



‡Length of a cap screw is measured from the underhead bearing surface to the extreme end of the screw.

### HEX CAP SCREWS

ASME B18.2.1-  
1996

Nominal or Basic Product Diameter		E		F			G		H			J	L <sub>T</sub>		Y
		Body Diameter		Width Across Flats			Width Across Corners		Head Height			Wrench- ing Height	Thread Length		Transi- tion Thread Length
													For Screw Lengths ≤ 6 in.	For Screw Lengths > 6 in.	
		Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min	Min	Ref	Ref	Max
1/4	0.2500	0.2500	0.2450	7/16	0.438	0.428	0.505	0.488	5/32	0.163	0.150	0.106	0.750	1.000	0.250
5/16	0.3125	0.3125	0.3065	1/2	0.500	0.489	0.577	0.557	13/64	0.211	0.195	0.140	0.875	1.125	0.278
3/8	0.3750	0.3750	0.3690	9/16	0.562	0.551	0.650	0.628	15/64	0.243	0.226	0.160	1.000	1.250	0.312
7/16	0.4375	0.4375	0.4305	5/8	0.625	0.612	0.722	0.698	9/32	0.291	0.272	0.195	1.125	1.375	0.357
1/2	0.5000	0.5000	0.4930	3/4	0.750	0.736	0.866	0.840	5/16	0.323	0.302	0.215	1.250	1.500	0.385
9/16	0.5625	0.5625	0.5545	13/16	0.812	0.798	0.938	0.910	23/64	0.371	0.348	0.250	1.375	1.625	0.417
5/8	0.6250	0.6250	0.6170	15/16	0.938	0.922	1.083	1.051	25/64	0.403	0.378	0.269	1.500	1.750	0.455
3/4	0.7500	0.7500	0.7410	1-1/8	1.125	1.100	1.299	1.254	15/32	0.483	0.455	0.324	1.750	2.000	0.500
7/8	0.8750	0.8750	0.8660	1-5/16	1.312	1.285	1.516	1.465	35/64	0.563	0.531	0.378	2.000	2.250	0.556
1	1.0000	1.0000	0.9900	1-1/2	1.500	1.469	1.732	1.675	39/64	0.627	0.591	0.416	2.250	2.500	0.625
1-1/8	1.1250	1.1250	1.1140	1-11/16	1.688	1.631	1.949	1.859	11/16	0.718	0.658	0.461	2.500	2.750	0.714
1-1/4	1.2500	1.2500	1.2390	1-7/8	1.875	1.812	2.165	2.066	25/32	0.813	0.749	0.530	2.750	3.000	0.714
1-1/2	1.5000	1.5000	1.4880	2-1/4	2.250	2.175	2.598	2.480	1-5/16	0.974	0.902	0.640	3.250	3.500	0.833

		Nominal Screw Size	Nominal Screw Length				
			Up to 1 in., incl.	Over 1 in. to 2-1/2 in., incl.	Over 2-1/2 in. to 4 in., incl.	Over 4 in. to 6 in., incl.	Longer than 6 in.
Tolerance on Length		1/4 to 3/8	-0.03	-0.04	-0.06	-0.10	-0.18
		7/16 and 1/2	-0.03	-0.06	-0.08	-0.10	-0.18
		9/16 to 3/4	-0.03	-0.08	-0.10	-0.10	-0.18
		7/8 and 1	....	-0.10	-0.14	-0.16	-0.20
		1-1/8 to 1-1/2	....	-0.12	-0.16	-0.18	-0.22



**GRADE-5 HEX CAP SCREW**

<b>Description</b>	A cap screw made from medium carbon steel and heat-treated.
<b>Applications/ Advantages</b>	Has greater tensile strength than a Grade-2. Yield-to-tensile ratio is the lowest of all heat treated steels.
<b>Heat Treatment</b>	Grade-5 cap screws shall be heat treated, oil or water quenched, at the option of the manufacturer, and tempered at a minimum tempering temperature of 800°F.
<b>Material</b>	Medium carbon steel. Use of an alloy steel is also acceptable.
<b>Core Hardness</b>	1/4 through 1 in. diameter, all lengths: Rockwell C25 - C34. 1-1/8 through 1-1/2 in. diameter, all lengths: Rockwell C19 - C30.
<b>Surface Hardness</b>	1/4 through 1 in. diameter, all lengths: Rockwell 30N54 maximum. 1-1/8 through 1-1/2 in. diameter, all lengths: Rockwell 30N50 maximum.
<b>Proof Load</b>	1/4 through 1 in. diameter, all lengths: 85,000 psi. 1-1/8 through 1-1/2 in. diameter, all lengths: 74,000 psi.
<b>Yield Strength*</b>	1/4 through 1 in. diameter, all lengths: 92,000 psi. minimum 1-1/8 through 1-1/2 in. diameter, all lengths: 81,000 psi. minimum
<b>Tensile Strength</b>	1/4 through 1 in. diameter, all lengths: 120,000 psi. minimum 1-1/8 through 1-1/2 in. diameter, all lengths: 105,000 psi. minimum
<b>Elongation*</b>	14% minimum (all diameters)
<b>Reduction of Area*</b>	35% minimum (all sizes)
<b>Plating</b>	See Appendix-A for plating information.



**GRADE-8 HEX CAP SCREW**

<b>Description</b>	A cap screw made from medium carbon alloy steel and heat-treated.
<b>Applications/ Advantages</b>	Has greater tensile strength than a Grade-5. Designed for use in high stress applications. See specifications below for more information on how the Grade-8 exceeds the strength of a Grade-5.
<b>Heat Treatment</b>	Grade-8 cap screws shall be heat-treated, oil-quenched and tempered at a minimum temperature of 800°F.
<b>Material</b>	Medium carbon alloy steel. <i>Note:</i> For diameters 1/4 through 7/16 inch, it is permissible to use AISI 1541 steel.
<b>Core Hardness</b>	1/4 through 1-1/2 in. diameter, all lengths: Rockwell C33 - C39.
<b>Surface Hardness</b>	1/4 through 1-1/2 in. diameter, all lengths: Rockwell 30N58.6 maximum.
<b>Proof Load</b>	1/4 through 1-1/2 in. diameter, all lengths: 120,000 psi.
<b>Yield Strength*</b>	1/4 through 1-1/2 in. diameter, all lengths: 130,000 psi. minimum
<b>Tensile Strength</b>	1/4 through 1-1/2 in. diameter, all lengths: 150,000 psi. minimum
<b>Elongation*</b>	12% minimum (all diameters)
<b>Reduction of Area*</b>	35% minimum (all sizes)
<b>Plating</b>	See Appendix-A for plating information.

\* These properties are tested only on machined specimens when the testing machine cannot provide for full testing of the parts.

\*\* Product standards require the manufacturer's head marking to appear on the top of all cap screws 1/4" diameter and larger. "X" represents one location such a marking may appear.