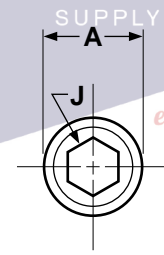
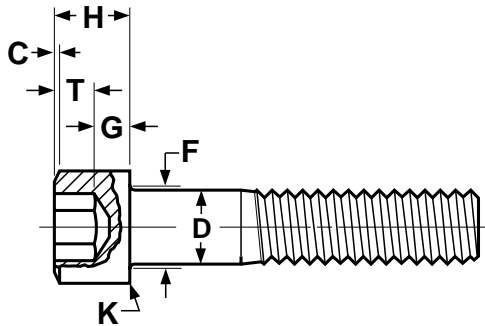


Alloy & Stainless

# Socket Cap Screws

Sockets



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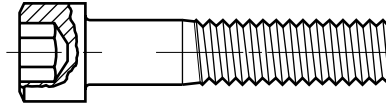
## SOCKET HEAD CAP SCREWS

ASME B18.3-1998

Screw Diam.	D Body Diameter		A Head Diameter		H Head Height		C Top Chamfer or Radius	J Hex Socket Size	F Fillet Transition Diameter		T Key Engagement	G Wall Thickness	K Bottom Chamfer or Radius
	Max	Min	Max	Min	Max	Min	Max	Nom	Max	Min	Min	Min	Max
	0	0.0600	0.0568	0.096	0.091	0.060	0.057	0.004	0.050	0.074	0.063	0.025	0.020
1	0.0730	0.0695	0.118	0.112	0.073	0.070	0.005	1/16	0.087	0.076	0.031	0.025	0.007
2	0.0860	0.0822	0.140	0.134	0.086	0.083	0.008	5/64	0.102	0.090	0.038	0.029	0.007
3	0.0990	0.0949	0.161	0.154	0.099	0.095	0.008	5/64	0.115	0.103	0.044	0.034	0.007
4	0.1120	0.1075	0.183	0.176	0.112	0.108	0.009	3/32	0.130	0.118	0.051	0.038	0.008
5	0.1250	0.1202	0.205	0.198	0.125	0.121	0.012	3/32	0.145	0.132	0.057	0.043	0.008
6	0.1380	0.1329	0.226	0.218	0.138	0.134	0.013	7/64	0.158	0.145	0.064	0.047	0.008
8	0.1640	0.1585	0.270	0.262	0.164	0.159	0.014	9/64	0.188	0.173	0.077	0.056	0.008
10	0.1900	0.1840	0.312	0.303	0.190	0.185	0.018	5/32	0.218	0.202	0.090	0.065	0.008
1/4	0.2500	0.2435	0.375	0.365	0.250	0.244	0.025	3/16	0.278	0.262	0.120	0.095	0.010
5/16	0.3125	0.3053	0.469	0.457	0.312	0.306	0.033	1/4	0.347	0.329	0.151	0.119	0.010
3/8	0.3750	0.3678	0.562	0.550	0.375	0.368	0.040	5/16	0.415	0.398	0.182	0.143	0.010
7/16	0.4375	0.4294	0.656	0.642	0.438	0.430	0.047	3/8	0.484	0.465	0.213	0.166	0.015
1/2	0.5000	0.4919	0.750	0.735	0.500	0.492	0.055	3/8	0.552	0.532	0.245	0.190	0.015
5/8	0.6250	0.6163	0.938	0.921	0.625	0.616	0.070	1/2	0.689	0.664	0.307	0.238	0.015
3/4	0.7500	0.7406	1.125	1.107	0.750	0.740	0.085	5/8	0.828	0.801	0.370	0.285	0.015
7/8	0.8750	0.8647	1.312	1.293	0.875	0.864	0.100	3/4	0.963	0.933	0.432	0.333	0.020
1	1.0000	0.9886	1.500	1.479	1.000	0.988	0.114	3/4	1.100	1.069	0.495	0.380	0.020
1 1/4	1.2500	1.2336	1.875	1.852	1.250	1.236	0.144	7/8	1.370	1.334	0.620	0.475	0.020
1 1/2	1.5000	1.4818	2.250	2.224	1.500	1.485	0.176	1	1.640	1.602	0.745	0.570	0.020

Tolerance on Length	Nominal Screw Size	Nominal Screw Length			
		Up to 1 in., Incl.	Over 1 in. to 2-1/2 in., Incl.	Over 2-1/2 to 6 in., Incl.	Over 6 in.
	0 thru 3/8, Incl.	-0.03	-0.04	-0.06	-0.12
	7/16 thru 3/4, Incl.	-0.03	-0.06	-0.08	-0.12
	7/8 thru 1-1/2, Incl.	-0.05	-0.10	-0.14	-0.20

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MECHANICAL PROPERTIES OF ALLOY STEEL SOCKET CAP SCREWS							Blue Devil®
Nominal Size	Tensile Strength (lbs., min.)		Yield Strength (lbs., min.)		Body Section	Tightening Torque (In.-Lbs.)	
	UNRC	UNRF	UNRC	UNRF	Single Shear Strength (lbs., min.)	UNRC	UNRF
0	-	320	-	290	305	-	2.6
1	475	500	425	450	450	4.5	4.8
2	665	710	600	635	625	7.5	8.0
3	875	940	790	845	830	11.0	12.0
4	1,090	1,190	975	1,070	1,060	16.0	18.0
5	1,430	1,490	1,290	1,345	1,325	24.0	24.0
6	1,640	1,825	1,470	1,645	1,615	30.0	34.0
8	2,520	2,650	2,270	2,385	2,280	55.0	58.0
10	3,150	3,600	2,835	3,240	3,060	79.0	90.0
1/4	5,725	6,550	5,150	5,900	5,295	200.0	230.0
5/16	9,430	10,440	8,490	9,395	8,285	415.0	460.0
3/8	13,950	15,805	12,555	14,225	11,910	740.0	845.0
7/16	19,135	21,365	17,220	19,230	16,200	1190.0	1305.0
1/2	25,540	28,780	22,990	25,905	21,175	1800.0	2065.0
5/8	38,400	43,500	34,550	39,150	31,300	3,400.0	3,800.0
3/4	56,750	63,400	51,100	57,050	45,050	6,000.0	6,750.0
7/8	78,500	86,500	70,700	77,850	61,350	8250.0	9,200.0
1	103,000	112,700	92,700	101,450	80,100	12,500.0	13,000.0
1 1/4	164,700	182,400	148,250	164,150	125,100	25,000.0	27,750.0
1 1/2	238,800	268,800	215,950	241,900	180,200	43,500.0	49,000.0

<b>Description</b>	An externally threaded fastener with unified threads, a cylindrical head with a flat chamfered top surface, knurled cylindrical sides and hexagonal recess, made from alloy steel.
<b>Applications/Advantages</b>	Ideal for precision assembly work with close tolerances and applications needing a well tooled appearance. Supplies greater tensile strength than equivalent sizes of Grade-5 or Grade-8 hex head cap screws while requiring less surface area or counterbore since the fastener is internally wrenched.
<b>Material</b>	Cap screws shall be made from an alloy steel which conforms to the following chemical composition requirements (per product analysis)-- <i>Carbon</i> : 0.31% minimum; <i>Phosphorus</i> : 0.040% maximum; <i>Sulfur</i> : 0.045% maximum. Also, one or more of the following elements shall be present in sufficient quantity to meet the strength requirements listed below: chromium, nickel, molybdenum or vanadium.
<b>Heat Treatment</b>	Cap screws shall be heat treated by oil quenching from above the transformation temperature and then tempered at a temperature not lower than 650°F.
<b>Hardness</b>	0 through 1/2" diameters: Rockwell C39 minimum; 5/8" diameter & larger: Rockwell C37 minimum
<i>Cap screws of a length 3D or greater, where D equals the nominal diameter of the screw, are subject to tensile strength, yield strength, elongation and reduction of area testing.</i>	
<b>Tensile Strength</b>	0 through 1/2" diameters: 180,000 psi. minimum; 5/8" diameter & larger: 170,000 psi. minimum
<b>Yield Strength</b>	0 through 1/2" diameters: 162,000 psi. minimum; 5/8" diameter & larger: 153,000 psi. minimum
<b>Elongation</b>	10% minimum (applies to machined specimens of length at least 4D where D equals the nominal diameter of the screw)
<b>Reduction of Area</b>	33% minimum (applies to machined specimens)
<b>Plating</b>	See Appendix-A for information on the plating of alloy steel socket cap screws.

# Length Specifications

# Socket Cap Screws

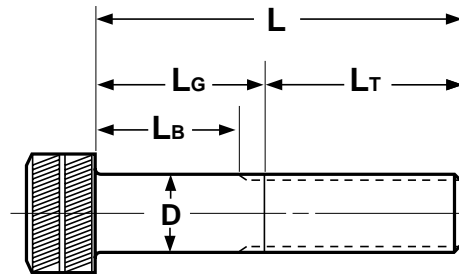
Sockets

**BODY AND GRIP LENGTHS OF SOCKET HEAD CAP SCREWS**

ASME  
B18.3-1998

Nom. Size D	0		1		2		3		4		5		6		8		10	
Basic Thread Length L <sub>T</sub>	<b>0.500</b>		<b>0.625</b>		<b>0.625</b>		<b>0.625</b>		<b>0.750</b>		<b>0.750</b>		<b>0.750</b>		<b>0.875</b>		<b>0.875</b>	
Nominal Length L	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>
<b>1.00</b>	0.50	0.44	0.25	0.17	0.25	0.16	0.25	0.15	0.25	0.12	0.25	0.12						
<b>1.25</b>	0.75	0.69	0.62	0.55	0.62	0.54	0.62	0.52	0.25	0.12	0.25	0.12	0.50	0.34	0.38	0.22	0.38	0.17
<b>1.50</b>			0.88	0.80	0.88	0.79	0.88	0.77	0.75	0.62	0.75	0.62	0.50	0.34	0.38	0.22	0.38	0.17
<b>1.75</b>					1.12	1.04	1.12	1.02	0.75	0.62	0.75	0.62	1.00	0.84	0.88	0.72	0.88	0.67
<b>2.00</b>							1.38	1.27	1.25	1.12	1.25	1.12	1.00	0.84	0.88	0.72	0.88	0.67
<b>2.25</b>									1.25	1.12	1.25	1.12	1.50	1.34	1.38	1.22	1.38	1.17
<b>2.50</b>											1.75	1.62	1.50	1.34	1.38	1.22	1.38	1.17
<b>2.75</b>													2.00	1.84	1.88	1.72	1.88	1.67
<b>3.00</b>															1.88	1.72	1.88	1.67
<b>3.50</b>																	2.38	2.17

Nom. Size D	1/4		5/16		3/8		7/16		1/2		5/8		3/4		7/8		1	
Basic Thread Length L <sub>T</sub>	<b>1.000</b>		<b>1.125</b>		<b>1.250</b>		<b>1.375</b>		<b>1.500</b>		<b>1.750</b>		<b>2.000</b>		<b>2.250</b>		<b>2.500</b>	
Nominal Length L	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>	L <sub>G</sub>	L <sub>B</sub>
<b>1.50</b>	0.50	0.25																
<b>1.75</b>	0.50	0.25	0.62	0.35	0.50	0.19												
<b>2.00</b>	1.00	0.75	0.62	0.35	0.50	0.19	0.62	0.27										
<b>2.25</b>	1.00	0.75	1.12	0.85	1.00	0.69	0.62	0.27	0.75	0.36								
<b>2.50</b>	1.50	1.25	1.12	0.85	1.00	0.69	1.12	0.77	0.75	0.36	0.75	0.30						
<b>2.75</b>	1.50	1.25	1.62	1.35	1.50	1.19	1.12	0.77	0.75	0.36	0.75	0.30						
<b>3.00</b>	2.00	1.75	1.62	1.35	1.50	1.19	1.62	1.27	1.50	1.12	0.75	0.30	1.00	0.50				
<b>3.25</b>	2.00	1.75	2.12	1.85	2.00	1.69	1.62	1.27	1.50	1.12	1.50	1.04	1.00	0.50	1.00	0.44		
<b>3.50</b>	2.50	2.25	2.12	1.85	2.00	1.69	2.12	1.77	1.50	1.12	1.50	1.04	1.00	0.50	1.00	0.44	1.00	0.38
<b>4.00</b>	3.00	2.75	2.62	2.35	2.50	2.19	2.62	2.27	2.25	1.86	2.25	1.80	2.00	1.50	1.00	0.44	1.00	0.38
<b>4.50</b>	3.50	3.25	3.12	2.85	3.00	2.69	3.12	2.77	3.00	2.62	2.25	1.80	2.00	1.50	2.00	1.44	2.00	1.38
<b>5.00</b>	4.00	3.75	3.62	3.35	3.50	3.19	3.62	3.27	3.00	2.62	3.00	2.54	3.00	2.50	2.00	1.44	2.00	1.38
<b>5.50</b>			4.12	3.85	4.00	3.69	4.12	3.77	3.75	3.36	3.75	3.30	3.00	2.50	3.00	2.44	3.00	2.38
<b>6.00</b>			4.62	4.35	4.50	4.19	4.62	4.27	4.50	4.12	3.75	3.30	4.00	3.50	3.00	2.44	3.00	2.38
<b>6.50</b>					5.00	4.69	5.12	4.77	4.50	4.12	4.50	4.04	4.00	3.50	4.00	3.44	4.00	3.38
<b>7.00</b>					5.50	5.19	5.62	5.27	5.25	4.86	5.25	4.80	5.00	4.50	4.00	3.44	4.00	3.38
<b>8.00</b>							6.62	6.27	6.00	5.62	6.00	5.54	6.00	5.50	5.00	4.44	5.00	4.38
<b>9.00</b>							7.62	7.27	7.00	6.62	6.75	6.30	7.00	6.50	6.00	5.44	6.00	5.38
<b>10.00</b>									8.00	7.62	7.75	7.30	8.00	7.50	7.00	6.44	7.00	6.38
<b>11.00</b>											9.25	8.80	9.00	8.50	8.00	7.44	8.00	7.38
<b>12.00</b>											10.25	9.80	10.00	9.50	9.00	8.44	9.00	8.38



### Notes Regarding the Thread Length of Socket Head Cap Screws

- The basic thread lengths ( $L_T$ ) listed directly below the nominal sizes in the table on page 176 represents the nominal length up to which all screws of that diameter shall be fully threaded.
- To determine the threaded portion of the screws with a nominal length greater than  $L_T$ , subtract the minimum design grip length ( $L_G$ ) from the nominal length ( $L$ ).
- For screws over 1 in. in diameter and of nominal lengths longer than  $L_T$ , the maximum grip gaging length ( $L_G$ ) and the minimum body length ( $L_B$ ) of the screws shall be determined as follows:

$$L_G = L - L_T$$

$$L_B = L - L_{TT}$$

- Where:  $L$  = Nominal length
- $L_T$  = Minimum thread length tabulated below
- $L_{TT}$  = Maximum total thread length tabulated below

Nominal Size	Min Thread Length ( $L_T$ )	Max Total Thread Length ( $L_{TT}$ )
1-1/4	3.12	5.09
1-1/2	3.75	6.08

