1.812	0.604	0.531
1 1/2	1.5000	1.531	1.875	1.812	2.165	2.063	0.700	0.591
2	2.0000	2.039	2.500	2.450	2.998	2.873	0.810	0.688
2 1/2	2.5000	2.539	3.125	3.075	3.750	3.611	0.902	0.750
3	3.0000	3.081	3.750	3.693	4.500	4.350	1.036	0.850
3 1/2	3.5000	3.589	4.375	4.317	5.250	5.086	1.175	0.950
4	4.0000	4.111	5.000	4.938	6.000	5.812	1.316	1.050
HEAVY HEX BOLTS								
1/2	0.5000	0.515	0.625	0.590	0.725	0.695	0.364	0.302
5/8	0.6250	0.642	0.750	0.725	0.866	0.826	0.444	0.378
3/4	0.7500	0.768	0.938	0.906	1.083	1.033	0.524	0.455
1	0.8750	0.895	1.116	1.094	1.394	1.366	0.604	0.531
1 1/4	1.0000	1.022	1.250	1.208	1.575	1.546	0.700	0.591
1 1/2	1.1250	1.149	1.412	1.381	1.795	1.766	0.786	0.658
1 3/4	1.2500	1.277	1.562	1.516	2.093	2.062	0.876	0.749
2	1.5000	1.531	1.875	1.812	2.399	2.369	0.940	0.810
2 1/4	1.7500	1.785	2.188	2.139	2.742	2.716	1.036	0.902
2 3/4	2.0000	2.039	2.500	2.450	3.045	3.019	1.136	1.002
3	2.5000	2.539	3.125	3.075	3.348	3.323	1.236	1.102
3 1/4	2.7500	2.859	3.500	3.438	3.793	3.768	1.336	1.202
3 3/4	3.0000	3.081	3.750	3.693	4.196	4.171	1.436	1.302
4	3.5000	3.589	4.375	4.317	4.599	4.574	1.536	1.402
4 1/4	4.0000	4.111	5.000	4.938	5.250	5.225	1.636	1.502
4 3/4	4.5000	4.611	5.625	5.563	6.000	5.975	1.736	1.602
5	5.0000	5.111	6.125	6.063	6.500	6.475	1.836	1.702
5 1/4	5.5000	5.611	6.625	6.563	7.000	6.975	1.936	1.802
5 3/4	6.0000	6.111	7.125	7.063	7.500	7.475	2.036	1.902
6	6.5000	6.611	7.625	7.563	8.000	7.975	2.136	2.002
6 1/4	7.0000	7.111	8.125	8.063	8.500	8.475	2.236	2.102
6 3/4	7.5000	7.611	8.625	8.563	9.000	8.975	2.336	2.202
7	8.0000	8.111	9.125	9.063	9.500	9.475	2.436	2.302
7 1/4	8.5000	8.611	9.625	9.563	10.000	9.975	2.536	2.402
7 3/4	9.0000	9.111	10.125	10.063	10.500	10.475	2.636	2.502
8	9.5000	9.611	10.625	10.563	11.000	10.975	2.736	2.602
8 1/4	10.0000	10.111	11.125	11.063	11.500	11.475	2.836	2.702
8 3/4	10.5000	10.611	11.625	11.563	12.000	11.975	2.936	2.802
9	11.0000	11.111	12.125	12.063	12.500	12.475	3.036	2.902
9 1/4	11.5000	11.611	12.625	12.563	13.000	12.975	3.136	3.002
9 3/4	12.0000	12.111	13.125	13.063	13.500	13.475	3.236	3.102
10	12.5000	12.611	13.625	13.563	14.000	13.975	3.336	3.202
10 1/4	13.0000	13.111	14.125	14.063	14.500	14.475	3.436	3.302
10 3/4	13.5000	13.611	14.625	14.563	15.000	14.975	3.536	3.402
11	14.0000	14.111	15.125	15.063	15.500	15.475	3.636	3.502
11 1/4	14.5000	14.611	15.625	15.563	16.000	15.975	3.736	3.602
11 3/4	15.0000	15.111	16.125	16.063	16.500	16.475	3.836	3.702
12	15.5000	15.611	16.625	16.563	17.000	16.975	3.936	3.802
12 1/4	16.0000	16.111	17.125	17.063	17.500	17.475	4.036	3.902
12 3/4	16.5000	16.611	17.625	17.563	18.000	17.975	4.136	4.002
13	17.0000	17.111	18.125	18.063	18.500	18.475	4.236	4.102
13 1/4	17.5000	17.611	18.625	18.563	19.000	18.975	4.336	4.202
13 3/4	18.0000	18.111	19.125	19.063	19.500	19.475	4.436	4.302
14	18.5000	18.611	19.625	19.563	20.000	19.975	4.536	4.402
14 1/4	19.0000	19.111	20.125	20.063	20.500	20.475	4.636	4.502
14 3/4	19.5000	19.611	20.625	20.563	21.000	20.975	4.736	4.602
15	20.0000	20.111	21.125	21.063	21.500	21.475	4.836	4.702
15 1/4	20.5000	20.611	21.625	21.563	22.000	21.975	4.936	4.802
15 3/4	21.0000	21.111	22.125	22.063	22.500	22.475	5.036	4.902
16	21.5000	21.611	22.625	22.563	23.000	22.975	5.136	5.002
16 1/4	22.0000	22.111	23.125	23.063	23.500	23.475	5.236	5.102
16 3/4	22.5000	22.611	23.625	23.563	24.000	23.975	5.336	5.202
17	23.0000	23.111	24.125	24.063	24.500	24.475	5.436	5.302
17 1/4	23.5000	23.611	24.625	24.563	25.000	24.975	5.536	5.402
17 3/4	24.0000	24.111	25.125	25.063	25.500	25.475	5.636	5.502
18	24.5000	24.611	25.625	25.563	26.000	25.975	5.736	5.602
18 1/4	25.0000	25.111	26.125	26.063	26.500	26.475	5.836	5.702
18 3/4	25.5000	25.611	26.625	26.563	27.000	26.975	5.936	5.802
19	26.0000	26.111	27.125	27.063	27.500	27.475	6.036	5.902
19 1/4	26.5000	26.611	27.625	27.563	28.000	27.975	6.136	6.002
19 3/4	27.0000	27.111	28.125	28.063	28.500	28.475	6.236	6.102
20	27.5000	27.611	28.625	28.563	29.000	28.975	6.336	6.202
20 1/4	28.0000	28.111	29.125	29.063	29.500	29.475	6.436	6.302
20 3/4	28.5000	28.611	29.625	29.563	30.000	29.975	6.536	6.402
21	29.0000	29.111	30.125	30.063	30.500	30.475	6.636	6.502
21 1/4	29.5000	29.611	30.625	30.563	31.000	30.975	6.736	6.602
21 3/4	30.0000	30.111	31.125	31.063	31.500	31.475	6.836	6.702
22	30.5000	30.611	31.625	31.563	32.000	31.975	6.936	6.802
22 1/4	31.0000	31.111	32.125	32.063	32.500	32.475	7.036	6.902
22 3/4	31.5000	31.611	32.625	32.563	33.000	32.975	7.136	7.002
23	32.0000	32.111	33.125	33.063	33.500	33.475	7.236	7.102
23 1/4	32.5000	32.611	33.625	33.563	34.000	33.975	7.336	7.202
23 3/4	33.0000	33.111	34.125	34.063	34.500	34.475	7.436	7.302
24	33.5000	33.611	34.625	34.563	35.000	34.975	7.536	7.402
24 1/4	34.0000	34.111	35.125	35.063	35.500	35.475	7.636	7.502
24 3/4	34.5000	34.611	35.625	35.563	36.000	35.975	7.736	7.602
25	35.0000	35.111	36.125	36.063	36.500	36.475	7.836	7.702
25 1/4	35.5000	35.611	36.625	36.563	37.000	36.975	7.936	7.802
25 3/4	36.0000	36.111	37.125	37.063	37.500	37.475	8.036	7.902
26	36.5000	36.611	37.625	37.563	38.000	37.975	8.136	8.002
26 1/4	37.0000	37.111	38.125	38.063	38.500	38.475	8.236	8.102
26 3/4	37.5000	37.611	38.625	38.563	39.000	38.975	8.336	8.202
27	38.0000	38.111	39.125	39.063	39.500	39.475	8.436	8.302
27 1/4	38.5000	38.611	39.625	39.563	40.000	39.975	8.536	8.402
27 3/4	39.0000	39.111	40.125	40.063	40.500	40.475	8.636	8.502
28	39.5000	39.611	40.625	40.563	41.000	40.975	8.736	8.602
28 1/4	40.0000	40.111	41.125	41.063	41.500	41.475	8.836	8.702
28 3/4	40.5000	40.611	41.625	41.563	42.000	41.975	8.936	8.802
29	41.0000	41.111	42.125	42.063	42.500	42.475	9.036	8.902
29 1/4	41.5000	41.611	42.625	42.563	43.000	42.975	9.136	9.002
29 3/4	42.0000	42.111	43.125	43.063	43.500	43.475	9.236	9.102
30	42.5000	42.611	43.625	43.563	44.000	43.975	9.336	9.202
30 1/4	43.0000	43.111	44.125	44.063	44.500	44.475	9.436	9.302
30 3/4	43.5000	43.611	44.625	44.563	45.000	44.975	9.536	9.402
31	44.0000	44.111	45.125	45.063	45.500	45.475	9.636	9.502
31 1/4	44.5000	44.611	45.625	45.563	46.000	45.975	9.736	9.602
31 3/4	45.0000	45.111	46.125	46.063	46.500	46.475	9.836	9.702
32	45.5000	45.611	46.625	46.563	47.000	46.975	9.936	9.802
32 1/4	46.0000	46.111	47.125	47.063	47.500	47.475	10.036	9.902
32 3/4	46.5000	46.611	47.625	47.563	48.000	47.975	10.136	10.002
33	47.0000	47.111	48.125	48.063	48.500	48.475	10.236	10.102
33 1/4	47.5000	47.611	48.625	48.563	49.000	48.975	10.336	10.202
33 3/4	48.0000	48.111	49.125	49.063	49.500	49.475	10.436	10.302
34	48.5000	48.611	49.625	49.563	50.000	49.975	10.536	10.402
34 1/4	49.0000	49.111	50.125	50.063	50.500	50.475	10.636	10.502
34 3/4	49.5000	49.611	50.625	50.563	51.000	50.975	10.736	10.602
35	50.0000	50.111	51.125	51.063	51.500	51.475	10.836	10.702
35 1/4	50.5000	50.611	51.625	51.563	52.000	51.975	10.936	10.802
35 3/4	51.0000	51.111	52.125	52.063	52.500	52.475	11.036	10.902
36	51.5000	51.611	52.625	52.563	53.000	52.975	11.136	11.002
36								

All dimensions are in inches. See diagram on page 1418.

Unified Thread: Bolt type indicates product features unified dimensionally with British and Canadian standards. Unified thread products are limited to sizes 1 inch and smaller.

Beading Surface: Beading surface is flat and washer faced. Diameter of beading surface is equal to the major diameter across flats within a tolerance of minus 10 per cent.

Thread: Threads, when rolled, are Unified Coarse, Fine or 8-thread series (UNRC, UNRF, or 8 UNR Series), Class 2A. Threads produced by other methods shall preferably be series (UNC, UNF, or 8 UN Series), Class 2A.

Material: Chemical and mechanical properties of steel screws normally conform to Grades 2, 5, or 8 of SAE 1420, ASTM A449 or ASTM A354 Grade BD. Where specified, screws may also be made from brass, zinc, corrosion-resistant steel, aluminum alloy or other materials.

* **Nominal Size:** Where specifying nominal size in decimals, zeros preceding the decimal point and in the fourth decimal place are omitted.

† **Thread Lengths:** L_T shown are for bolt lengths 6 inches or shorter. For longer bolt lengths add 0.250 inch to thread lengths shown.

Table 3. American National Standard and Unified Standard Heavy Hex Screws and Hex Cap Screws (ANSI B18.2.1-1981, R1992)

Nominal Size* or Basic Diam.	Body Diam. E		Width Across Flats F		Width Across Corners G		Height H		Thread Length L _T	Basic
	Max.	Min.	Basic	Max.	Min.	Max.	Basic			
HEAVY HEX SCREWS										
1/2	0.5000	0.5000	0.482	0.850	0.810	0.969	3/16	0.333	0.302	1.250
5/8	0.6250	0.6250	0.605	1.062	1.021	1.227	1/4	0.403	0.378	1.500
3/4	0.7500	0.7500	0.729	1.250	1.212	1.443	5/16	0.483	0.455	1.750
1	0.8750	0.8750	0.852	1.438	1.394	1.660	3/8	0.563	0.531	2.000
1 1/4	1.0000	1.0000	0.976	1.812	1.755	2.093	7/16	0.627	0.591	2.250
1 1/2	1.1250	1.1250	1.098	2.000	1.938	2.309	1/2	0.718	0.658	2.500
1 3/4	1.2500	1.2500	1.223	2.188	2.110	2.505	5/8	0.813	0.749	2.750
2	1.5000	1.5000	1.470	2.375	2.300	2.742	3/4	0.974	0.902	3.000
2 1/4	1.7500	1.7500	1.716	2.750	2.662	3.125	1 1/4	1.134	1.054	3.250
2 1/2	2.0000	2.0000	1.964	3.125	3.025	3.608	1 1/2	1.263	1.175	3.500
2 3/4	2.2500	2.2500	2.214	3.500	3.388	4.041	1 3/4	1.423	1.327	3.750
3	2.5000	2.5000	2.461	3.875	3.750	4.474	2	1.583	1.479	4.000
3 1/2	2.7500	2.7500	2.711	4.250	4.112	4.907	2 1/4	1.744	1.632	4.250
4	3.0000	3.0000	2.961	4.625	4.475	5.340	2 1/2	1.903	1.815	4.500
HEX CAP SCREWS (Finished Hex Bolts)										
1/4	0.2500	0.2500	0.2450	0.438	0.428	0.505	5/32	0.163	0.150	0.750
5/16	0.3125	0.3125	0.3065	0.500	0.489	0.577	3/16	0.211	0.195	0.875
3/8	0.3750	0.3750	0.3690	0.562	0.551	0.650	1/4	0.243	0.226	1.000
1/2	0.4375	0.4375	0.4305	0.625	0.612	0.722	5/16	0.291	0.272	1.125
5/8	0.5000	0.5000	0.4930	0.688	0.676	0.866	3/8	0.333	0.302	1.250
3/4	0.5625	0.5625	0.5545	0.750	0.736	0.938	1/2	0.371	0.348	1.375
1	0.6250	0.6250	0.6170	0.813	0.798	1.083	5/8	0.403	0.378	1.500
1 1/4	0.7500	0.7500	0.7410	0.938	0.922	1.208	3/4	0.455	0.435	1.750
1 1/2	0.8750	0.8750	0.8660	1.062	1.046	1.354	1 1/4	0.563	0.531	2.000
1 3/4	1.0000	1.0000	0.9900	1.250	1.235	1.516	1 1/2	0.627	0.591	2.250
2	1.2500	1.2500	1.2380	1.438	1.416	1.675	2	0.718	0.658	2.500
2 1/4	1.5000	1.5000	1.4790	1.625	1.601	1.859	2 1/4	0.813	0.749	2.750
2 1/2	1.7500	1.7500	1.7360	1.813	1.785	2.066	2 1/2	0.878	0.810	3.000
2 3/4	2.0000	2.0000	1.9880	2.000	1.976	2.382	2 3/4	0.974	0.902	3.250
3	2.2500	2.2500	2.2380	2.188	2.158	2.598	3	1.062	0.984	3.500
3 1/4	2.5000	2.5000	2.4880	2.375	2.342	2.897	3 1/4	1.134	1.054	3.750
3 1/2	2.7500	2.7500	2.7380	2.563	2.525	3.191	3 1/2	1.263	1.175	4.000
3 3/4	3.0000	3.0000	2.9880	2.750	2.713	3.493	3 3/4	1.423	1.327	4.250
4	3.2500	3.2500	3.2380	2.938	2.898	3.796	4	1.583	1.479	4.500
4 1/4	3.5000	3.5000	3.4880	3.125	3.084	4.098	4 1/4	1.744	1.632	4.750
4 1/2	3.7500	3.7500	3.7380	3.313	3.271	4.399	4 1/2	1.903	1.815	5.000

Table I. American National Standard Hexagon and Spline Socket Head Cap Screws (1966 Series) (ANSI/ASME B18.3-1986)

Nominal Size	Body Diameter		Head Diameter		Head Height		Spline Socket Size		Hex Socket Size		Fillet		Key Eng. ment*	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Ext.	Max	T
0	0.0600	0.0568	0.086	0.091	0.060	0.057	0.060	0.050	0.050	0.050	0.007	0.007	0.025	0.025
1	0.0730	0.0695	0.118	0.112	0.073	0.070	0.072	0.062	0.062	0.062	0.007	0.007	0.031	0.031
2	0.0860	0.0822	0.140	0.134	0.086	0.083	0.086	0.078	0.078	0.078	0.008	0.008	0.038	0.038
3	0.0990	0.0949	0.161	0.154	0.099	0.095	0.096	0.086	0.086	0.086	0.008	0.008	0.044	0.044
4	0.1120	0.1075	0.183	0.176	0.112	0.108	0.111	0.094	0.094	0.094	0.009	0.009	0.051	0.051
5	0.1250	0.1202	0.205	0.198	0.125	0.121	0.111	0.094	0.094	0.094	0.009	0.009	0.057	0.057
6	0.1380	0.1329	0.226	0.218	0.138	0.134	0.133	0.109	0.109	0.109	0.010	0.010	0.064	0.064
8	0.1640	0.1585	0.270	0.262	0.164	0.159	0.168	0.141	0.141	0.141	0.012	0.012	0.077	0.077
10	0.1900	0.1840	0.312	0.303	0.190	0.185	0.183	0.156	0.156	0.156	0.014	0.014	0.090	0.090
1/4	0.2500	0.2435	0.375	0.365	0.250	0.244	0.216	0.188	0.188	0.188	0.014	0.014	0.120	0.120
3/8	0.3125	0.3053	0.460	0.457	0.312	0.306	0.291	0.250	0.250	0.250	0.017	0.017	0.151	0.151
1/2	0.3750	0.3678	0.562	0.550	0.375	0.368	0.372	0.312	0.312	0.312	0.020	0.020	0.182	0.182
5/8	0.4375	0.4294	0.656	0.642	0.438	0.430	0.454	0.375	0.375	0.375	0.023	0.023	0.213	0.213
3/4	0.5000	0.4919	0.750	0.735	0.500	0.492	0.484	0.400	0.400	0.400	0.026	0.026	0.245	0.245
7/8	0.6250	0.6163	0.938	0.921	0.625	0.616	0.595	0.500	0.500	0.500	0.032	0.032	0.307	0.307
1	0.7500	0.7406	1.125	1.107	0.750	0.740	0.620	0.625	0.625	0.625	0.039	0.039	0.370	0.370
1 1/4	0.8750	0.8647	1.312	1.293	0.875	0.864	0.698	0.750	0.750	0.750	0.044	0.044	0.432	0.432
1 1/2	1.0000	0.9886	1.500	1.479	1.000	0.988	0.790	0.875	0.875	0.875	0.050	0.050	0.495	0.495
1 3/4	1.1250	1.1086	1.688	1.665	1.125	1.111	0.875	0.938	0.938	0.938	0.055	0.055	0.557	0.557
2	1.2500	1.2336	1.875	1.852	1.250	1.236	0.938	1.000	1.000	1.000	0.060	0.060	0.620	0.620
2 1/4	1.3750	1.3568	2.062	2.038	1.375	1.360	1.000	1.062	1.062	1.062	0.065	0.065	0.682	0.682
2 1/2	1.5000	1.4818	2.250	2.224	1.500	1.485	1.062	1.125	1.125	1.125	0.070	0.070	0.745	0.745
2 3/4	1.6250	1.6059	2.438	2.412	1.625	1.609	1.125	1.188	1.188	1.188	0.075	0.075	0.807	0.807
3	1.7500	1.7295	2.625	2.597	1.750	1.734	1.188	1.250	1.250	1.250	0.080	0.080	0.870	0.870
3 1/4	1.8750	1.8535	2.812	2.784	1.875	1.858	1.250	1.312	1.312	1.312	0.085	0.085	0.932	0.932
3 1/2	2.0000	1.9780	3.000	2.970	2.000	1.983	1.312	1.375	1.375	1.375	0.090	0.090	0.995	0.995
3 3/4	2.1250	2.1025	3.188	3.157	2.125	2.108	1.375	1.438	1.438	1.438	0.095	0.095	1.057	1.057
4	2.2500	2.2260	3.375	3.344	2.250	2.232	1.438	1.500	1.500	1.500	0.100	0.100	1.120	1.120
4 1/4	2.3750	2.3505	3.562	3.530	2.375	2.356	1.500	1.562	1.562	1.562	0.105	0.105	1.182	1.182
4 1/2	2.5000	2.4745	3.750	3.717	2.500	2.481	1.562	1.625	1.625	1.625	0.110	0.110	1.245	1.245
4 3/4	2.6250	2.5985	3.938	3.904	2.625	2.604	1.625	1.688	1.688	1.688	0.115	0.115	1.307	1.307
5	2.7500	2.7235	4.125	4.090	2.750	2.730	1.688	1.750	1.750	1.750	0.120	0.120	1.370	1.370
5 1/4	2.8750	2.8485	4.312	4.277	2.875	2.854	1.750	1.812	1.812	1.812	0.125	0.125	1.432	1.432
5 1/2	3.0000	2.9735	4.500	4.464	3.000	2.979	1.812	1.875	1.875	1.875	0.130	0.130	1.495	1.495
5 3/4	3.1250	3.0985	4.688	4.652	3.125	3.104	1.875	1.938	1.938	1.938	0.135	0.135	1.557	1.557
6	3.2500	3.2235	4.875	4.839	3.250	3.228	1.938	2.000	2.000	2.000	0.140	0.140	1.620	1.620
6 1/4	3.3750	3.3495	5.062	5.026	3.375	3.354	2.000	2.062	2.062	2.062	0.145	0.145	1.682	1.682
6 1/2	3.5000	3.4745	5.250	5.214	3.500	3.478	2.062	2.125	2.125	2.125	0.150	0.150	1.745	1.745
6 3/4	3.6250	3.5995	5.438	5.402	3.625	3.604	2.125	2.188	2.188	2.188	0.155	0.155	1.807	1.807
7	3.7500	3.7245	5.625	5.589	3.750	3.729	2.188	2.250	2.250	2.250	0.160	0.160	1.870	1.870
7 1/4	3.8750	3.8495	5.812	5.776	3.875	3.854	2.250	2.312	2.312	2.312	0.165	0.165	1.932	1.932
7 1/2	4.0000	3.9745	6.000	5.964	4.000	3.979	2.312	2.375	2.375	2.375	0.170	0.170	1.995	1.995

(* Key engagement depths are minimum.)

All dimensions in inches. The body length, L_b , of the screw is the length of the unthreaded cylindrical portion of the shank. The length of thread, L_t , is the distance from the extreme point to the last complete (full form) thread. Standard length increments for screw diameters up to 1 inch are 1/4 inch for lengths 1/4 inch through 1/2 inch, 1/2 inch for lengths 1/2 inch through 3/4 inch, 3/4 inch for lengths 3/4 inch through 1 inch, 1 inch for lengths 1 inch through 1 1/4 inches, 1 1/4 inches for lengths 1 1/4 inches through 1 3/4 inches, 1 3/4 inches for lengths 1 3/4 inches through 2 inches, 2 inches for lengths 2 inches through 2 1/4 inches, 2 1/4 inches for lengths 2 1/4 inches through 2 3/4 inches, 2 3/4 inches for lengths 2 3/4 inches through 3 inches, 3 inches for lengths 3 inches through 3 1/4 inches, 3 1/4 inches for lengths 3 1/4 inches through 3 1/2 inches, 3 1/2 inches for lengths 3 1/2 inches through 3 3/4 inches, 3 3/4 inches for lengths 3 3/4 inches through 4 inches, 4 inches for lengths 4 inches through 4 1/4 inches, 4 1/4 inches for lengths 4 1/4 inches through 4 1/2 inches, 4 1/2 inches for lengths 4 1/2 inches through 4 3/4 inches, 4 3/4 inches for lengths 4 3/4 inches through 5 inches, 5 inches for lengths 5 inches through 5 1/4 inches, 5 1/4 inches for lengths 5 1/4 inches through 5 1/2 inches, 5 1/2 inches for lengths 5 1/2 inches through 5 3/4 inches, 5 3/4 inches for lengths 5 3/4 inches through 6 inches, 6 inches for lengths 6 inches through 6 1/4 inches, 6 1/4 inches for lengths 6 1/4 inches through 6 1/2 inches, 6 1/2 inches for lengths 6 1/2 inches through 6 3/4 inches, 6 3/4 inches for lengths 6 3/4 inches through 7 inches, 7 inches for lengths 7 inches through 7 1/4 inches, 7 1/4 inches for lengths 7 1/4 inches through 7 1/2 inches, 7 1/2 inches for lengths 7 1/2 inches through 7 3/4 inches, 7 3/4 inches for lengths 7 3/4 inches through 8 inches, 8 inches for lengths 8 inches through 8 1/4 inches, 8 1/4 inches for lengths 8 1/4 inches through 8 1/2 inches, 8 1/2 inches for lengths 8 1/2 inches through 8 3/4 inches, 8 3/4 inches for lengths 8 3/4 inches through 9 inches, 9 inches for lengths 9 inches through 9 1/4 inches, 9 1/4 inches for lengths 9 1/4 inches through 9 1/2 inches, 9 1/2 inches for lengths 9 1/2 inches through 9 3/4 inches, 9 3/4 inches for lengths 9 3/4 inches through 10 inches, 10 inches for lengths 10 inches through 10 1/4 inches, 10 1/4 inches for lengths 10 1/4 inches through 10 1/2 inches, 10 1/2 inches for lengths 10 1/2 inches through 10 3/4 inches, 10 3/4 inches for lengths 10 3/4 inches through 11 inches, 11 inches for lengths 11 inches through 11 1/4 inches, 11 1/4 inches for lengths 11 1/4 inches through 11 1/2 inches, 11 1/2 inches for lengths 11 1/2 inches through 11 3/4 inches, 11 3/4 inches for lengths 11 3/4 inches through 12 inches, 12 inches for lengths 12 inches through 12 1/4 inches, 12 1/4 inches for lengths 12 1/4 inches through 12 1/2 inches, 12 1/2 inches for lengths 12 1/2 inches through 12 3/4 inches, 12 3/4 inches for lengths 12 3/4 inches through 13 inches, 13 inches for lengths 13 inches through 13 1/4 inches, 13 1/4 inches for lengths 13 1/4 inches through 13 1/2 inches, 13 1/2 inches for lengths 13 1/2 inches through 13 3/4 inches, 13 3/4 inches for lengths 13 3/4 inches through 14 inches, 14 inches for lengths 14 inches through 14 1/4 inches, 14 1/4 inches for lengths 14 1/4 inches through 14 1/2 inches, 14 1/2 inches for lengths 14 1/2 inches through 14 3/4 inches, 14 3/4 inches for lengths 14 3/4 inches through 15 inches, 15 inches for lengths 15 inches through 15 1/4 inches, 15 1/4 inches for lengths 15 1/4 inches through 15 1/2 inches, 15 1/2 inches for lengths 15 1/2 inches through 15 3/4 inches, 15 3/4 inches for lengths 15 3/4 inches through 16 inches, 16 inches for lengths 16 inches through 16 1/4 inches, 16 1/4 inches for lengths 16 1/4 inches through 16 1/2 inches, 16 1/2 inches for lengths 16 1/2 inches through 16 3/4 inches, 16 3/4 inches for lengths 16 3/4 inches through 17 inches, 17 inches for lengths 17 inches through 17 1/4 inches, 17 1/4 inches for lengths 17 1/4 inches through 17 1/2 inches, 17 1/2 inches for lengths 17 1/2 inches through 17 3/4 inches, 17 3/4 inches for lengths 17 3/4 inches through 18 inches, 18 inches for lengths 18 inches through 18 1/4 inches, 18 1/4 inches for lengths 18 1/4 inches through 18 1/2 inches, 18 1/2 inches for lengths 18 1/2 inches through 18 3/4 inches, 18 3/4 inches for lengths 18 3/4 inches through 19 inches, 19 inches for lengths 19 inches through 19 1/4 inches, 19 1/4 inches for lengths 19 1/4 inches through 19 1/2 inches, 19 1/2 inches for lengths 19 1/2 inches through 19 3/4 inches, 19 3/4 inches for lengths 19 3/4 inches through 20 inches, 20 inches for lengths 20 inches through 20 1/4 inches, 20 1/4 inches for lengths 20 1/4 inches through 20 1/2 inches, 20 1/2 inches for lengths 20 1/2 inches through 20 3/4 inches, 20 3/4 inches for lengths 20 3/4 inches through 21 inches, 21 inches for lengths 21 inches through 21 1/4 inches, 21 1/4 inches for lengths 21 1/4 inches through 21 1/2 inches, 21 1/2 inches for lengths 21 1/2 inches through 21 3/4 inches, 21 3/4 inches for lengths 21 3/4 inches through 22 inches, 22 inches for lengths 22 inches through 22 1/4 inches, 22 1/4 inches for lengths 22 1/4 inches through 22 1/2 inches, 22 1/2 inches for lengths 22 1/2 inches through 22 3/4 inches, 22 3/4 inches for lengths 22 3/4 inches through 23 inches, 23 inches for lengths 23 inches through 23 1/4 inches, 23 1/4 inches for lengths 23 1/4 inches through 23 1/2 inches, 23 1/2 inches for lengths 23 1/2 inches through 23 3/4 inches, 23 3/4 inches for lengths 23 3/4 inches through 24 inches, 24 inches for lengths 24 inches through 24 1/4 inches, 24 1/4 inches for lengths 24 1/4 inches through 24 1/2 inches, 24 1/2 inches for lengths 24 1/2 inches through 24 3/4 inches, 24 3/4 inches for lengths 24 3/4 inches through 25 inches, 25 inches for lengths 25 inches through 25 1/4 inches, 25 1/4 inches for lengths 25 1/4 inches through 25 1/2 inches, 25 1/2 inches for lengths 25 1/2 inches through 25 3/4 inches, 25 3/4 inches for lengths 25 3/4 inches through 26 inches, 26 inches for lengths 26 inches through 26 1/4 inches, 26 1/4 inches for lengths 26 1/4 inches through 26 1/2 inches, 26 1/2 inches for lengths 26 1/2 inches through 26 3/4 inches, 26 3/4 inches for lengths 26 3/4 inches through 27 inches, 27 inches for lengths 27 inches through 27 1/4 inches, 27 1/4 inches for lengths 27 1/4 inches through 27 1/2 inches, 27 1/2 inches for lengths 27 1/2 inches through 27 3/4 inches, 27 3/4 inches for lengths 27 3/4 inches through 28 inches, 28 inches for lengths 28 inches through 28 1/4 inches, 28 1/4 inches for lengths 28 1/4 inches through 28 1/2 inches, 28 1/2 inches for lengths 28 1/2 inches through 28 3/4 inches, 28 3/4 inches for lengths 28 3/4 inches through 29 inches, 29 inches for lengths 29 inches through 29 1/4 inches, 29 1/4 inches for lengths 29 1/4 inches through 29 1/2 inches, 29 1/2 inches for lengths 29 1/2 inches through 29 3/4 inches, 29 3/4 inches for lengths 29 3/4 inches through 30 inches, 30 inches for lengths 30 inches through 30 1/4 inches, 30 1/4 inches for lengths 30 1/4 inches through 30 1/2 inches, 30 1/2 inches for lengths 30 1/2 inches through 30 3/4 inches, 30 3/4 inches for lengths 30 3/4 inches through 31 inches, 31 inches for lengths 31 inches through 31 1/4 inches, 31 1/4 inches for lengths 31 1/4 inches through 31 1/2 inches, 31 1/2 inches for lengths 31 1/2 inches through 31 3/4 inches, 31 3/4 inches for lengths 31 3/4 inches through 32 inches, 32 inches for lengths 32 inches through 32 1/4 inches, 32 1/4 inches for lengths 32 1/4 inches through 32 1/2 inches, 32 1/2 inches for lengths 32 1/2 inches through 32 3/4 inches, 32 3/4 inches for lengths 32 3/4 inches through 33 inches, 33 inches for lengths 33 inches through 33 1/4 inches, 33 1/4 inches for lengths 33 1/4 inches through 33 1/2 inches, 33 1/2 inches for lengths 33 1/2 inches through 33 3/4 inches, 33 3/4 inches for lengths 33 3/4 inches through 34 inches, 34 inches for lengths 34 inches through 34 1/4 inches, 34 1/4 inches for lengths 34 1/4 inches through 34 1/2 inches, 34 1/2 inches for lengths 34 1/2 inches through 34 3/4 inches, 34 3/4 inches for lengths 34 3/4 inches through 35 inches, 35 inches for lengths 35 inches through 35 1/4 inches, 35 1/4 inches for lengths 35 1/4 inches through 35 1/2 inches, 35 1/2 inches for lengths 35 1/2 inches through 35 3/4 inches, 35 3/4 inches for lengths 35 3/4 inches through 36 inches, 36 inches for lengths 36 inches through 36 1/4 inches, 36 1/4 inches for lengths 36 1/4 inches through 36 1/2 inches, 36 1/2 inches for lengths 36 1/2 inches through 36 3/4 inches, 36 3/4 inches for lengths 36 3/4 inches through 37 inches, 37 inches for lengths 37 inches through 37 1/4 inches, 37 1/4 inches for lengths 37 1/4 inches through 37 1/2 inches, 37 1/2 inches for lengths 37 1/2 inches through 37 3/4 inches, 37 3/4 inches for lengths 37 3/4 inches through 38 inches, 38 inches for lengths 38 inches through 38 1/4 inches, 38 1/4 inches for lengths 38 1/4 inches through 38 1/2 inches, 38 1/2 inches for lengths 38 1/2 inches through 38 3/4 inches, 38 3/4 inches for lengths 38 3/4 inches through 39 inches, 39 inches for lengths 39 inches through 39 1/4 inches, 39 1/4 inches for lengths 39 1/4 inches through 39 1/2 inches, 39 1/2 inches for lengths 39 1/2 inches through 39 3/4 inches, 39 3/4 inches for lengths 39 3/4 inches through 40 inches, 40 inches for lengths 40 inches through 40 1/4 inches, 40 1/4 inches for lengths 40 1/4 inches through 40 1/2 inches, 40 1/2 inches for lengths 40 1/2 inches through 40 3/4 inches, 40 3/4 inches for lengths 40 3/4 inches through 41 inches, 41 inches for lengths 41 inches through 41 1/4 inches, 41 1/4 inches for lengths 41 1/4 inches through 41 1/2 inches, 41 1/2 inches for lengths 41 1/2 inches through 41 3/4 inches, 41 3/4 inches for lengths 41 3/4 inches through 42 inches, 42 inches for lengths 42 inches through 42 1/4 inches, 42 1/4 inches for lengths 42 1/4 inches through 42 1/2 inches, 42 1/2 inches for lengths 42 1/2 inches through 42 3/4 inches, 42 3/4 inches for lengths 42 3/4 inches through 43 inches, 43 inches for lengths 43 inches through 43 1/4 inches, 43 1/4 inches for lengths 43 1/4 inches through 43 1/2 inches, 43 1/2 inches for lengths 43 1/2 inches through 43 3/4 inches, 43 3/4 inches for lengths 43 3/4 inches through 44 inches, 44 inches for lengths 44 inches through 44 1/4 inches, 44 1/4 inches for lengths 44 1/4 inches through 44 1/2 inches, 44 1/2 inches for lengths 44 1/2 inches through 44 3/4 inches, 44 3/4 inches for lengths 44 3/4 inches through 45 inches, 45 inches for lengths 45 inches through 45 1/4 inches, 45 1/4 inches for lengths 45 1/4 inches through 45 1/2 inches, 45 1/2 inches for lengths 45 1/2 inches through 45 3/4 inches, 45 3/4 inches for lengths 45 3/4 inches through 46 inches, 46 inches for lengths 46 inches through 46 1/4 inches, 46 1/4 inches for lengths 46 1/4 inches through 46 1/2 inches, 46 1/2 inches for lengths 46 1/2 inches through 46 3/4 inches, 46 3/4 inches for lengths 46 3/4 inches through 47 inches, 47 inches for lengths 47 inches through 47 1/4 inches, 47 1/4 inches for lengths 47 1/4 inches through 47 1/2 inches, 47 1/2 inches for lengths 47 1/2 inches through 47 3/4 inches, 47 3/4 inches for lengths 47 3/4 inches through 48 inches, 48 inches for lengths 48 inches through 48 1/4 inches, 48 1/4 inches for lengths 48 1/4 inches through 48 1/2 inches, 48 1/2 inches for lengths 48 1/2 inches through 48 3/4 inches, 48 3/4 inches for lengths 48 3/4 inches through 49 inches, 49 inches for lengths 49 inches through 49 1/4 inches, 49 1/4 inches for lengths 49 1/4 inches through 49 1/2 inches, 49 1/2 inches for lengths 49 1/2 inches through 49 3/4 inches, 49 3/4 inches for lengths 49 3/4 inches through 50 inches, 50 inches for lengths 50 inches through 50 1/4 inches, 50 1/4 inches for lengths 50 1/4 inches through 50 1/2 inches, 50 1/2 inches for lengths 50 1/2 inches through 50 3/4 inches, 50 3/4 inches for lengths 50 3/4 inches through 51 inches, 51 inches for lengths 51 inches through 51 1/4 inches, 51 1/4 inches for lengths 51 1/4 inches through 51 1/2 inches, 51 1/2 inches for lengths 51 1/2 inches through 51 3/4 inches, 51 3/4 inches for lengths 51 3/4 inches through 52 inches, 52 inches for lengths 52 inches through 52 1/4 inches, 52 1/4 inches for lengths 52 1/4 inches through 52 1/2 inches, 52 1/2 inches for lengths 52 1/2 inches through 52 3/4 inches, 52 3/4 inches for lengths 52 3/4 inches through 53 inches, 53 inches for lengths 53 inches through 53 1/4 inches, 53 1/4 inches for lengths 53 1/4 inches through 53 1/2 inches, 53 1/2 inches for lengths 53 1/2 inches through 53 3/4 inches, 53 3/4 inches for lengths 53 3/4 inches through 54 inches, 54 inches

Table 4: American National Standard Hexagon Socket and Spline Socket Button Head Cap Screws* (ANSI/ASME B18.3-1986)

SLIGHT FLAT AND/OR COUNTERSINK PERMISSIBLE

Nominal Size	Screw Diameter Basic	Head Diameter		Head Height		Head Side Ref.	Spline Socket Size†	Hexagon Socket Size†	Standard Length
		Max.	Min.	Max.	Min.				
0	0.0600	0.114	0.104	0.032	0.026	0.010	0.048	0.035	1/2
1	0.0730	0.139	0.129	0.039	0.033	0.010	0.060	0.050	1/2
2	0.0860	0.164	0.154	0.046	0.038	0.010	0.072	0.060	1/2
3	0.0990	0.188	0.176	0.052	0.044	0.010	0.084	0.072	1/2
4	0.1120	0.213	0.201	0.059	0.050	0.010	0.096	0.084	1/2
5	0.1250	0.238	0.226	0.066	0.058	0.010	0.108	0.096	1/2
6	0.1380	0.262	0.250	0.073	0.063	0.010	0.120	0.108	1/2
8	0.1640	0.312	0.298	0.087	0.077	0.010	0.144	0.132	1/2
10	0.1900	0.361	0.347	0.101	0.091	0.010	0.168	0.156	1/2
1/4	0.2500	0.437	0.419	0.132	0.122	0.031	0.216	0.204	1
3/8	0.3125	0.547	0.527	0.166	0.152	0.031	0.272	0.260	1 1/4
1/2	0.3750	0.656	0.636	0.199	0.185	0.031	0.328	0.316	2
3/4	0.5000	0.875	0.851	0.265	0.245	0.046	0.432	0.420	2 1/2
1	0.6250	1.000	0.970	0.331	0.311	0.062	0.528	0.516	3

All dimensions in inches.
 * These cap screws have been designed and recommended for light fastening applications. They are not suggested for use in critical high-strength applications where socket head cap screws should normally be used.

Standard length increments for socket button head cap screws are as follows: 1/8 inch for nominal screw lengths of 1/8 through 1/4 inch, 1/4 inch for nominal screw lengths of 1/4 through 1 inch, and 1/2 inch for nominal screw lengths of 1 inch through 2 inches. Tolerances on lengths are -0.03 inch for lengths up to 1 inch inclusive; for lengths from 1 through 2 inches, inclusive, length tolerances are -0.04 inch.

† Socket dimensions are given in Table 9.

To prevent interference, American National Standard ANSI/ASME B18.3.4M-1986 gives metric dimensional and general requirements for a lower head profile hexagon socket button head cap screw. Because of its design, wrenchability and other design factors are reduced; therefore, B18.3.4M should be reviewed carefully. Available only in metric sizes and with metric threads.

For manufacturing details, including materials, not shown, see American National Standard ANSI/ASME B18.3-1986.

Table 3: American National Standard Hexagon and Spline Socket Flat Countersunk Head Cap Screws (ANSI/ASME B18.3-1986)

THEORETICAL SHARP CORNER
ABSOLUTE MINIMUM ROUNDNESS

Nominal Size	Body Diameter	Head Diameter		Head Height	Spline Socket Size†	Hexagon Socket Size†	Key Engagement
		Max.	Min.				
0	0.0600	0.138	0.117	0.044	0.048	0.035	0.025
1	0.0730	0.168	0.143	0.054	0.060	0.050	0.031
2	0.0860	0.197	0.168	0.064	0.072	0.060	0.038
3	0.0990	0.226	0.193	0.073	0.084	0.072	0.044
4	0.1120	0.255	0.218	0.083	0.096	0.084	0.055
5	0.1250	0.281	0.240	0.090	0.108	0.096	0.060
6	0.1380	0.307	0.263	0.097	0.120	0.108	0.066
8	0.1640	0.359	0.311	0.112	0.144	0.132	0.072
10	0.1900	0.411	0.359	0.127	0.168	0.156	0.087
1/4	0.2500	0.531	0.480	0.161	0.216	0.204	0.111
3/8	0.3125	0.656	0.600	0.198	0.272	0.260	0.135
1/2	0.3750	0.781	0.720	0.234	0.328	0.316	0.159
3/4	0.4375	0.844	0.781	0.251	0.372	0.360	0.173
1	0.5000	0.949	0.872	0.251	0.432	0.420	0.200
1 1/4	0.6250	1.188	1.112	0.374	0.528	0.516	0.220
1 1/2	0.7500	1.438	1.355	0.396	0.624	0.612	0.248
1 3/4	0.8750	1.688	1.604	0.468	0.720	0.708	0.272
2	1.0000	1.938	1.841	0.540	0.816	0.804	0.297
2 1/4	1.1250	2.188	2.079	0.611	0.912	0.900	0.325
2 1/2	1.2500	2.438	2.316	0.683	1.008	1.000	0.353
2 3/4	1.3750	2.688	2.553	0.755	1.104	1.100	0.402
3	1.5000	2.938	2.791	0.827	1.200	1.200	0.435

All dimensions in inches.
 The body of the screw is the unthreaded cylindrical portion of the shank where not threaded to the head; the shank being the portion of the screw from the point of juncture of the conical bearing surface and the body to the flat of the point. The length of thread L_T is the distance measured from the extreme point to the last complete (full form) thread.

Standard length increments for 1/8 inch through 1/4 inch sizes are as follows: 1/8 inch for nominal screw lengths of 1/8 through 1/4 inch, 1/4 inch for lengths of 1/4 through 1 inch, and 1/2 inch for lengths of 1 inch through 2 inches. Tolerances on lengths are -0.03 inch for lengths up to 1 inch inclusive; for lengths from 1 through 2 inches, inclusive, length tolerances are -0.04 inch.

† Socket dimensions are given in Table 9.

To prevent interference, American National Standard ANSI/ASME B18.3.4M-1986 gives metric dimensional and general requirements for a lower head profile hexagon socket button head cap screw. Because of its design, wrenchability and other design factors are reduced; therefore, B18.3.4M should be reviewed carefully. Available only in metric sizes and with metric threads.

For manufacturing details, including materials, not shown, see American National Standard ANSI/ASME B18.3-1986. Socket dimensions are given in Table 9.

Table 3a. Coarse-Thread Series, UNC and UNRC — Basic Dimensions

Sizes No. or Inches	Basic Major Diam., D		Thds. Per Inch, n	Basic Pitch Diam., D_2		Minor Diameter		Lead Angle λ at Basic P.D.	Area of Minor Diam. at $D-2h_f$	Tensile Stress Area ^b
	Inches	Inches		Inches	Inches	Ext. Thds., d_3 (Ref.)	Int. Thds., d_1			
1 (0.073)*	0.0730	0.0649	64	0.0644	0.0561	0.0561	0.0561	4	0.0018	0.00263
2 (0.086)	0.0860	0.0744	56	0.0741	0.0674	0.0674	0.0674	4	0.00210	0.00307
3 (0.099)*	0.0990	0.0855	55	0.0852	0.0764	0.0764	0.0764	4	0.00230	0.00330
4 (0.112)	0.1120	0.0958	46	0.0952	0.0849	0.0849	0.0849	4	0.00260	0.00394
5 (0.125)	0.1250	0.1068	44	0.1068	0.0979	0.0979	0.0979	4	0.00280	0.00425
6 (0.138)	0.1380	0.1177	33	0.1177	0.1042	0.1042	0.1042	4	0.00310	0.00466
8 (0.164)	0.1640	0.1437	32	0.1437	0.1268	0.1268	0.1268	4	0.00350	0.00521
10 (0.190)	0.1900	0.1629	24	0.1629	0.1449	0.1449	0.1449	4	0.00400	0.00596
12 (0.216)*	0.2160	0.1889	24	0.1889	0.1709	0.1709	0.1709	4	0.00450	0.00661
1/4	0.2500	0.2175	20	0.2175	0.1995	0.1995	0.1995	4	0.00500	0.00736
5/16	0.3125	0.2764	18	0.2764	0.2524	0.2524	0.2524	4	0.00550	0.00801
3/8	0.3750	0.3344	16	0.3344	0.3073	0.3073	0.3073	4	0.00600	0.00866
1/2	0.4375	0.3914	14	0.3914	0.3585	0.3585	0.3585	4	0.00650	0.00931
5/8	0.5000	0.4500	12	0.4500	0.4107	0.4107	0.4107	4	0.00700	0.01000
3/4	0.5625	0.5084	12	0.5084	0.4623	0.4623	0.4623	4	0.00750	0.01069
7/8	0.6250	0.5660	10	0.5660	0.5168	0.5168	0.5168	4	0.00800	0.01138
1	0.7500	0.6850	9	0.6850	0.6417	0.6417	0.6417	4	0.00850	0.01207
1 1/8	0.8750	0.8028	9	0.8028	0.7547	0.7547	0.7547	4	0.00900	0.01276
1 1/4	1.0000	0.9188	8	0.9188	0.8472	0.8472	0.8472	4	0.00950	0.01345
1 1/2	1.1250	1.0322	7	1.0322	0.9549	0.9549	0.9549	4	0.01000	0.01414
1 3/4	1.2500	1.1472	7	1.1472	1.0654	1.0654	1.0654	4	0.01050	0.01483
2	1.3750	1.2667	6	1.2667	1.1940	1.1940	1.1940	4	0.01100	0.01552
2 1/4	1.5000	1.3917	6	1.3917	1.3016	1.3016	1.3016	4	0.01150	0.01621
2 1/2	1.6250	1.5001	5	1.5001	1.4119	1.4119	1.4119	4	0.01200	0.01690
2 3/4	1.7500	1.6057	4 1/2	1.6057	1.5335	1.5335	1.5335	4	0.01250	0.01759
3	1.8750	1.7557	4 1/2	1.7557	1.6594	1.6594	1.6594	4	0.01300	0.01828
3 1/4	2.0000	1.8557	4 1/2	1.8557	1.7853	1.7853	1.7853	4	0.01350	0.01897
3 1/2	2.1250	2.0057	4 1/2	2.0057	1.9094	1.9094	1.9094	4	0.01400	0.01966
3 3/4	2.2500	2.1057	4 1/2	2.1057	2.0394	2.0394	2.0394	4	0.01450	0.02035
4	2.3750	2.2057	4	2.2057	2.1694	2.1694	2.1694	4	0.01500	0.02104
4 1/4	2.5000	2.3057	4	2.3057	2.2994	2.2994	2.2994	4	0.01550	0.02173
4 1/2	2.6250	2.4057	4	2.4057	2.4294	2.4294	2.4294	4	0.01600	0.02242
4 3/4	2.7500	2.5057	4	2.5057	2.5594	2.5594	2.5594	4	0.01650	0.02311
5	2.8750	2.6057	4	2.6057	2.6894	2.6894	2.6894	4	0.01700	0.02380
5 1/4	3.0000	2.7057	4	2.7057	2.8194	2.8194	2.8194	4	0.01750	0.02449
5 1/2	3.1250	2.8057	4	2.8057	2.9494	2.9494	2.9494	4	0.01800	0.02518
5 3/4	3.2500	2.9057	4	2.9057	3.0794	3.0794	3.0794	4	0.01850	0.02587
6	3.3750	3.0057	4	3.0057	3.2094	3.2094	3.2094	4	0.01900	0.02656
6 1/4	3.5000	3.1057	4	3.1057	3.3394	3.3394	3.3394	4	0.01950	0.02725
6 1/2	3.6250	3.2057	4	3.2057	3.4694	3.4694	3.4694	4	0.02000	0.02794
6 3/4	3.7500	3.3057	4	3.3057	3.5994	3.5994	3.5994	4	0.02050	0.02863
7	3.8750	3.4057	4	3.4057	3.7294	3.7294	3.7294	4	0.02100	0.02932
7 1/4	4.0000	3.5057	4	3.5057	3.8594	3.8594	3.8594	4	0.02150	0.03001

* Secondary sizes.

^a British: Effective Diameter.^b See formula, pages 1407 and 1416.^c Design form for UNR threads. (See figure on page 1637.)^d Basic minor diameter.

Constant Pitch Series: The various constant-pitch series, UN, with 4, 6, 8, 12, 16, 20, 28 and 32 threads per inch, given in Table 4, offer a comprehensive range of diameter-pitch combinations for those purposes where the threads in the Coarse, Fine, and Extra-Fine series do not meet the particular requirements of the design. When selecting threads from these constant-pitch series, preference should be given wherever possible to those tabulated in the 8-, 12-, or 16-thread series.

8-Thread Series: The 8-thread series (8-UN) is a uniform-pitch series for large diameters. Although originally intended for high-pressure-joint bolts and nuts, it is now widely used as a substitute for the Coarse-Thread Series for diameters larger than 1 inch.

12-Thread Series: The 12-thread series (12-UN) is a uniform-pitch series for large diameters requiring threads of medium-fine pitch. Although originally intended for boiler practice, it is now used as a continuation of the Fine-Thread Series for diameters larger than 1 1/2 inches.

Table 3b. Fine-Thread Series, UNF and UNRF — Basic Dimensions

Sizes No. or Inches	Basic Major Diam., D		Thds. Per Inch, n	Basic Pitch Diam., D_2		Minor Diameter		Lead Angle λ at Basic P.D.	Area of Minor Diam. at $D-2h_f$	Tensile Stress Area ^b
	Inches	Inches		Inches	Inches	Ext. Thds., d_3 (Ref.)	Int. Thds., d_1			
1 (0.060)	0.0600	0.0519	80	0.0519	0.0481	0.0481	0.0481	4	0.00151	0.00180
2 (0.073)*	0.0730	0.0640	72	0.0640	0.0585	0.0585	0.0585	3	0.00151	0.00180
3 (0.086)	0.0860	0.0759	64	0.0759	0.0674	0.0674	0.0674	3	0.00151	0.00180
4 (0.099)*	0.0990	0.0890	56	0.0890	0.0778	0.0778	0.0778	3	0.00151	0.00180
5 (0.112)	0.1120	0.0985	48	0.0985	0.0871	0.0871	0.0871	3	0.00151	0.00180
6 (0.125)	0.1250	0.1102	44	0.1102	0.0979	0.0979	0.0979	3	0.00151	0.00180
8 (0.138)	0.1380	0.1218	40	0.1218	0.1082	0.1082	0.1082	3	0.00151	0.00180
10 (0.164)	0.1640	0.1460	36	0.1460	0.1309	0.1309	0.1309	3	0.00151	0.00180
12 (0.190)	0.1900	0.1697	32	0.1697	0.1528	0.1528	0.1528	3	0.00151	0.00180
1/4	0.2500	0.2268	28	0.2268	0.2074	0.2074	0.2074	3	0.00151	0.00180
5/16	0.3125	0.2854	24	0.2854	0.2620	0.2620	0.2620	3	0.00151	0.00180
3/8	0.3750	0.3479	22	0.3479	0.3254	0.3254	0.3254	3	0.00151	0.00180
1/2	0.4375	0.4090	20	0.4090	0.3780	0.3780	0.3780	3	0.00151	0.00180
5/8	0.5000	0.4675	18	0.4675	0.4405	0.4405	0.4405	3	0.00151	0.00180
3/4	0.5625	0.5264	18	0.5264	0.4964	0.4964	0.4964	3	0.00151	0.00180
7/8	0.6250	0.5889	16	0.5889	0.5589	0.5589	0.5589	3	0.00151	0.00180
1	0.7500	0.7094	14	0.7094	0.6793	0.6793	0.6793	3	0.00151	0.00180
1 1/8	0.8750	0.8386	14	0.8386	0.7990	0.7990	0.7990	3	0.00151	0.00180
1 1/4	1.0000	0.9459	12	0.9459	0.9001	0.9001	0.9001	3	0.00151	0.00180
1 1/2	1.1250	1.0709	12	1.0709	1.0258	1.0258	1.0258	3	0.00151	0.00180
1 3/4	1.2500	1.1959	12	1.1959	1.1508	1.1508	1.1508	3	0.00151	0.00180
2	1.3750	1.3209	12	1.3209	1.2758	1.2758	1.2758	3	0.00151	0.00180
2 1/4	1.5000	1.4459	12	1.4459	1.4008	1.4008	1.4008	3	0.00151	0.00180

* Secondary sizes.

^a British: Effective Diameter.^b See formula, pages 1407 and 1416.^c Design form for UNR threads. (See figure on page 1637.)^d Basic minor diameter.

16-Thread Series: The 16-thread series (16-UN) is a uniform pitch series for large diameters requiring fine-pitch threads. It is suitable for adjusting collars and retaining nuts, and also serves as a continuation of the Extra-fine Thread Series for diameters larger than 1 1/4 inches.

4-, 6-, 20-, 28-, and 32-Thread Series: These thread series have been used more or less widely in industry for various applications where the Standard Coarse, Fine or Extra-fine Series were not as applicable. They are now recognized as Standard Unified Thread Series in a specified selection of diameters for each pitch (see Table 2).

Whenever a thread in a constant-pitch series also appears in the UNC, UNF, or UNEF series, the symbols and tolerances for limits of size of UNC, UNF, or UNEF series are applicable, as will be seen in Tables 2 and 4.

Fine Threads for Thin-Wall Tubing: Dimensions for a 27-thread series, ranging from 1/4- to 1-inch nominal size, also are included in Table 4. These threads are recommended for general use on thin-wall tubing. The minimum length of complete thread is one-third of the basic major diameter plus 5 threads (+0.185 in.).

Selected Combinations: Thread data are tabulated in Table 4 for certain additional selected special combinations of diameter and pitch, with pitch diameter tolerances based on a length of thread engagement of 9 times the pitch. The pitch diameter limits are applicable to a length of engagement of from 5 to 15 times the pitch. (This provision should not be confused with the lengths of thread on mating parts, as they may exceed the length of engagement by a considerable amount.) Thread symbols are UNS and UNRS.