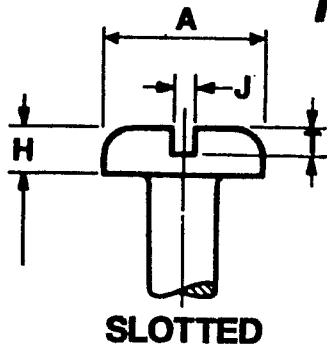


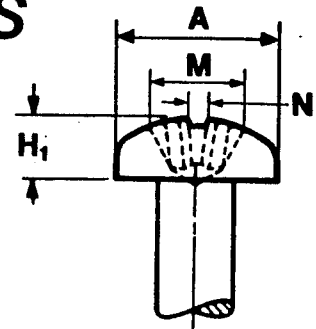
Head Dimensions



SLOTTED

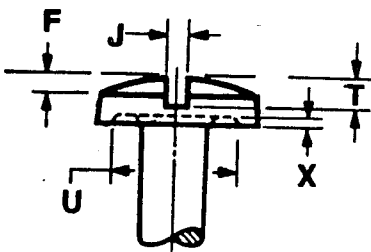
Pan Head

MACHINE SCREWS
TAPPING SCREWS
SELF DRILLING SCREWS



PHILLIPS

Nominal Size	A		H		H ₁		J		T		M		G	N	Phillips Driver Size
	Head Diameter		Height of Head				Width of Slot		Depth of Slot		Dimensions of Recess				
			Slotted		Recessed						Diameter		Depth	Width	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
2	.167	.155	.053	.045	.062	.053	.031	.023	.031	.022	.104	.091	.059	.017	1
4	.219	.205	.068	.058	.080	.070	.039	.031	.040	.030	.122	.109	.078	.019	1
6	.270	.256	.082	.072	.097	.087	.048	.039	.050	.037	.166	.153	.091	.028	2
8	.322	.306	.096	.085	.115	.105	.054	.045	.058	.045	.182	.169	.108	.030	2
10	.373	.357	.110	.099	.133	.122	.060	.050	.068	.053	.199	.186	.124	.031	2
12	.425	.407	.125	.112	.151	.139	.067	.056	.077	.061	.259	.246	.141	.034	3
¼	.492	.473	.144	.130	.175	.162	.075	.064	.087	.070	.281	.268	.161	.036	3

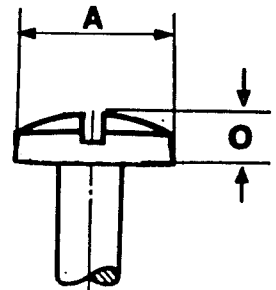


SLOTTED

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217

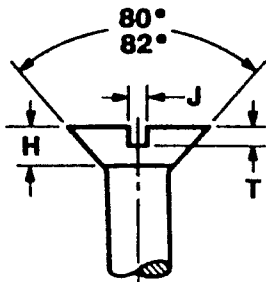
Binding Head

(Specify undercut or not undercut)
MACHINE SCREWS

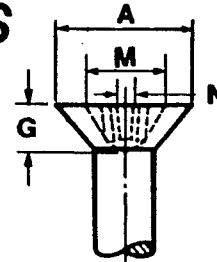


Nominal Size	A		F		O		J		T		U		X	
	Head Dia.		Height of Head				Width of Slot		Depth of Slot		Undercut Dimensions			
			Hgt. of Oval		Total Hgt.						Diameter		Depth	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
2	.181	.171	.018	.013	.050	.043	.031	.023	.030	.024	.141	.124	.010	.005
4	.235	.223	.025	.018	.068	.061	.039	.031	.042	.034	.184	.161	.012	.007
6	.290	.275	.032	.024	.087	.078	.048	.039	.053	.044	.226	.199	.015	.010
8	.344	.326	.039	.029	.105	.095	.054	.045	.065	.054	.269	.236	.017	.012
10	.399	.378	.045	.034	.123	.112	.060	.050	.077	.064	.312	.274	.020	.015
¼	.513	.488	.061	.046	.165	.152	.075	.064	.105	.088	.410	.360	.026	.021

RECEIVED JAN 20 1988



Head Dimensions



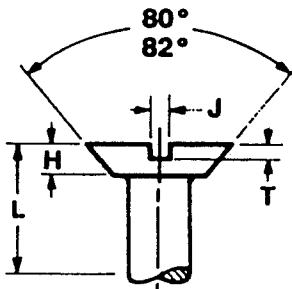
Flat Head

MACHINE SCREWS
WOOD SCREWS*
TAPPING SCREWS

SLOTTED

PHILLIPS

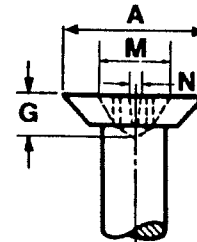
Nominal Size	A		H		J		T		M		G	N	Phillips Driver Size
	Head Diameter		Height of Head		Width of Slot		Depth of Slot		Dimensions of Recess				
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Diameter	Depth	Width		
2	.172	.147	.051	.040	.031	.023	.023	.015	.102	.089	.063	.017	1
4	.225	.195	.067	.055	.039	.031	.030	.020	.128	.115	.089	.018	1
5	.252	.220	.075	.062	.043	.035	.034	.022	.154	.141	.086	.027	2
6	.279	.244	.083	.069	.048	.039	.038	.024	.174	.161	.106	.029	2
7*	.305	.268	.091	.076	.048	.039	.041	.027	.182	.169	.114	.030	2
8	.332	.292	.100	.084	.054	.045	.045	.029	.189	.176	.121	.031	2
9*	.358	.316	.108	.091	.054	.045	.049	.032	.258	.245	.146	.034	2
10	.385	.340	.116	.098	.060	.050	.053	.034	.204	.191	.136	.032	2-3*
12	.438	.389	.132	.112	.067	.056	.060	.039	.268	.255	.156	.036	3
14*	.491	.437	.148	.127	.075	.064	.068	.044	.283	.270	.171	.039	3
1/4	.507	.452	.153	.131	.075	.064	.070	.046	.283	.270	.171	.035	3
5/16	.635	.568	.191	.165	.084	.072	.088	.058	-	-	-	-	-
3/8	.762	.685	.230	.200	.094	.081	.106	.070	-	-	-	-	-
1/2	.875	.775	.223	.198	.106	.091	.103	.065	-	-	-	-	-



Knoxville Bolt & Nut Co.
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Knoxville, TN 37940-0217

Flat Head Undercut

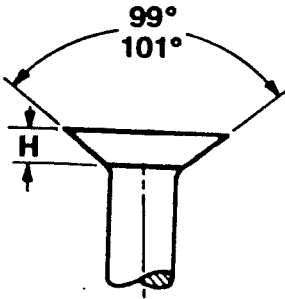
MACHINE SCREWS



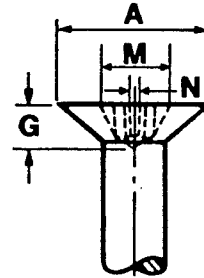
SLOTTED

PHILLIPS

Nominal Size	L These Lengths or Shorter are Undercut	A		H		J		T		M		G	N	Phillips Driver Size	
		Head Diameter		Height of Head		Width of Slot		Depth of Slot		Dimensions of Recess					
		Max. Edge Sharp	Min. Edge Rounded or Flat	Max.	Min.	Max.	Min.	Max.	Min.	Diameter	Depth	Width			
4	3/16	0.225	0.195	0.047	0.038	0.039	0.031	0.022	0.014	0.117	0.104	0.078	0.062	0.018	1
6	3/16	0.279	0.244	0.059	0.048	0.048	0.039	0.027	0.017	0.146	0.133	0.078	0.055	0.025	2
8	1/4	0.332	0.292	0.070	0.058	0.054	0.045	0.032	0.021	0.174	0.161	0.106	0.083	0.029	2
10	5/16	0.385	0.340	0.081	0.068	0.060	0.050	0.037	0.024	0.189	0.176	0.121	0.098	0.030	2
12	3/8	0.438	0.389	0.092	0.078	0.067	0.056	0.043	0.028	0.233	0.220	0.121	0.098	0.030	3
1/4	7/16	0.507	0.452	0.107	0.092	0.075	0.064	0.050	0.032	0.250	0.237	0.136	0.113	0.032	3



Head Dimensions



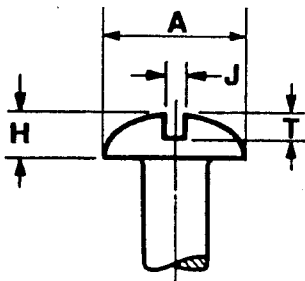
Flat Head 100°

MACHINE SCREWS

PHILLIPS

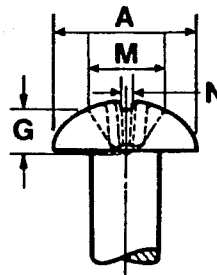
Nominal Size	A		H	M		G		N	Phillips Driver Size	
	Head Diameter		Height of Head Ref.	Dimensions of Recess						
	Max. Edge Sharp	Min. Edge Rounded or Flat		Diameter		Depth		Width		
				Max.	Min.	Max.	Min.	Min.		
4	0.225	0.191	0.049	0.117	0.104	0.078	0.062	0.018	1	
6	0.279	0.238	0.060	0.154	0.141	0.086	0.063	0.027	2	
8	0.332	0.285	0.072	0.169	0.156	0.101	0.078	0.028	2	
10	0.385	0.333	0.083	0.184	0.171	0.116	0.093	0.030	2	

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, IN 37940-0217



Round Head

MACHINE SCREWS
WOOD SCREWS*

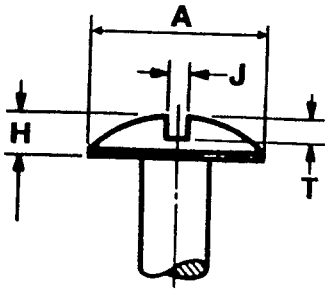


SLOTTED

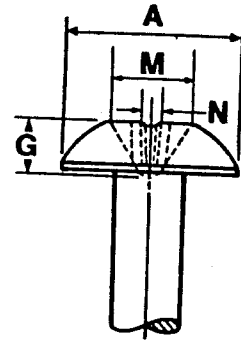
PHILLIPS

Nominal Size	A		H		J		T		M		G	N	Phillips Driver Size		
	Head Diameter		Height of Head		Width of Slot		Depth of Slot		Dimensions of Recess						
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Diameter		Depth	Width			
									Max.	Min.	Max.	Min.			
2	.162	.146	.069	.059	.031	.023	.048	.037	.100	.087	.053	.017	1		
4	.211	.193	.086	.075	.039	.031	.058	.044	.118	.105	.072	.019	1		
5	.236	.217	.095	.083	.043	.035	.063	.047	.154	.141	.074	.027	2		
6	.260	.240	.103	.091	.048	.039	.068	.051	.162	.149	.084	.027	2		
7*	.285	.264	.111	.099	.048	.039	.072	.055	.170	.157	.092	.029	2		
8	.309	.287	.120	.107	.054	.045	.077	.058	.178	.165	.101	.030	2		
9*	.334	.311	.128	.115	.054	.045	.082	.062	.186	.173	.110	.030	2		
10	.359	.334	.137	.123	.060	.050	.087	.065	.195	.182	.119	.031	2-3*		
12	.408	.382	.153	.139	.067	.056	.096	.072	.249	.236	.125	.032	3		
14*	.457	.429	.170	.155	.075	.064	.106	.080	.265	.252	.142	.034	3		
1/4	.472	.443	.175	.160	.075	.064	.109	.082	.268	.255	.147	.034	3		
5/16	.590	.557	.216	.198	.084	.072	.132	.099	—	—	—	—	—		
3/8	.708	.670	.256	.237	.094	.081	.155	.117	—	—	—	—	—		
1/2	.813	.766	.355	.332	.106	.091	.211	.159	—	—	—	—	—		

Head Dimensions



SLOTTED

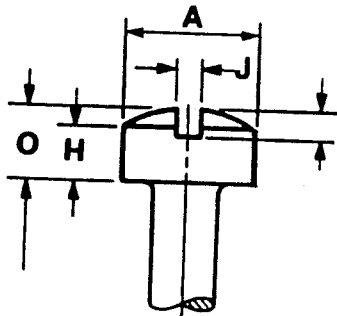


PHILLIPS

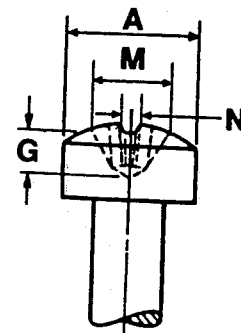
Truss Head

MACHINE SCREWS
TAPPING SCREWS

Nominal Size	A		H		J		T		M		G	N	Phillips Driver Size
	Head Diameter		Height of Head		Width of Slot		Depth of Slot		Dimensions of Recess				
									Diameter		Depth	Width	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
4	.257	.241	.069	.059	—	—	—	—	.112	.099	.069	.017	1
6	.321	.303	.086	.074	.048	.039	.050	.037	.158	.145	.084	.027	2
8	.384	.364	.102	.088	.054	.045	.058	.045	.173	.160	.099	.029	2
10	.448	.425	.118	.103	.060	.050	.068	.053	.188	.175	.115	.030	2
1/4	.573	.546	.150	.133	.075	.064	.087	.070	.263	.250	.143	.033	3
5/16	.698	.666	.183	.162	.084	.072	.106	.085	—	—	—	—	—
3/8	.823	.787	.215	.191	.094	.081	.124	.100	—	—	—	—	—



SLOTTED



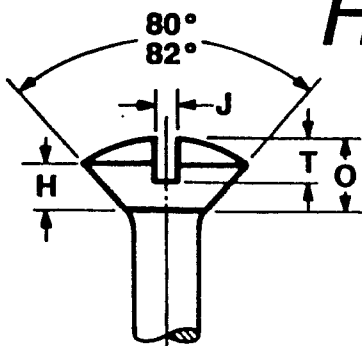
PHILLIPS

Fillister Head

MACHINE SCREWS

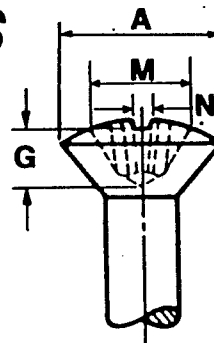
Nominal Size	A		H		O	J		T		M		G	N	Phillips Driver Size
	Head Diameter		Height of Head		Side Height	Total Height	Width of Slot		Depth of Slot		Dimensions of Recess			
											Diameter		Depth	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
2	.140	.124	.062	.053	.083	.066	.031	.023	.037	.025	—	—	—	—
4	.183	.166	.079	.069	.107	.088	.039	.031	.048	.035	.122	.109	.078	.019
6	.226	.208	.096	.086	.132	.111	.048	.039	.060	.045	.166	.153	.091	.028
8	.270	.250	.113	.102	.156	.133	.054	.045	.071	.054	.182	.169	.108	.030
10	.313	.292	.130	.118	.180	.156	.060	.050	.083	.064	.199	.186	.124	.031
1/4	.414	.389	.170	.155	.237	.207	.075	.064	.109	.087	—	—	—	—

Head Dimensions



SLOTTED

Oval Head
MACHINE SCREWS
TAPPING SCREWS
WOOD SCREWS*

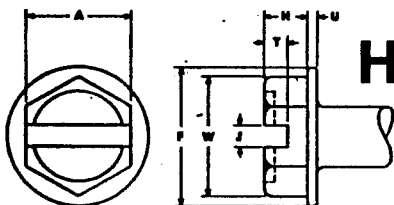


PHILLIPS

Nom. Size	A		H		O		J		T		M		G	N	Phillips Driver Size
	Head Diameter		Height of Head				Width of Slot		Depth of Slot		Dimensions of Recess				
			Side Height		Total Height						Diameter		Depth	Width	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
5*	.252	.220	.075	.062	.116	.095	.043	.035	.067	.055	.158	.145	.085	.028	2
6	.279	.244	.083	.069	.128	.105	.048	.039	.074	.060	.178	.165	.105	.030	2
8	.332	.292	.100	.084	.152	.126	.054	.045	.088	.072	.192	.179	.119	.031	2
9*	.358	.316	.108	.091	.164	.137	.054	.045	.095	.078	.216	.203	.144	.034	2
10	.385	.340	.116	.098	.176	.148	.060	.050	.103	.084	.209	.196	.137	.033	2-3*
12	.438	.389	.132	.112	.200	.169	.067	.056	.117	.096	.270	.257	.152	.038	3
14*	.491	.452	.148	.127	.224	.190	.075	.064	.132	.108	.305	.292	.188	.042	3
1/4	.507	.452	.153	.131	.232	.197	.075	.064	.136	.112	.290	.277	.173	.040	3

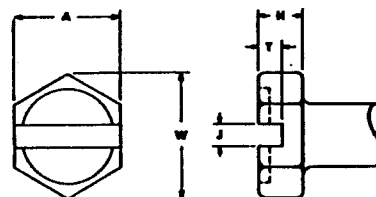
Hex Head

Hex Washer Head



SLOTTED

MACHINE SCREWS
TAPPING SCREWS
SELF DRILLING SCREWS



SLOTTED

Nominal Size	A		W	H		F		U		I		T	
	Width Across Flats		Width Across Corners	Height of Head		Diameter of Washer		Thickness of Washer		Width of Slot		Depth of Slot	
	Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
4	.187	.181	.202	.060	.049	.243	.225	.019	.011	.039	.031	.042	.025
6	.250	.244	.272	.093	.080	.328	.302	.025	.015	.048	.039	.053	.033
8	.250	.244	.272	.110	.096	.348	.322	.031	.019	.054	.045	.074	.052
10	.312	.305	.340	.120	.105	.414	.384	.031	.019	.060	.050	.080	.057
12	.312	.305	.340	.155	.139	.432	.398	.039	.022	.067	.056	.103	.077
14	.375	.367	.409	.190	.172	.520	.480	.050	.030	.075	.064	.111	.083
1/4	.375	.367	.409	.190	.172	.520	.480	.050	.030	.075	.064	.111	.083
5/16	.500	.489	.545	.230	.208	.676	.624	.055	.035	.084	.072	.134	.100

ASTM, SAE AND ISO GRADE MARKINGS AND
MECHANICAL PROPERTIES FOR STEEL FASTENERS

Identification Grade Mark	Specification	Fastener Description	Material	Nominal Size Range (in.)	Mechanical Properties					
					Proof Load (psi)	Yield Strength Min (psi)	Tensile Strength Min (psi)			
	ASTM A320 Grade B8	Bolts, Screws, Studs for Low-Temperature Service	AISI 304	1/4 and larger	-	30,000	75,000			
	ASTM A320 Grade B8C		AISI 347							
	ASTM A320 Grade B8T		AISI 321							
	ASTM A320 Grade B8F		AISI 303 or 303Se							
	ASTM A320 Grade B8M		AISI 316							
	ASTM A320 Grade B8		AISI 304	1/4 thru 3/4 Over 3/4 thru 1 Over 1 thru 1-1/4 Over 1-1/4 thru 1-1/2				-	100,000 80,000 65,000 50,000	125,000 115,000 105,000 100,000
	ASTM A320 Grade B8C		AISI 347							
	ASTM A320 Grade B8F		AISI 303 or 303Se							
	ASTM A320 Grade B8M		AISI 316							
	ASTM A320 Grade B8T		AISI 321							

Knoxville Bolt & Screw, Inc.
P. O. Box 2017
Knoxville, TN 37902-0217

See footnotes on Page N-24.



WRENCH OPENING FOR SQUARE AND HEX BOLTS AND SCREWS

1970 Draft
Revision of
ANSI B18.2.1
1966

Nominal Size of Wrench also Basic (Maximum) Width Across Flats of Bolt and Screw Heads	Allowance between Bolt or Screw Head and Jaws of Wrench	Knoxville Bolt & Screw, Inc. P. O. Box 9217 Knoxville, TN. 37940-0217			Square Bolt	Heavy Hex Bolt
		Wrench Openings			Hex Bolt	Heavy Hex Screw
					Hex Cap Screw (Finished Hex Bolt)	
		Min	Tol ²	Max	Nominal Product Sizes	
9/32 0.2812	0.002	0.283	0.005	0.288	No. 10	—
5/16 0.3125	0.003	0.316	0.006	0.322	—	—
11/32 0.3438	0.003	0.347	0.006	0.353	—	—
3/8 0.3750	0.003	0.378	0.006	0.384	1/4*	—
7/16 0.4375	0.003	0.440	0.006	0.446	1/4	—
1/2 0.5000	0.004	0.504	0.006	0.510	5/16	—
9/16 0.5625	0.004	0.566	0.007	0.573	3/8	—
5/8 0.6250	0.004	0.629	0.007	0.636	7/16	—
11/16 0.6875	0.004	0.692	0.007	0.699	—	—
3/4 0.7500	0.005	0.755	0.008	0.763	1/2	—
13/16 0.8125	0.005	0.818	0.008	0.826	9/16	—
7/8 0.8750	0.005	0.880	0.008	0.888	—	1/2
15/16 0.9375	0.006	0.944	0.009	0.953	5/8	—
1 1.0000	0.006	1.006	0.009	1.015	—	—
1-1/16 1.0625	0.006	1.068	0.009	1.077	—	5/8
1-1/8 1.1250	0.007	1.132	0.010	1.142	3/4	—
1-1/4 1.2500	0.007	1.257	0.010	1.267	—	3/4
1-5/16 1.3125	0.008	1.320	0.011	1.331	7/8	—
1-3/8 1.3750	0.008	1.383	0.011	1.394	—	—
1-7/16 1.4375	0.008	1.446	0.011	1.457	—	7/8
1-1/2 1.5000	0.008	1.508	0.012	1.520	1	—
1-5/8 1.6250	0.009	1.634	0.012	1.646	—	1
1-11/16 1.6875	0.009	1.696	0.012	1.708	1-1/8	—
1-13/16 1.8125	0.010	1.822	0.013	1.835	—	1-1/8
1-7/8 1.8750	0.010	1.885	0.013	1.898	1-1/4	—
2 2.0000	0.011	2.011	0.014	2.025	—	1-1/4
2-1/16 2.0625	0.011	2.074	0.014	2.088	1-3/8	—
2-3/16 2.1875	0.012	2.200	0.015	2.215	—	1-3/8
2-1/4 2.2500	0.012	2.262	0.015	2.277	1-1/2	—
2-3/8 2.3750	0.013	2.388	0.016	2.404	—	1-1/2
2-7/16 2.4375	0.013	2.450	0.016	2.466	1-5/8	—
2-9/16 2.5625	0.014	2.576	0.017	2.593	—	1-5/8
2-5/8 2.6250	0.014	2.639	0.017	2.656	1-3/4	—
2-3/4 2.7500	0.014	2.766	0.017	2.783	—	1-3/4
2-13/16 2.8125	0.015	2.827	0.018	2.845	1-7/8	—
2-15/16 2.9375	0.016	2.954	0.019	2.973	—	1-7/8
3 3.0000	0.016	3.016	0.019	3.035	2	—
3-1/8 3.1250	0.017	3.142	0.020	3.162	—	2
3-3/8 3.3750	0.018	3.393	0.021	3.414	2-1/4	—
3-1/2 3.5000	0.019	3.518	0.022	3.540	—	2-1/4
3-3/4 3.7500	0.020	3.770	0.023	3.793	2-1/2	—
3-7/8 3.8750	0.020	3.895	0.023	3.918	—	2-1/2
4-1/8 4.1250	0.022	4.147	0.025	4.172	2-3/4	—
4-1/4 4.2500	0.022	4.272	0.025	4.297	—	2-3/4
4-1/2 4.5000	0.024	4.524	0.026	4.550	3	—
4-5/8 4.6250	0.024	4.649	0.027	4.676	—	3
4-7/8 4.8750	0.025	4.900	0.028	4.928	3-1/4	—
5 5.0000	0.026	5.026	0.029	5.055	—	—
5-1/4 5.2500	0.027	5.277	0.030	5.307	3-1/2	—
5-3/8 5.3750	0.028	5.403	0.031	5.434	—	—
5-5/8 5.6250	0.029	5.654	0.032	5.686	3-3/4	—
5-3/4 5.7500	0.030	5.780	0.033	5.813	—	—
6 6.0000	0.031	6.031	0.034	6.065	4	—
See Notes	2	3	3			

NOTES: *1. Square Bolt and Square Lag Screw only.

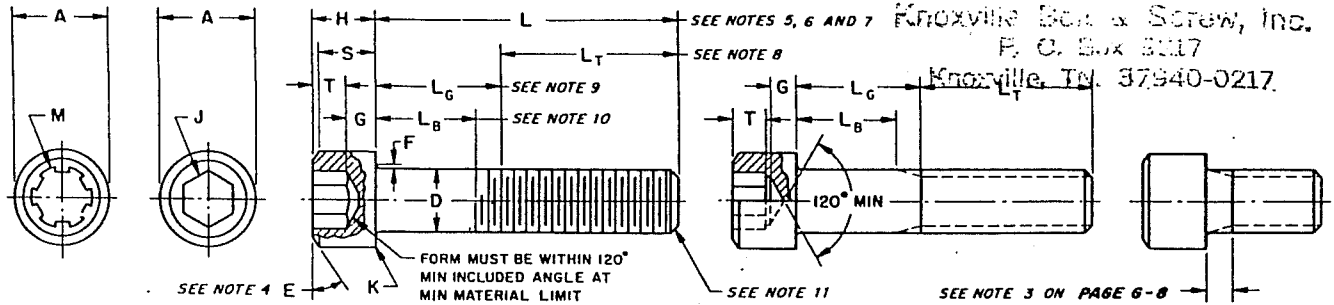
2. Wrenches shall be marked with the "Nominal Size of Wrench" which is equal to the basic (maximum) width across flats of the corresponding bolt or screw head.

3. Allowance (minimum clearance) between maximum width across flats of bolt or screw head and jaws of wrench equals $(0.005W + 0.001)$. Tolerance on wrench opening equals plus $(0.005W + 0.004)$ from minimum. W equals nominal size of wrench.



HEXAGON AND SPLINE SOCKET HEAD CAP SCREWS (1960 SERIES)

**ANSI
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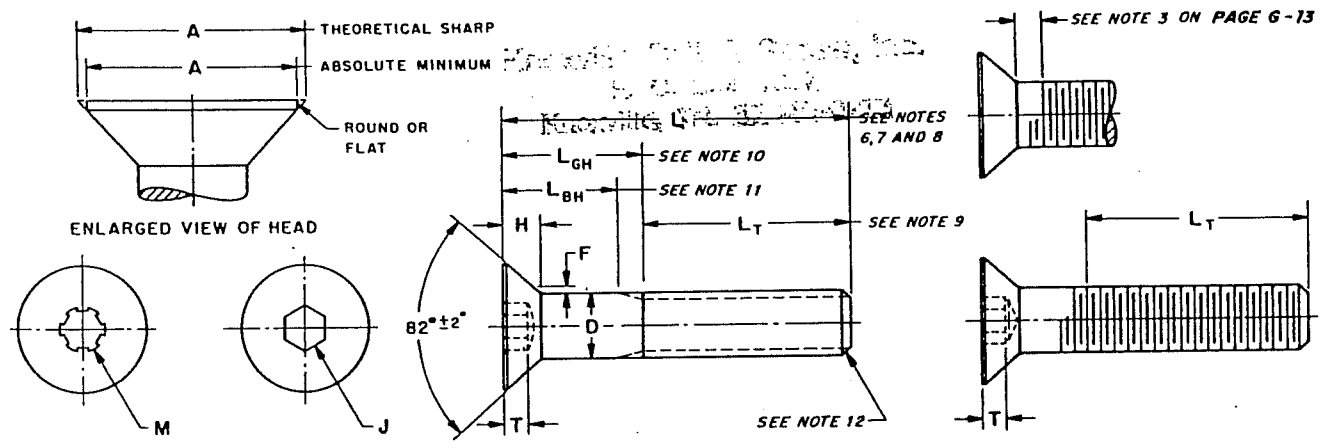


Nominal Size or Basic Screw Diameter	D		A		H		S	M	J	T	G	F		K	
	Body Diameter		Head Diameter		Head Height		Head Side Height	Spline Socket Size	Hexagon Socket Size	Key Engagement	Wall Thickness	Fillet Extension		Chamfer or Radius	
	Max	Min	Max	Min	Max	Min	Min	Nom	Nom	Min	Min	Max	Min	Max	
No. 0	0.0600	0.0600	0.0568	0.096	0.091	0.060	0.057	0.054	0.060	0.050	0.025	0.020	0.007	0.003	0.003
1	0.0730	0.0730	0.0695	0.118	0.112	0.073	0.070	0.066	0.072	1/16 0.062	0.031	0.025	0.007	0.003	0.003
2	0.0860	0.0860	0.0822	0.140	0.134	0.086	0.083	0.077	0.096	5/64 0.078	0.038	0.029	0.008	0.004	0.003
3	0.0990	0.0990	0.0949	0.161	0.154	0.099	0.095	0.089	0.096	5/64 0.078	0.044	0.034	0.008	0.004	0.003
4	0.1120	0.1120	0.1075	0.183	0.176	0.112	0.108	0.101	0.111	3/32 0.094	0.051	0.038	0.009	0.005	0.005
5	0.1250	0.1250	0.1202	0.205	0.198	0.125	0.121	0.112	0.111	3/32 0.094	0.057	0.043	0.010	0.006	0.005
6	0.1380	0.1380	0.1329	0.226	0.218	0.138	0.134	0.124	0.133	7/64 0.109	0.064	0.047	0.010	0.006	0.005
8	0.1640	0.1640	0.1585	0.270	0.262	0.164	0.159	0.148	0.168	9/64 0.141	0.077	0.056	0.012	0.007	0.005
10	0.1900	0.1900	0.1840	0.312	0.303	0.190	0.185	0.171	0.183	5/32 0.156	0.090	0.065	0.014	0.009	0.005
1/4	0.2500	0.2500	0.2435	0.375	0.365	0.250	0.244	0.225	0.216	3/16 0.188	0.120	0.095	0.014	0.009	0.008
5/16	0.3125	0.3125	0.3053	0.469	0.457	0.312	0.306	0.281	0.291	1/4 0.250	0.151	0.119	0.017	0.012	0.008
3/8	0.3750	0.3750	0.3678	0.562	0.550	0.375	0.368	0.337	0.372	5/16 0.312	0.182	0.143	0.020	0.015	0.008
7/16	0.4375	0.4375	0.4294	0.656	0.642	0.438	0.430	0.394	0.454	3/8 0.375	0.213	0.166	0.023	0.018	0.010
1/2	0.5000	0.5000	0.4919	0.750	0.735	0.500	0.492	0.450	0.454	3/8 0.375	0.245	0.190	0.026	0.020	0.010
5/8	0.6250	0.6250	0.6163	0.938	0.921	0.625	0.616	0.562	0.595	1/2 0.500	0.307	0.238	0.032	0.024	0.010
3/4	0.7500	0.7500	0.7406	1.125	1.107	0.750	0.740	0.675	0.620	5/8 0.625	0.370	0.285	0.039	0.030	0.010
7/8	0.8750	0.8750	0.8647	1.312	1.293	0.875	0.864	0.787	0.698	3/4 0.750	0.432	0.333	0.044	0.034	0.015
1	1.0000	1.0000	0.9886	1.500	1.479	1.000	0.988	0.900	0.790	3/4 0.750	0.495	0.380	0.050	0.040	0.015
1-1/8	1.1250	1.1250	1.1086	1.688	1.665	1.125	1.111	1.012	-	7/8 0.875	0.557	0.428	0.055	0.045	0.015
1-1/4	1.2500	1.2500	1.2336	1.875	1.852	1.250	1.236	1.125	-	7/8 0.875	0.620	0.475	0.060	0.050	0.015
1-3/8	1.3750	1.3750	1.3568	2.062	2.038	1.375	1.360	1.237	-	1 1.000	0.682	0.523	0.065	0.055	0.015
1-1/2	1.5000	1.5000	1.4818	2.250	2.224	1.500	1.485	1.350	-	1 1.000	0.745	0.570	0.070	0.060	0.015
1-3/4	1.7500	1.7500	1.7295	2.625	2.597	1.750	1.734	1.575	-	1-1/4 1.250	0.870	0.665	0.080	0.070	0.015
2	2.0000	2.0000	1.9780	3.000	2.970	2.000	1.983	1.800	-	1-1/2 1.500	0.995	0.760	0.090	0.075	0.015
2-1/4	2.2500	2.2500	2.2280	3.375	3.344	2.250	2.232	2.025	-	1-3/4 1.750	1.120	0.855	0.100	0.085	0.031
2-1/2	2.5000	2.5000	2.4762	3.750	3.717	2.500	2.481	2.250	-	1-3/4 1.750	1.245	0.950	0.110	0.095	0.031
2-3/4	2.7500	2.7500	2.7262	4.125	4.090	2.750	2.730	2.475	-	2 2.000	1.370	1.045	0.120	0.105	0.031
3	3.0000	3.0000	2.9762	4.500	4.464	3.000	2.979	2.700	-	2-1/4 2.250	1.495	1.140	0.130	0.115	0.031
3-1/4	3.2500	3.2500	3.2262	4.875	4.837	3.250	3.228	2.925	-	2-1/4 2.250	1.620	1.235	0.140	0.125	0.031
3-1/2	3.5000	3.5000	3.4762	5.250	5.211	3.500	3.478	3.150	-	2-3/4 2.750	1.745	1.330	0.150	0.135	0.031
3-3/4	3.7500	3.7500	3.7262	5.625	5.584	3.750	3.727	3.375	-	2-3/4 2.750	1.870	1.425	0.160	0.145	0.031
4	4.0000	4.0000	3.9762	6.000	5.958	4.000	3.976	3.600	-	3 3.000	1.995	1.520	0.170	0.155	0.031
See Notes	1	2, 10		3				4	20	21			12		14

See General Data on Page G-3 and notes on Pages G-5 and G-6.

HEXAGON AND SPLINE SOCKET FLAT COUNTERSUNK HEAD CAP SCREWS

**ANSI
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Nominal Size or Basic Screw Diameter	D		A		H		M	J	T	F	
	Body Dia		Head Diameter		Head Height		Spline Socket Size	Hexagon Socket Size	Key Engagement	Fillet Extension Above D Max	
	Max	Min	Theoretical Sharp Max	Abs. Min	Reference	Flushness Tolerance	Nom	Nom	Min	Max	
No. 0	0.0600	0.0600	0.0568	0.138	0.117	0.044	0.006	0.048	0.035	0.025	0.006
1	0.0730	0.0730	0.0695	0.168	0.143	0.054	0.007	0.060	0.050	0.031	0.008
2	0.0860	0.0860	0.0822	0.197	0.168	0.064	0.008	0.060	0.050	0.038	0.010
3	0.0990	0.0990	0.0949	0.226	0.193	0.073	0.010	0.072	1/16 0.062	0.044	0.010
4	0.1120	0.1120	0.1075	0.255	0.218	0.083	0.011	0.072	1/16 0.062	0.055	0.012
5	0.1250	0.1250	0.1202	0.281	0.240	0.090	0.012	0.096	5/64 0.078	0.061	0.014
6	0.1380	0.1380	0.1329	0.307	0.263	0.097	0.013	0.096	5/64 0.078	0.066	0.015
8	0.1640	0.1640	0.1585	0.359	0.311	0.112	0.014	0.111	3/32 0.094	0.076	0.015
10	0.1900	0.1900	0.1840	0.411	0.359	0.127	0.015	0.145	1/8 0.125	0.087	0.015
1/4	0.2500	0.2500	0.2435	0.531	0.480	0.161	0.016	0.183	5/32 0.156	0.111	0.015
5/16	0.3125	0.3125	0.3053	0.656	0.600	0.198	0.017	0.216	3/16 0.188	0.135	0.015
3/8	0.3750	0.3750	0.3678	0.781	0.720	0.234	0.018	0.251	7/32 0.219	0.159	0.015
7/16	0.4375	0.4375	0.4294	0.844	0.781	0.234	0.018	0.291	1/4 0.250	0.159	0.015
1/2	0.5000	0.5000	0.4919	0.938	0.872	0.251	0.018	0.372	5/16 0.312	0.172	0.015
5/8	0.6250	0.6250	0.6163	1.188	1.112	0.324	0.022	0.454	3/8 0.375	0.220	0.015
3/4	0.7500	0.7500	0.7406	1.438	1.355	0.396	0.024	0.454	1/2 0.500	0.220	0.015
7/8	0.8750	0.8750	0.8647	1.688	1.604	0.468	0.025	—	9/16 0.562	0.248	0.015
1	1.0000	1.0000	0.9886	1.938	1.841	0.540	0.028	—	5/8 0.625	0.297	0.015
1-1/8	1.1250	1.1250	1.1086	2.188	2.079	0.611	0.031	—	3/4 0.750	0.325	0.031
1-1/4	1.2500	1.2500	1.2336	2.438	2.316	0.683	0.035	—	7/8 0.875	0.358	0.031
1-3/8	1.3750	1.3750	1.3568	2.688	2.553	0.755	0.038	—	7/8 0.875	0.402	0.031
1-1/2	1.5000	1.5000	1.4818	2.938	2.791	0.827	0.042	—	1 1.000	0.435	0.031
See Notes	1	2	3	4	5	19	20				13

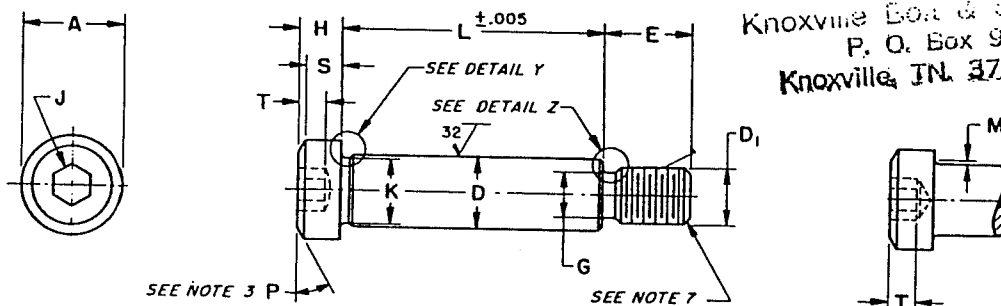
- NOTES:**
- Nominal Size.** Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
 - Body.** The term body refers to the unthreaded cylindrical portion of the shank for those screws not threaded to the head.
 - Head Diameters.** The maximum sharp values under Column A are theoretical values only as it is not practical to make the edges of the head sharp. The maximum sharp value represents the exact diameter of a hole countersunk to exactly 82 deg in which a screw having maximum head size will just fit flush.
 - Head Height.** The tabulated values for head height are given for reference only and are calculated to the maximum formulation.
 - Flushness Tolerance.** The flushness tolerance is the distance the top surface of a screw having the minimum head size will be below the flush condition in a hole countersunk exactly 82 deg to the maximum sharp dimension listed in Column A.
 - Length.** The length of the screw shall be measured, parallel to the axis of screw, from the plane of the top of the head to the plane of the flat of the point. The basic length dimension on the product shall be the nominal length expressed as a two-place decimal.

(continued next page)



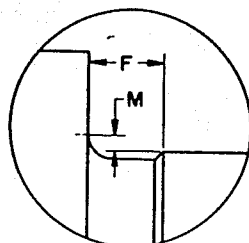
HEXAGON SOCKET HEAD SHOULDER SCREWS

ANSI
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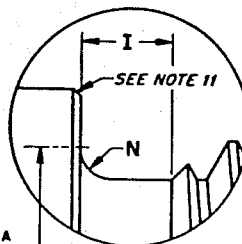


Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, IN. 37940-0217

Nominal Size or Basic Shoulder Diameter	D		A		H		S	J		T	M		
	Shoulder Diameter		Head Diameter		Head Height		Head Side Height	Hexagon Socket Size		Key Engagement	Head Fillet Extension Above D		
	Max	Min	Max	Min	Max	Min	Min	Nom	Min	Max	Min		
1/4	0.250	0.2480	0.2460	0.375	0.357	0.188	0.177	0.157	1/8	0.125	0.094	0.014	0.009
5/16	0.312	0.3105	0.3085	0.438	0.419	0.219	0.209	0.183	5/32	0.156	0.117	0.017	0.012
3/8	0.375	0.3730	0.3710	0.562	0.543	0.250	0.240	0.209	3/16	0.188	0.141	0.020	0.015
1/2	0.500	0.4980	0.4960	0.750	0.729	0.312	0.302	0.262	1/4	0.250	0.188	0.026	0.020
5/8	0.625	0.6230	0.6210	0.875	0.853	0.375	0.365	0.315	5/16	0.312	0.234	0.032	0.024
3/4	0.750	0.7480	0.7460	1.000	0.977	0.500	0.490	0.421	3/8	0.375	0.281	0.039	0.030
1	1.000	0.9980	0.9960	1.312	1.287	0.625	0.610	0.527	1/2	0.500	0.375	0.050	0.040
1-1/4	1.250	1.2480	1.2460	1.750	1.723	0.750	0.735	0.633	5/8	0.625	0.469	0.060	0.050
See Notes	1		2						15			8	



ENLARGED
DETAIL Y
(SEE NOTE 8)



ENLARGED
DETAIL Z
(SEE NOTE 10)

THIS DIA NOT TO EXCEED MAJOR DIA OF THREAD

Nominal Size or Basic Shoulder Diameter	K	F	D ₁		Threads Per Inch	G		I	N		E		
			Shoulder Neck Diameter	Shoulder Neck Width		Nominal Thread Size or Basic Thread Diameter	Thread Neck Diameter		Thread Neck Width	Thread Neck Fillet			
							Max			Min		Max	Min
1/4	0.250	0.227	0.093	10	0.1900	24	0.142	0.133	0.062	0.023	0.017	0.375	
5/16	0.312	0.289	0.093	1/4	0.2500	20	0.193	0.182	0.075	0.028	0.022	0.438	
3/8	0.375	0.352	0.093	5/16	0.3125	18	0.249	0.237	0.083	0.031	0.025	0.500	
1/2	0.500	0.477	0.093	3/8	0.3750	16	0.304	0.291	0.093	0.035	0.029	0.625	
5/8	0.625	0.602	0.093	1/2	0.5000	13	0.414	0.397	0.115	0.042	0.036	0.750	
3/4	0.750	0.727	0.093	5/8	0.6250	11	0.521	0.502	0.136	0.051	0.045	0.875	
1	1.000	0.977	0.125	3/4	0.7500	10	0.638	0.616	0.150	0.055	0.049	1.000	
1-1/4	1.250	1.227	0.125	7/8	0.8750	9	0.750	0.726	0.166	0.062	0.056	1.125	
See Notes	8	8	13				10		10	10			

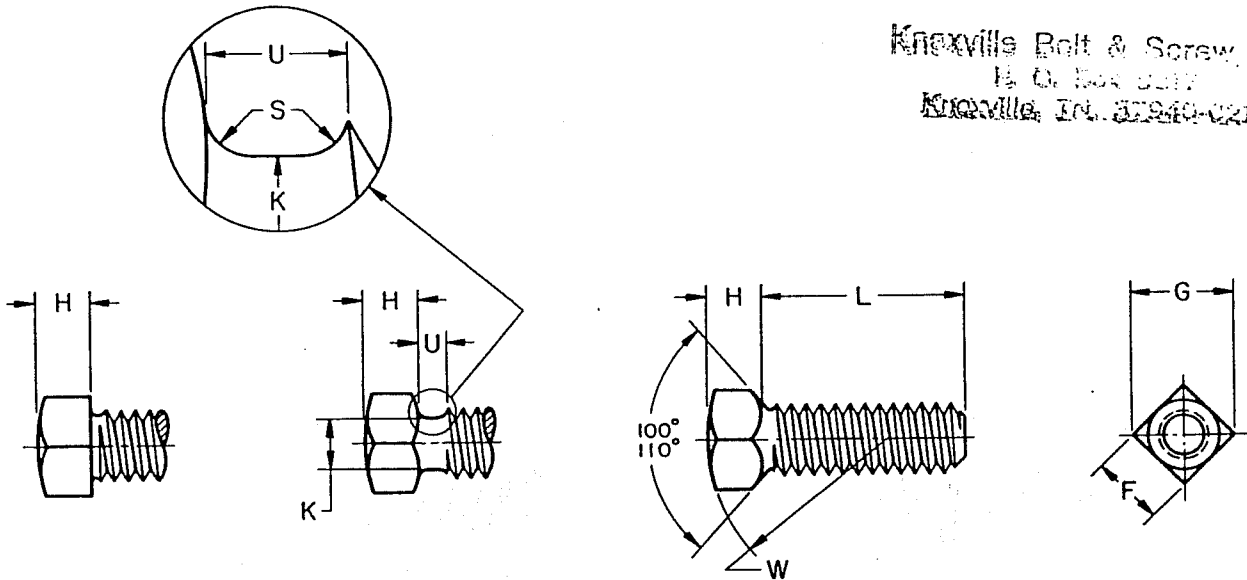
See Notes on Page G-17.



SQUARE HEAD SET SCREWS

1970 Draft
Revision of
ANSI B18.6.2
1956

Knoxville Bolt & Screw, Inc.
P. O. Box 5017
Knoxville, Tenn. 37940-0217



OPTIONAL HEAD CONSTRUCTIONS

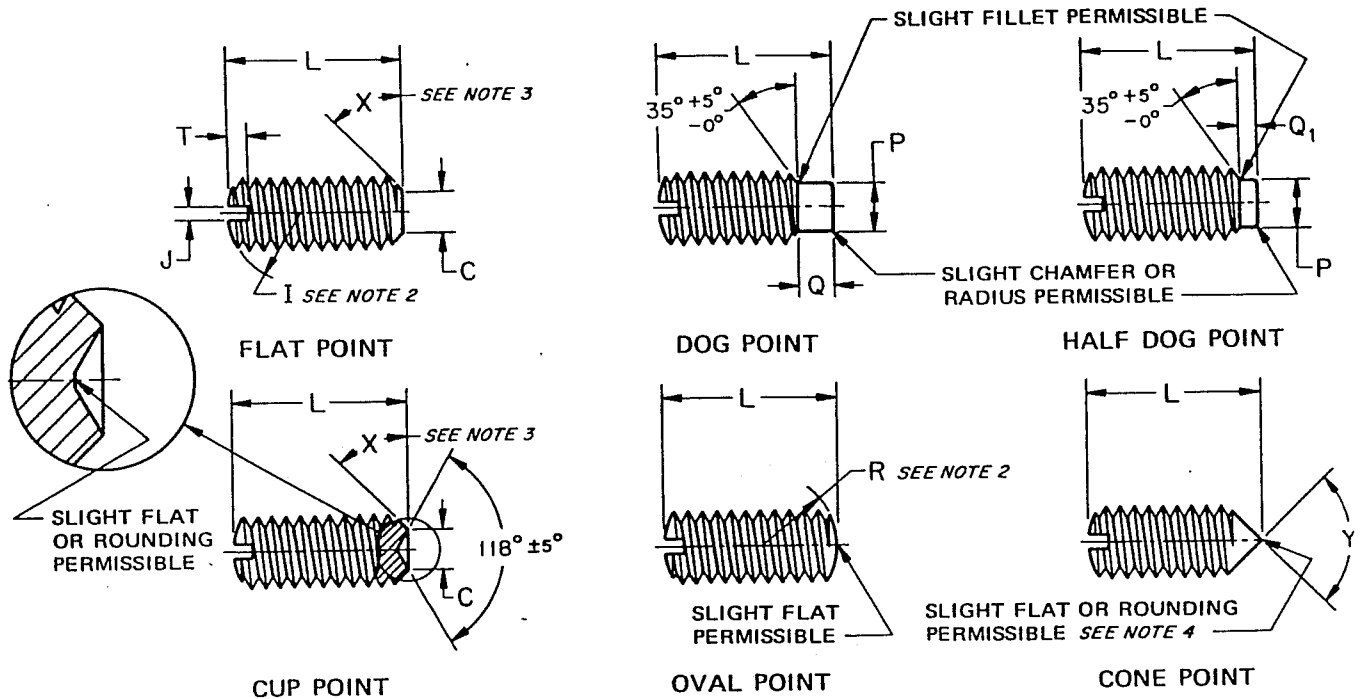
Nominal Size ¹ or Basic Screw Diameter	F		G		H		K		S	U	W	
	Width Across Flats		Width Across Corners		Head Height		Neck Relief Diameter		Neck Relief Fillet Radius	Neck Relief Width	Head Radius	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Min	
No. 10	0.1900	0.188	0.180	0.265	0.247	0.148	0.134	0.145	0.140	0.027	0.083	0.48
1/4	0.2500	0.250	0.241	0.354	0.331	0.196	0.178	0.185	0.170	0.032	0.100	0.62
5/16	0.3125	0.312	0.302	0.442	0.415	0.245	0.224	0.240	0.225	0.036	0.111	0.78
3/8	0.3750	0.375	0.362	0.530	0.497	0.293	0.270	0.294	0.279	0.041	0.125	0.94
7/16	0.4375	0.438	0.423	0.619	0.581	0.341	0.315	0.345	0.330	0.046	0.143	1.09
1/2	0.5000	0.500	0.484	0.707	0.665	0.389	0.361	0.400	0.385	0.050	0.154	1.25
9/16	0.5625	0.562	0.545	0.795	0.748	0.437	0.407	0.454	0.439	0.054	0.167	1.41
5/8	0.6250	0.625	0.606	0.884	0.833	0.485	0.452	0.507	0.492	0.059	0.182	1.56
3/4	0.7500	0.750	0.729	1.060	1.001	0.582	0.544	0.620	0.605	0.065	0.200	1.88
7/8	0.8750	0.875	0.852	1.237	1.170	0.678	0.635	0.731	0.716	0.072	0.222	2.19
1	1.0000	1.000	0.974	1.414	1.337	0.774	0.726	0.838	0.823	0.081	0.250	2.50
1-1/8	1.1250	1.125	1.096	1.591	1.505	0.870	0.817	0.939	0.914	0.092	0.283	2.81
1-1/4	1.2500	1.250	1.219	1.768	1.674	0.966	0.908	1.064	1.039	0.092	0.283	3.12
1-3/8	1.3750	1.375	1.342	1.945	1.843	1.063	1.000	1.159	1.134	0.109	0.333	3.44
1-1/2	1.5000	1.500	1.464	2.121	2.010	1.159	1.091	1.284	1.259	0.109	0.333	3.75

- NOTES: 1. Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
2. See General Data for Square Head Set Screws on Page H-3.
3. Weights of set screws are given on Page N-95.

(continued)

SLOTTED HEADLESS SET SCREWS

1970 Draft
Revision of
ANSI B18.6.2
1956



Nominal Size or Basic Screw Diameter	I	J		T		C		P		Q		Q ₁		R	Y	
	Crown Radius	Slot Width		Slot Depth		Cup and Flat Point Diameters		Dog Point Diameters		Point Length				Oval Point Radius		
		Basic	Max	Min	Max	Min	Max	Min	Max	Min	Dog		Half Dog			
No. 0	0.0600	0.060	0.014	0.010	0.020	0.016	0.033	0.027	0.040	0.037	0.032	0.028	0.017	0.013	0.045	5/64
1	0.0730	0.073	0.016	0.012	0.020	0.016	0.040	0.033	0.049	0.045	0.040	0.036	0.021	0.017	0.055	3/32
2	0.0860	0.086	0.018	0.014	0.025	0.019	0.047	0.039	0.057	0.053	0.046	0.042	0.024	0.020	0.064	7/64
3	0.0990	0.099	0.020	0.016	0.028	0.022	0.054	0.045	0.066	0.062	0.052	0.048	0.027	0.023	0.074	1/8
4	0.1120	0.112	0.024	0.018	0.031	0.025	0.061	0.051	0.075	0.070	0.058	0.054	0.030	0.026	0.084	5/32
5	0.1250	0.125	0.026	0.020	0.036	0.026	0.067	0.057	0.083	0.078	0.063	0.057	0.033	0.027	0.094	3/16
6	0.1380	0.138	0.028	0.022	0.040	0.030	0.074	0.064	0.092	0.087	0.073	0.067	0.038	0.032	0.104	3/16
8	0.1640	0.164	0.032	0.026	0.046	0.036	0.087	0.076	0.109	0.103	0.083	0.077	0.043	0.037	0.123	1/4
10	0.1900	0.190	0.035	0.029	0.053	0.043	0.102	0.088	0.127	0.120	0.095	0.085	0.050	0.040	0.142	1/4
12	0.2160	0.216	0.042	0.035	0.061	0.051	0.115	0.101	0.144	0.137	0.115	0.105	0.060	0.050	0.162	5/16
1/4	0.2500	0.250	0.049	0.041	0.068	0.058	0.132	0.118	0.156	0.149	0.130	0.120	0.068	0.058	0.188	5/16
5/16	0.3125	0.312	0.055	0.047	0.083	0.073	0.172	0.156	0.203	0.195	0.161	0.151	0.083	0.073	0.234	3/8
3/8	0.3750	0.375	0.068	0.060	0.099	0.089	0.212	0.194	0.250	0.241	0.193	0.183	0.099	0.089	0.281	7/16
7/16	0.4375	0.438	0.076	0.068	0.114	0.104	0.252	0.232	0.297	0.287	0.224	0.214	0.114	0.104	0.328	1/2
1/2	0.5000	0.500	0.086	0.076	0.130	0.120	0.291	0.270	0.344	0.334	0.255	0.245	0.130	0.120	0.375	9/16
9/16	0.5625	0.562	0.096	0.086	0.146	0.136	0.332	0.309	0.391	0.379	0.287	0.275	0.146	0.134	0.422	5/8
5/8	0.6250	0.625	0.107	0.097	0.161	0.151	0.371	0.347	0.469	0.456	0.321	0.305	0.164	0.148	0.469	3/4
3/4	0.7500	0.750	0.134	0.124	0.193	0.183	0.450	0.425	0.562	0.549	0.383	0.367	0.196	0.180	0.562	7/8
See Notes	1	2													2	

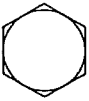


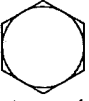

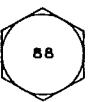

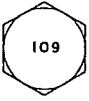
- NOTES:**
- Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
 - Tolerance on radius for nominal sizes up to and including 5 (0.125 in.) shall be plus 0.015 in. and minus 0.000, and for larger sizes, plus 0.031 in. and minus 0.000. Slotted ends on screws of shorter nominal lengths than listed in Column Y may be flat at option of manufacturer.

- Point angle X shall be 45° plus 5° , minus 0° , for screws of nominal lengths equal to or longer than those listed in Column Y, and 30° minimum for screws of shorter nominal lengths.
- The extent of rounding or flat at apex of cone point shall not exceed an amount equivalent to 10 per cent of the basic screw diameter.
- See General Data for Slotted Headless Set Screws on Page H-5.

Knexville Bolt & Screw, Inc.
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Knexville, TN. 37940-0217



**ASTM, SAE AND ISO GRADE MARKINGS AND
MECHANICAL PROPERTIES FOR STEEL FASTENERS**

Identification Grade Mark	Specification	Fastener Description	Material	Nominal Size Range (in.)	Mechanical Properties		
					Proof Load (psi)	Yield Strength Min (psi)	Tensile Strength Min (psi)
 No Grade Mark	SAE J429 Grade 8.1	Studs	Medium Carbon Alloy or SAE 1041 Modified Elevated Temperature Drawn Steel	1/4 thru 1-1/2	120,000	130,000	150,000
 A490	ASTM A490	High Strength Structural Bolts	Alloy Steel, Quenched and Tempered	1/2 thru 1-1/2	120,000	130,000	150,000 min 170,000 max
 No Grade Mark	ISO R898 Class 4.6	Bolts, Screws, Studs	Low or Medium Carbon Steel	All Sizes thru 1-1/2	33,000	36,000	60,000
 No Grade Mark	ISO R898 Class 5.8				55,000	57,000	74,000
 8.8 or  88	ISO R898 Class 8.8				85,000	92,000	120,000
 10.9 or  109	ISO R898 Class 10.9				120,000	130,000	150,000
					Alloy Steel, Quenched and Tempered		

Knockville Bolt & Screw, Inc.
P. O. Box 1217

Knockville, TN 37940-0217

NOTES: 1. ASTM Specifications:

- A 193—Alloy-Steel Bolting Materials for High-Temperature Service
- A 307—Low-Carbon Steel Externally and Internally Threaded Standard Fasteners
- A 320—Alloy-Steel Bolting Materials for Low-Temperature Service
- A 325—High-Strength Bolts for Structural Steel Joints, including Suitable Nuts and Plain Hardened Washers
- A 354—Quenched and Tempered Alloy Steel Bolts and Studs with Suitable Nuts
- A 449—Quenched and Tempered Steel Bolts and Studs

2. SAE Specification:

- J429—Mechanical and Quality Requirements for Externally Threaded Fasteners

3. ISO Recommendations:


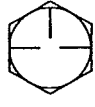








- No. R898—Mechanical Properties of Fasteners—Part I —Bolts, Screws and Studs

4. Grade 7 bolts and screws are roll threaded after heat treatment.

IFI

ASTM, SAE AND ISO GRADE MARKINGS AND MECHANICAL PROPERTIES FOR STEEL FASTENERS

TECHNICAL DATA

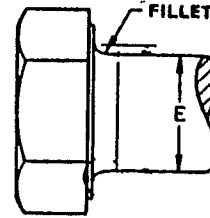
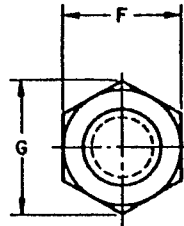
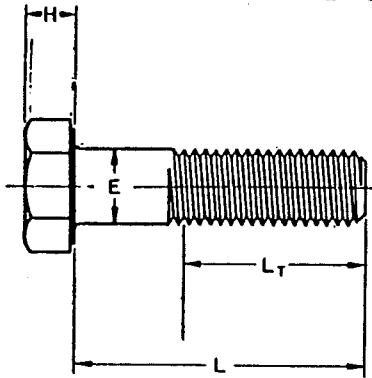
Identification Grade Mark	Specification	Fastener Description	Material	Nominal Size Range (in.)	Mechanical Properties		
					Proof Load (psi)	Yield Strength Min (psi)	Tensile Strength Min (psi)
	SAE J429 Grade 5	Bolts, Screws, Studs	Medium Car- bon Steel, Quenched and Tempered	1/4 thru 1 Over 1 to 1-1/2	85,000 74,000	92,000 81,000	120,000 105,000
	ASTM A449			1/4 thru 1 Over 1 thru 1-1/2 Over 1-1/2 thru 3	85,000 74,000 55,000	92,000 81,000 58,000	120,000 105,000 90,000
	SAE J429 Grade 5.1	Sems	Low or Med- ium Carbon Steel, Quenched and Tempered	No. 6 thru 3/8	85,000	-	120,000
	SAE J429 Grade 5.2	Bolts, Screws, Studs	Low Carbon Martensitic Steel, Quenched and Tempered	1/4 thru 1	85,000	92,000	120,000
	ASTM A325 Type 1	High Strength Structural Bolts	Medium Car- bon Steel, Quenched and Tempered	1/2 thru 1 1-1/8 thru 1-1/2	85,000 74,000	92,000 81,000	120,000 105,000
	ASTM A325 Type 2		Low Carbon Martensitic Steel, Quenched and Tempered	1/2 thru 1	85,000	92,000	120,000
	ASTM A325 Type 3		Atmospheric Corrosion Resisting Steel, Quenched and Tempered	1/2 thru 1 1-1/8 thru 1-1/2	85,000 74,000	92,000 81,000	120,000 105,000
	ASTM A354 Grade B8	Bolts, Studs	Alloy Steel, Quenched and Tempered	1/4 thru 2-1/2 2-3/4 thru 4	80,000 75,000	83,000 78,000	105,000 100,000
	ASTM A354 Grade BC				105,000 95,000	109,000 99,000	125,000 115,000
	SAE J429 Grade 7	Bolts, Screws	Medium Car- bon Alloy Steel, Quenched and Tempered ⁴	1/4 thru 1-1/2	105,000	115,000	133,000
	SAE J429 Grade 8	Bolts, Screws, Studs	Medium Car- bon Alloy Steel, Quenched and Tempered	1/4 thru 1-1/2	120,000	130,000	150,000
	ASTM A354 Grade BD		Alloy Steel, Quenched and Tempered				

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HEX CAP SCREWS

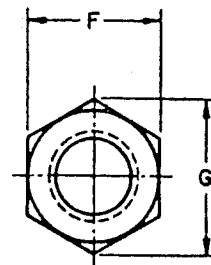
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Nominal Size or Basic Product Dia	E		F				G		H			R	L _T	
	Body Dia		Width Across Flats		Width Across Corners		Height			Radius of Fillet	Thread Length			
	Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min	Min	For Screw Lengths ≤ 6 in.	For Screw Lengths > 6 in.	
1/4	0.2500	0.2500	0.2450	7/16	0.438	0.428	0.505	0.488	5/32	0.163	0.150	0.015	0.750	1.000
5/16	0.3125	0.3125	0.3065	1/2	0.500	0.489	0.577	0.557	13/64	0.211	0.195	0.015	0.875	1.125
3/8	0.3750	0.3750	0.3690	9/16	0.562	0.551	0.650	0.628	15/64	0.243	0.226	0.015	1.000	1.250
7/16	0.4375	0.4375	0.4305	5/8	0.625	0.612	0.722	0.698	9/32	0.291	0.272	0.015	1.125	1.375
1/2	0.5000	0.5000	0.4930	3/4	0.750	0.736	0.866	0.840	5/16	0.323	0.302	0.015	1.250	1.500
9/16	0.5625	0.5625	0.5545	13/16	0.812	0.798	0.938	0.910	23/64	0.371	0.348	0.020	1.375	1.625
5/8	0.6250	0.6250	0.6170	15/16	0.938	0.922	1.083	1.051	25/64	0.403	0.378	0.020	1.500	1.750
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	0.020	1.750	2.000
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	0.040	2.000	2.250
1	1.0000	1.0000	0.9900	1-1/2	1.500	1.469	1.732	1.675	39/64	0.627	0.591	0.060	2.250	2.500
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	0.060	2.500	2.750
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	0.060	2.750	3.000
1-3/8	1.3750	1.3750	1.3630	2-1/16	2.062	1.994	2.382	2.273	27/32	0.878	0.810	0.060	3.000	3.250
1-1/2	1.5000	1.5000	1.4880	2-1/4	2.250	2.175	2.598	2.480	15/16	0.974	0.902	0.060	3.250	3.500

HEAVY HEX NUTS

Nominal Size or Basic Major Dia of Thread	F			G		H			
	Width Across Flats			Width Across Corners		Thickness Heavy Hex Nuts			
	Basic	Max	Min	Max	Min	Basic	Max	Min	
1/4	0.2500	1/2	0.500	0.488	0.577	0.556	15/64	0.250	0.218
5/16	0.3125	9/16	0.562	0.546	0.650	0.622	19/64	0.314	0.280
3/8	0.3750	11/16	0.688	0.669	0.794	0.763	23/64	0.377	0.341
7/16	0.4375	3/4	0.750	0.728	0.866	0.830	27/64	0.441	0.403
1/2	0.5000	7/8	0.875	0.850	1.010	0.969	31/64	0.504	0.464
9/16	0.5625	15/16	0.938	0.909	1.083	1.037	35/64	0.568	0.526
5/8	0.6250	1-1/16	1.062	1.031	1.227	1.175	39/64	0.631	0.587
3/4	0.7500	1-1/4	1.250	1.212	1.443	1.382	47/64	0.758	0.710
7/8	0.8750	1-7/16	1.438	1.394	1.660	1.589	55/64	0.885	0.833
1	1.0000	1-5/8	1.625	1.575	1.876	1.796	63/64	1.012	0.956
1-1/8	1.1250	1-13/16	1.812	1.756	2.093	2.002	1-7/64	1.139	1.079
1-1/4	1.2500	2	2.000	1.938	2.309	2.209	1-7/32	1.251	1.187
1-3/8	1.3750	2-3/16	2.188	2.119	2.526	2.416	1-11/32	1.378	1.310
1-1/2	1.5000	2-3/8	2.375	2.300	2.742	2.622	1-15/32	1.505	1.433
1-5/8	1.6250	2-9/16	2.562	2.481	2.959	2.828	1-19/32	1.632	1.556
1-3/4	1.7500	2-3/4	2.750	2.662	3.175	3.035	1-23/32	1.759	1.679
1-7/8	1.8750	2-15/16	2.938	2.844	3.392	3.242	1-27/32	1.886	1.802
2	2.0000	3-1/8	3.125	3.025	3.608	3.449	1-31/32	2.013	1.925
2-1/4	2.2500	3-1/2	3.500	3.388	4.041	3.862	2-13/64	2.251	2.155
2-1/2	2.5000	3-7/8	3.875	3.750	4.474	4.275	2-29/64	2.505	2.401
2-3/4	2.7500	4-1/4	4.250	4.112	4.907	4.688	2-45/64	2.759	2.647
3	3.0000	4-5/8	4.625	4.475	5.340	5.102	2-61/64	3.013	2.893
3-1/4	3.2500	5	5.000	4.838	5.774	5.515	3-3/16	3.252	3.124
3-1/2	3.5000	5-3/8	5.375	5.200	6.207	5.928	3-7/16	3.506	3.370
3-3/4	3.7500	5-3/4	5.750	5.562	6.640	6.341	3-11/16	3.760	3.616
4	4.0000	6-1/8	6.125	5.925	7.073	6.755	3-15/16	4.014	3.862



TIGHTENING TORQUE FOR SCREWS, BOLTS AND NUTS

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217

TABLE I—TORQUE COEFFICIENTS—K

Bolt Size	Theoretical ¹ K	Measured K (average)	
		High-point torque	Mid-point torque
1/4 -20	0.210	0.243	0.267
1/4 -28	0.205	0.216	0.231
5/16-18	0.210	0.206	0.186
5/16-24	0.205	0.194	0.183
3/8 -16	0.204	0.200	0.247
3/8 -24	0.198	0.192	0.234
7/16-14	0.205	0.217	0.224
7/16-20	0.200	0.194	0.190
1/2 -13	0.201	0.205	0.158
1/2 -20	0.195	0.167	0.205
9/16-12	0.198	0.194	0.214
9/16-18	0.193	0.196	0.207
5/8 -11	0.199	0.178	0.196
5/8 -18	0.193	0.183	0.175
3/4 -10	0.194	0.169	0.172
3/4 -16	0.189	0.170	0.180
7/8 - 9	0.194	0.181	0.194
7/8 -14	0.189	0.171	0.178
1 - 8	0.193	0.188	0.204
1 -14	0.188	0.161	0.167
Average	0.198	0.191	0.201

NOTE: 1. Computed with coefficient of friction of 0.15 and the dimensions of American National Standard Hex Nuts.

TABLE II—TORQUE COEFFICIENTS—COMPUTED

Size	Hex Nut.				Hex Cap Screw (Finished Hex Bolt)	Heavy Hex Screw
	K ₁	K ₂	K ₃	K	K	K
1/4 -20	0.1055	0.0753	0.0318	0.213	0.213	0.223
1/4 -28	0.1055	0.0786	0.0227	0.207	0.207	0.218
5/16-18	0.0993	0.0766	0.0284	0.204	0.204	0.213
5/16-24	0.0993	0.0790	0.0212	0.200	0.200	0.208
3/8 -16	0.0950	0.0772	0.0265	0.199	0.199	0.213
3/8 -24	0.0950	0.0802	0.0176	0.193	0.193	0.207
7/16-14	0.0980	0.0772	0.0260	0.201	0.196	0.207
7/16-20	0.0980	0.0800	0.0181	0.196	0.190	0.202
1/2 -13	0.0950	0.0780	0.0245	0.198	0.198	0.208
1/2 -20	0.0950	0.0811	0.0159	0.192	0.192	0.203
9/16-12	0.0970	0.0781	0.0235	0.199	0.195	0.202
9/16-18	0.0970	0.0811	0.0157	0.194	0.191	0.197
5/8 -11	0.0950	0.0783	0.0231	0.196	0.196	0.205
5/8 -18	0.0950	0.0816	0.0141	0.191	0.191	0.199
3/4 -10	0.0950	0.0790	0.0212	0.195	0.195	0.203
3/4 -16	0.0950	0.0819	0.0132	0.190	0.190	0.198
7/8 - 9	0.0950	0.0793	0.0201	0.194	0.194	0.201
7/8 -14	0.0950	0.0819	0.0130	0.190	0.190	0.196
1 - 8	0.0950	0.0795	0.0199	0.194	0.194	0.200
1 -14	0.0950	0.0826	0.0109	0.189	0.189	0.194
Average				0.197	0.196	0.205

NOTE: K₁ + K₂ + K₃ = K

LENGTH TOLERANCES FOR SQUARE AND HEX BOLTS AND SCREWS

1970 Draft
Revision of
ANSI B18.2.1
1968

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217

NON-POINTED PRODUCTS¹

Nominal Length	Nominal Size					
	1/4 to 3/8	7/16 & 1/2	9/16 to 3/4	7/8 & 1	1-1/8 to 1-1/2	Over 1-1/2
Up to 1 in., incl.	+0.02 -0.03	+0.02 -0.03	+0.02 -0.03	- -	- -	- -
Over 1 in. to 2-1/2 in., incl.	+0.02 -0.04	+0.04 -0.06	+0.06 -0.08	+0.08 -0.10	+0.12 -0.12	+0.18 -0.18
Over 2-1/2 in. to 4 in., incl.	+0.04 -0.06	+0.06 -0.08	+0.08 -0.10	+0.10 -0.14	+0.16 -0.16	+0.20 -0.20
Over 4 in. to 6 in., incl.	+0.06 -0.10	+0.08 -0.10	+0.10 -0.10	+0.12 -0.16	+0.18 -0.18	+0.22 -0.22
Longer than 6 in.	+0.10 -0.18	+0.12 -0.18	+0.14 -0.18	+0.16 -0.20	+0.22 -0.22	+0.24 -0.24

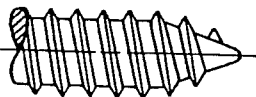
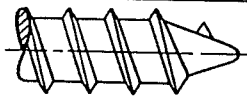


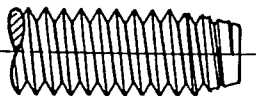
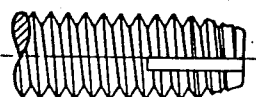
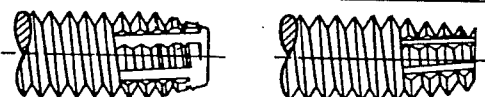
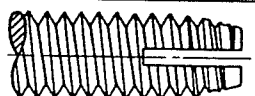

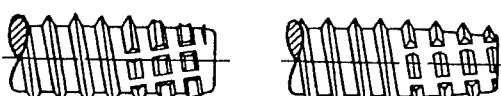

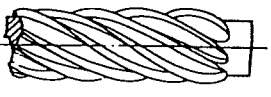
POINTED PRODUCTS²

Nominal Length	Nominal Size					
	1/4 to 3/8	7/16 & 1/2	9/16 to 3/4	7/8 & 1	1-1/8 to 1-1/2	Over 1-1/2
Up to 1 in., incl.	-0.03	-0.03	-0.03	-	-	-
Over 1 in. to 2-1/2 in., incl.	-0.04	-0.06	-0.08	-0.10	-0.12	-0.18
Over 2-1/2 in. to 4 in., incl.	-0.06	-0.08	-0.10	-0.14	-0.16	-0.20
Over 4 in. to 6 in., incl.	-0.10	-0.10	-0.10	-0.16	-0.18	-0.22
Longer than 6 in.	-0.18	-0.18	-0.18	-0.20	-0.22	-0.24

- NOTES:** 1. Non-pointed products are square, hex, heavy hex and askew head bolts. bolts) and heavy hex screws.
 2. Pointed products are hex cap screws (finished hex lag screws are given in the respective product standards.
 3. Length tolerances for heavy hex structural bolts and lag screws are given in the respective product standards.

TYPE DESIGNATION OF TAPPING SCREWS AND METALLIC DRIVE SCREWS

1970
Revisi
ANSI B
196

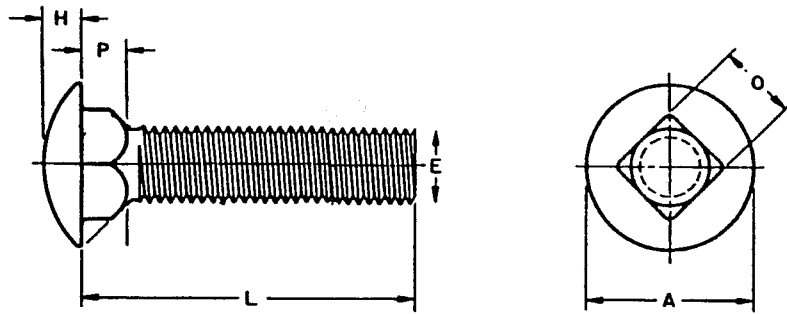
Type	ANSI Standard	Manufacturer
	AB	AB
 NOT RECOMMENDED—USE TYPE AB**	A	A
	B	B
	BP	BP
	C	C
	D	1
	F	F
	G	G
	T	23
	BF	BF
	BT	25
	U	U

NOTE: **See paragraphs 1.3.1.1 and 1.3.1.2 in Introductory Notes, Page E-4.



CARRIAGE BOLTS

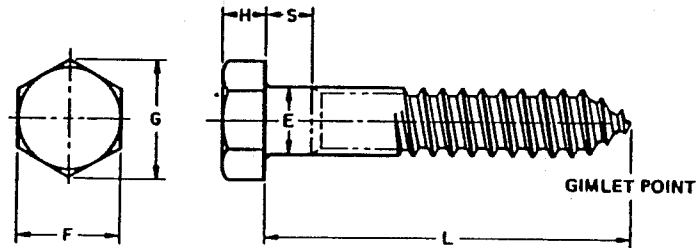
Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, IN. 37940-0217



ROUND HEAD SQUARE NECK BOLTS

Basic Bolt Diameter	E		A		H		O		P		
	Body Diameter		Head Diameter		Head Height		Square Width		Square Depth		
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
No. 10	0.1900	0.199	0.182	0.469	0.438	0.114	0.094	0.189	0.185	0.125	0.094
1/4	0.2500	0.260	0.237	0.594	0.563	0.145	0.125	0.260	0.245	0.156	0.125
5/16	0.3125	0.324	0.298	0.719	0.688	0.176	0.156	0.324	0.307	0.187	0.156
3/8	0.3750	0.388	0.360	0.844	0.782	0.208	0.188	0.388	0.368	0.219	0.188
7/16	0.4375	0.452	0.421	0.969	0.907	0.239	0.219	0.452	0.431	0.250	0.219
1/2	0.5000	0.515	0.483	1.094	1.032	0.270	0.250	0.515	0.492	0.281	0.250
5/8	0.6250	0.642	0.605	1.344	1.219	0.344	0.313	0.642	0.616	0.344	0.313
3/4	0.7500	0.768	0.729	1.594	1.469	0.406	0.375	0.768	0.741	0.406	0.375

LAG SCREWS

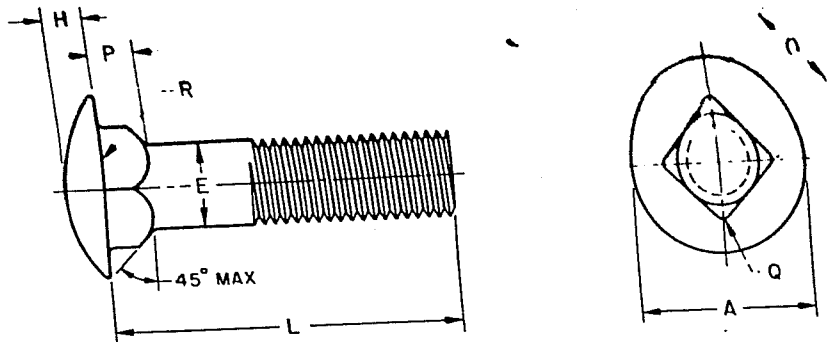


HEX HEAD

Basic Product Dia	Threads per Inch	E		F				G		H			Shoulder Length
		Body or Shoulder Dia		Width Across Flats				Hex Lag Screws					
		Max	Min	Bsc	Max	Min	Max	Min	Max	Min	Min		
**1/4	0.2500	10	0.260	0.237	7/16	0.438	0.425	0.505	0.484	11/64	0.188	0.150	0.094
5/16	0.3125	9	0.324	0.298	1/2	0.500	0.484	0.577	0.552	7/32	0.235	0.195	0.125
3/8	0.3750	7	0.388	0.360	9/16	0.562	0.544	0.650	0.620	1/4	0.268	0.226	0.125
7/16	0.4375	7	0.452	0.421	5/8	0.625	0.603	0.722	0.687	19/64	0.316	0.272	0.156
1/2	0.5000	6	0.515	0.482	3/4	0.750	0.725	0.866	0.826	11/32	0.384	0.302	0.156
3/8	0.6250	5	0.642	0.605	15/16	0.938	0.906	1.083	1.033	27/64	0.444	0.378	0.312
3/4	0.7500	4-1/2	0.768	0.729	1-1/8	1.125	1.068	1.299	1.240	1/2	0.524	0.455	0.375

ROUND HEAD SQUARE NECK AND ROUND HEAD SHORT SQUARE NECK BOLTS

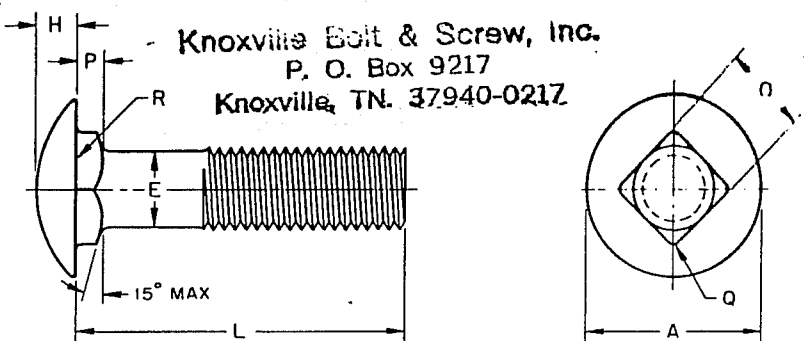
Revision of
ANSI B18.5
1959



ROUND HEAD SQUARE NECK BOLTS

Nominal Size ¹ or Basic Bolt Diameter	E		A		H		O		P		Q	R	
	Body Diameter		Head Diameter		Head Height		Square Width		Square Depth		Corner Radius on Square	Fillet Radius	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Max	
No. 10	0.1900	0.199	0.182	0.469	0.438	0.114	0.094	0.199	0.185	0.125	0.094	0.031	0.031
1/4	0.2500	0.260	0.237	0.594	0.563	0.145	0.125	0.260	0.245	0.156	0.125	0.031	0.031
5/16	0.3125	0.324	0.298	0.719	0.688	0.176	0.156	0.324	0.307	0.187	0.156	0.031	0.031
3/8	0.3750	0.388	0.360	0.844	0.782	0.208	0.188	0.388	0.368	0.219	0.188	0.047	0.031
7/16	0.4375	0.452	0.421	0.969	0.907	0.239	0.219	0.452	0.431	0.250	0.219	0.047	0.031
1/2	0.5000	0.515	0.483	1.094	1.032	0.270	0.250	0.515	0.492	0.281	0.250	0.047	0.031
5/8	0.6250	0.642	0.605	1.344	1.219	0.344	0.313	0.642	0.616	0.344	0.313	0.078	0.062
3/4	0.7500	0.768	0.729	1.594	1.469	0.406	0.375	0.768	0.741	0.406	0.375	0.078	0.062
7/8	0.8750	0.895	0.852	1.844	1.719	0.469	0.438	0.895	0.865	0.469	0.438	0.094	0.062
1	1.0000	1.022	0.976	2.094	1.969	0.531	0.500	1.022	0.990	0.531	0.500	0.094	0.062

NOTES: 1. Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
 2. Weights of product given on Pages N-88 and N-89.
 3. See General Data on Pages B-4 and B-5.



Knoxville Bolt & Screw, Inc.
 P. O. Box 9217
 Knoxville, TN. 37940-0217

ROUND HEAD SHORT SQUARE NECK BOLTS

Nominal Size ¹ or Basic Bolt Diameter	E		A		H		O		P		Q	R	
	Body Diameter		Head Diameter		Head Height		Square Width		Square Depth		Corner Radius on Square	Fillet Radius	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Max	
1/4	0.2500	0.260	0.213	0.594	0.563	0.145	0.125	0.260	0.245	0.124	0.093	0.031	0.031
5/16	0.3125	0.324	0.272	0.719	0.688	0.176	0.156	0.324	0.307	0.124	0.093	0.031	0.031
3/8	0.3750	0.388	0.329	0.844	0.782	0.208	0.188	0.388	0.368	0.156	0.125	0.047	0.031
7/16	0.4375	0.452	0.385	0.969	0.907	0.239	0.219	0.452	0.431	0.156	0.125	0.047	0.031
1/2	0.5000	0.515	0.444	1.094	1.032	0.270	0.250	0.515	0.492	0.156	0.125	0.047	0.031
5/8	0.6250	0.642	0.559	1.344	1.219	0.344	0.313	0.642	0.616	0.218	0.187	0.078	0.062
3/4	0.7500	0.768	0.678	1.594	1.469	0.406	0.375	0.768	0.741	0.218	0.187	0.078	0.062

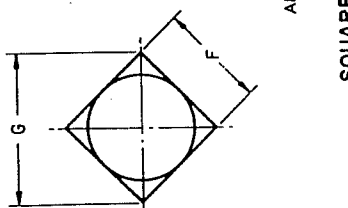
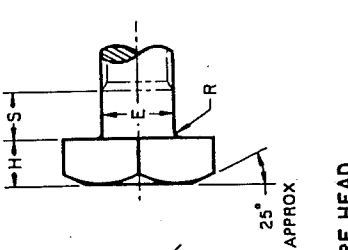
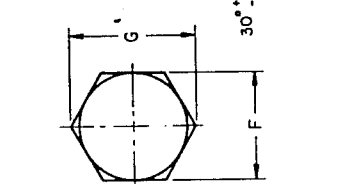
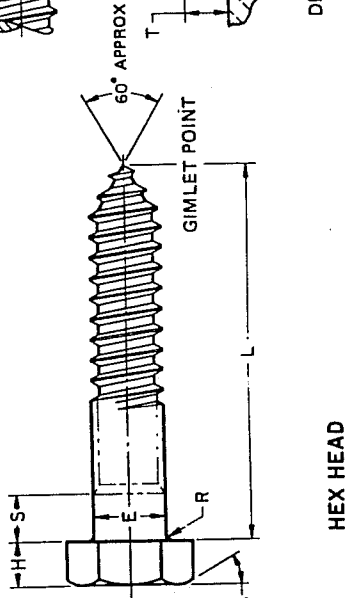
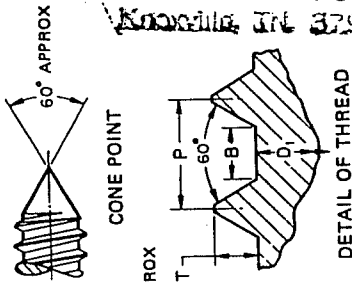
NOTES: 1. Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
 2. See General Data on Pages B-4 and B-5.



SQUARE AND HEX LAG SCREWS

1970 Draft
Revision of
ANSI B18.2.1
1968

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN 37940-0217



Nominal Size or Basic Product Dia	E		F		G			H			Hex Lag Screws			S		Threads per Inch	Thread Dimensions			
	Max	Min	Width Across Flats		Width Across Corners		Height		Basic	Height		Min	Max	Min	Max		Radius of Fillet	Pitch	Depth of Thread	Root Dia
			Basic	Max	Min	Max	Min	Max		Min	Max									
No. 10	0.190	0.178	9/32	0.281	0.271	0.398	0.372	1/8	0.323	0.309	1/8	0.140	0.110	0.094	0.030	0.01	0.091	0.039	0.035	0.120
**1/4	0.2500	0.237	3/8	0.375	0.362	0.530	0.498	11/64	0.188	0.156	—	—	—	0.094	0.030	0.01	0.100	0.043	0.039	0.173
**1/4	0.2500	0.260	23/76	0.438	0.425	—	—	—	0.505	0.484	11/64	0.188	0.150	0.094	0.030	0.01	0.100	0.043	0.039	0.173
5/16	0.3125	0.324	29/80	0.500	0.484	0.707	0.665	13/64	0.220	0.186	0.577	0.552	7/32	0.235	0.195	0.125	0.111	0.048	0.043	0.227
3/8	0.3750	0.388	3/8	0.562	0.544	0.795	0.747	1/4	0.268	0.232	0.650	0.620	1/4	0.268	0.226	0.125	0.143	0.062	0.055	0.265
7/16	0.4375	0.452	5/8	0.625	0.603	0.884	0.828	19/64	0.316	0.278	0.722	0.687	19/64	0.316	0.272	0.156	0.143	0.062	0.055	0.328
1/2	0.5000	0.515	3/4	0.750	0.725	1.061	0.995	21/64	0.348	0.308	0.866	0.826	11/32	0.364	0.302	0.156	0.167	0.072	0.064	0.371
5/8	0.6250	0.642	15/16	0.938	0.906	1.326	1.244	27/64	0.444	0.400	1.083	1.033	27/64	0.444	0.378	0.312	0.200	0.086	0.077	0.471
3/4	0.7500	0.768	1-1/8	1.125	1.088	1.591	1.494	1/2	0.524	0.476	1.299	1.240	1/2	0.524	0.455	0.375	0.222	0.096	0.085	0.579
7/8	0.8750	0.895	1-5/16	1.312	1.269	1.856	1.742	19/32	0.620	0.568	1.516	1.447	37/64	0.604	0.531	0.375	0.250	0.108	0.096	0.683
1	1.0000	1.022	1-1/2	1.500	1.450	2.121	1.991	21/32	0.684	0.628	1.732	1.653	43/64	0.700	0.591	0.625	0.286	0.123	0.110	0.780
1-1/8	1.1250	1.149	1-11/16	1.688	1.631	2.386	2.239	3/4	0.780	0.720	1.949	1.859	3/4	0.780	0.658	0.625	0.308	0.133	0.119	0.887
1-1/4	1.2500	1.277	1-7/8	1.875	1.812	2.632	2.489	27/32	0.876	0.812	2.165	2.066	27/32	0.876	0.749	0.625	0.308	0.133	0.119	1.012
See Notes	12	6, 7	3											7						10

(continued)

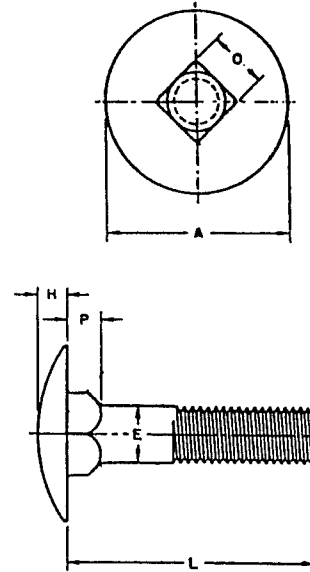
* Square Lag Screw
** Hex Lag Screw
See Notes on Page A-19.

STEP BOLTS

STEP BOLTS

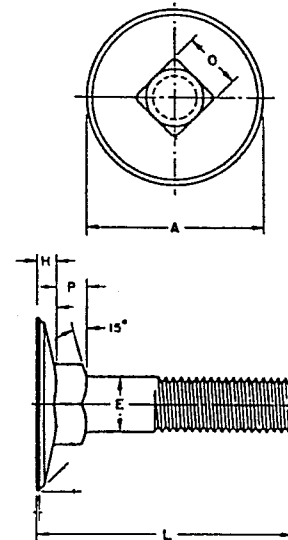
Nominal Size ¹ or Basic Bolt Diameter	E		A		H		O		P		
	Body Diameter		Head Diameter		Head Height		Square Width		Square Depth		
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
No. 10	0.1900	0.199	0.182	0.656	0.625	0.114	0.094	0.199	0.185	0.125	0.094
1/4	0.2500	0.260	0.237	0.844	0.813	0.145	0.125	0.260	0.245	0.156	0.125
5/16	0.3125	0.324	0.298	1.031	1.000	0.176	0.156	0.324	0.307	0.187	0.156
3/8	0.3750	0.388	0.360	1.219	1.188	0.208	0.188	0.388	0.368	0.219	0.188

Knoxville Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217



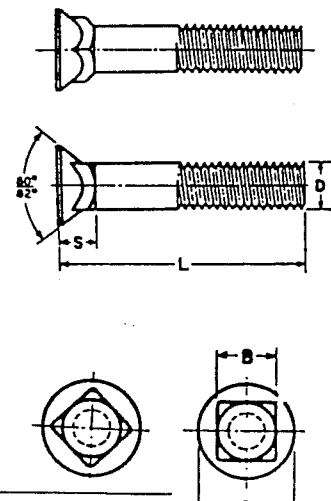
ELEVATOR BOLTS

Nominal Size ¹ or Basic Bolt Diameter	E		A			H		O		P		
	Body Diameter		Head Diameter			Head Height		Square Width		Square Depth		
	Max	Min	Max, Edge Sharp	Min, Edge Sharp	Min, Edge Flat	Max	Min	Max	Min	Max	Min	
1/4	0.2500	0.260	0.237	1.008	0.969	0.938	0.098	0.078	0.280	0.245	0.219	0.188
5/16	0.3125	0.324	0.298	1.227	1.188	1.157	0.114	0.094	0.342	0.307	0.250	0.219
3/8	0.3750	0.388	0.360	1.352	1.312	1.272	0.145	0.125	0.405	0.368	0.250	0.219



NO. 3 HEAD PLOW BOLTS

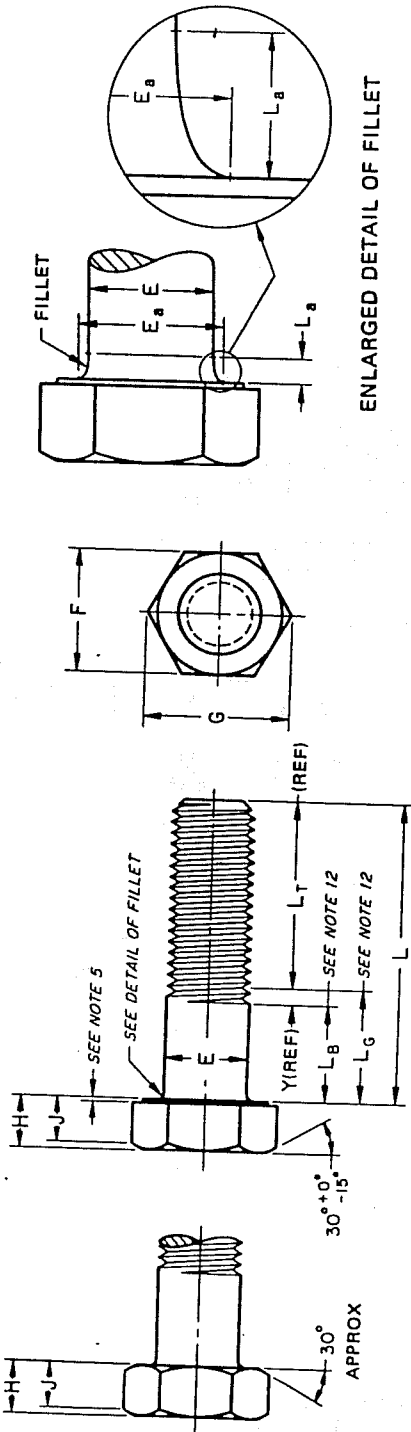
Nominal Diameter of Bolt	A			F	S		B	
	Diameter of Head			Feed Thickness	Depth of Square and Head		Width of Square	
	Max	Min Sharp	Abs. Min With Flat	Max	Max	Min	Max	Min (Basic)
3/8	0.708	0.671	0.656	0.031	0.312	0.281	0.387	0.375
7/16	0.826	0.781	0.766	0.036	0.364	0.328	0.450	0.438
1/2	0.945	0.890	0.875	0.042	0.417	0.375	0.515	0.500
5/8	1.147	1.094	1.063	0.050	0.506	0.456	0.640	0.625



HEX CAP SCREWS (FINISHED HEX BOLTS)

1970 Draft
Revision of
ANSI B18.2.1
1965

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217



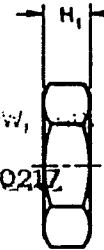
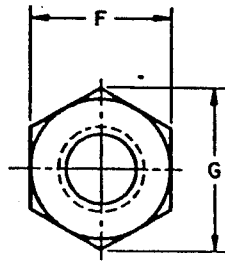
ENLARGED DETAIL OF FILLET

Nominal Size or Basic Product Dia	E Body Dia		F Width Across Flats		G Width Across Corners		H Height		J Wrenching Height		Runout of Bearing Surface FIR	L ₀ Fillet Length		R Radius of Fillet	L _T (Ref) Thread Length For Screw Lengths		Y (Ref) Transition Thread Lengths For Screw Lengths	
	Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min		Max	Min		Basic	Max	Basic	Max
1/4	0.2500	0.2450	7/16	0.438	0.428	0.505	0.488	5/32	0.163	0.150	0.010	0.300	0.280	0.015	0.750	1.000	0.400	0.650
5/16	0.3125	0.3065	1/2	0.500	0.489	0.577	0.557	13/64	0.211	0.195	0.011	0.362	0.342	0.015	0.875	1.125	0.417	0.667
3/8	0.3750	0.3690	9/16	0.562	0.551	0.650	0.628	15/64	0.243	0.226	0.012	0.425	0.405	0.015	1.000	1.250	0.438	0.688
7/16	0.4375	0.4305	5/8	0.625	0.612	0.722	0.698	9/32	0.291	0.272	0.013	0.488	0.468	0.015	1.125	1.375	0.464	0.714
1/2	0.5000	0.4930	3/4	0.750	0.736	0.866	0.840	5/16	0.323	0.302	0.014	0.550	0.530	0.015	1.250	1.500	0.481	0.731
5/8	0.5625	0.5545	13/16	0.812	0.798	0.938	0.910	23/64	0.371	0.348	0.015	0.652	0.602	0.015	1.375	1.625	0.500	0.750
3/4	0.6250	0.6170	15/16	0.938	0.922	1.083	1.051	25/64	0.403	0.378	0.017	0.715	0.665	0.020	1.500	1.750	0.520	0.773
7/8	0.7500	0.7410	1-1/8	1.125	1.100	1.299	1.254	15/32	0.483	0.455	0.020	0.840	0.790	0.020	1.750	2.000	0.540	0.800
1	0.8750	0.8660	1-1/2	1.312	1.285	1.516	1.465	35/64	0.563	0.531	0.023	1.005	0.955	0.023	2.000	2.250	0.560	0.833
1-1/8	1.1250	1.1140	1-1/2	1.500	1.469	1.732	1.675	39/64	0.627	0.591	0.026	1.190	1.120	0.026	2.250	2.500	0.580	0.875
1-1/4	1.2500	1.2390	1-7/8	1.688	1.631	1.949	1.859	11/16	0.716	0.658	0.029	1.315	1.245	0.029	2.500	2.750	0.600	0.929
1-3/8	1.3750	1.3630	2-1/16	1.875	1.812	2.165	2.066	25/32	0.813	0.749	0.033	1.440	1.370	0.033	2.750	3.000	0.620	0.929
1-1/2	1.5000	1.4880	2-1/4	2.062	1.994	2.382	2.273	27/32	0.878	0.810	0.036	1.565	1.495	0.036	3.000	3.250	0.640	1.000
1-3/4	1.7500	1.7380	2-5/8	2.250	2.175	2.598	2.480	15/16	0.974	0.902	0.039	1.690	1.620	0.039	3.250	3.500	0.660	1.000
2	2.0000	2.0000	3	2.625	2.538	3.031	2.893	1-3/32	1.134	1.054	0.046	1.940	1.870	0.046	3.500	4.000	0.680	1.000
2-1/4	2.2500	2.2380	3-3/8	3.000	2.900	3.464	3.306	1-7/32	1.263	1.175	0.052	2.190	2.120	0.052	4.000	4.500	0.700	1.000
2-1/2	2.5000	2.4880	3-3/4	3.375	3.262	3.897	3.719	1-3/8	1.423	1.327	0.059	2.440	2.370	0.059	4.250	4.750	0.720	1.167
2-3/4	2.7500	2.7380	4-1/8	3.750	3.625	4.330	4.133	1-17/32	1.583	1.479	0.065	2.690	2.620	0.065	4.500	5.000	0.740	1.250
3	3.0000	3.0000	4-1/2	4.125	3.988	4.763	4.546	1-1/16	1.744	1.632	0.072	2.940	2.870	0.072	5.000	5.500	0.760	1.250
See Notes 18			8	4.500	4.350	5.196	4.959	1-7/8	1.935	1.815	0.079	3.190	3.120	0.079	6.000	6.500	0.780	1.250
						4						7						
																		12

(continued)

See Notes on Page A-11.

Finished Hex Nuts and Hex Jam Nuts



Knoxville Bolt & Screw,
P. O. Box 9217
Knoxville, IN. 37940-0217

Nominal Size or Basic Major Dia of Thread	F			G		H			H ₁		
	Width Across Flats			Width Across Corners		Thickness Hex Nuts			Thickness Hex Jam Nuts		
	Basic	Max	Min	Max	Min	Basic	Max	Min	Basic	Max	Min
1/4 0.2500	7/16	0.438	0.428	0.505	0.488	7/32	0.226	0.212	5/32	0.164	0.130
5/16 0.3125	1/2	0.500	0.489	0.577	0.557	17/64	0.273	0.258	3/16	0.195	0.180
3/8 0.3750	9/16	0.562	0.551	0.650	0.628	21/64	0.337	0.320	7/32	0.227	0.210
7/16 0.4375	11/16	0.688	0.675	0.794	0.768	3/8	0.385	0.365	1/4	0.260	0.240
1/2 0.5000	3/4	0.750	0.736	0.866	0.840	7/16	0.448	0.427	5/16	0.323	0.302
9/16 0.5625	7/8	0.875	0.861	1.010	0.982	31/64	0.496	0.473	5/16	0.324	0.301
5/8 0.6250	15/16	0.938	0.922	1.083	1.051	35/64	0.559	0.535	3/8	0.387	0.363
3/4 0.7500	1-1/8	1.125	1.088	1.299	1.240	41/64	0.665	0.617	27/64	0.446	0.398
7/8 0.8750	1-5/16	1.312	1.269	1.516	1.447	3/4	0.776	0.724	31/64	0.510	0.458
1 1.0000	1-1/2	1.500	1.450	1.732	1.653	55/64	0.887	0.831	35/64	0.575	0.519
1-1/8 1.1250	1-11/16	1.688	1.631	1.949	1.859	31/32	0.999	0.939	39/64	0.639	0.579
1-1/4 1.2500	1-7/8	1.875	1.812	2.165	2.066	1-1/16	1.094	1.030	23/32	0.751	0.687
1-3/8 1.3750	2-1/16	2.062	1.994	2.382	2.273	1-11/64	1.206	1.138	25/32	0.815	0.747
1-1/2 1.5000	2-1/4	2.250	2.175	2.598	2.480	1-9/32	1.317	1.245	27/32	0.880	0.808

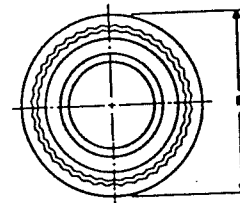
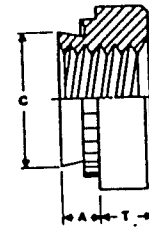
External Threads Class 2A

Internal Threads Class 2B

Nominal Size Threads Per In. and Series Designation	External Threads							Internal Threads					
	Allow- ance	Major Diameter		Pitch Diameter			Nom. Minor Dia.	Minor Diameter		Pitch Diameter			Major Dia. Min.
		Max.	Min.	Max.	Min.	Tol.		Min.	Max.	Min.	Max.	Tol.	
2 -56 UNC	0.0006	0.0854	0.0813	0.0738	0.0717	0.0021	0.0635	0.0667	0.0737	0.0744	0.0772	0.0028	0.0660
3 -48 UNC	0.0007	0.0983	0.0938	0.0848	0.0825	0.0023	0.0727	0.0764	0.0845	0.0855	0.0885	0.0030	0.0990
4 -40 UNC	0.0008	0.1112	0.1061	0.0950	0.0925	0.0025	0.0805	0.0849	0.0939	0.0958	0.0991	0.0033	0.1120
5 -40 UNC	0.0008	0.1242	0.1191	0.1080	0.1054	0.0026	0.0935	0.0979	0.1062	0.1088	0.1121	0.0033	0.1250
6 -32 UNC	0.0008	0.1372	0.1312	0.1169	0.1141	0.0028	0.0989	0.104	0.114	0.1177	0.1214	0.0037	0.1380
8 -32 UNC	0.0009	0.1631	0.1571	0.1428	0.1399	0.0029	0.1248	0.130	0.139	0.1437	0.1475	0.0038	0.1640
10 -24 UNC	0.0010	0.1890	0.1818	0.1619	0.1586	0.0033	0.1379	0.145	0.156	0.1629	0.1672	0.0043	0.1900
10 -32 UNF	0.0009	0.1891	0.1831	0.1688	0.1658	0.0030	0.1508	0.156	0.164	0.1697	0.1736	0.0039	0.1900
12 -24 UNC	0.0010	0.2150	0.2078	0.1879	0.1845	0.0034	0.1639	0.171	0.181	0.1889	0.1933	0.0044	0.2160
1/4 -20 UNC	0.0011	0.2489	0.2408	0.2164	0.2127	0.0037	0.1876	0.196	0.207	0.2175	0.2223	0.0048	0.2500
1/4 -28 UNF	0.0010	0.2490	0.2425	0.2258	0.2225	0.0033	0.2052	0.211	0.220	0.2268	0.2311	0.0043	0.2500
5/16 -18 UNC	0.0012	0.3113	0.3026	0.2752	0.2712	0.0040	0.2431	0.252	0.265	0.2764	0.2817	0.0053	0.3125
3/4 -16 UNC	0.0013	0.3737	0.3643	0.3331	0.3287	0.0044	0.2970	0.307	0.321	0.3344	0.3401	0.0057	0.3750
1/2 -13 UNC	0.0015	0.4985	0.4876	0.4485	0.4435	0.0050	0.4041	0.417	0.434	0.4500	0.4565	0.0065	0.5000

SELF CLINCHING NUTS

SIZE	A MAX.	MINIMUM SHEET THICKNESS	HOLE SIZE IN SHEET +.003 - .000	C MAX.	E	T
4-40-0	.030	.030-0.39	.166	.165	.25	.07
4-40-1	.038	.040	.166	.165	.25	.07
4-40-2	.054	.056	.160	.165	.25	.07
6-32-0	.030	.030-0.39	.1875	.187	.28	.07
6-32-1	.038	.040	.1875	.187	.28	.07
6-32-2	.054	.056	.1875	.187	.28	.07
8-32-0	.030	.030-0.39	.213	.212	.31	.09
8-32-1	.038	.040	.213	.212	.31	.09
8-32-2	.054	.056	.213	.212	.31	.09
10-24-0	.030	.030-0.39	.250	.249	.34	.09
10-24-1	.038	.040	.250	.249	.34	.09
10-24-2	.054	.056	.250	.249	.34	.09
10-32-0	.030	.030-0.39	.250	.249	.34	.09
10-32-1	.038	.040	.250	.249	.34	.09
10-32-2	.054	.056	.250	.249	.34	.09
1/4-20-1	.054	.056	.344	.343	.44	.17
1/4-20-2	.087	.081	.344	.343	.44	.17



A COMPARISON OF PART NUMBERS

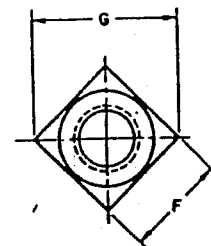
Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217.

KANEBRIDGE	PEM*	CAPTIVE
04NCL 04-1NCL 04-2NCL	S-440-0 S-440-1 S-440-2	C-440-0 C-440-1 C-440-2
06-0NCL 06-1NCL 06-2NCL	S-632-0 S-632-1 S-632-2	C-632-0 C-632-1 C-632-2
08-0NCL 08-1NCL 08-2NCL	S-832-0 S-832-1 S-832-2	C-832-0 C-832-1 C-832-2
10-0NCL 10-1NCL 10-2NCL	SS-024-0 SS-024-1 SS-024-2	C-024-0 C-024-1 C-024-2
11-0NCL 11-1NCL 11-2NCL	SS-032-0 SS-032-1 SS-032-2	C-032-0 C-032-1 C-032-2
14-1NCL 14-2NCL	S-0420-1 S-0420-2	C-0420-1 C-0420-2

*PEM" IS A REGISTERED TRADEMARK OF PENN ENGINEERING & MANUFACTURING CORPORATION

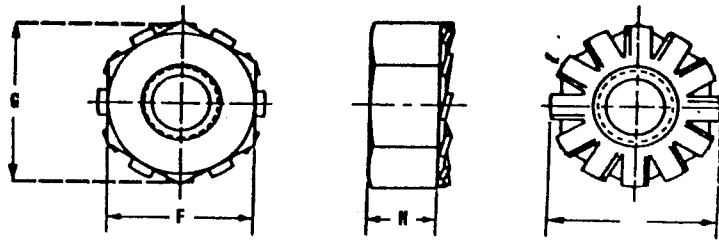
REGULAR SQUARE NUTS

Nominal Size or Basic Major Dia of Thread	F			G		H		
	Width Across Flats			Width Across Corners		Thickness		
	Basic	Max	Min	Max	Min	Basic	Max	Min
1/4 0.2500	7/16	0.438	0.425	0.619	0.584	7/32	0.235	0.203
5/16 0.3125	9/16	0.562	0.547	0.795	0.751	17/64	0.283	0.249
3/8 0.3750	5/8	0.625	0.606	0.884	0.832	21/64	0.346	0.310
7/16 0.4375	3/4	0.750	0.728	1.061	1.000	3/8	0.394	0.356
1/2 0.5000	13/16	0.812	0.788	1.149	1.082	7/16	0.458	0.418
5/8 0.6250	1	1.000	0.969	1.414	1.330	35/64	0.569	0.525
3/4 0.7500	1-1/8	1.125	1.088	1.591	1.494	21/32	0.680	0.632
7/8 0.8750	1-5/16	1.312	1.269	1.856	1.742	49/64	0.792	0.740
1 1.0000	1-1/2	1.500	1.450	2.121	1.991	7/8	0.903	0.847



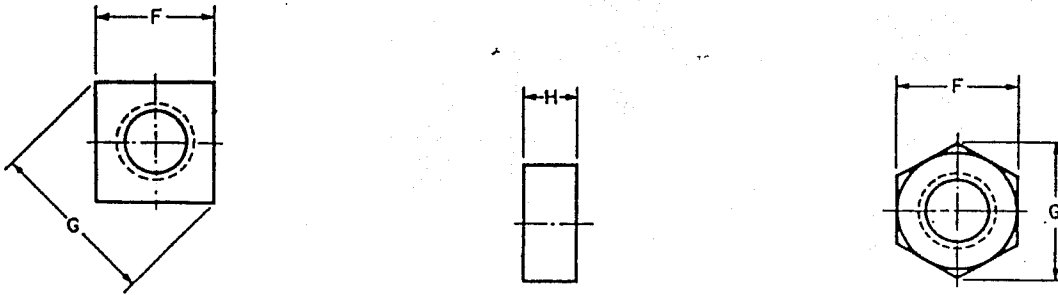
"K" Lock Nuts

Knockoff Bolt & Saver, Inc.
 15 E. Oak Hill
 Knoxville, TN 37918-0217



Nominal Size or Basic Thread Diameter	F			G		H		I
	Width Across Flats			Width Across Corners		Thickness		Washer DIAMETER
				Hex				
	Basic	Max.	Min.	Max.	Min.	Max.	Min.	Ref.
4 0.1120	1/4	0.250	0.241	0.289	0.275	0.098	0.087	0.281
6 0.1380	5/16	0.312	0.302	0.361	0.344	0.114	0.102	0.344
8 0.1640	11/32	0.344	0.332	0.397	0.378	0.130	0.117	0.375
10 0.1900	3/8	0.375	0.362	0.433	0.413	0.130	0.117	0.406
1/4 0.2500	7/16	0.438	0.423	0.505	0.482	0.193	0.178	0.500
5/16 0.3125	1/2	0.500	0.489	0.577	0.557	0.273	0.258	0.578
3/8 0.3750	9/16	0.562	0.551	0.650	0.628	0.385	0.365	0.656

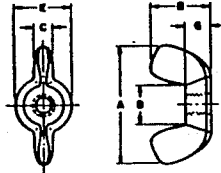
Square and Hex Machine Screw Nuts



Nominal Size or Basic Thread Diameter	F			G		G ₁		H	
	Width Across Flats			Width Across Corners				Thickness	
				Square		Hex			
	Basic	Max	Min	Max	Min	Max	Min	Max	Min
2 0.0860	3/16	0.188	0.180	0.265	0.247	0.217	0.205	0.066	0.057
3 0.0990	3/16	0.188	0.180	0.265	0.247	0.217	0.205	0.066	0.057
4 0.1200	1/4	0.250	0.241	0.354	0.331	0.289	0.275	0.098	0.087
5 0.1250	5/16	0.312	0.302	0.442	0.415	0.361	0.344	0.114	0.102
6 0.1380	5/16	0.312	0.302	0.442	0.415	0.361	0.344	0.114	0.102
8 0.1640	11/32	0.344	0.332	0.486	0.456	0.397	0.378	0.130	0.117
10 0.1900	3/8	0.375	0.362	0.530	0.497	0.433	0.413	0.130	0.117
12 0.2160	7/16	0.438	0.423	0.619	0.581	0.505	0.482	0.161	0.148
1/4 0.2500	7/16	0.438	0.423	0.619	0.581	0.505	0.482	0.193	0.178
5/16 0.3125	9/16	0.562	0.545	0.795	0.748	0.650	0.621	0.225	0.208
3/8 0.3750	5/8	0.625	0.607	0.884	0.833	0.722	0.692	0.257	0.239

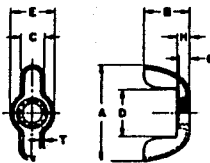
WING NUTS

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217



Cold Forged

Nominal Size or Basic Major Diameter of Thread	Threads per Inch	A		B		C		D		E		G	
		Wing Spread		Wing Height		Wing Thickness		Between Wings		Boss Diameter		Boss Height	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
6 0.1380	32	0.72	0.59	0.41	0.28	0.11	0.07	0.21	0.17	0.33	0.29	0.14	0.10
8 0.1640	32	0.91	0.78	0.47	0.34	0.14	0.10	0.27	0.22	0.43	0.39	0.18	0.14
10 0.1900	24 & 32	0.91	0.78	0.47	0.34	0.14	0.10	0.27	0.22	0.45	0.39	0.18	0.14
1/4 0.2500	20	1.10	0.97	0.57	0.43	0.18	0.14	0.39	0.26	0.50	0.45	0.22	0.17
5/16 0.3125	18	1.25	1.12	0.66	0.53	0.21	0.17	0.39	0.32	0.58	0.51	0.25	0.20
3/8 0.3750	16	1.44	1.31	0.79	0.65	0.24	0.20	0.48	0.42	0.70	0.64	0.30	0.26
1/2 0.5000	13	1.94	1.81	1.00	0.87	0.33	0.26	0.65	0.54	0.93	0.86	0.39	0.35



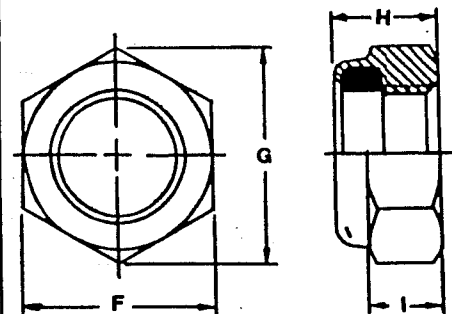
Stamped

Nominal Size or Basic Major Diameter of Thread	Threads per Inch	A		B		C		D		E		G		H		T	
		Wing Spread		Wing Height		Wing Thickness		Between Wings		Boss Diameter		Boss Height		Wall Height		Stack Thickness	
		Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.	Min.	Min.	Min.	Min.	Min.	Max.	Min.	
6 0.1380	32	0.78	0.72	0.40	0.34	0.18	0.14	0.25	0.41	0.35	0.08	0.12	0.04	0.03			
8 0.1640	32	0.78	0.72	0.40	0.34	0.18	0.14	0.25	0.41	0.35	0.08	0.12	0.04	0.03			
10 0.1900	24 & 32	0.91	0.85	0.47	0.41	0.21	0.17	0.34	0.53	0.47	0.10	0.12	0.04	0.03			
1/4 0.2500	20	1.11	1.05	0.50	0.44	0.25	0.21	0.34	0.62	0.56	0.11	0.12	0.05	0.04			

NYLON INSERT STOP NUTS

THIN PATTERN

Nominal Size or Basic Thread Diameter		F			H		I	G
		Width Across Flats			Thickness		Side Height	Width Across Corners
		Basic	Max.	Min.	Max.	Min.	Ref.	Ref.
4 0.1120	1/4	0.251	0.243	.124	.094	.075	0.268	
6 0.1380	5/16	0.313	0.305	.140	.110	.090	0.399	
8 0.164	11/32	0.345	0.336	.187	.157	.110	0.374	
10 0.190	3/8	0.376	0.367	.187	.157	.110	0.410	
1/4 0.250	7/16	0.439	0.430	.218	.188	.125	0.482	



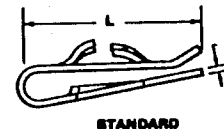
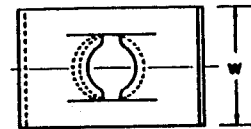
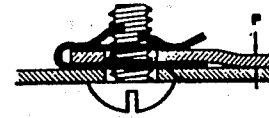
STEEL SPRING NUTS

Heat Treated, Spring Steel, Black Phosphate & Oil

"U" TYPE

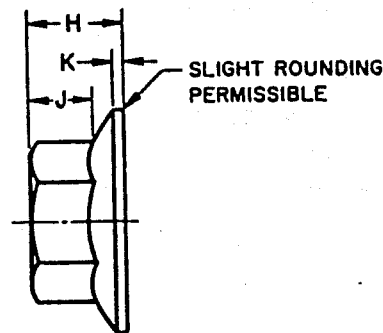
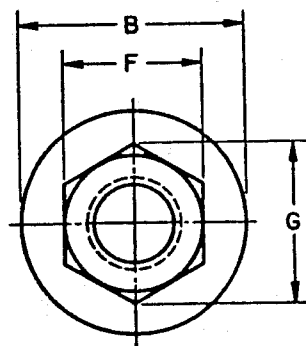
SPECIFICATIONS

PART NUMBER	SCREW SIZE	P PANEL RANGE	L LENGTH	W WIDTH	T MATERIAL THICKNESS
8090632	6/32	.025-.040	.48	.50	.017
8091632	6/32	.045-.062	.48	.50	.017
8093632	6/32	.045-.062	.65	.31	.017
8094632	6/32	.025-.040	.62	.31	.017
8095632	6/32	.045-.062	.63	.31	.017
80968	6A or B	.025-.040	.48	.50	.025
80967	6A or B	.045-.062	.47	.50	.025
81006	6A or B	.025-.040	.61	.31	.025
81016	6A or B	.045-.062	.62	.31	.025
8102832	8/32	.025-.040	.52	.50	.017
8103832	8/32	.045-.062	.67	.41	.017
8105832	8/32	.045-.062	.67	.41	.017
8106832	8/32	.025-.040	.66	.41	.017
8107832	8/32	.045-.062	.67	.41	.017
81088	8A or B	.025-.040	.52	.50	.028
81088	8A or B	.045-.062	.67	.41	.028
81128	8A or B	.025-.040	.65	.41	.028
81138	8A or B	.045-.062	.66	.41	.028
81141024	10/24	.025-.040	.58	.63	.022
81151024	10/24	.045-.062	.56	.63	.022
81171024	10/24	.045-.062	.76	.38	.022
81181024	10/24	.025-.040	.95	.38	.022
81191024	10/24	.045-.062	.95	.38	.022
812010	10A or B	.025-.040	.58	.63	.031
812110	10A or B	.045-.062	.56	.63	.031
812310	10A or B	.045-.062	.76	.50	.031
812410	10A or B	.025-.040	.96	.50	.031
812510	10A or B	.045-.062	.95	.50	.031



STANDARD

SERRATED FLANGE LOCK NUTS

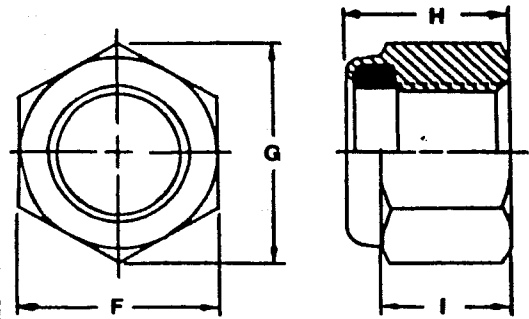


Nominal Size or Basic Major Dia of Thread	F		G		B		H		J	K	
	Width Across Flats		Width Across Corners		Flange Diameter		Nut Thickness		Wrenching Length	Flange Thickness	
	Max	Min	Max	Min	Max	Min	Max	Min	Min	Min	
No. 6	0.1380	0.312	0.302	0.361	0.342	0.422	0.406	0.171	0.156	0.10	0.02
8	0.1640	0.344	0.334	0.397	0.381	0.469	0.452	0.203	0.187	0.13	0.02
10	0.1900	0.375	0.365	0.433	0.416	0.500	0.480	0.219	0.203	0.13	0.03
12	0.2160	0.438	0.428	0.505	0.488	0.594	0.574	0.236	0.222	0.14	0.04
1/4	0.2500	0.438	0.428	0.505	0.488	0.594	0.574	0.236	0.222	0.14	0.04
5/16	0.3125	0.500	0.489	0.577	0.557	0.680	0.660	0.283	0.268	0.17	0.04
3/8	0.3750	0.562	0.551	0.650	0.628	0.750	0.728	0.347	0.330	0.23	0.04
7/16	0.4375	0.688	0.675	0.794	0.768	0.937	0.910	0.395	0.375	0.26	0.04
1/2	0.5000	0.750	0.736	0.866	0.840	1.031	1.000	0.458	0.437	0.31	0.05

NYLON INSERT STOP NUTS

Engineering Invention & Service, Inc.
 P. O. Box 1217
 Knoxville, TN 37940-0217

Nominal Size or Basic Thread Diameter	F			H		I	G	
	Width Across Flats			Thickness		Side Height	Width Across Corners	
	Basic	Max.	Min.	Max.	Min.	Ref.	Ref.	
4	0.1120	1/4	0.251	0.243	0.153	0.133	0.081	0.268
6	0.1380	5/16	0.313	0.305	0.188	0.168	0.103	0.399
8	0.164	11/32	0.345	0.336	0.239	0.219	0.140	0.374
10	0.190	3/8	0.376	0.367	0.249	0.229	0.140	0.410
1/4	0.250	7/16	0.439	0.430	0.328	0.298	0.225	0.482
5/16	0.3125	1/2	0.502	0.492	0.359	0.329	0.250	0.552
3/8	0.3750	9/16	0.564	0.553	0.468	0.438	0.335	0.622



Weights of Wood Screws

(Approximate weight of 1000 steel wood screws in pounds)

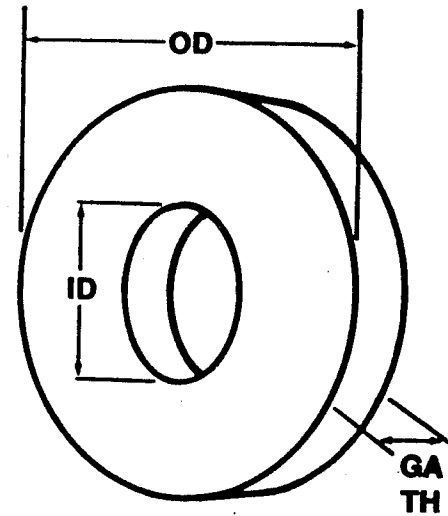
Screw Size Length (Inches)	Screw Size									
	4	5	6	7	8	9	10	12	14	
1/4	0.7	—	—	—	—	—	—	—	—	
3/8	1.0	1.2	1.4	1.7	2.3	—	—	—	—	
1/2	1.2	1.6	1.9	2.3	2.9	3.2	3.8	—	—	
5/8	1.5	1.8	2.2	2.8	3.2	3.9	4.4	7.5	—	
3/4	1.7	2.1	2.7	3.2	3.8	4.5	5.1	7.8	8.9	
7/8	2.0	2.5	3.0	3.7	4.2	5.2	5.9	8.1	9.8	
1	2.4	2.9	3.4	4.1	4.9	5.7	6.6	8.8	10.9	
1 - 1/4	2.8	4.3	4.3	5.5	6.2	7.2	8.4	11.0	13.7	
1 - 1/2	3.3	4.5	5.3	6.2	7.4	8.6	10.0	13.0	16.5	
1 - 3/4	4.2	5.1	6.1	7.3	8.7	10.0	11.4	14.7	18.5	
2	—	—	6.9	8.3	9.6	11.3	12.6	17.4	21.3	
2 - 1/4	—	—	8.2	9.5	11.0	12.8	15.0	19.2	24.7	
2 - 1/2	—	—	8.6	10.4	11.7	14.7	16.3	22.4	26.8	
2 - 3/4	—	—	—	—	13.8	15.4	18.8	23.9	29.0	
3	—	—	—	—	14.9	17.4	20.1	26.3	32.1	
3 - 1/2	—	—	—	—	18.5	22.0	24.3	31.1	37.7	
4	—	—	—	—	22.5	—	29.8	34.1	42.9	

NOTES: 1 Brass Wood Screw weights are calculated by multiplying the above by 1.08.

Knoxville Bolt & Screw, Inc.
 P. O. Box 9217
 Knoxville, IN. 37940-0217

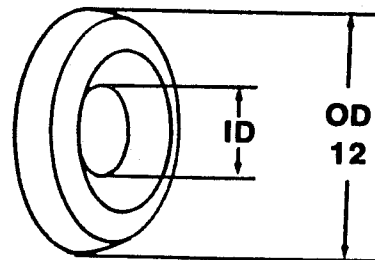
SAE WASHERS

BOLT SIZE	ID	OD	GAUGE	APPROX. NO. IN 100#	APPROX. LBS. PER "M"
#6	5/32	3/8	18	79,000	1.3
#8	3/16	7/16	18	58,500	1.7
#10	7/32	1/2	18	43,500	2.3
#12	1/4	9/16	18	36,200	2.8
1/4	9/32	5/8	16	22,200	4.5
5/16	11/32	11/16	16	19,200	5.2
3/8	13/32	13/16	16	14,000	7.2
7/16	15/32	89/64	16	10,500	9.5
1/2	17/32	1 1/16	13	5,500	18.3
9/16	19/32	1 3/16	13	4,300	23.4
5/8	21/32	1 5/16	13	3,600	27.7
3/4	13/16	1 1/2	10	2,100	47.4
7/8	15/16	1 3/4	10	1,600	63.0
1	1 1/16	2	10	1,200	83.0
1 1/8	1 3/16	2 1/4	10	920	109.0
1 1/4	1 5/16	2 1/2	9	576	173.0
1 3/8	1 7/16	2 3/4	9	438	228.0
1 1/2	1 9/16	3	9	366	274.0



USS WASHERS

BOLT SIZE	ID	OD	GAUGE	APPROX. NO. IN 100#	APPROX. LBS. PER "M"
3/16	1/4	9/16	18	36,200	2.8
1/4	5/16	3/4	16	14,900	6.7
5/16	3/8	7/8	14	9,000	11.1
3/8	7/16	1	14	6,700	14.9
7/16	1/2	1 1/4	14	4,100	24.4
1/2	9/16	1 3/8	12	2,600	38.5
9/16	5/8	1 1/2	12	2,200	45.5
5/8	11/16	1 3/4	10	1,300	77.0
3/4	13/16	2	9	910	110.0
7/8	15/16	2 1/4	8	650	153.0
1	1 1/16	2 1/2	8	530	188.0
1 1/8	1 1/4	2 3/4	8	450	220.0
1 1/4	1 3/8	3	8	380	260.0
1 3/8	1 1/2	3 1/4	7	300	333.0
1 1/2	1 5/8	3 1/2	7	260	385.0



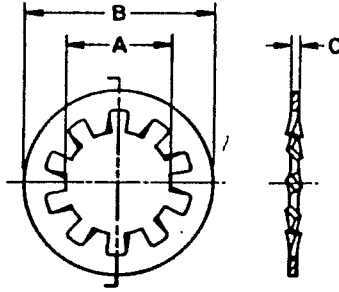
COUNTERSUNK FINISHING WASHER

SIZE	ID	OD	WT PERM
6	.173	.469	.8
8	.209	.531	1.1
10	.269	.593	1.4
12	.275	.656	2.1
14	.324	.781	2.7

Lock Washers

Knoxville Bolt & Screw, Inc.
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Knoxville, IN. 37940-0217

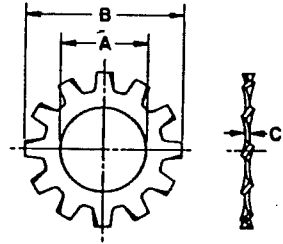
Internal Tooth Lock Washers



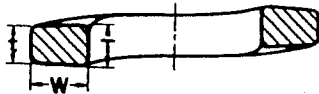
Nominal Washer Size	A		B		C		
	Inside Diameter		Outside Diameter		Thickness		
	Min.	Max.	Max.	Min.	Max.	Min.	
No. 2	0.086	0.089	0.095	0.200	0.175	0.015	0.010
4	0.112	0.115	0.123	0.270	0.255	0.019	0.015
6	0.138	0.141	0.150	0.295	0.275	0.021	0.017
8	0.164	0.168	0.176	0.340	0.325	0.023	0.018
10	0.190	0.195	0.204	0.381	0.365	0.025	0.020
12	0.216	0.221	0.231	0.410	0.394	0.025	0.020
1/4	0.250	0.256	0.267	0.478	0.460	0.028	0.023
5/16	0.312	0.320	0.332	0.610	0.594	0.034	0.028
3/8	0.375	0.384	0.398	0.692	0.670	0.040	0.032
7/16	0.438	0.448	0.464	0.789	0.746	0.040	0.032
1/2	0.500	0.512	0.530	0.900	0.867	0.045	0.037
5/8	0.625	0.640	0.663	1.071	1.045	0.050	0.042

External Tooth Lock Washers

Nominal Washer Size	A		B		C		
	Inside Diameter		Outside Diameter		Thickness		
	Min.	Max.	Max.	Min.	Max.	Min.	
No. 4	0.112	0.115	0.123	0.260	0.245	0.019	0.015
6	0.138	0.141	0.150	0.320	0.305	0.022	0.016
8	0.164	0.168	0.176	0.381	0.365	0.023	0.018
10	0.190	0.195	0.204	0.410	0.395	0.025	0.020
12	0.216	0.221	0.231	0.475	0.460	0.028	0.023
1/4	0.250	0.256	0.267	0.510	0.494	0.028	0.023
5/16	0.312	0.320	0.332	0.610	0.588	0.034	0.028
3/8	0.375	0.384	0.398	0.694	0.670	0.040	0.032
7/16	0.438	0.448	0.464	0.760	0.740	0.040	0.032
1/2	0.500	0.513	0.530	0.900	0.880	0.045	0.037
5/8	0.625	0.641	0.663	1.070	1.045	0.050	0.042

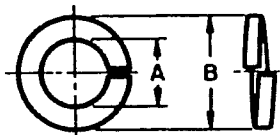


Split Lock Washers



HI-COLLAR HELICAL SPRING LOCK WASHERS

Nominal Washer Size	A		B	W	T-1	
	Inside Diameter		Outside Diameter	Width	Thickness	
	Min	Max	Max 2	Min	Min	Min
No. 4	0.112	0.115	0.121	0.173	0.022	0.022
6	0.138	0.141	0.146	0.216	0.030	0.030
8	0.164	0.168	0.175	0.267	0.042	0.047
10	0.190	0.194	0.202	0.294	0.042	0.047
1/4	0.250	0.255	0.263	0.365	0.047	0.078
5/16	0.312	0.318	0.328	0.460	0.042	0.093
3/8	0.375	0.382	0.393	0.553	0.074	0.125



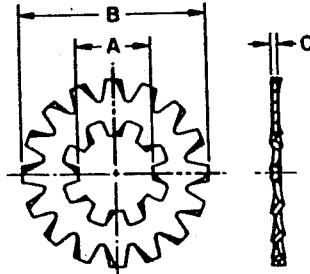
MEDIUM SPLIT HELICAL SPRING LOCK WASHERS

Nominal Washer Size	A		B	W	T-1	
	Inside Diameter		Outside Diameter	Width	Thickness	
	Min	Max	Max 2	Min	Min	Min
No. 2	0.086	0.088	0.094	0.172	0.035	0.020
4	0.112	0.115	0.121	0.209	0.040	0.025
5	0.125	0.128	0.134	0.236	0.047	0.031
6	0.138	0.141	0.146	0.250	0.047	0.031
8	0.164	0.168	0.175	0.293	0.055	0.040
10	0.190	0.194	0.202	0.334	0.062	0.047
12	0.216	0.221	0.229	0.377	0.070	0.056
1/4	0.250	0.255	0.263	0.489	0.109	0.062
5/16	0.312	0.318	0.328	0.584	0.125	0.078
3/8	0.375	0.382	0.393	0.683	0.141	0.094
7/16	0.438	0.446	0.459	0.779	0.156	0.109
1/2	0.500	0.509	0.523	0.873	0.171	0.125
9/16	0.562	0.572	0.587	0.971	0.188	0.141
5/8	0.625	0.636	0.653	1.079	0.203	0.156
3/4	0.750	0.763	0.783	1.271	0.234	0.188
7/8	0.875	0.890	0.912	1.464	0.266	0.219
1	1.000	1.017	1.042	1.661	0.297	0.250
1-1/16	1.062	1.080	1.107	1.756	0.312	0.266
1-1/8	1.125	1.144	1.172	1.853	0.328	0.281
1-3/16	1.188	1.208	1.237	1.950	0.344	0.297
1-1/4	1.250	1.271	1.302	2.045	0.359	0.312
1-1/2	1.500	1.525	1.561	2.430	0.422	0.375

**LOCK
WASHERS**

INTERNAL-EXTERNAL TOOTH LOCK WASHERS

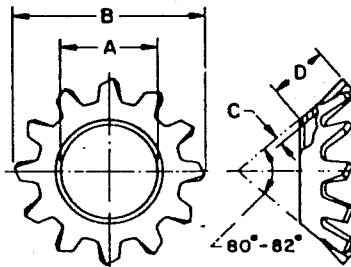
**ANSI
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TYPE A

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217

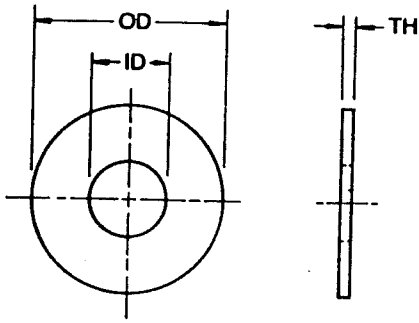
Nominal Washer Size		A		B		C	
		Inside Diameter		Outside Diameter		Thickness	
		Min	Max	Max	Min	Max	Min
No. 6	0.138	0.141	0.150	0.510	0.495	0.028	0.023
No. 8	0.164	0.168	0.176	0.510	0.495	0.028	0.023
No. 10	0.190	0.195	0.204	0.610	0.580	0.034	0.028
No. 1/4	0.250	0.256	0.267	0.760	0.725	0.040	0.032



TYPE A

COUNTERSUNK EXTERNAL TOOTH LOCK WASHERS

Nominal Washer Size		A		B	C		D	
		Inside Diameter		Outside Diameter	Thickness		Length	
		Min	Max	Ref.	Max	Min	Max	Min
No. 6	0.138	0.140	0.150	0.301	0.021	0.017	0.092	0.082
8	0.164	0.167	0.177	0.340	0.021	0.017	0.105	0.088
10	0.190	0.195	0.205	0.369	0.025	0.020	0.099	0.083
1/4	0.250	0.255	0.267	0.468	0.025	0.020	0.128	0.113



Flat Washers

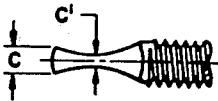
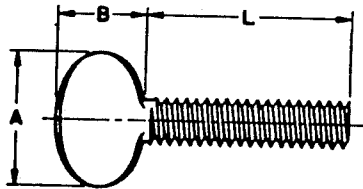
Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217

Fender Washers

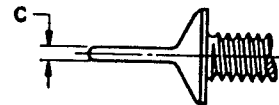
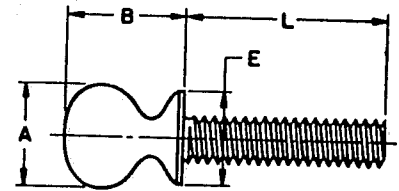
BOLT SIZE	ID	OD	TH	APPROX NO. IN 100#
10	7/32	1	.051	7M
			.080	
1/4	9/32	1	.051	7.5M
			.080	
1/4	9/32	1 1/4	.051	4.6M
			.080	
1/4	9/32	1 1/2	.051	3.1M
			.080	
5/16	11/32	1 1/4	.051	4.8M
			.080	
5/16	11/32	1 1/2	.051	3.2M
			.080	
3/8	13/32	1 1/4	.051	4.7M
			.080	
3/8	13/32	1 1/2	.051	3.3M
			.080	
1/2	17/32	2	.051	1.9M
			.080	

Machine Screw

NO	ID	OD	TH	WT.M
2	.092	.219	.018	.16
4	.125	.280	.026	.36
5	.140	.280	.026	.33
6	.150	.375	.032	.83
8	.170	.375	.032	.79
10	.203	.438	.032	1.10
12	.227	.500	.048	2.22
14	.265	.562	.048	2.70



Type P



Type S

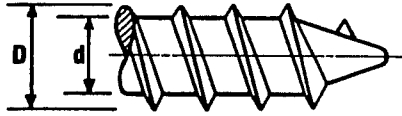
Thumb Screws

Nominal Size or Basic Screw Diameter	Threads per Inch	A		B		C		C'		L		
		Head Width		Head Height		Head Thickness		Head Thickness		Practical Screw Lengths		
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
1/4	0.250	20	0.83	0.80	0.52	0.48	0.16	0.14	0.06	0.03	2.50	0.50
5/16	0.312	18	0.96	0.91	0.64	0.60	0.17	0.14	0.09	0.06	3.00	0.50

Types S

Nominal Size or Basic Screw Diameter	Threads per Inch	A		B		C		E		L		
		Head Width		Head Height		Head Thickness		Shoulder Diameter		Practical Screw Lengths		
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
1/4	0.250	20	0.55	0.52	0.64	0.61	0.07	0.05	0.47	0.44	2.00	0.50

Threads For Self Tapping Screws Types A & AB

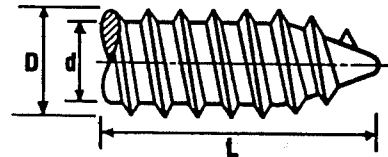


Type A

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, IN. 37940-0217

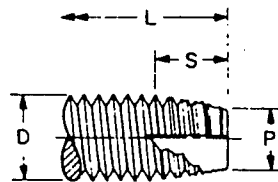
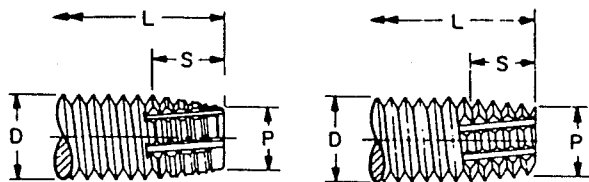
Nominal Size or Basic Screw Diameter	Threads per Inch	D		d		These Lengths or Shorter Have AB Threads		
		Major Diameter		Minor Diameter				
		Max.	Min.	Max.	Min.	90° Heads	Csk Heads	
6	0.139	18	0.141	0.136	0.102	0.096	1/4	5/16
7	0.155	16	0.158	0.152	0.114	0.108	5/16	3/8
8	0.165	15	0.168	0.162	0.123	0.116	3/8	7/16
10	0.192	12	0.194	0.188	0.133	0.126	3/8	1/2
12	0.218	11	0.221	0.215	0.162	0.155	7/16	9/16
14	0.252	10	0.254	0.248	0.185	0.178	1/2	5/8
20(5/16)	0.330	9	0.333	0.327	0.234	0.226	11/16	13/16
24(3/8)	0.385	9	0.390	0.383	0.219	0.282	3/4	1

Type AB



Nominal Size or Basic Screw Diameter	Threads per Inch	D		d		L		
		Major Diameter		Minor Diameter		Minimum Practical Screw Lengths		
		Max.	Min.	Max.	Min.	90° Heads	Csk Heads	
4	0.1120	24	0.114	0.110	0.086	0.082	3/16	7/32
6	0.1380	20	0.139	0.135	0.104	0.099	7/32	17/64
8	0.1640	18	0.166	0.161	0.122	0.116	9/32	21/64
10	0.1900	16	0.189	0.183	0.141	0.135	21/64	3/8
12	0.2160	14	0.215	0.209	0.164	0.157	3/8	13/32
1/4	0.2500	14	0.246	0.240	0.192	0.185	13/32	15/32

Threads and Points for Thread Cutting Screws Type F, 23, 25 and Self Tapping Screws Type B

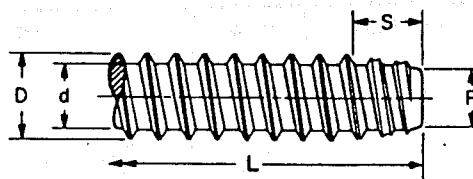
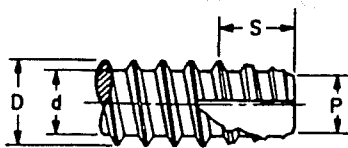


Type F

Type 23

Knoxville Bolt & Screw,
P. O. Box 9217
Knoxville, TN. 37940-021

Nominal Size or Basic Screw Diameter	Threads per Inch	D		P		S				L				
		Major Diameter		Point Diameter		Point Taper Length				Determinant Length for Point Taper		Minimum Practical Screw Length		
		Max.	Min.	Max.	Min.	For Short Screws		For Long Screws		90° Heads	Csk Heads	90° Heads	Csk Heads	
						Max.	Min.	Max.	Min.					
4	0.1120	40	0.1120	0.1072	0.086	0.077	0.088	0.062	0.112	0.088	13/64	1/4	1/8	3/16
6	0.1380	32	0.1380	0.1326	0.106	0.095	0.109	0.078	0.141	0.109	1/4	5/16	3/16	1/4
8	0.1640	32	0.1640	0.1586	0.132	0.121	0.109	0.078	0.141	0.109	1/4	21/64	3/16	1/4
10	0.1900	24	0.1900	0.1834	0.147	0.133	0.146	0.104	0.188	0.146	11/32	27/64	15/64	5/16
10	0.1900	32	0.1900	0.1846	0.158	0.147	0.109	0.078	0.141	0.109	1/4	11/32	15/64	5/16
1/4	0.2500	20	0.2500	0.2428	0.198	0.181	0.175	0.125	0.225	0.175	13/32	33/64	17/64	3/8

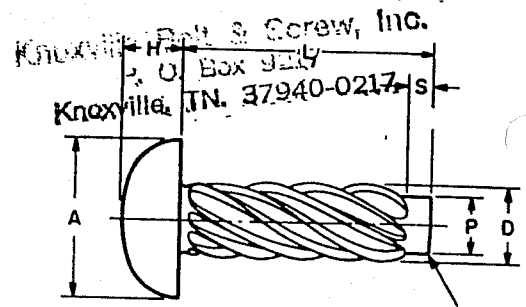


Type 25

Type B

Nominal Size or Basic Screw Diameter	Threads per Inch	D		d		P		S				L				
		Major Diameter		Minor Diameter		Point Diameter		Point Taper Length				Determinant Length for Point Taper		Minimum Practical Screw Lengths		
		Max.	Min.	Max.	Min.	Max.	Min.	For Short Screws		For Long Screws		90° Heads	Csk Heads	90° Heads	Csk Heads	
								Max.	Min.	Max.	Min.					
2	0.0860	32	0.088	0.084	0.064	0.060	0.058	0.054	0.062	0.047	0.078	0.062	7/64	3/16	7/64	5/32
4	0.1120	24	0.114	0.110	0.086	0.082	0.079	0.074	0.083	0.063	0.104	0.083	3/16	1/4	9/64	3/16
6	0.1380	20	0.139	0.135	0.104	0.099	0.095	0.089	0.100	0.075	0.125	0.100	1/4	5/16	11/64	1/4
8	0.1640	18	0.166	0.161	0.122	0.116	0.112	0.106	0.111	0.083	0.139	0.111	5/16	7/16	3/16	1/4
10	0.1900	16	0.189	0.183	0.141	0.135	0.130	0.123	0.125	0.094	0.156	0.125	3/8	1/2	15/64	5/16
12	0.2160	14	0.215	0.209	0.164	0.157	0.152	0.145	0.143	0.107	0.179	0.143	7/16	9/16	9/32	3/8
14	0.2500	14	0.246	0.240	0.192	0.185	0.179	0.171	0.143	0.107	0.179	0.143	1/2	5/8	9/32	3/8

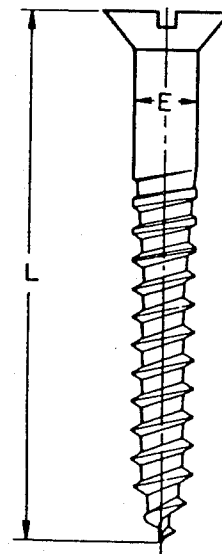
Drive Screws — Type U Round Head



Nominal Screw Size	Number of Thread Starts	D		A		H		P		Recommended Hole Size	
		Outside Diameter		Head Diameter		Head Height		Pilot Diameter		Drill Size No.	Hole Diameter
		Max	Min	Max	Min	Max	Min	Max	Min		
00	6	0.060	0.057	0.099	0.090	0.034	0.026	0.049	0.046	55	0.052
0	6	0.075	0.072	0.127	0.118	0.049	0.041	0.063	0.060	51	0.067
2	8	0.100	0.097	0.162	0.146	0.069	0.059	0.083	0.080	44	0.086
4	7	0.116	0.112	0.211	0.193	0.086	0.075	0.096	0.092	37	0.104
6	7	0.140	0.136	0.260	0.240	0.103	0.091	0.116	0.112	31	0.120
7	8	0.154	0.150	0.285	0.264	0.111	0.099	0.126	0.122	29	0.136
8	8	0.167	0.162	0.309	0.287	0.120	0.107	0.136	0.132	27	0.144
10	8	0.182	0.177	0.359	0.334	0.137	0.123	0.150	0.146	20	0.161
12	8	0.212	0.206	0.408	0.382	0.153	0.139	0.177	0.173	11	0.191
14	9	0.242	0.236	0.457	0.429	0.170	0.155	0.202	0.198	-2	0.221
L	Nominal Screw Length	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1 in. and over	
S	Pilot Length	0.047	0.047	0.047	0.047	0.062	0.062	0.078	0.078	0.125	

Wood Screws

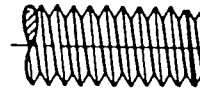
Nominal Size or Basic Screw Diameter	Threads per Inch	E		
		Body Diameter		
		Max.	Min.	
4	0.112	22	0.116	0.105
5	0.125	20	0.129	0.118
6	0.138	18	0.142	0.131
7	0.151	16	0.155	0.144
8	0.164	15	0.168	0.157
9	0.177	14	0.181	0.170
10	0.190	13	0.194	0.183
12	0.216	11	0.220	0.209
14	0.242	10	0.246	0.235



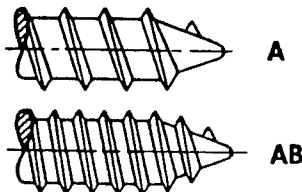
Tolerance on Length Machine Screws

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
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Nominal Screw Size	0 thru 12	¼ thru ¾
Nominal Screw Length	Tolerance on Length	
Up to ½ in., Incl.	-0.02	-0.03
Over ½ to 1 in., Incl.	-0.03	-0.03
Over 1 to 2 in., Incl.	-0.06	-0.06
Over 2 in.	-0.09	-0.09



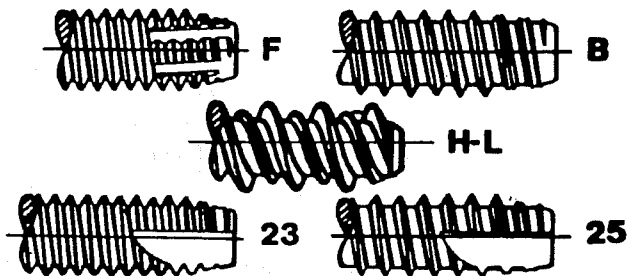
Type A - AB



Nominal Screw Length	Tolerance on Length
Up to 1 in., Incl.	±0.03
Over 1 in.	±0.05

Type B, F, H-L, 25 and 23

Nominal Screw Length	Tolerance on Length
Up to ¾ in., Incl.	-0.03
Over ¾ to 1½ in., Incl.	-0.05



Type U



Nominal Screw Length	Tolerance on Length
Up to ¾ in., Incl.	±0.02
Over ¾ in.	±0.03

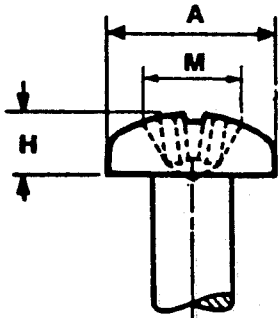
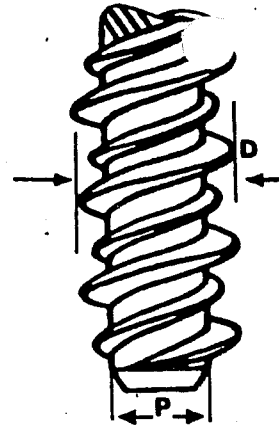
Wood Screws

Nominal Screw Length	Tolerance on Length
Up to ⅝ in., Incl.	-0.03
Over ⅝ to 1½ in., Incl.	-0.05
Over 1½ to 2¾ in., Incl.	-0.06
Over 2¾ to 5 in., Incl.	-0.09



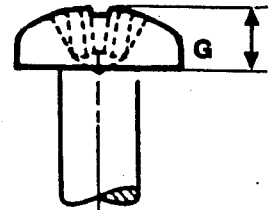
Type H-L Self Tapping Screws

Nominal Diameter and Thread	D High Thread Diameter	B Low Thread Diameter	P Point Diameter	Head Size
4-24	.105-.115	.086	.061-.070	3
6-19	.135-.145	.108	.080-.090	5*
8-18	.160-.170	.130	.095-.105	6
10-16	.185-.195	.145	.099-.110	8



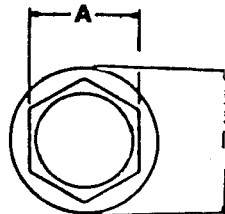
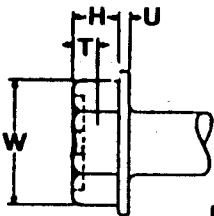
*Special Dimensions for Pan Head
 Knoxville Bolt & Screw, Inc.
 P. O. Box 9217
 Knoxville, TN, 37940-0217

Pan Head



Nominal Size	A		H		M		G		Phillips Driver Size
	Head Diameter		Height of Head		Dimensions of Recess				
			Recessed		Diameter		Depth		
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
4	.193	.180	.071	.062	.112	.099	.061	.043	1
6	.254	.240	.097	.087	.158	.145	.072	.046	2
8	.270	.256	.097	.087	.166	.153	.080	.055	2
10	.322	.306	.115	.105	.182	.169	.097	.071	2

Hex Washer Head



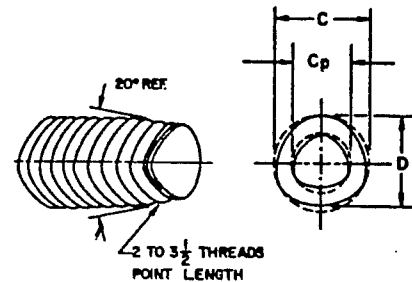
Nominal Size	A		W	H		F		U	
	Width Across Flats		Width Across Corners	Height of Head		Diameter of Washer		Thickness of Washer	
	Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
4	.125	.120	.134	.055	.044	.177	.163	.016	.010
6	.188	.181	.202	.070	.058	.260	.240	.025	.015
8	.250	.244	.272	.093	.080	.328	.302	.025	.015
10	.250	.244	.272	.110	.096	.348	.322	.031	.019

High Performance Thread Rolling Screws

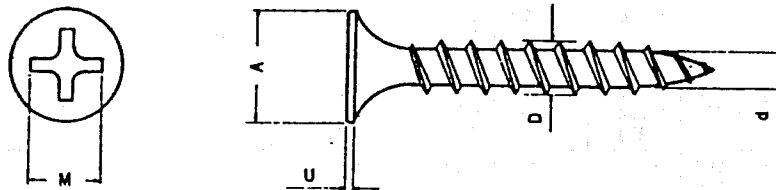
Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN. 37940-0217

THREAD AND POINT DIMENSIONS OF HIGH PERFORMANCE THREAD ROLLING SCREWS

Nominal Screw Size and Threads Per Inch	Screw Diameter	C		D		CP
		Diameter of Circumscribing Circle		Measurement Across Center		Circumscribing Circle (Point)
		Basic	Max.	Min.	Max.	Min.
No. 4 40	0.1120	0.1145	0.1105	0.1095	0.1055	0.090
6 32	0.1380	0.1410	0.1350	0.1350	0.1290	0.111
8 32	0.1640	0.1670	0.1610	0.1610	0.1550	0.137
10 32	0.1900	0.1940	0.1880	0.1850	0.1790	0.153
1/4 20	0.250	0.2550	0.2490	0.2460	0.2400	0.206



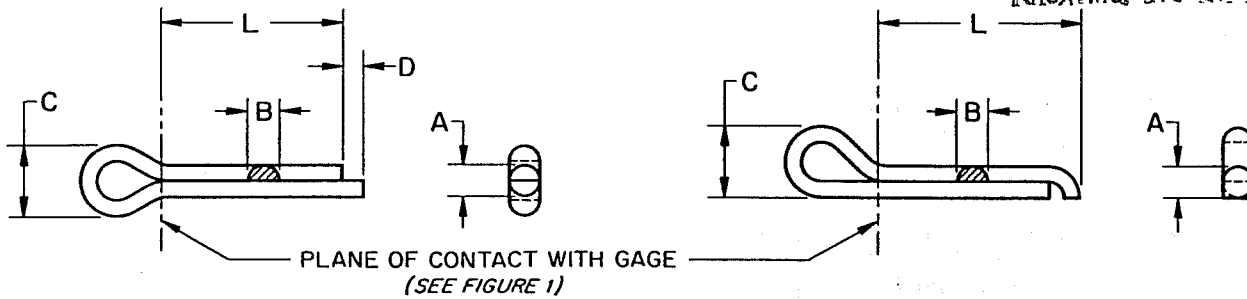
Drywall Screws



Screw Size	Head		Recess		Major		Minor	
	Dia. A	Thickness U	Dia. M	Depth	Dia. B	Dia. d		
Twin Fast #6	min	.340	0.31	max	.107	.142	.102	
	max	.320	.020	.189	0.87	.136	0.96	
Twin Fast #8	min	.358	.039	max	.122	.168	.123	
	max	.339	.020	.205	.115	.160	.118	

COTTER PINS

Knoxville Bolt & Screw, Inc.
P. O. Box 9217
Knoxville, TN 37940-0217



EXTENDED PRONG
SQUARE CUT

HAMMER LOCK

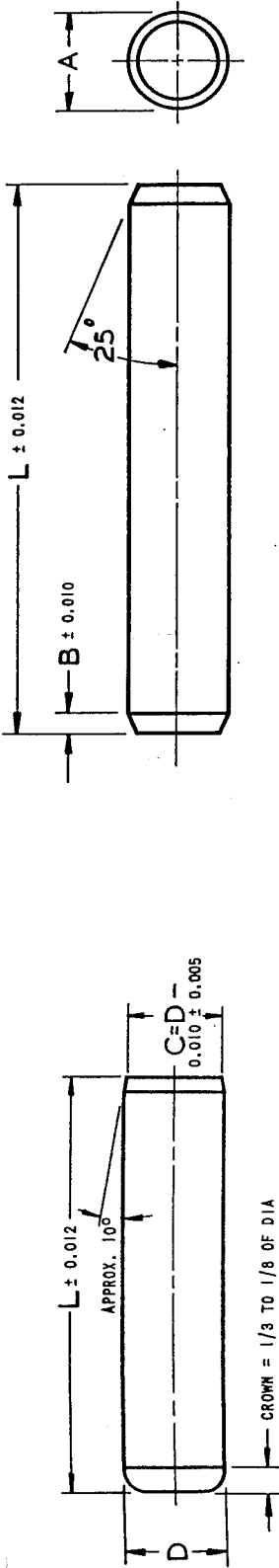
Nominal Size or Basic Pin Diameter	A		B		C	D	Recommended Hole Size
	Total Shank Diameter		Wire Width		Head Diameter	Extended Prong Length	
	Max	Min	Max	Min	Min	Min	
1/32 0.031	0.032	0.028	0.032	0.022	0.06	0.01	0.047
3/64 0.047	0.048	0.044	0.048	0.035	0.09	0.02	0.062
1/16 0.062	0.060	0.056	0.060	0.044	0.12	0.03	0.078
5/64 0.078	0.076	0.072	0.076	0.057	0.16	0.04	0.094
3/32 0.094	0.090	0.086	0.090	0.069	0.19	0.04	0.109
7/64 0.109	0.104	0.100	0.104	0.080	0.22	0.05	0.125
1/8 0.125	0.120	0.116	0.120	0.093	0.25	0.06	0.141
9/64 0.141	0.134	0.130	0.134	0.104	0.28	0.06	0.156
5/32 0.156	0.150	0.146	0.150	0.116	0.31	0.07	0.172
3/16 0.188	0.176	0.172	0.176	0.137	0.38	0.09	0.203
7/32 0.219	0.207	0.202	0.207	0.161	0.44	0.10	0.234
1/4 0.250	0.225	0.220	0.225	0.176	0.50	0.11	0.266
5/16 0.312	0.280	0.275	0.280	0.220	0.62	0.14	0.312
3/8 0.375	0.335	0.329	0.335	0.263	0.75	0.16	0.375
7/16 0.438	0.406	0.400	0.406	0.320	0.88	0.20	0.438
1/2 0.500	0.473	0.467	0.473	0.373	1.00	0.23	0.500
5/8 0.625	0.598	0.590	0.598	0.472	1.25	0.30	0.625
3/4 0.750	0.723	0.715	0.723	0.572	1.50	0.36	0.750

NOTE: 1. See General Data for Cotter Pins on Pages L-4 and L-5.

ANSI
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1958

HARDENED AND GROUND DOWEL PINS AND UNHARDENED GROUND DOWEL PINS

PINS



UNHARDENED GROUND DOWEL PINS

Nominal Diameter	A		Chamfer
	Diameter		
	Max	Min	
0.062	0.0600	0.0595	0.015
0.094	0.0912	0.0907	0.015
0.109	0.1068	0.1063	0.015
0.125	0.1223	0.1218	0.015
0.156	0.1535	0.1530	0.015
0.188	0.1847	0.1842	0.015
0.219	0.2159	0.2154	0.015
0.250	0.2470	0.2465	0.015
0.312	0.3094	0.3089	0.030
0.375	0.3717	0.3712	0.030
0.438	0.4341	0.4336	0.030
0.500	0.4964	0.4959	0.030
0.625	0.6211	0.6206	0.045
0.750	0.7458	0.7453	0.045
0.875	0.8705	0.8700	0.060
1.000	0.9952	0.9947	0.060

NOTES:

- All dimensions are given in inches.
- Maximum diameters are graduated from 0.0005 on 1/16 in. pins to 0.0028 on 1 in. pins under the minimum commercial bar stock sizes.

HARDENED AND GROUND DOWEL PINS

Length L	Nominal Diameter D									
	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
	Diameter Standard Pins ±0.0001									
0.1252	0.1877	0.2502	0.3127	0.3752	0.4377	0.5002	0.6252	0.7502	0.8752	
Diameter Oversize Pins ±0.0001										
0.1260	0.1885	0.2510	0.3135	0.3760	0.4385	0.5010	0.6260	0.7510	0.8760	
1/2	X	X	X	X	X	X	X	X	X	
5/8	X	X	X	X	X	X	X	X	X	
3/4	X	X	X	X	X	X	X	X	X	
7/8	X	X	X	X	X	X	X	X	X	
1	X	X	X	X	X	X	X	X	X	
1-1/4	X	X	X	X	X	X	X	X	X	
1-1/2	X	X	X	X	X	X	X	X	X	
1-3/4	X	X	X	X	X	X	X	X	X	
2	X	X	X	X	X	X	X	X	X	
2-1/4	X	X	X	X	X	X	X	X	X	
2-1/2	X	X	X	X	X	X	X	X	X	
3	X	X	X	X	X	X	X	X	X	
3-1/2										X
4										X
4-1/2										X
5										X
5-1/2										X

- may be used to produce the holes into which these pins tap or press fit. They must be straight and free from any defects that will affect their serviceability.
- All dimensions are given in inches.
 - These pins are extensively used in the tool and machine industry and a machine reamer of nominal size



Weights of Drive and Thumb Screws Hex and K Lock Nuts, Flat and Lock Washers

Weights of Round Head Drive Screws

(Approximate weight of 1000 screws in pounds.)

Length	00	0	2	4	6	8	10
1/8	.105	.211	.41	—	—	—	—
3/16	.137	.275	.59	.9	—	—	—
1/4	.1428	.278	.61	1.0	1.7	2.6	—
5/16	—	.360	.69	1.1	1.8	—	—
3/8	—	—	.79	1.2	2.0	3.2	4.0
1/2	—	—	—	—	2.4	3.4	4.6
5/8	—	—	—	—	—	—	5.2

Weights of Thumbs Screws Plain and Shoulder

(Approximate weight of 1000 screws in pounds.)

Length	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
1/4 P	10.5	13	17	19	22	27	32
1/4 S	13.8	16.3	20	22.5	25	30	—

Weights of Nuts

(Approximate weight of 1000 nuts in pounds.)

Nominal Size	Nut Type	Machine Screw Pattern	Small Pattern	K-Loc Nut	Nylon Insert Stop Nuts	Cold Forged Wing Nuts	Stamped Wing Nuts	Cap Nuts
2-56		0.40	—	—	—	—	—	—
3-48		0.40	—	—	—	—	—	—
4-40		1.10	3/16 x 1/16 0.30	—	—	—	—	—
5-40		2.10	—	1.20	1.40	—	—	—
6-32		2.10	1/4 x 3/32 1.00	2.30	2.60	3.80	—	—
8-32		2.70	1/4 x 3/32 0.80	3.10	4.20	7.50	3.00	4.00
			5/16 x 7/64 1.90	—	—	—	3.00	4.00
10-24		3.20	—	3.60	5.00	7.40	—	—
10-32		3.20	—	3.60	5.00	7.40	4.00	5.00
12-24		5.60	—	—	—	—	4.00	5.00
1/4-20		6.60	—	—	—	—	—	—
1/4-28		6.50	—	7.10	9.00	13.00	8.00	7.00
5/16-18		12.90	—	—	9.00	—	—	—
3/8-16		16.80	—	11.80	12.00	23.00	—	17
				16.30	18.00	37.00	—	23

Weights of Flat and Lock Washers

(Approximate weight of 1000 washers in pounds.)

Washer No.	Machine Screw Washers	Internal Tooth Washers	External Tooth Washers	Medium Split Washers	Fender Washers	
2	—	.05	—	—	10 x 1	13.14
4	.36	.14	.10	.15	1/4 x 1	12.80
5	.33	—	—	—	1/4 x 1 1/4	20.60
6	.83	.18	.22	.27	1/4 x 1 1/2	30.18
8	.79	.26	.35	.50	5/16 x 1 1/4	20.10
10	1.10	.39	.37	.70	5/16 x 1 1/2	30.00
12	2.22	—	.63	—	3/8 x 1 1/4	19.85
1/4	2.70	.61	.66	2.20	3/8 x 1 1/2	29.75
5/16	—	1.23	1.13	3.80	1/2 x 2	51.68
3/8	—	1.91	1.51	6.00	—	—
7/16	—	2.15	1.53	—	—	—
1/2	—	3.29	2.62	—	—	—
5/8	—	5.19	4.50	—	—	—

Weights of Machine Screws and Tapping Screws

WEIGHTS OF MACHINE SCREWS¹ AND THREAD CUTTING SCREWS TYPE F, AND 23
(Approximate weight of 1000 screws in pounds)

Screw Size Length (Inches)	2-56	4-40	6-32	8-32	10-24	10-32	12-24	1/4-20	5/16-18	3/8-16
1/8	0.4	0.7	1.4	—	—	—	—	—	—	—
3/16	0.5	0.9	1.5	2.5	3.8	3.9	—	—	—	—
1/4	0.6	1.0	1.7	2.8	4.1	4.3	—	—	—	—
5/16	0.6	1.2	1.9	3.1	4.4	4.6	5.6	8.5	—	—
3/8	0.7	1.3	2.1	3.4	4.8	5.0	6.1	9.1	16.7	—
7/16	0.8	1.5	2.2	3.6	5.1	5.4	6.5	9.8	17.7	29.2
1/2	0.8	1.6	2.4	3.9	5.4	5.8	6.9	10.4	18.8	30.7
9/16	0.9	1.7	2.6	4.2	5.8	6.2	7.4	11.1	19.8	32.2
5/8	1.0	1.8	2.8	4.5	6.2	6.6	7.8	11.7	20.9	33.6
3/4	1.1	2.1	3.2	5.0	6.9	7.3	8.3	12.4	21.9	35.1
7/8	1.3	2.3	3.5	5.6	7.6	8.1	9.2	13.6	24.0	38.0
1	1.4	2.5	3.9	6.2	8.3	8.9	10.1	14.9	26.1	41.0
1 - 1/8	—	2.8	4.3	6.7	9.0	9.6	11.0	16.1	28.2	44.0
1 - 1/4	—	3.0	4.6	7.3	9.7	10.4	11.9	17.4	30.2	47.0
1 - 1/2	—	3.5	5.3	8.3	11.1	11.9	12.8	18.7	32.3	49.8
1 - 3/4	—	—	6.1	9.4	12.5	13.5	14.7	21.2	36.5	55.8
2	—	—	6.8	10.6	13.8	15.0	16.5	23.7	40.7	61.7
2 - 1/4	—	—	7.6	11.8	15.2	16.6	18.3	26.2	44.8	67.6
2 - 1/2	—	—	8.3	12.9	16.6	18.1	20.1	28.8	49.0	73.5
2 - 3/4	—	—	9.1	13.9	18.0	19.7	22.0	31.3	53.2	79.5
3	—	—	9.8	15.0	19.4	21.2	23.8	33.9	57.3	85.3
3 - 1/4	—	—	—	16.2	20.8	22.7	25.6	36.4	61.5	91.3
3 - 1/2	—	—	—	17.4	22.2	24.2	27.4	39.0	65.7	97.0
3 - 3/4	—	—	—	—	23.6	25.8	29.2	41.5	70.0	103.0
4	—	—	—	—	25.0	27.3	31.0	44.0	74.0	109.0
4 - 1/2	—	—	—	—	27.7	30.4	32.8	46.6	78.2	115.0
5	—	—	—	—	30.5	35.5	36.6	51.6	86.5	127.0
5 - 1/2	—	—	—	—	33.3	36.6	40.2	56.7	95.0	139.0
6	—	—	—	—	36.0	39.6	43.8	61.8	103.3	151.0
							47.5	67.0	111.7	163.0

NOTES: 1. The above weights are based on Pan Head Machine Screws. Thread cutting screws will weigh slightly less depending on the size of point slot, also other head styles vary slightly from above weights.

NOTES: 2. Brass Machine Screw weights are calculated by multiplying the above by 1.08.

WEIGHTS OF TYPE AB TAPPING SCREWS¹
(Approximate weight of 1000 screws in pounds)

Screw Size Length (Inches)	2	4	6	8	10	12	14
3/16	0.4	—	—	—	—	—	—
1/4	0.5	1.0	1.4	2.4	—	—	—
5/16	0.6	1.1	1.7	2.6	—	—	—
3/8	0.7	1.2	1.9	2.8	4.3	5.7	—
1/2	0.8	1.4	2.2	3.3	4.8	6.6	9.4
5/8	0.9	1.6	2.5	3.8	5.4	7.3	10.5
3/4	1.0	1.9	2.9	4.2	5.9	8.1	11.5
7/8	—	2.1	3.2	4.7	6.5	8.9	12.6
1	—	2.3	3.6	5.2	7.1	9.7	13.7
1 1/4	—	—	4.3	6.2	8.3	11.5	15.9
1 1/2	—	—	5.0	7.2	9.5	13.2	18.1
1 3/4	—	—	5.7	8.1	10.7	14.8	20.4
2	—	—	—	9.0	11.9	16.4	22.5
2 1/4	—	—	—	—	13.1	18.1	24.7
2 1/2	—	—	—	—	14.3	19.8	26.9
2 3/4	—	—	—	—	—	21.4	29.1
3	—	—	—	—	—	23.0	31.3

NOTES: 1. The above weights are based on Pan Head Type AB Tapping Screws. Type B Tapping Screws will weigh slightly more, also other head styles will vary slightly from the above weights.

Weights of Hex Head Cap Screws

(Approximate weight of 100 screws in pounds)

— DIAMETERS —

	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
3/8	1.05													
1/2	1.18	1.99	2.93											
5/8	1.31	2.20	3.24											
3/4	1.44	2.41	3.55	5.08	8.10									
7/8	1.57	2.62	3.86	5.50	8.66									
1	1.74	2.83	4.17	5.92	9.22	11.28	15.16	24.46	36.78	51.42	70.4	94.3	121.9	156.9
1 1/4	2.08	3.37	4.86	6.76	10.34	12.71	16.93	27.06	40.35	56.10	76.3	101.7	130.8	167.6
1 1/2	2.43	3.91	5.64	7.82	11.59	14.14	18.70	29.66	43.92	60.78	82.2	109.1	139.7	178.4
1 3/4	2.77	4.45	6.42	8.88	12.97	15.89	20.66	32.26	47.49	65.46	88.1	116.6	148.6	189.1
2	3.12	4.99	7.19	9.94	14.35	17.64	22.82	35.12	51.06	70.14	94.0	124.0	157.5	199.8
2 1/4	3.46	5.52	7.97	11.00	15.73	19.39	24.97	38.23	54.96	74.82	99.9	131.5	166.4	210.6
2 1/2	3.81	6.06	8.74	12.06	17.11	21.14	27.13	41.34	59.19	79.92	105.8	138.9	175.3	221.3
2 3/4	4.15	6.60	9.52	13.12	18.49	22.90	29.28	44.45	63.42	85.44	112.3	146.3	184.2	232.0
3	4.50	7.14	10.30	14.18	19.87	24.65	31.44	47.56	67.65	90.96	119.3	154.4	193.1	242.8
3 1/4	4.84	7.68	11.07	15.24	21.25	26.40	33.59	50.67	71.88	96.48	126.3	163.0	202.8	253.5
3 1/2	5.19	8.21	11.85	16.30	22.63	28.15	35.75	53.78	76.11	102.00	133.3	171.7	213.3	265.1
3 3/4	5.53	8.75	12.62	17.36	24.01	29.90	37.90	56.89	80.34	107.52	140.3	180.3	223.8	277.6
4	5.88	9.29	13.40	18.41	25.39	31.65	40.06	60.00	84.57	113.04	147.3	188.9	234.2	290.0
4 1/4	6.41	10.07	14.59	19.95	27.07	33.23	42.70	62.44	86.22	116.84	153.2	196.4	243.6	301.6
4 1/2	6.57	10.37	14.95	20.53	28.15	35.15	44.37	66.22	93.03	124.08	161.3	206.2	255.2	314.9
4 3/4	6.83	10.78	15.54	21.35	29.27	36.55	46.14	68.86	96.75	129.04	167.8	214.4	265.4	327.5
5	7.26	11.44	16.50	22.65	30.91	38.65	48.68	72.44	101.49	135.12	175.4	223.5	276.2	339.9
5 1/4	7.55	11.89	17.20	23.55	32.14	40.19	50.62	75.33	105.54	140.52	182.4	232.4	287.2	353.5
5 1/2	7.95	12.52	18.06	24.77	33.67	42.16	52.99	78.66	109.95	146.16	189.4	240.8	297.1	364.8
5 3/4	8.26	13.02	18.78	25.76	35.01	43.84	55.10	81.80	114.34	152.0	196.0	250.4	308.9	379.4
6	8.64	13.6	19.6	26.9	36.4	45.66	57.3	84.9	118.4	157	203	258	318	390
6 1/4	8.88	14.0	20.2	27.3	37.2	...	59.5	87.9	122	164	211	270	330	405
6 1/2	9.22	14.5	20.9	28.3	38.6	...	61.6	90.9	127	170	218	278	341	417
6 3/4	9.55	15.0	21.7	29.4	39.5	...	63.7	93.9	131	175	225	286	351	430
7	9.89	15.5	22.5	30.4	40.9	...	65.8	96.9	135	180	232	295	362	442
7 1/4	10.2	16.1	23.2	31.4	42.3	...	67.9	100	139	186	238	303	372	455
7 1/2	10.6	16.6	24.0	32.5	43.5	...	70.0	103	143	191	245	311	383	467
7 3/4	10.9	17.1	24.7	33.5	44.9	...	72.0	106	147	196	252	320	393	480
8	11.2	17.7	25.5	34.5	46.1	...	74.1	109	151	202	259	328	404	492
8 1/2	11.9	18.7	27.0	36.6	48.8	...	78.3	115	159	213	272	345	424	517
9	12.6	19.8	28.5	38.6	51.5	...	82.4	121	168	223	286	362	446	542
9 1/2	13.3	20.8	30.1	40.7	54.2	...	86.6	127	176	234	300	379	466	567
10	13.9	21.9	31.6	42.8	57.0	...	90.8	133	184	245	313	395	488	592
10 1/2	14.6	22.9	33.1	44.8	59.6	...	94.9	139	192	255	327	412	508	617
11	15.3	24.0	34.6	46.9	62.3	...	99.1	145	201	266	340	429	530	642
11 1/2	15.9	25.0	36.1	48.9	65.0	151	209	277	354	446	550	667
12	16.6	26.1	37.6	51.0	67.6	158	217	288	368	462	572	692

LENGTHS

DECIMAL EQUIVALENTS

Knoxville Bolt & Screw, Inc.
 P. O. Box 9217
 Knoxville, TN 37940-0217

		Working Equivalent	Exact Decimal
	1/32	1/64	.0156
		3/64	.0312
1/16		5/64	.0469
	3/32	7/64	.0625
		9/64	.0781
1/8		11/64	.0938
	5/32	13/64	.109
		15/64	.125
3/16		17/64	.141
	7/32	19/64	.156
		21/64	.172
1/4		23/64	.188
	9/32	25/64	.203
		27/64	.219
5/16		29/64	.234
	11/32	31/64	.250
		33/64	.266
3/8		35/64	.281
	13/32	37/64	.297
		39/64	.312
7/16		41/64	.328
	15/32	43/64	.344
		45/64	.359
1/2		47/64	.375
	17/32	49/64	.391
		51/64	.406
9/16		53/64	.422
	19/32	55/64	.438
		57/64	.453
5/8		59/64	.469
	21/32	61/64	.484
		63/64	.500
3/4			.516
	23/32		.531
			.547
7/8			.562
	25/32		.578
			.594
	27/32		.609
			.625
	29/32		.641
			.656
	31/32		.672
			.688
			.703
			.719
			.734
			.750
			.766
			.781
			.797
			.812
			.828
			.844
			.859
			.875
			.891
			.906
			.922
			.938
			.953
			.969
			.984

