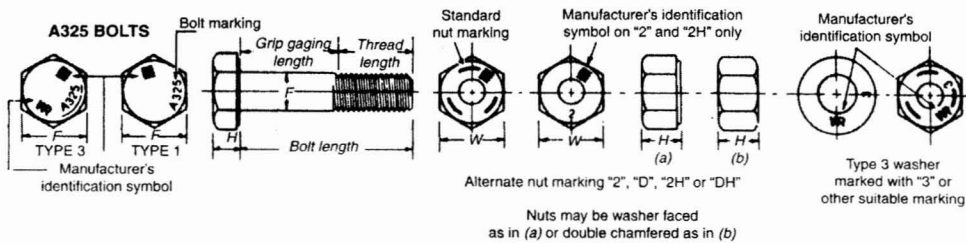


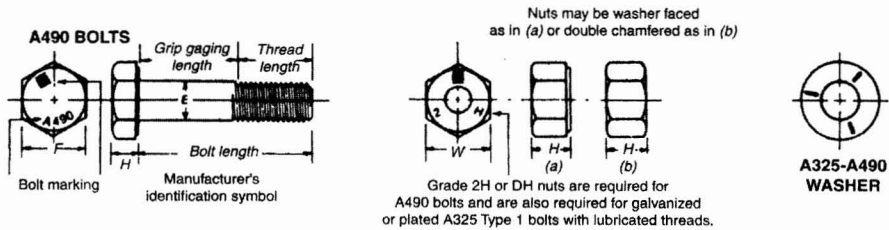
STRUCTURAL BOLTS - HIGH STRENGTH
GRIP RANGES FOR HIGH STRENGTH STRUCTURAL BOLTS

Nom Bolt Dia and Thds per Inch	1/2-13		5/8-11		3/4-10		7/8-9		1-8		1-1/8-7		1-1/4-7		1-3/8-6		1-1/2-6	
Nom Bolt Length Inch	Grip Range, Inch																	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	0.55	0.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.75	0.80	1.04	0.56	0.89	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.00	1.05	1.29	0.81	1.14	0.69	0.94	-	-	-	-	-	-	-	-	-	-	-	-
2.25	1.30	1.54	1.06	1.39	0.94	1.19	0.82	1.09	-	-	-	-	-	-	-	-	-	-
2.50	1.55	1.79	1.31	1.64	1.19	1.44	1.07	1.34	-	-	-	-	-	-	-	-	-	-
2.75	1.80	2.04	1.56	1.89	1.44	1.69	1.32	1.59	1.08	1.47	-	-	-	-	-	-	-	-
3.00	2.05	2.29	1.81	2.14	1.69	1.94	1.57	1.84	1.33	1.72	1.10	1.53	1.10	1.42	-	-	-	-
3.25	2.30	2.54	2.06	2.39	1.94	2.19	1.82	2.09	1.58	1.97	1.35	1.78	1.35	1.67	1.11	1.54	1.11	1.41
3.50	2.55	2.79	2.31	2.64	2.19	2.44	2.07	2.34	1.83	2.22	1.60	2.03	1.60	1.92	1.36	1.79	1.36	1.66
3.75	2.80	3.04	2.56	2.89	2.44	2.69	2.32	2.59	2.08	2.47	1.85	2.28	1.85	2.17	1.61	2.04	1.61	1.91
4.00	3.05	3.29	2.81	3.14	2.69	2.94	2.57	2.84	2.33	2.72	2.10	2.53	2.10	2.42	1.86	2.29	1.86	2.16
4.25	3.30	3.54	3.06	3.39	2.94	3.19	2.82	3.09	2.58	2.97	2.35	2.78	2.35	2.67	2.11	2.54	2.11	2.41
4.50	3.55	3.79	3.31	3.64	3.19	3.44	3.07	3.34	2.83	3.22	2.60	3.03	2.60	2.92	2.36	2.79	2.36	2.66
4.75	3.80	4.04	3.56	3.89	3.44	3.69	3.32	3.59	3.08	3.47	2.85	3.28	2.85	3.17	2.61	3.04	2.61	2.91
5.00	4.05	4.29	3.81	4.14	3.69	3.94	3.57	3.84	3.33	3.72	3.10	3.53	3.10	3.42	2.86	3.29	2.86	3.16
5.25	4.30	4.54	4.06	4.39	3.94	4.19	3.82	4.09	3.58	3.97	3.35	3.78	3.35	3.67	3.11	3.54	3.11	3.41
5.50	4.55	4.79	4.31	4.64	4.19	4.44	4.07	4.34	3.83	4.22	3.60	4.03	3.60	3.92	3.36	3.79	3.36	3.66
5.75	4.80	5.04	4.56	4.89	4.44	4.69	4.32	4.59	4.08	4.47	3.85	4.28	3.85	4.17	3.61	4.04	3.61	3.91
6.00	5.05	5.29	4.81	5.14	4.69	4.94	4.57	4.84	4.33	4.72	4.10	4.53	4.10	4.42	3.86	4.29	3.86	4.16
6.25	-	-	-	-	4.94	5.19	4.82	5.03	4.58	4.91	4.35	4.78	4.35	4.67	4.11	4.54	4.11	4.41
6.50	-	-	-	-	5.19	5.44	5.07	5.28	4.83	5.16	4.60	5.03	4.60	4.92	4.36	4.79	4.36	4.66
6.75	-	-	-	-	5.44	5.69	5.32	5.53	5.08	5.41	4.85	5.28	4.85	5.17	4.61	5.04	4.61	4.91
7.00	-	-	-	-	5.69	5.94	5.57	5.78	5.33	5.66	5.10	5.53	5.10	5.42	4.86	5.29	4.86	5.16
7.25	-	-	-	-	5.94	6.19	5.82	6.03	5.58	5.91	5.35	5.78	5.35	5.67	5.11	5.54	5.11	5.41
7.50	-	-	-	-	6.19	6.44	6.07	6.28	5.83	6.16	5.60	6.03	5.60	5.92	5.36	5.79	5.36	5.66
7.75	-	-	-	-	6.44	6.69	6.32	6.53	6.08	6.41	5.85	6.28	5.85	6.17	5.61	6.04	5.61	5.91
8.00	-	-	-	-	6.69	6.94	6.57	6.78	6.33	6.66	6.10	6.53	6.10	6.42	5.86	6.29	5.86	6.16

A325 BOLTS



A490 BOLTS



HIGH-STRENGTH STRUCTURAL BOLTS, NUTS AND WASHERS

Bolt Dimensional Standards ANSI B18.21

Nominal Size of Basic Bolt Dia.	E		F			G		H			R		L _T (Ref)	Y (Ref)	Runout of Bearing Surface FIR
	Body Dia.		Width Across Flats			Width Across Corners		Height			Radius of Fillet		Thread Length	Transi- tion Thread Length	
	Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Max
1/2 0.5000	0.515	0.482	7/8	0.875	0.850	1.010	0.969	5/16	0.323	0.302	0.031	0.009	1.00	0.19	0.016
5/8 0.6250	0.642	0.605	1 1/16	1.062	1.031	1.227	1.175	25/64	0.403	0.378	0.062	0.021	1.25	0.22	0.019
3/4 0.7500	0.768	0.729	1 1/4	1.250	1.212	1.443	1.383	15/32	0.483	0.455	0.062	0.021	1.38	0.25	0.022
7/8 0.8750	0.895	0.852	1 7/16	1.438	1.394	1.660	1.589	35/64	0.563	0.531	0.062	0.031	1.50	0.28	0.025
1 1.0000	1.022	0.976	1 5/8	1.625	1.575	1.876	1.796	35/64	0.627	0.591	0.093	0.062	1.75	0.31	0.028
1 1/8 1.1250	1.149	1.098	1 13/16	1.812	1.756	2.093	2.002	11/16	0.718	0.658	0.093	0.062	2.00	0.34	0.032
1 1/4 1.2500	1.277	1.223	2	2.000	1.938	2.309	2.209	25/32	0.813	0.749	0.093	0.062	2.00	0.38	0.035
1 3/8 1.3750	1.404	1.345	2 3/16	2.188	2.119	2.526	2.416	27/32	0.878	0.810	0.093	0.062	2.25	0.44	0.038
1 1/2 1.5000	1.531	1.470	2 3/8	2.375	2.300	2.742	2.622	15/16	0.974	0.902	0.093	0.062	2.25	0.44	0.041

Washer Dimensions

Bolt Size E	Circular Washers				Square or Rectangular Beveled Washers for American Standard Beams and Channels		
	Nominal Outside Diameter	Nominal Diameter Of Hole	Thickness		Minimum Side Dimension	Mean Thickness	Slope or Taper in Thickness
			Min	Max			
1/2	1 1/16	17/32	0.097	0.177	1 3/4	5/16	1.6
5/8	1 1/4	11/16	0.122	0.177	1 3/4	5/16	1.6
3/4	1 1/2	13/16	0.122	0.177	1 3/4	5/16	1.6
7/8	1 3/4	15/16	0.136	0.177	1 3/4	5/16	1.6
1	2	1 1/8	0.136	0.177	1 3/4	5/16	1.6
1 1/8	2 1/4	1 1/4	0.136	0.177	2 1/4	5/16	1.6
1 1/4	2 1/2	1 3/8	0.136	0.177	2 1/4	5/16	1.6
1 3/8	2 3/4	1 1/2	0.136	0.177	2 1/4	5/16	1.6
1 1/2	3	1 5/8	0.136	0.177	2 1/4	5/16	1.6

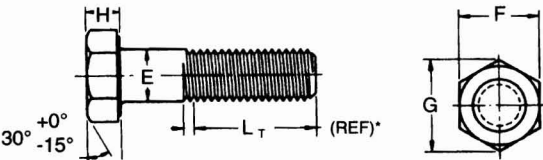
Washer Dimensions Tolerance (inches)

Dimension	Washer Size
	To 1 1/2 In. Nominal Bolt Size, Incl.
Nominal diameter of hole	-0: + 1/32
Nominal outside dimensions	-1/32: + 1/4
Flatness: max. deviation from straight edge placed on "cut" side shall not exceed	0.01
Butt shall not project above immediately adjacent washer surface more than	0.01

Nut Dimensions

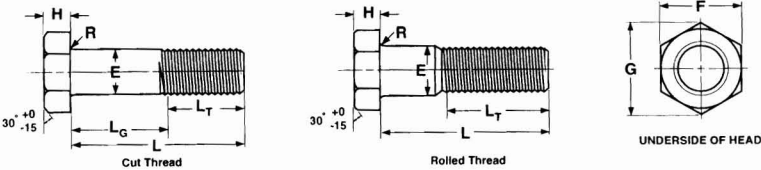
Nut Size In Inches	Inches	
	Heavy Hex Nuts	
	Width across flats F	Height, G
1/2	7/8	21/64
5/8	1 1/16	35/64
3/4	1 5/16	47/64
7/8	1 7/16	55/64
1	1 5/8	63/64
1 1/8	1 13/16	1 7/64
1 1/4	2	1 7/32
1 3/8	2 3/16	1 11/32
1 1/2	2 3/8	1 15/32

HEX
HEAD
CAP SCREWS



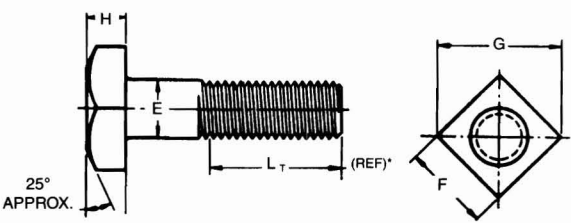
Nominal Size or Basic Product Dia.	E		F			G		H			L _T (Ref)	
	Body Diameter		Width Across Flats			Width Across Corners		Height			Thread Length For Screw Lengths	
	Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min	Less than 6"	More than 6"
1/4	0.2500	0.2450	7/16	0.438	0.428	0.505	0.488	5/32	0.163	0.150	0.750	1.000
5/16	0.3125	0.3065	1/2	0.500	0.489	0.577	0.557	13/64	0.211	0.195	0.875	1.125
3/8	0.3750	0.3690	9/16	0.562	0.551	0.650	0.628	15/64	0.243	0.226	1.000	1.250
7/16	0.4375	0.4305	5/8	0.625	0.612	0.722	0.698	9/32	0.291	0.272	1.125	1.375
1/2	0.5000	0.4930	3/4	0.750	0.736	0.866	0.840	5/16	0.323	0.302	1.250	1.500
9/16	0.5625	0.5545	13/16	0.812	0.798	0.938	0.910	23/64	0.371	0.348	1.375	1.625
5/8	0.6250	0.6170	15/16	0.938	0.922	1.083	1.051	25/64	0.403	0.378	1.500	1.750
3/4	0.7500	0.7410	1 1/8	1.125	1.100	1.299	1.254	15/32	0.483	0.455	1.750	2.000
7/8	0.8750	0.8660	1 5/16	1.312	1.285	1.516	1.465	35/64	0.563	0.531	2.000	2.250
1	1.0000	0.9900	1 1/2	1.500	1.469	1.732	1.675	39/64	0.627	0.591	2.250	2.500
1 1/8	1.1250	1.1140	1 11/16	1.688	1.631	1.949	1.859	11/16	0.718	0.658	2.500	2.750
1 1/4	1.2500	1.2390	1 7/8	1.875	1.812	2.165	2.066	25/32	0.813	0.749	2.750	3.000
1 3/8	1.3750	1.3630	2 1/16	2.062	1.994	2.382	2.273	27/32	0.878	0.810	3.000	3.250
1 1/2	1.5000	1.4880	2 1/4	2.250	2.175	2.598	2.480	15/16	0.974	0.902	3.250	3.500
1 3/4	1.7500	1.7380	2 5/8	2.625	2.538	3.031	2.893	1 3/32	1.134	1.054	3.750	4.000
2	2.0000	1.9880	3	3.000	2.900	3.464	3.306	1 7/32	1.263	1.175	4.250	4.500
2 1/4	2.2500	2.2380	3 3/8	3.375	3.262	3.897	3.719	1 3/8	1.423	1.327	4.750	5.000
2 1/2	2.5000	2.4880	3 3/4	3.750	3.625	4.330	4.133	1 17/32	1.583	1.479	5.250	5.500
2 3/4	2.7500	2.7380	4 1/8	4.125	3.988	4.763	4.546	1 11/16	1.744	1.632	5.750	6.000
3	3.0000	2.9880	4 1/2	4.500	4.350	5.196	4.959	1 7/8	1.935	1.815	6.250	6.500

HEAVY
HEX
BOLTS



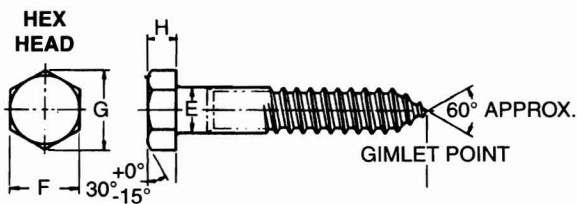
Nominal Size or Basic Product Dia.		E		F			G		H			R		L _T	
		Body Dia.		Width Across Flats			Width Across Corners		Head Height			Radius of Fillet		Thread Length For Bolt Lengths	
														Less Than 6"	More Than 6"
		Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min	Max	Min	Basic	Basic
1/2	0.5000	0.515	0.482	7/8	0.875	0.850	1.010	0.969	11/32	0.364	0.302	0.03	0.01	1.250	1.500
5/8	0.6250	0.642	0.605	1-1/16	1.062	1.031	1.227	1.175	27/64	0.444	0.378	0.06	0.02	1.500	1.750
3/4	0.7500	0.768	0.729	1-1/4	1.250	1.212	1.443	1.383	1/2	0.524	0.455	0.06	0.02	1.750	2.000
7/8	0.8750	0.895	0.852	1-7/16	1.438	1.394	1.660	1.589	37/64	0.604	0.531	0.06	0.02	2.000	2.250
1	1.0000	1.022	0.976	1-5/8	1.625	1.575	1.876	1.796	43/64	0.700	0.591	0.09	0.03	2.250	2.500
1-1/8	1.1250	1.149	1.098	1-13/16	1.812	1.756	2.093	2.002	3/4	0.780	0.658	0.09	0.03	2.500	2.750
1-1/4	1.2500	1.277	1.223	2	2.000	1.938	2.309	2.209	27/32	0.876	0.749	0.09	0.03	2.750	3.000
1-3/8	1.3750	1.404	1.345	2-3/16	2.188	2.119	2.526	2.416	29/32	0.940	0.810	0.09	0.03	3.000	3.250
1-1/2	1.5000	1.531	1.470	2-3/8	2.375	2.300	2.742	2.622	1	1.036	0.902	0.09	0.03	3.250	3.500
1-3/4	1.7500	1.785	1.716	2-3/4	2.750	2.662	3.175	3.035	1-5/32	1.196	1.054	0.12	0.04	3.750	4.000
2	2.0000	2.039	1.964	3-1/8	3.125	3.025	3.608	3.449	1-11/32	1.388	1.175	0.12	0.04	4.250	4.500
2-1/4	2.2500	2.305	2.214	3-1/2	3.500	3.388	4.041	3.862	1-1/2	1.548	1.327	0.19	0.06	4.750	5.000
2-1/2	2.5000	2.559	2.461	3-7/8	3.875	3.750	4.474	4.275	1-21/32	1.708	1.479	0.19	0.06	5.250	5.500
2-3/4	2.7500	2.827	2.711	4-1/4	4.250	4.112	4.907	4.688	1-13/16	1.869	1.632	0.19	0.06	5.750	6.000
3	3.0000	3.081	2.961	4-5/8	4.625	4.475	5.340	5.102	2	2.060	1.815	0.19	0.06	6.250	6.500

SQUARE HEAD BOLTS



Nominal Size or Basic Bolt Dia.	E	F				G		H			L _T (Ref)	
	Body Dia	Width Across Flats				Width Across Corners		Height			Thread Length For Bolt Lengths	
		Less Than 6"	More Than 6"									
	Max	Basic	Max	Min	Max	Min	Basic	Max	Min	Basic	Basic	
1/4	0.260	3/8	0.375	0.362	0.530	0.498	11/64	0.188	0.156	0.750	1.000	
5/16	0.324	1/2	0.500	0.484	0.707	0.665	13/64	0.220	0.186	0.875	1.125	
3/8	0.388	9/16	0.562	0.544	0.795	0.747	1/4	0.268	0.232	1.000	1.250	
7/16	0.452	5/8	0.625	0.603	0.884	0.828	19/64	0.316	0.278	1.125	1.375	
1/2	0.515	3/4	0.750	0.725	1.061	0.995	21/64	0.348	0.308	1.250	1.500	
5/8	0.642	15/16	0.938	0.906	1.326	1.244	27/64	0.444	0.400	1.500	1.750	
3/4	0.768	1 1/8	1.125	1.088	1.591	1.494	1/2	0.524	0.476	1.750	2.000	
7/8	0.895	1 5/16	1.312	1.269	1.856	1.742	19/32	0.620	0.568	2.000	2.250	
1	1.022	1 1/2	1.500	1.450	2.121	1.991	21/32	0.684	0.628	2.250	2.500	
1 1/8	1.149	1 11/16	1.688	1.631	2.386	2.239	3/4	0.780	0.720	2.250	2.750	
1 1/4	1.277	1 7/8	1.875	1.812	2.652	2.489	27/32	0.876	0.812	2.750	3.000	
1 3/8	1.404	2 1/16	2.062	1.994	2.917	2.738	29/32	0.940	0.872	3.000	3.250	
1 1/2	1.531	2 1/4	2.250	2.175	3.182	2.986	1	1.036	0.964	3.250	3.500	

HEX HEAD LAG SCREWS



Nominal Size or Basic Product Dia	E		F			G		H			Threads per Inch	
	Body or Shoulder Dia.		Width Across Flats			Hex Lag Screws						
						Width Across Corners		Height				
	Max	Min	Basic	Max	Min							Max
No. 10	0.199	0.178	9/32	0.281	0.271	0.323	0.309	1/8	0.140	0.110	11	
1/4	0.260	0.237	3/8	0.375	0.362	—	—	—	—	—	10	
1/4 **	0.260	0.237	7/16	0.438	0.425	0.505	0.484	11/64	0.188	0.150	10	
5/16	0.324	0.298	1/2	0.500	0.484	0.577	0.552	7/32	0.235	0.195	9	
3/8	0.388	0.360	9/16	0.562	0.544	0.650	0.620	1/4	0.268	0.226	7	
7/16	0.452	0.421	5/8	0.625	0.603	0.722	0.687	19/64	0.316	0.272	7	
1/2	0.515	0.482	3/4	0.750	0.725	0.866	0.826	11/32	0.364	0.302	6	
5/8	0.642	0.605	15/16	0.938	0.906	1.083	1.033	27/64	0.444	0.378	5	
3/4	0.768	0.729	1 1/8	1.125	1.088	1.299	1.240	1/2	0.524	0.455	4 1/2	
7/8	0.895	0.852	1 15/16	1.312	1.269	1.516	1.447	37/64	0.604	0.531	4	
1	1.022	0.976	1 1/2	1.500	1.450	1.732	1.653	43/64	0.700	0.591	3 1/2	
1 1/8	1.149	1.098	1 11/16	1.688	1.631	1.949	1.859	3/4	0.780	0.658	3 1/4	
1 1/4	1.277	1.223	1 7/8	1.875	1.812	2.165	2.066	27/32	0.876	0.749	3 1/4	

** Hex Lag Screw

CARRIAGE BOLTS

ASTM A307

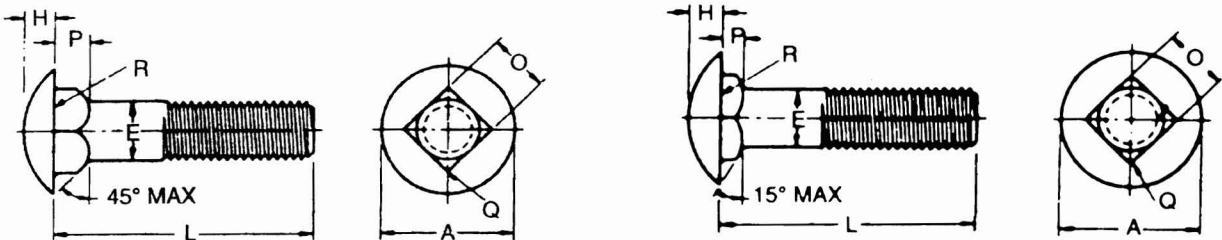
Grade A

Carriage bolts with UNRC-2A threads can be furnished in two different styles: square-neck carriage bolts in diameters from 1/4" to 3/4", inclusive and short square-neck carriage bolts in diameters from 1/4" to 5/8" inclusive.

Dimensional data for both styles are shown below.

MINIMUM THREAD LENGTH

The formula for determining thread length is, Bolts 6" and shorter, 2 diameters plus 1/4". Bolts over 6" 2 diameters plus 1/2". If bolts are too short to apply the formula, the thread will be extended as close to head as possible.



Square-neck carriage bolt dimensions (in.) ANSI B18.5

Nominal Size or Basic Bolt Diameter		Body Diameter		Head Diameter		Head Height		Square Width		Square Depth		Corner Radius on Square	Fillet Radius
		E		A		H		O		P		Q	R
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Max
	0.1900	0.199	0.182	0.469	0.438	0.144	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

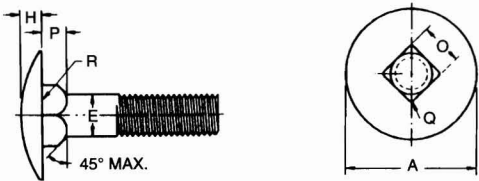
Full size body bolts are furnished unless user specifies undersize body bolts.

Short Square-neck carriage bolt dimensions (in.) ANSI B18.5

Nominal Size or Basic Bolt Diameter		Body Diameter		Head Diameter		Head Height		Square Width		Square Depth		Corner Radius on Square	Fillet Radius
		E		A		H		O		P		Q	R
		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

Undersize body bolts are furnished unless user specifies full-size body bolts.

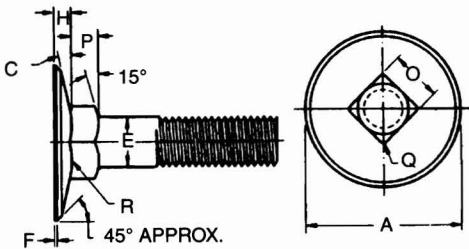
STEP BOLTS



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	0.199	0.182	0.656	0.625	0.114	0.094	0.199	0.185	0.125	0.094	0.031	0.031
1/4	0.260	0.237	0.844	0.813	0.145	0.125	0.260	0.245	0.156	0.125	0.031	0.031
5/16	0.324	0.298	1.031	1.000	0.176	0.156	0.324	0.307	0.187	0.156	0.031	0.031
3/8	0.388	0.360	1.249	1.188	0.208	0.188	0.388	0.368	0.219	0.188	0.047	0.031
7/16	0.452	0.421	1.406	1.375	0.239	0.219	0.452	0.431	0.250	0.219	0.047	0.031
1/2	0.515	0.483	1.594	1.563	0.270	0.250	0.515	0.492	0.281	0.250	0.047	0.031

¹ Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

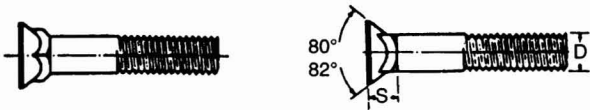
ELEVATOR BOLTS



Nominal Size ¹ or Basic Bolt Diameter	E		A			C	F	H		O		P		Q	R
	Body Diameter		Head Diameter			Head Angle	Flat on Min Dia. Head	Head Height		Square Width		Square Depth		Corner Radius On Square	Fillet Radius
	Max	Min	Max Edge Sharp	Min Edge Sharp	Min Edge Flat	Ref	Max	Max	Min	Max	Min	Max	Min	Max	Max
No.10	0.199	0.182	0.790	0.750	0.740	9°	0.025	0.082	0.062	0.210	0.185	0.125	0.094	0.031	0.031
1/4	0.260	0.237	1.080	0.969	0.938	9°	0.035	0.098	0.078	0.280	0.245	0.219	0.188	0.031	0.031
5/16	0.324	0.298	1.227	1.188	1.157	9°	0.035	0.114	0.094	0.342	0.307	0.250	0.219	0.031	0.031
3/8	0.388	0.360	1.352	1.312	1.272	11°	0.040	0.145	0.125	0.405	0.368	0.250	0.219	0.047	0.031
7/16	0.452	0.421	1.477	1.438	1.397	13°	0.040	0.176	0.156	0.468	0.431	0.281	0.250	0.047	0.031
1/2	0.515	0.483	1.602	1.562	1.532	12°	0.040	0.176	0.156	0.530	0.492	0.281	0.250	0.047	0.031

¹ Where specifying nominal size in decimals, zeroes preceding decimal and in the fourth decimal place shall be omitted.

NO. 3 HEAD PLOW BOLTS



D	A			F	S		B	
Nominal Diameter of Bolt	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

IDENTIFICATION MARKINGS ON BOLT HEADS

ASTM and SAE Standards
Specifications, Proof Loads, Tensile Strengths

Grade Marking	Specification	Material	Bolt and Screw Size In	Proof Load psi	Tensile Strength min psi
	SAE-J429 Grade 1	Low or Medium Carbon Steel	1/4 thru 1 1/2	33,000	60,000
	ASTM-A307		1/4 thru 4		60,000
	SAE-J429 Grade 2	Low or Medium Carbon Steel	1/4 thru 1/4 Over 3/4 thru 1 1/2	55,000 33,000	74,000 60,000
	SAE-J429 Grade 5	Medium Carbon Steel Quenched and Tempered	1/4 thru 1 Over 1 thru 1 1/4	85,000 74,000	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	120,000 105,000 90,000
	*ASTM-A325 Type 1	Medium Carbon Steel Quenched and Tempered	1/2 thru 1 1/2 Over 1 thru 1 1/2	85,000 74,000	120,000 105,000
	*ASTM-A32b Type 2	Low Carbon Martensite Steel Quenched and Tempered	1/2 thru 1	85,000	120,000
	ASTM-A325 Type 3	Weather Resistant Steel Quenched and Tempered	1 1/8 thru 1 1/2 1/2 thru 1	74,000 85,000	105,000 120,000
	ASTM-A354 Grade BB	Low Alloy Steel Quenched and Tempered	1/4 thru 2 1/2 Over 2 1/4 thru 4	80,000 75,000	105,000 100,000
	ASTM-A354 Grade BC	Low Alloy Steel Quenched and Tempered	1/4 thru 4 Over 2 1/2 thru 4	105,000 95,000	125,000 115,000
	SAE-J429 GRADE B	Medium Carbon Alloy Steel Quenched and Tempered	1/4 thru 1 1/4	120,000	150,000
	ASTM-A354 Grade BD	Low Alloy Steel Quenched and Tempered			
	ASTM-A490	Alloy Steel Quenched and Tempered	1/2 thru 1 1/2	120,000	150,000

* Radial Lines on Type 1 bolts are optional to manufacturer. On Type 2 bolts radial lines 60 degrees apart are required.
Bolt head markings include manufacturers identity symbols.