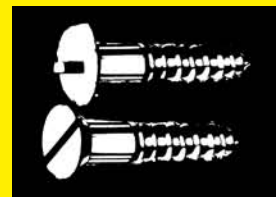


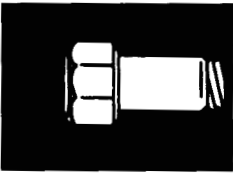
**THE
WOODWARD CO.**

ALBANY, NY



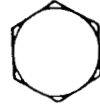
DECIMAL EQUIVALENTS AND TAP DRILL SIZES

DRILL SIZE	DECIMAL	TAP SIZE	DRILL SIZE	DECIMAL	TAP SIZE	DRILL SIZE	DECIMAL	TAP SIZE
80	.0135		30	.1285		P	.3230	
79	.0145		29	.1360	8-32, 36	21/64	.3281	
1/64	.0156		28	.1405		Q	.3320	3/8-24
78	.0160		9/64	.1406		R	.3390	
77	.0180		27	.1440		11/32	.3438	
76	.0200		26	.1470		S	.3480	
75	.0210		25	.1495	10-24	T	.3580	
74	.0225		24	.1520		23/64	.3594	
73	.0240		23	.1540		U	.3680	7/16-14
72	.0250		5/32	.1562		3/8	.3750	
71	.0260		22	.1570		V	.3770	
70	.0280		21	.1590	10-32	W	.3860	
69	.0292		20	.1610		25/64	.3906	7/16-20
68	.0310		19	.1660		X	.3970	
1/32	.0312		18	.1695		Y	.4040	
67	.0320		11/64	.1719		13/32	.4062	
66	.0330		17	.1730		Z	.4130	
65	.0350		16	.1770	12-24	27/64	.4219	1/2-13
64	.0360		15	.1800		7/16	.4375	
63	.0370		14	.1820	12-28	29/64	.4531	1/2-20
62	.0380		13	.1850		15/32	.4688	
61	.0390		3/16	.1875		31/64	.4844	9/16-12
60	.0400		12	.1890		1/2	.5000	
59	.0410		11	.1910		33/64	.5156	9/16-18
58	.0420		10	.1935		17/32	.5312	5/8-11
57	.0430		9	.1960		35/64	.5469	
56	.0465		8	.1990		9/16	.5625	
3/64	.0469	0-80	7	.2010	1/4-20	37/64	.5781	5/8-18
55	.0520		13/64	.2031		19/32	.5938	
54	.0550		6	.2040		39/64	.6094	11/16-11
53	.0595	1-64, 72	5	.2055		5/8	.6250	11/16-16
1/16	.0625		4	.2090		41/64	.6406	
52	.0635		3	.2130	1/4-28	21/32	.6562	3/4-10
51	.0670		7/32	.2188		43/64	.6719	
50	.0700	2-56, 64	2	.2210		11/16	.6875	3/4-16
49	.0730		1	.2280		45/64	.7031	
48	.0760		A	.2340		23/32	.7188	
5/64	.0781		15/64	.2344		47/64	.7344	
47	.0785	3-48	B	.2380		3/4	.7500	
46	.0810		C	.2420		49/64	.7656	7/8-9
45	.0820	3-56	D	.2460		25/32	.7812	
44	.0860		E, 1/4	.2500		51/64	.7969	
43	.0890	4-40	F	.2570	5/16-18	13/16	.8125	7/8-14
42	.0935	4-48	G	.2610		53/64	.8281	
3/32	.0938		17/64	.2656		27/32	.8438	
41	.0960		H	.2660		55/64	.8594	
40	.0980		I	.2720	5/16-24	7/8	.8750	1-8
39	.0995		J	.2770		57/64	.8906	
38	.1015	5-40	K	.2810		29/32	.9062	
37	.1040	5-44	9/32	.2812		59/64	.9219	1-14
36	.1065	6-32	L	.2900		15/16	.9375	
7/64	.1094		M	.2950		61/64	.9531	
35	.1100		19/64	.2969		31/32	.9688	
34	.1110		N	.3020		63/64	.9844	
33	.1130	6-40	5/16	.3125	3/8-16	1	1.000	
32	.1160		O	.3160				
31	.1200							
1/8	.1250							



Coarse Thread Gr. 2 Hex Cap Screws

ASTM A307-A Low Carbon



(Plain Head)

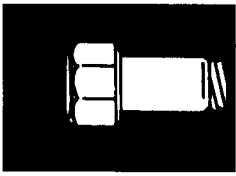
“C” (Coarse) denotes stock size - other sizes on application

Length	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-18	Dia. 1/2-13	Dia. 5/8-11	Dia. 3/4-10	Dia. 7/8-9	Dia. 1-8
1/2	C	C						
5/8	C	C	C					
3/4	C	C	C	C				
7/8	C	C	C					
1	C	C	C	C	C	C		
1 1/4	C	C	C	C	C	C		
1 1/2	C	C	C	C	C	C	C	
1 3/4	C	C	C	C	C	C	C	
2	C	C	C	C	C	C	C	C
2 1/4	C	C	C	C	C	C	C	
2 1/2	C	C	C	C	C	C	C	C
2 3/4	C	C	C	C	C	C	C	
3	C	C	C	C	C	C	C	C
3 1/4		C	C		C	C		
3 1/2	C	C	C	C	C	C	C	C
3 3/4					C	C	C	
4	C	C	C	C	C	C	C	C
4 1/2	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C
5 1/2	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C

Most popular sizes from 1/4-20x1/2 thru 3/4-10x6 are stocked both plain and zinc plated.



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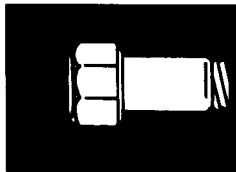


Coarse Thread Gr. 2 Hex Machine Bolts

ASTM A307-A Low Carbon

“C” (Coarse) denotes stock size - other sizes on application

Length	Dia. 3/8-16	Dia. 1/2-13	Dia. 5/8-11	Dia. 3/4-10	Dia. 7/8-9	Dia. 1-8	Dia. 1 1/8-7	Dia. 1 1/4-7	Dia. 1 1/2-6	Dia. 1 3/4-5
3							C	C		
3 1/2							C	C		
4							C	C	C	
4 1/2							C	C		
5							C	C	C	
5 1/2								C		
6							C	C	C	
6 1/2	C	C	C	C		C				
7	C	C	C	C	C	C	C	C	C	
7 1/2		C	C	C		C				
8	C	C	C	C	C	C	C	C	C	C
8 1/2			C	C						
9	C	C	C	C	C	C		C	C	
10	C	C	C	C	C	C	C	C	C	C
11		C	C	C	C	C		C		
12	C	C	C	C	C	C	C	C	C	C

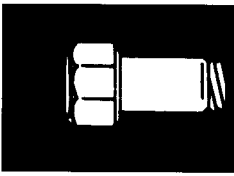


Coarse Thread Heavy Hex Machine Bolts

ASTM A307-B Low Carbon

“C” (Coarse) denotes stock size - other sizes on application

dia.	lgth 1 3/4	lgth 2	lgth 2 1/4	lgth 2 1/2	lgth 2 3/4	lgth 3	lgth 3 1/4	lgth 3 1/2	lgth 3 3/4	lgth 4
1/2-13	C	C	C	C						
5/8-11	C	C	C	C	C	C	C	C		C
3/4-10	C	C	C	C	C	C	C	C	C	C



Coarse Thread Gr. 5 Hex Cap Screws

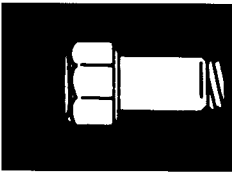


(3 Radial Lines on Head)

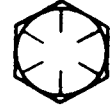
ASTM A449 C-1038 Med. Carbon Heat Treated

“C” (Coarse) denotes stock size - other sizes on application

lgth	Dia. 1/4 20	Dia. 5/16 18	Dia. 3/8 16	Dia. 7/16 14	Dia. 1/2 13	Dia. 9/16 12	Dia. 5/8 11	Dia. 3/4 10	Dia. 7/8 9	Dia. 1 8	Dia. 1 1/8 7	Dia. 1 1/4 7	Dia. 1 3/8 6	Dia. 1 1/2 6
1/2	C	C	C											
5/8	C	C	C											
3/4	C	C	C	C	C									
7/8	C	C	C	C										
1	C	C	C	C	C		C	C						
1 1/4	C	C	C	C	C	C	C	C						
1 1/2	C	C	C	C	C	C	C	C						
1 3/4	C	C	C	C	C	C	C	C		C				
2	C	C	C	C	C	C	C	C	C	C				
2 1/4	C	C	C	C	C	C	C	C		C				
2 1/2	C	C	C	C	C	C	C	C	C	C	C	C		
2 3/4	C	C	C	C	C		C	C		C		C		
3	C	C	C	C	C	C	C	C	C	C	C	C		
3 1/4		C	C		C		C	C		C				
3 1/2	C	C	C	C	C	C	C	C	C	C	C	C		
3 3/4					C		C	C						
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4 1/2	C	C	C	C	C	C	C	C	C	C	C	C	C	
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5 1/2	C	C	C	C	C		C	C	C	C	C	C		
6	C	C	C	C	C		C	C	C	C	C	C	C	C
6 1/2			C		C		C	C	C	C	C			
7	C	C	C		C		C	C	C	C	C	C		C
8	C	C	C		C		C	C	C	C	C	C	C	C
9			C		C		C	C	C	C	C	C		
10			C		C		C	C	C	C	C	C		C
11							C	C	C					
12			C		C		C	C	C	C	C	C		
13							C	C						
14							C	C						



Coarse & Fine Thread Gr. 8 Hex Cap Screws

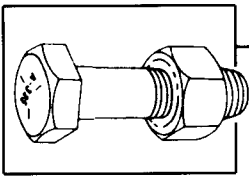


(6 Radial Lines on Head)

ASTM A354 4140 Alloy Heat Treated

“C” (Coarse) & “F” (Fine) denotes stock size - other sizes on application

lgth	Dia. 1/4 20/24	Dia. 5/16 18/24	Dia. 3/8 16/24	Dia. 7/16 14/20	Dia. 1/2 13/20	Dia. 9/16 12/18	Dia. 5/8 11/18	Dia. 3/4 10/16	Dia. 7/8 9/14	Dia. 1 8/14	Dia. 1 1/8 7	Dia. 1 1/4 7	Dia. 1 3/8 6	Dia. 1 1/2 6
1/2	F	F												
3/4	C/F	C/F	C/F		C		C							
1	C/F	C/F	C/F	C/F	C/F	C/F	C							
1 1/4	C/F	C/F	C/F	C/F	C/F	C/F	C							
1 1/2	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C		C				
1 3/4	C/F	C/F	C/F	C/F	C/F	C/F	C/F							
2	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F			
2 1/4	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C	C/F					
2 1/2	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F			
2 3/4	C	C	C/F	C	C	C	C	C	C					
3	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F			
3 1/4	C	C	C/F		C		C	C	C					
3 1/2	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C		
4	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C	C	C
4 1/2	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F			
5	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C	C	C
5 1/2	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F			
6	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C	C	C
7			C		C		C/F	C/F	C	C	C	C		C
8			C/F		C		C/F	C/F	C/F	C/F	C	C	C	C
9					C		C/F	C/F	C	C	C	C		
10					C		C/F	C/F	C	C	C	C		C
11					C		C	C	C					
12					C		C/F	C/F	C	C	C	C		C
13					C		C	C						
14					C		C	C	C	C	C	C		C
16										C				



#A-325 Type 1/Type 3/Load Indicator Heavy Hex Structural Bolts



Standard Keg quantities shown for stock sizes - other sizes on application

Where "G" - Hot dipped Galvanized type 1 in stock

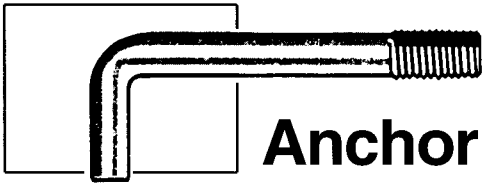
Where "3" - type 3 in stock

Where "L" - Load Indicator Bolts in stock

Length	Diam. 1/2-13	Diam. 5/8-11	Diam. 3/4-10	Diam. 7/8-9	Diam. 1-8	Diam. 1 1/8-7	Diam. 1 1/4-7
1 1/2	1,000G	650G	375G3				
1 3/4	900G	600G3	375G3L	275			
2	900G	550G3	350G3L	250G3			
2 1/4	800	500G	325G3L	225G3	170		
2 1/2	700	450G3	300G3L	200G3	180		
2 3/4		425	275G3L	200G3	160		
3	500	400G	250G3L	175G3	150		
3 1/4		400	225G L	175	140		
3 1/2	450	350G	225G3L	175 3	125		
3 3/4		325	200	150	120		
4	400	300	200	150 3	115	90	70
4 1/4			200	150	110		
4 1/2			175	125	110	90	
4 3/4				125	110	80	
5			150	125	100	80	60
5 1/2			150	100	95		
6			135	100	95	70	55
6 1/2			125	100	75		
7			125	90	70	60	45
8				75			40



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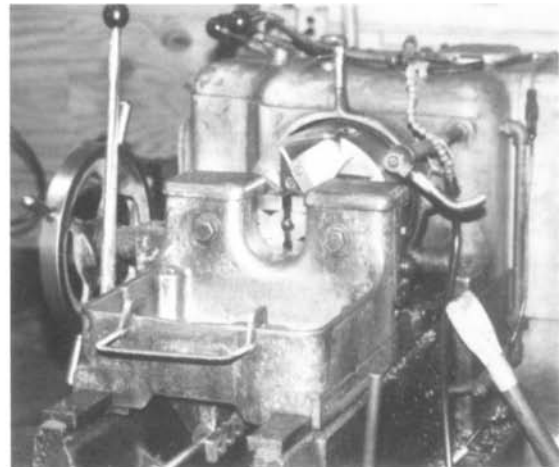
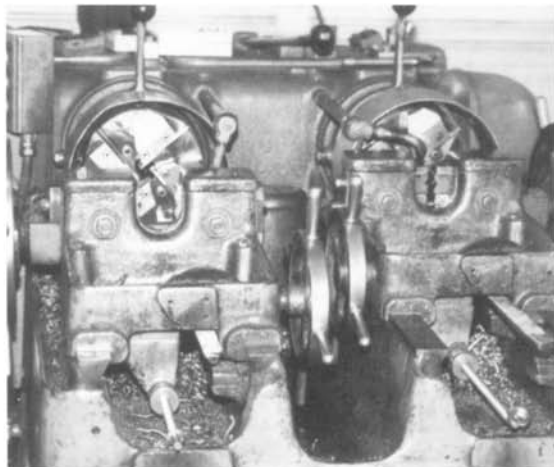
Anchor Bolts

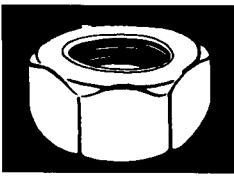
● - denotes stock size - other sizes on application

We have in-house facilities for furnishing promptly a wide range of Anchor Bolts from 1/2" to 2 1/2" diameter with any hook and thread length; and a variety of alloy materials, high strength steels and stainless. Popular sizes below are available off the shelf in A-36 undersize body with rolled threads including Hot Dipped Galvanized ("G") where indicated. All items made by our equipment are full body with standard cut threads.

We encourage your inquiries for any "specials" or unusual size Anchor Bolts, as well as a wide variety of cross braces, sag bars, tie rods, and other threaded construction items either straight or bent, together with turnbuckles, eyebolts, clevises, yokes, hooks and similar related items as shown on page 75.

	3/8-16	1/2-13	5/8-11	3/4-10	7/8-9	1-8	1 1/4-7
lgth. hooks	2"	2"	3"	3"	3"	3"	4"
lgth. thrd.	2"	2"	3"	4"	4"	4"	6"
lgth. bolt							
6	●	●					
8	●	● G	●				
10	●	●	●	●			
12	●	● G	● G	● G			
14		●	●	●			
15				●		●	
16		● G	●	● G		●	
18		●	●	●	●	●	
20				●			
24				● G	● G	● G	●
36			● G	● G		● G	● G





Coarse & Fine Thread Finished Hex Nuts

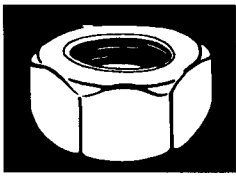
ASTM A563

“C” (Coarse) & “F” (Fine) denotes stock size - other sizes on application

C/F	G-2 Plain	G-2 Zinc Plt.	G-2 HD Galv.	G-5 Zinc Plt.	G-8 Zinc Plt.	G-2 Slotted	G-2 Jam
1/4-20/28	C	C	C	C	C/F		C/F
5/16-18/24	C	C	C	C	C/F	C	C/F
3/8-16/24	C	C	C	C	C/F	C/F	C/F
7/16-14/20	C	C		C	C/F	C/F	C/F
1/2-13/20	C	C	C	C	C/F	C/F	C/F
9/16-12/18	C	C		C	C/F	C/F	C/F
5/8-11/18	C	C	C	C	C/F	C/F	C/F
3/4-10/16	C	C	C	C	C/F	C/F	C/F
7/8-9/14	C	C	C	C	C/F	C/F	C/F
1-8/14	C	C	C	C	C/F	C/F	C/F
1 ¹ / ₈ -7/12	C	C	C	C	C/F	C/F	C/F
1 ¹ / ₄ -7/12	C	C	C	C	C/F	C/F	C/F
1 ³ / ₈ -6/12				C	C		C/F
1 ¹ / ₂ -6/12	C	C	C	C	C/F	C/F	C/F
1 ³ / ₄ -5/12					C		
2-4.5/12					C		



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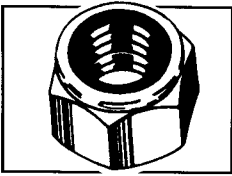
Coarse & 2-H (8)Thread Heavy Hex Nuts

“C” (Coarse) or “8” (2'H) denotes stock size - other sizes available on application.

	A-563 Plain	A-563 Zinc Plt.	A-563 HD Galv.	A-325 Plain	A-194-2H Plain	A-194-2H H.D Galv.
1/4-20	C	C			C	
5/16-18	C	C			C	
3/8-16	C	C	C		C	
7/16-14	C	C				
1/2-13	C	C	C		C	C
9/16-12	C	C				
5/8-11	C	C	C	C	C	C
3/4-10	C	C	C	C	C	C
7/8-9	C	C	C	C	C	C
1-8	C	C	C	C	C	C
1 ¹ / ₈ -7	C			C	C/8 thread	C
1 ¹ / ₄ -7	C			C	C/8 thread	C
1 ³ / ₈ -6	C				C/8 thread	
1 ¹ / ₂ -6	C				C/8 thread	C
1 ³ / ₄ -5	C				8 thread	
2-4 ¹ / ₂	C				8 thread	
2 ¹ / ₄ -4 ¹ / ₂	C				8 thread	
2 ¹ / ₂ -4	C				8 thread	
2 ³ / ₄ -4	C				8 thread	
3-4	C				8 thread	



THE WOODWARD CO.



Coarse & Fine Thread Hex Locknuts

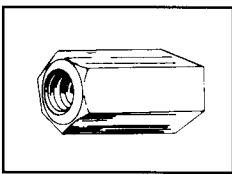


“C” (Coarse) & “F” (Fine) denotes stock size - other sizes on application

	NE Nylon Insert Elastic Stop Zinc Plt.	All Metal Class C (G-8) Prev. Torque Zinc Plt. & Waxed
6-32	C	
8-32	C	
10-24/32	C/F	
1/4-20/28	C/F	C/F
5/16-18/24	C/F	C/F
3/8-16/24	C/F	C/F
7/16-14/20	C/F	C/F
1/2-13/20	C/F	C/F
9/16-12/18	C/F	C/F
5/8-11/18	C/F	C/F
3/4-10/16	C/F	C/F
7/8-9/14	C/F	C/F
1-8/14	C/F	C/F
1 ¹ / ₈ -7/12	C/F	C
1 ¹ / ₄ -7/12	C/F	C
1 ¹ / ₂ -6/12	C	C



THE WOODWARD CO.



Coarse & Fine Thread Miscellaneous Nuts



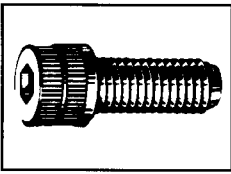
“C” (Coarse) & “F” (Fine) denotes stock size - other sizes on application

	Coupling Hex Z.P.	Reducer Hex Z.P.	Square Fin. Pln.	Mach. Scr. Hex Z.P.	Left Hand Fin. Hex Pln.	Wing Z.P.	Cap Acorn Z.P.	Acme
4-40				C				
5-40				C				
6-32				C		C		
8-32				C		C		
10-24/32	C			C/F		C/F	C/F	
12-24				C		C	C	
1/4-20/28	C		C	C	C/F	C	C	
5/16-18/24	C		C	C	C/F	C	C	
3/8-16/24	C	C	C	C	C/F	C	C	
7/16					C/F	C		
1/2-13/20	C	C	C		C/F	C	C	
5/8-11/18	C	C	C		C/F	C	C	
3/4-10/16	C	C	C		C/F	C	C	6 thread
7/8-9/14	C		C		C/F			6 thread
1-8/14	C		C		C/F			5 thread
1 ¹ / ₈ -7	C		C		C			5 thread
1 ¹ / ₄ -7	C		C		C			5 thread
1 ³ / ₈ -6	C				C			
1 ¹ / ₂ -6	C		C		C			4 thread
1 ³ / ₄ -5	C				C			
2-4 ¹ / ₂					C			

The above is a partial listing of the more popular miscellaneous nuts we stock. We encourage your inquiries for any type nut, standard or special, any size, any material.



THE WOODWARD CO.

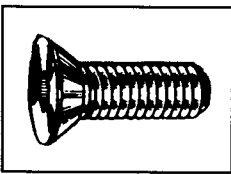


Coarse & Fine Thread Socket Cap Screws

“C” (Coarse) & “F” (Fine) denotes stock size - other sizes on application

lgth.	Dia. 4	Dia. 5	Dia. 6	Dia. 8	Dia. 10	Dia. 1/4	Dia. 5/16	Dia. 3/8	Dia. 7/16	Dia. 1/2	Dia. 5/8	Dia. 3/4	Dia. 7/8	Dia. 1	Dia. 1 1/4
	40	40	32	32	24/32	20/28	18/24	16/24	14/20	13/20	11/18	10/16	9/14	8/14	7
1/4	C	C	C	C	C										
3/8	C	C	C	C	C/F	C/F	C/F								
1/2	C	C	C	C	C/F	C/F	C/F	C/F	C	C					
5/8	C	C	C	C	C/F	C/F	C/F	C/F	C	C					
3/4	C	C	C	C	C/F	C/F	C/F	C/F	C	C	C				
7/8	C		C	C	C/F	C/F	C	C	C	C					
1	C	C	C	C	C/F	C/F	C/F	C/F	C/F	C/F	C/F				
1 1/4			C	C	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C			
1 1/2				C	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C		
1 3/4					C	C/F	C/F	C/F	C	C/F	C/F	C			
2				C	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C/F	C	C	
2 1/4					C/F	C	C/F	C/F	C	C/F	C/F	C	C	C	
2 1/2					C/F	C	C/F	C/F	C	C/F	C/F	C/F	C	C	C
2 3/4						C	C	C	C	C	C	C		C	
3					C/F	C	C	C/F	C	C/F	C/F	C	C	C	C
3 1/4							C	C		C	C	C		C	
3 1/2							C	C	C	C	C	C	C	C	C
4							C	C	C	C	C	C	C	C	C
4 1/2								C		C	C	C	C	C	C
5								C		C	C	C	C	C	C
5 1/2										C		C		C	
6								C		C	C	C		C	C
7										C	C	C			
8										C	C	C		C	

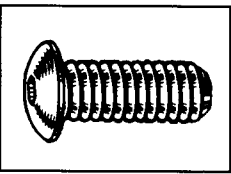
Short Arm and Long Arm Hex Keys are stocked for all sizes of socket products shown. For key sizes see table on pg.85



Coarse & Fine Thread Flat Socket Cap Screws

“C” (Coarse) & “F” (Fine) denotes stock size - other sizes on application

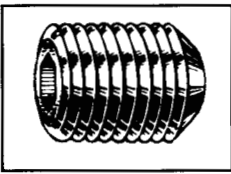
	Dia. 4	Dia. 5	Dia. 6	Dia. 8	Dia. 10	Dia. 1/4	Dia. 5/16	Dia. 3/8	Dia. 7/16	Dia. 1/2	Dia. 5/8	Dia. 3/4
lgth.	40	40	32	32	24/32	20	18	16	14	13	11	10
1/4	C		C									
3/8	C	C	C	C	C/F	C						
1/2	C	C	C	C	C/F	C	C	C				
5/8	C	C	C	C	C/F	C	C	C				
3/4	C	C	C	C	C/F	C	C	C				
1				C	C/F	C	C	C	C	C		
1 1/4					F	C	C	C	C	C	C	
1 1/2					F	C	C	C	C	C	C	C
1 3/4					F	C				C	C	
2					F	C	C	C	C	C	C	C
2 1/4										C	C	C
2 1/2							C	C		C	C	C
3							C	C		C	C	C
3 1/2											C	
4												C



Coarse & Fine Thread Button Socket Cap Screws

	Dia. 4	Dia. 6	Dia. 8	Dia. 10	Dia. 1/4	Dia. 5/16	Dia. 3/8	Dia. 1/2	Dia. 5/8
lgth.	40	32	32	24/32	20	18	16	13	11
1/4	C	C	C	F					
3/8	C	C	C	C/F	C				
1/2	C	C	C	C/F	C	C	C		
5/8	C	C	C	C/F	C	C	C		
3/4	C	C	C	C/F	C	C	C		
7/8				C/F	C		C		
1			C	C/F	C	C	C	C	C
1 1/4					C	C	C	C	C
1 1/2					C	C	C	C	C
2					C		C	C	

Short Arm and Long Arm Hex Keys are stocked for all sizes of socket products shown. For key sizes see table on pg.85



Cup Point Socket Set Screws

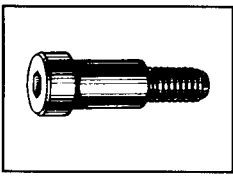
“C” (Coarse) & “F” (Fine) denotes stock size - other sizes on application

lgth.	Dia. 4	Dia. 5	Dia. 6	Dia. 8	Dia. 10	Dia. 1/4	Dia. 5/16	Dia. 3/8	Dia. 7/16	Dia. 1/2	Dia. 5/8	Dia. 3/4	Dia. 1
	40	40	32	32	24/32	20/28	18/24	16/24	14/20	13/20	11	10	8
1/8	C	C	C	C									
3/16	C	C	C	C	C/F	C							
1/4	C	C	C	C	C/F	C/F	C	C					
5/16	C	C	C	C	C/F	C	C/F	C/F					
3/8	C	C	C	C	C/F	C/F	C/F	C/F		C			
7/16						C	C/F	C	C				
1/2	C	C	C	C	C/F	C/F	C/F	C/F	C/F	C/F	C		
5/8			C	C	C/F	C	C/F	C/F	C	C	C/F	C	
3/4			C	C	C/F	C/F	C/F	C/F	C	C/F	C/F	C	
1			C	C	C/F	C	C/F	C/F	C	C/F	C/F	C	C
1 1/4						C/F	C	C/F		C	C	C	
1 1/2						C	C	C/F	C	C/F	C/F	C	
1 3/4						C		C	C	C	C		
2							C	C		C	C/F	C	C
2 1/2							C	C		C	C		C
3								C			C	C	C

Short Arm and Long Arm Hex Keys are stocked for all sizes of socket products shown. For key sizes see table on pg.85



THE WOODWARD CO.



Socket Shoulder Screws

(Stripper Bolts)

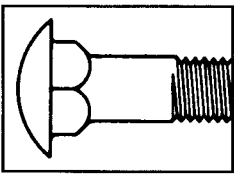
● - denotes stock size - other sizes on application
 order by shoulder diameter and length — not by thread

lgth	Dia. 1/4 Thread 10-24	Dia. 5/16 1/4-20	Dia. 3/8 5/16-18	Dia. 1/2 3/8-16	Dia. 5/8 1/2-13	Dia. 3/4 5/8-11
3/8	●	●	●			
1/2	●	●	●	●		
5/8	●	●	●	●		
3/4	●	●	●	●		
1	●	●	●	●	●	
1 1/4	●	●	●	●	●	
1 1/2	●	●	●	●	●	●
1 3/4		●	●	●	●	●
2		●	●	●	●	●
2 1/4			●	●	●	●
2 1/2			●	●	●	●
2 3/4			●		●	●
3			●	●	●	●
3 1/4						●
3 1/2				●	●	●
4				●	●	●

Short Arm and Long Arm Hex Keys are stocked for all sizes of socket products shown. For key sizes see table on pg.85



THE WOODWARD CO.



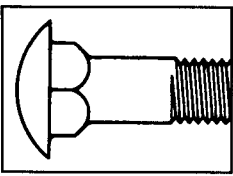
Carriage Screws

Zinc Plated thru 1/2 x 6

G denotes H.D. Galvanized

● - denotes stock size - other sizes on application

	Dia. 3/16	Dia. 1/4	Dia. 5/16	Dia. 3/8	Dia. 7/16	Dia. 1/2	Dia. 5/8	Dia. 3/4
3/4	●	●	●					
1	●	●	●	●	●	●		
1 1/4	●	●	●	●	●	●		
1 1/2	●	●	●	●	●	●		
1 3/4		●	●	●	●			
2	●	●	●	●G	●	●		
2 1/4		●		●		●		
2 1/2	●	●	●	●G	●	●G		
3	●	●	●	●G	●	●G		
3 1/2		●	●	●G	●	●G		
4	●	●	●	●G	●	●G		●G
4 1/2		●	●	●	●	●G	●	
5		●	●	●G	●	●G	●	●
5 1/2		●	●	●	●	●G	●	
6		●	●	●G	●	●G	●	●G
6 1/2				●		●G		
7		●	●	●G		●G	●	
7 1/2				●		●		
8		●	●	●G		●G	●	●G
9			●	●		●		
10			●	●G		●G	●G	●G
11						●		
12				●		●	●G	●



Shaker Screen Bolts - Grade 5

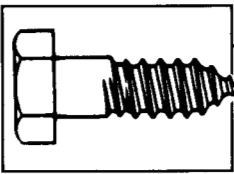
Full Thread

• - denotes stock size - others on application

Igth	Dia. 5/16	Dia. 3/8	Dia. 7/16	Dia. 1/2	Dia. 5/8	Dia. 3/4
3/4	●	●				
1	●	●		●		
1 1/4		●				
1 1/2		●	●	●	●	
1 3/4					●	
2		●	●	●	●	
2 1/4					●	
2 1/2				●	●	●
2 3/4					●	●
3				●	●	●
3 1/2				●	●	●
4				●	●	●
4 1/2					●	●
5				●	●	●
5 1/2				●	●	●
6				●	●	●
7					●	●
8						●
9						●



THE WOODWARD CO.



Hex Lag Screws

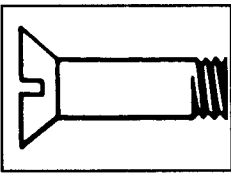
● - denotes stock size - other sizes on application

lgth	Dia. 1/4	Dia. 5/16	Dia. 3/8	Dia. 1/2	Dia. 5/8	Dia. 3/4
1	●	●	●			
1 ¹ / ₄	●	●	●			
1 ¹ / ₂	●	●	●	●		
2	●	●	●	●		
2 ¹ / ₂	●	●	●	●		
3	●	●	●	●	●	●
3 ¹ / ₂	●	●	●	●	●	●
4	●	●	●	●	●	●
4 ¹ / ₂	●		●	●		
5	●	●	●	●	●	●
5 ¹ / ₂	●		●			
6	●	●	●	●	●	●
7			●	●		
8			●	●	●	●
10			●	●	●	●
12			●	●	●	●

Sizes thru 1/2x6 are generally stocked zinc plated. Various larger sizes above are also stocked H.D. Galvanized. Larger diameters and lengths than shown can be furnished on application.



THE WOODWARD CO.



Flat Head Slotted Cap Screws

● - denotes stock size - other sizes on application

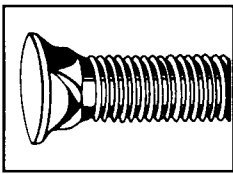
Length	Dia. 1/2-13	Dia. 5/8-11	Dia. 3/4-10	Dia. 7/8-9	Dia. 1-8
1 1/2		●	●		
1 3/4		●	●		
2		●	●	●	
2 1/2		●	●		
2 3/4		●	●		
3		●	●	●	
3 1/2		●	●	●	
4		●	●	●	●
4 1/2	●	●	●	●	●
5	●	●	●		●
5 1/2	●	●			
6	●	●	●		



Square Head Cup Point Set Screws

● - denotes stock size - other sizes on application

Length	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 1/2-13	Dia. 5/8-11	Dia. 3/4-10	Dia. 7/8-9	Dia. 1-8
3/8	●							
1/2	●	●		●				
3/4	●	●	●	●	●			
1	●	●	●	●	●			
1 1/4	●	●	●	●	●			
1 1/2		●	●	●	●	●		
1 3/4			●	●	●	●		
2		●	●	●	●	●	●	●
2 1/4						●		
2 1/2			●	●	●	●	●	●
3		●	●	●	●	●	●	●
3 1/2				●	●	●	●	●
4			●	●	●	●	●	●
4 1/2				●	●	●	●	●
5			●	●	●	●	●	●
6			●	●	●	●	●	●



Plow Bolts (P)

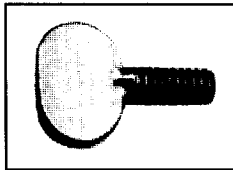
#3 Head - thru 5/8 dia. GR-5; 3/4 dia. & larger GR-8

Elevator Bolts (E)



“P”, “E” - denotes stock size - other sizes on application

lgth.	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 7/16-14	Dia. 1/2-13	Dia. 5/8-11	Dia. 3/4-10	Dia. 7/8-9	Dia. 1-8
3/4	E								
1	E	E	PE	P					
1 1/4	E	E	P	P	P				
1 1/2	E	E	P	P	P	P			
1 3/4	E	E		P	P	P			
2	E	E	P	P	P	P	P		
2 1/2				P	P	P	P		P
2 3/4						P	P		
3					P	P	P	P	P
3 1/2						P	P	P	P
4						P	P	P	P



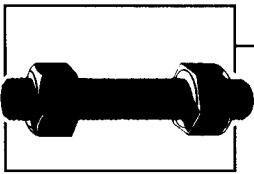
Thumb Screws (T)

Hanger Screws (H)



“T”, “H” - denotes stock size - other sizes on application

lgth.	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 7/16-14	Dia. 1/2-13
1/2	T	T			
3/4	T	T			
1	T	T	T	T	
1 1/4		T	T		
1 1/2	T	T	T	T	
2	T	T	T	T	
3		T	T		
4			H	H	H
6				H	H
8				H	H



A193-B7 Alloy Full Thread Steel Studs

● - denotes stock size - other sizes on application

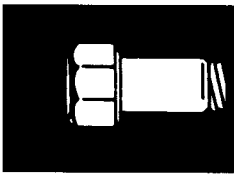
lgth.	Dia. 1/2-13	Dia. 5/8-11	Dia. 3/4-10	Dia. 7/8-9	Dia. 1-8	Dia. 1 1/8-8	Dia. 1 1/4-8
2	●		●				
2 1/4	●						
2 1/2	●	●	●				
2 3/4	●						
3	●	●	●				
3 1/4		●	●				
3 1/2	●	●	●	●	●		
3 3/4		●	●	●			
4	●	●	●	●	●		
4 1/4		●	●				
4 1/2	●	●	●	●	●	●	
4 3/4	●	●	●				
5	●	●	●	●	●	●	
5 1/2		●	●	●	●	●	
6	●	●	●	●	●	●	●
6 1/2			●	●	●	●	●
7		●	●	●	●	●	●
7 1/2				●		●	●
8		●	●	●		●	●
8 1/2				●			●
9				●			●
10				●			●

B-7 Alloy studs are produced in a large range of sizes - much more extensive than the popular items shown in inventory above.

Prompt delivery from manufacturer's stock is available to meet most needs regarding both quantity and size range.

We encourage your inquiries for any diameters, threads, or lengths required.

Many other sizes can be furnished from threaded rod promptly.

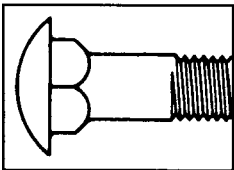


#18-8 Stainless Steel Hex Cap Screws

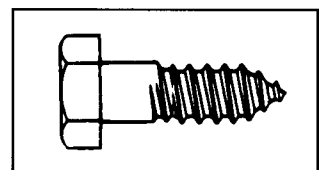
● - denotes stock size - other sizes on application

Length	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 7/16-14	Dia. 1/2-13	Dia. 5/8-11	Dia. 3/4-10	Dia. 7/8-9	Dia. 1-8	Dia. 1 1/4-7
3/8	●	●	●							
1/2	●	●	●							
5/8	●	●	●							
3/4	●	●	●	●	●	●				
1	●	●	●	●	●	●	●			
1 1/4	●	●	●	●	●	●	●			
1 1/2	●	●	●	●	●	●	●	●		
1 3/4	●	●	●	●	●	●	●	●		
2	●	●	●	●	●	●	●	●	●	
2 1/4	●	●	●		●	●	●	●		
2 1/2	●	●	●	●	●	●	●	●	●	●
2 3/4		●	●		●	●	●			
3	●	●	●	●	●	●	●	●	●	●
3 1/4		●			●	●	●			
3 1/2	●	●	●		●	●	●	●	●	●
3 3/4					●	●	●	●		
4	●	●	●		●	●	●	●	●	●
4 1/2			●		●	●	●	●	●	
5	●		●		●	●	●	●	●	
6	●		●		●	●	●	●	●	

Many popular sizes of Hex Cap Screws, Nuts, & Washers are also available in type #316 stainless steel from stock.

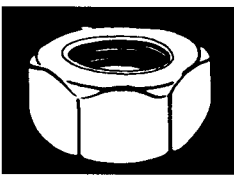


#18-8 Stainless Steel Carriage & Lag Screws



Stock size denoted by "C" Carriage & "L" Lag - other sizes on application

lgth	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 1/2-13
1	C/L	C		
1 1/4	C			
1 1/2	C/L	C/L	C/L	C
2	C/L	C/L	C/L	C/L
2 1/2	C/L	C/L	C/L	C/L
3	C/L	C/L	C/L	C/L
3 1/2			C/L	C/L
4			C/L	C/L



#18-8 Stainless Steel Nuts

“C” (Coarse) & “F” (Fine) denotes stock size - other sizes on application

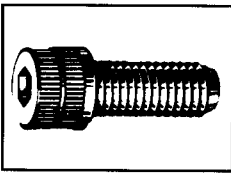
	Finished Hex	Heavy Hex	Mach Screw	Nylon Insert	Wing	Acorn	Finished Jam	Coupling
4-40			C					
5-40			C					
6-32			C	C	C	C		
8-32			C	C	C	C		
10-24/32			C/F	C/F	C/F	C/F		
1/4-20/28	C/F	C	C	C	C	C	C	C
5/16-18/24	C/F	C		C	C	C	C	C
3/8-16/24	C/F	C		C	C	C	C	C
7/16-14/20	C/F	C		C				
1/2-13/20	C/F	C		C	C	C	C	C
5/8-11/18	C/F	C		C			C	C
3/4-10/16	C/F	C		C			C	C
7/8-9	C	C					C	C
1-8/14	C/F	C					C	C
1 1/8-74	C	C						
1 1/4-7	C	C						
1 1/2-6	C	C						



#18-8 Stainless Steel Washers

● - denotes stock size - other sizes on application

	#4	#5	#6	#8	#10	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1"	1 1/8"	1 1/4"
Comm. Flat	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Split L/W's	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Fender						●	●	●		●						
Finishing			●	●	●	●										



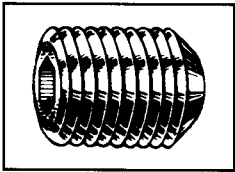
#18-8 Stainless Steel Socket Cap Screws

● - denotes stock size of standard socket head - other sizes on application

B - denotes Button head

F - denotes Flat head

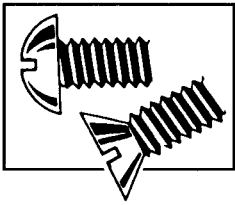
Lgth.	Dia. 6-32	Dia. 8-32	Dia. 10-32	Dia. 10-24	Dia 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 1/2-13
1/4	●	●	●					
3/8	●	●	●	● B	●			
1/2	● BF	● BF	● B	● BF	● F	●	● F	
5/8	● B	●	●	●	● BF	● F	● F	
3/4	● BF	● BF	● B	● BF	● BF	● BF	● BF	●
1	●	● BF	● B	● F	● BF	● BF	● BF	●
1 1/4		●	●		●	●	● F	●
1 1/2			●		●	●	● F	● F
1 3/4					●	●	● F	● F
2					●	●	●	●
2 1/2					●	●	●	●
3					●	●	●	●



#18-8 Stainless Steel Socket Set Screws (Cup point)

● - denotes stock size - other sizes on application

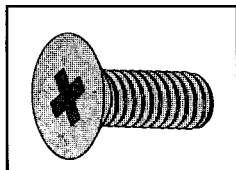
Lgth.	Dia. 6-32	Dia. 8-32	Dia. 10-32	Dia. 10-24	Dia 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 1/2-13
1/4		●	●	●	●	●		
3/8	●	●	●	●	●	●	●	
1/2	●	●		●	●	●	●	●
5/8		●			●		●	●
3/4		●		●	●	●	●	●
1					●	●	●	●
1 1/4					●			●



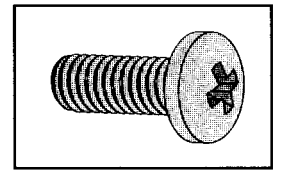
#18-8 Stainless Steel Round, Flat & Pan Head Slotted Machine Screws

“R” (Round), “F” (Flat), & “P” (Pan) denotes stock size - other sizes on application.

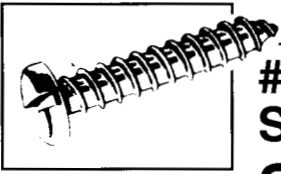
Lgth.	Dia. 4-40	Dia. 5-40	Dia. 6-32	Dia. 8-32	Dia. 10-32	Dia. 10-24	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 1/2-13
1/4	R/F/P	R/F	R/F/P	R/F/P	F/P	R/F				
5/16			R/F	R	R/F					
3/8	R/F/P	R/F	R/F/P	R/F/P	R/F/P	R/F/P	R/F/P			
1/2	R/F/P	R/F	R/F/P	R/F/P	R/F/P	R/F/P	R/F/P	R/F		
5/8	R/F/P	R/F	R/F/P	R/F/P	R/F/P	R/F/P	R/F/P	F	R/F	
3/4	R/F/P	R/F	R/F/P	R/F/P	R/F/P	R/F/P	R/F/P	R/F	R/F	
1	P	F	R/F/P	R/F/P	R/F/P	R/F/P	R/F/P	R/F	R/F	
1 1/4		F	R/F	R/F	R/F	R/F	R/F/P	R/F	R/F	F
1 1/2			R/F	R/F	R/F	R/F	R/F/P	R/F	R/F	F
1 3/4				R	R		R/F			F
2			F	R/F	R/F	R/F	R/F/P	R/F	R/F	F
2 1/4							R			
2 1/2				R/F		R/F	R/F	R/F	R/F	F
2 3/4							R/F			
3				R/F		R/F	R/F	R/F	R/F	F



#18-8 Stainless Steel Flat & Pan Head Phillips Machine Screws



Lgth.	Dia. 4-40	Dia. 6-32	Dia. 8-32	Dia. 10-32	Dia. 10-24	Dia. 1/4-20
1/4	F/P	F	F	F/P	F/P	
3/8	F/P	F/P	F/P	F/P	F/P	F/P
1/2	F/P	F/P	F/P	F/P	F/P	F/P
5/8	F/P	F/P	F/P	F/P	F/P	F/P
3/4	F/P	F/P	F/P	F/P	F/P	F/P
1	F/P	F/P	F/P	F/P	F/P	F/P
1 1/4						F/P
1 1/2		F		F		F/P
2						P

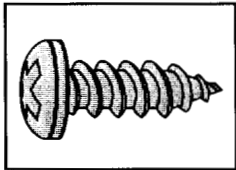


#18-8 Stainless Steel Self-Tapping Slotted Sheet Metal Screws

Pan Head Type A/B

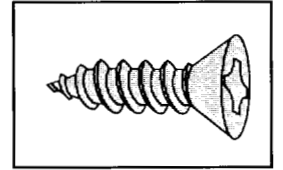
● - denotes stock size - other sizes on application

Lgth.	Dia. #6	Dia. #8	Dia. #10	Dia. #12	Dia. #14
3/8	●	●	●		
1/2	●	●	●		
5/8		●	●		
3/4	●	●	●	●	●
1	●	●	●	●	●
1 ¹ / ₄		●	●	●	●
1 ¹ / ₂	●	●	●	●	●
1 ³ / ₄		●			
2	●	●	●	●	
2 ¹ / ₂		●			

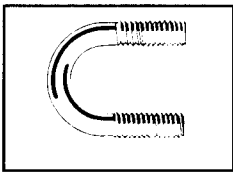


#18-8 Stainless Steel Self-Tapping Phillips Sheet Metal Screws

"P" (Pan) & "F" (Flat) Head Type A/B



Lgth.	Dia. #6	Dia. #8	Dia. #10	Dia. #12	Dia. #14
1/2	F/P	F/P	F/P		
5/8		P	F		
3/4	F/P	F/P	F/P	F/P	
1	F/P	F/P	F/P	F/P	F
1 ¹ / ₄		P	P		
1 ¹ / ₂	F/P	F/P	F/P	F/P	F
2		F/P	F	F	F
2 ¹ / ₂			F		



U-Bolts

Zinc Plated with Nuts

(All dimensions in inches)

Std. Pipe Size	Cat No.	Dia. & Thread	Inside Width	Inside Length	Thread Length
3/8"	37UB1	1/4-20	3/4	1 1/4	3/4
3/8"	37UB2	1/4-20	3/4	1 3/4	3/4
1/2"	50UB1	1/4-20	1	1 3/4	3/4
3/4"	75UB1	1/4-20	1 1/8	2	3/4
1"	100UB1	1/4-20	1 3/8	2 1/4	3/4
1"	100UB2	1/4-20	1 1/2	2 1/2	2
1"	100UB3	5/15-18	1 3/8	2 3/16	1
1"	100UB4	3/8-16	1 3/8	3 1/8	1 1/2
1"	100UB5	3/8-16	1 1/2	2 1/2	1 1/4
1 1/4"	125UB1	5/16-18	1 3/4	2 11/16	1
1 1/2"	150UB1	1/4-20	2	3 1/4	1 1/4
1 1/2"	150UB2	5/16-18	2	2 11/16	1
1 1/2"	150UB3	3/8-16	2	3 1/8	1 1/4
2"	200UB1	5/16-18	2 1/2	3 3/16	1 1/2
2"	200UB2	3/8-16	2 1/2	3 5/8	1 1/2
2 1/2"	250UB1	3/8-16	3	4 1/8	1 1/2
2 1/2"	250UB2	1/2-13	3	4 1/2	1 1/2
3"	300UB1	3/8-16	3 5/8	4 5/8	1 1/2
3"	300UB2	1/2-13	3 1/2	5	1 1/2
3 1/2"	350UB1	1/2-13	4	5 1/2	1 1/2
4"	400UB1	1/2-13	4 5/8	6	1 1/2
5"	500UB1	1/2-13	5 5/8	7	2
6"	600UB1	1/2-13	6 3/4	8	2

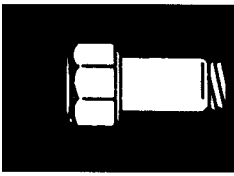
All above can be furnished with strap washers. Above are "standard" stock sizes. U Bolts can be furnished in other patterns, and in a wide range of sizes and lengths on application.

U-Bolts

#304 Stainless Steel with Nuts

(All dimensions in inches)

Std. Pipe Size	Dia. & Thread	Inside Width	Inside Length	Thread Length
1/2"	1/4-20	1	3 1/4	2 1/4
3/4"	1/4-20	1 1/8	3 3/8	2 1/4
1"	1/4-20	1 3/8	3 1/2	2 1/4
1 1/4"	3/8-16	1 11/16	3 3/4	2 1/4
1 1/2"	3/8-16	2	4	2 1/2
2"	3/8-16	2 1/2	4 1/2	2 1/2

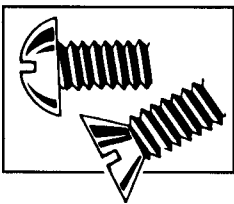


Brass Hex Cap Screws

● - denotes stock size - other sizes on application

Lgth.	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 1/2-13	Dia. 5/8-11
3/4	●	●	●	●	
1	●	●	●	●	
1 1/4	●		●		
1 1/2	●	●	●	●	●
2	●		●	●	●
2 1/2			●	●	●
3			●	●	●

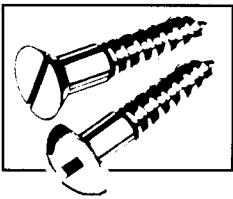
Many popular size of Cap Screws, Nuts, & Washers are also available in Silicon Bronze from stock.



Round & Flat Head Slotted Brass Machine Screws

“R” (Round) & “F” (Flat) denotes stock size - other sizes on application

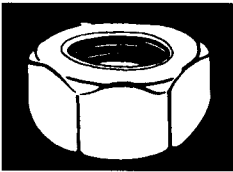
Lgth.	Dia. 6-32	Dia. 8-32	Dia. 10-32	Dia. 10-24	Dia. 12-24	Dia. 1/4-20
1/4	R	R		R		
3/8	R	R	R/F	R		
1/2	R	R/F	R/F	R/F		R/F
3/4	R	R/F	R/F	R/F	R	R/F
1	R	R/F	R/F	R/F		R/F
1 1/4	R			R		R/F
1 1/2	R	R	R/F	R/F		R/F
2	R	R	R/F	R		R/F
2 1/2			R	R		R/F



Round & Flat Head Slotted Brass Wood Screws

“R” (Round) & “F” (Flat) denotes stock size - other sizes on application

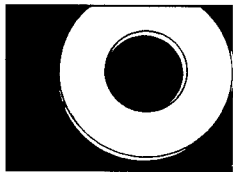
	Dia. #6	Dia. #8	Dia. #10	Dia. #12
1/2	F/R	F	F	
3/4	F/R	F/R	F/R	
1	F/R	F/R	F/R	R
1 1/4	R	F/R	F/R	F
1 1/2	R	F/R	F/R	F
2		R	R	



Brass Nuts

● - denotes stock size - other sizes on application

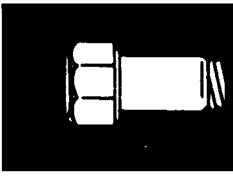
	Hex Finished	Hex Mach Screw	Wing
6-32		●	
8-32		●	
10-32		●	●
10-24		●	●
12-24		●	
1/4-20	●	●	●
5/16-18	●		●
3/8-16	●		●
7/16-14	●		
1/2-13	●		●
5/8-11	●		●
3/4-10	●		



Brass Flat Washers Bronze Split Lockwashers

● - denotes stock size - other sizes on application

	#6	#8	#10	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
F/W's			●	●	●	●	●	●	●
L/W's	●	●	●	●	●	●	●	●	●



Metric Coarse Thread Metric Hex Cap Screws

DIN #931/933 Grade 8.8

● - denotes stock size - other sizes on application

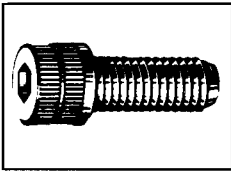
Lgth	Dia/Thr M4 .7	Dia.Thr M5 .8	Dia/Thr M6 1	Dia/Thr M8 1.25	Dia/Thr M10 1.5	Dia/Thr M12 1.75	Dia/Thr M14 2	Dia/Thr M16 2	Dia/Thr M20 2.5	Dia/Thr M24 3
10	●	●	●							
12	●	●	●	●						
16	●	●	●	●	●					
20	●	●	●	●	●	●		●		
25	●	●	●	●	●	●		●	●	
30	●	●	●	●	●	●	●	●	●	
35	●	●	●	●	●	●	●	●	●	
40		●	●	●	●	●	●	●	●	
45		●	●	●	●	●	●	●	●	
50			●	●	●	●	●	●	●	●
55			●	●	●	●		●	●	
60			●	●	●	●	●	●	●	●
65			●	●	●	●		●	●	●
70				●	●	●		●	●	●
75			●	●	●	●	●	●	●	●
80				●	●					
90				●	●	●	●	●	●	●
100			●	●	●	●	●	●	●	●
110					●					●
120					●	●		●	●	●
130					●	●		●	●	●
150				●	●	●		●	●	●

Metric Mechanical Properties

Approximate in lbs/sq. inch

Grade	4.8	5.8	8.8	10.9	12.9
Tensile	60,000	75,000	116,000	150,000	177,000
Yield	49,000	61,000	93,000	136,000	160,000

Metric/Inch Conversion Table - See Inside Back Cover



Metric Coarse Thread Metric Socket Cap Screws

DIN #912-12 Grade 12.9

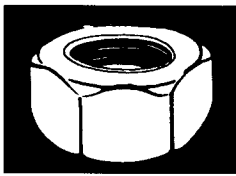
● - denotes stock size - other sizes on application

Lgth	Dia/Thr M3 .5	Dia/Thr M4 .7	Dia/Thr M5 .8	Dia/Thr M6 1	Dia/Thr M8 1.25	Dia/Thr M10 1.5	Dia/Thr M12 1.75	Dia/Thr M14 2	Dia/Thr M16 2	Dia/Thr M20 2.5
6	●									
8	●	●	●	●						
10	●	●	●	●	●					
12	●	●	●	●	●	●				
16	●	●	●	●	●	●	●			
20	●	●	●	●	●	●	●			
25	●	●	●	●	●	●	●	●		
30		●	●	●	●	●	●		●	
35		●	●	●	●	●	●	●	●	
40		●	●	●	●	●	●		●	
45			●	●	●	●	●	●	●	●
50			●	●	●	●	●		●	●
55			●	●	●		●		●	
60			●	●	●	●	●		●	●
65				●	●	●	●		●	
70				●			●		●	
75			●	●	●	●	●			
80						●	●		●	●
85				●			●			
90					●	●				
100				●	●	●	●		●	
110				●	●		●			
120				●						
140				●						

Metric Conversion-Diameter & Pitch - mm/inch

Thread/mm	M 3	M 4	M 5	M 6	M 7	M 8	M 10	M 12	M 14	M 16	M 18	M 20	M 22	M 24	M 30
Dia./inch	.118	.157	.197	.236	.276	.315	.394	.472	.551	.630	.709	.787	.866	.945	1.181
Pitch/mm	.5	.7	.8	1	1	1.25	1.5	1.75	2	2	2.5	2.5	2.5	3	3.5
Thrds/inch	50 ³ / ₄	36 ¹ / ₄	31 ³ / ₄	25 ¹ / ₂	25 ¹ / ₂	20 ¹ / ₄	17	14 ¹ / ₂	12 ³ / ₄	12 ³ / ₄	10 ¹ / ₄	10 ¹ / ₄	10 ¹ / ₄	8 ¹ / ₂	7 ¹ / ₄

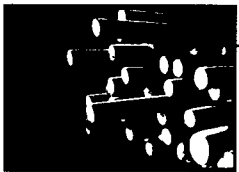
Metric/Inch Conversion Table - See Inside Back Cover



Metric Nuts - Washers - Keys

● - denotes stock size - other sizes on application

	NUTS		WASHERS		KEYS	
	Fin. Hex Din #934 Grade 8.8	Nylon Insert Din #985	Flat Din # 125/126	Split Lock Din #127B	Regular Hex Din #911	For Socket Cap Screw
M2 x .4	●					
M2.5 x .45					●	M3
M3 x .5	●	●			●	M4
M4 x .7	●	●	●	●	●	M5
M5 x .8	●	●	●	●	●	M6
M6 x 1	●	●	●	●	●	M8
M7 x 1	●		●	●		
M8 x 1.25	●	●	●	●	●	M10
M10 x 1.5	●	●	●	●	●	M12
M12 x 1.75	●	●	●	●	●	M14
M14 x 2	●	●	●	●	●	M16/18
M16 x 2	●	●	●	●		
M18 x 2.5	●	●	●	●		
M20 x 2.5	●	●	●	●		
M24 x 3	●		●	●		
M30 x 3.5	●					
M33 x 3.5	●					

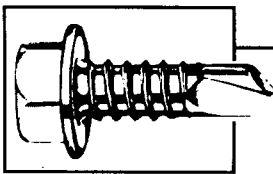


Metric Coarse Thread — 1 Meter Long Continuous Threaded Rod

● - denotes stock size - other sizes on application

M4x.7	M6x1.	M8x1.25	M10x1.5	M12x1.75	M16x2.	M20x2.5	M24x3
●	●	●	●	●	●	●	●

Metric/Inch Conversion Table - See Inside Back Cover



Hex Washer, Pan & Flat Head - Zinc Plated Self Drilling (Tek-Type) Screws

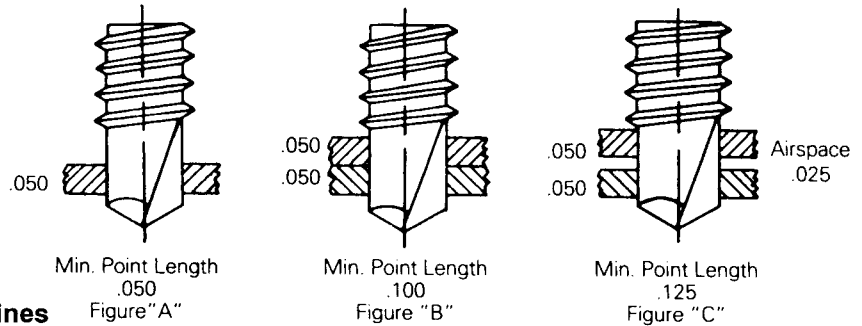
"H" (Hex Washer Hd), "P" (Phil Pan Hd), "F" (Phil Flat Hd) denotes stock size - other sizes on application

Lgth.	(1/4" Hex) Dia. #6-20	(1/4" Hex) Dia. #8-18	(5/16" Hex) Dia. #10-16	(5/16" Hex) Dia. #12-14	(3/8" Hex) Dia. 1/4-14
1/2	H	HP	H		
5/8		HP	H		
3/4	H	HP	HP	H	H
7/8				H	
1	H	HP	HP	H	H
1 1/4		H	HP	H	H
1 1/2		H	HP	H	H
1 7/16			F		
2			H	HF	H
2 1/2				HF	H
2 3/4				F	
3				H	H

Also available from stock are a variety of special purpose self drilling screws, as well as both plain and bonded sealing washers for use with many of the above. Please call for details.

Typical Point Length Selection

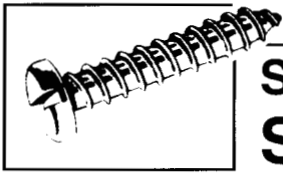
It is important that the correct point length is selected with self-drilling screws, because drilling and tapping operations should not occur simultaneously. For optimum performances, the drilling operation must be completed and the lip of the drill point must have fully penetrated the material before thread engagement begins (see Figure A, B, C) or stall-out or stripping can result.



Self-Drilling Screws Material Thickness Guidelines

Type of Screws	Use Screw Size	.050	.100	.150	.200	.250	.300	.350	.400	.450	.500
#2 Point	4	.035	.080								
	6	.035	.090								
	8	.035	.100								
	10	.035	.110								
	12	.035	.140								
	1/4	.035	.175								
#3 Point	6		.080-.110								
	8		.100-.140								
	10		.110-.175								
	12		.110-.210								
	1/4		.110-.210								
#4 Point	12			.187	.312						
#4 Plus Point	12			.187	.375						
#5 Point				.187	.500						

Capacities may vary by alteration of the fastener or in certain applications. The above table is intended as a guide and does not constitute a warranty of any type.

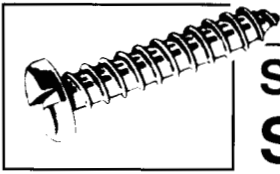


Self-Tapping Zinc Plated Sheet Metal Screws

● - denotes stock size - other sizes on application

Dia & Lgth	Slot Pan Hd. Type A/B	Slot Oval Hd. Type A/B	Phillips Pan Hd. Type A/B	Phillips Flat Hd. Type A/B	Hex Wash. Hd. Type A/B	Slot Pan Hd. Type B	Hex Hd. Type B	Slot Pan Hd. Type F
#4 x 3/16	●							
1/4	●							
3/8	●							
1/2	●			●				
3/4	●			●				
#6 x 1/4	●				●			
3/8	●		●	●				
1/2	●	●	●	●	●			
5/8	●		●	●				
3/4	●	●	●	●	●			
1	●		●	●				
1 1/4	●		●	●				
1 1/2	●							
2	●							
#7 x 1/4	●							
1/2	●							
5/8	●							
3/4	●		●					
1	●							
#8 x 3/8	●	●	●		●	●		
1/2	●	●	●	●	●	●		●
5/8	●	●	●	●	●			
3/4	●	●	●	●	●			●
1	●	●	●	●	●			●
1 1/4	●	●	●	●	●			
1 1/2	●	●	●	●	●			
1 3/4	●		●					
2	●	●	●	●	●			
#10 x 3/8	●				●	●		●
1/2	●	●	●	●	●	●		●
5/8	●	●	●	●	●			
3/4	●	●	●	●	●			●

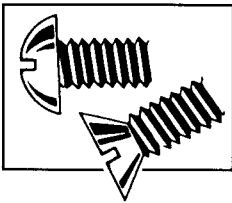
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Self-Tapping Zinc Plated Sheet Metal Screws, continued

● - denotes stock size - other sizes on application

Dia & Lgth	Slot Pan Hd. Type A/B	Slot Oval Hd. Type A/B	Phillips Pan Hd. Type A/B	Phillips Flat Hd. Type A/B	Hex Wash. Hd. Type A/B	Slot Pan Hd. Type B	Hex Hd. Type B	Slot Pan Hd. Type F
#10 x 1	●	●	●	●	●			●
1 ¹ / ₄	●	●	●	●	●			
1 ¹ / ₂	●	●	●	●	●			
1 ³ / ₄	●	●	●					
2	●		●	●	●			
2 ¹ / ₂	●			●				
3	●		●					
#12 x 1/2	●		●		●			
5/8	●		●					
3/4	●		●	●	●			
1	●		●	●	●			
1 ¹ / ₄	●		●	●	●			
1 ¹ / ₂	●		●	●	●			
1 ³ / ₄	●							
2	●		●	●	●			
2 ¹ / ₂	●							
3	●		●					
#14 x 1/2	●		●		●		●	
5/8	●		●		●		●	
3/4	●		●	●	●	●	●	
1	●		●	●	●	●	●	
1 ¹ / ₄	●		●	●	●			
1 ¹ / ₂	●		●	●	●		●	
2	●		●	●				
2 ¹ / ₂	●							
3	●							
5/16 x 3/4					●			
1					●			
1 ¹ / ₄					●			
3/8 x 1					●			
1 ¹ / ₄					●			
1 ¹ / ₂					●			



Round & Flat Head - Zinc Plated Slotted Machine Screws

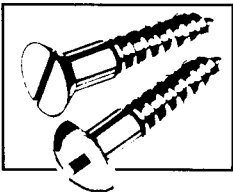
“R” (Round) & “F” (Flat) - denotes stock size - other sizes on application.

Lgth.	Dia. 4-40	Dia. 6-32	Dia. 8-32	Dia. 10-32	Dia. 10-24	Dia. 12-24	Dia. 1/4-20	Dia. 5/16-18	Dia. 3/8-16	Dia. 1/2-13
1/8	F									
3/16	R/F									
1/4	R/F	R/F	R/F	R			R			
3/8	R/F	R/F	R/F	R/F	R/F		R			
1/2	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R		
5/8		R/F	R/F	R	R/F		R/F			
3/4	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	
1	F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F
1 1/4	F	R/F	R/F	R/F	R/F		R/F	R/F	R/F	R/F
1 1/2		R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F
1 3/4		F	R	R/F	R/F		R/F			R
2		R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F
2 1/4							R/F			R
2 1/2			R/F	R/F	R/F		R/F	R/F	R/F	R/F
3		R	R/F	R/F	R/F		R/F	R/F	R/F	R/F
3 1/2					R		R/F	R/F	R/F	F
4		R	R	R	R/F		R/F	R/F	R/F	R/F
4 1/2							R/F	F	F	
5					R		R/F	R/F	R/F	R
6					R		R/F	F	R/F	R

Also available from stock are various sizes of Phillips Recessed Pan, Round & Flat Head; Slotted Pan & Truss Head; and indented Hex Head plated Machine Screws.



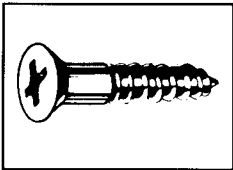
THE WOODWARD CO.



Round & Flat Head - Zinc Plated Slotted Wood Screws

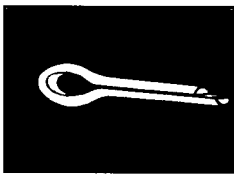
“R” (Round) & “F” (Flat) denotes stock size - other sizes on application

Lgth.	Dia. #4	Dia. #5	Dia. #6	Dia. #7	Dia. #8	Dia. #9	Dia. #10	Dia. #12	Dia. #14	Dia. #16	Dia. #18
1/2	R/F		R/F	R/F	R/F	R	R/F				
5/8			R/F		R/F		F				
3/4	R/F	F	R/F	R/F	R/F	F	R/F	R/F			
1	F	F	R/F	F	R/F	R/F	R/F	R/F	F		
1 1/4			R/F	F	R/F	F	R/F	R/F	R/F		
1 1/2	F		R/F	F	R/F	R/F	R/F	R/F	R/F	F	
1 3/4			F	F	R/F		R/F	R/F	R		
2			R/F	F	R/F		R/F	R/F	R/F		
2 1/4					F		F	F			
2 1/2					F		F	F	F	F	F
3					F		F	F	F	F	F
3 1/2								F	F	F	F
4							F	F	F	F	F



Flat Head - Zinc Plated Phillips Wood Screws

Lgth.	Dia. #4	Dia. #6	Dia. #8	Dia. #10	Dia. #12	Dia. #14
1/2	F	F	F	F		
3/4	F	F	F	F	F	
1		F	F	F	F	F
1 1/4		F	F	F	F	F
1 1/2		F	F	F	F	F
1 3/4			F	F	F	F
2			F	F	F	F
2 1/2			F	F	F	F
3			F	F	F	F
3 1/2				F	F	
4					F	

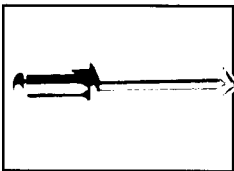


Cotter Pins

Zinc Plated

● - denotes stock size - other sizes on application

Lgth.	Dia. 1/16	Dia. 3/32	Dia. 7/64	Dia. 1/8	Dia. 5/32	Dia. 3/16	Dia. 1/4	Dia. 5/16	Dia. 3/8	Dia. 1/2
1/2	●	●			●					
3/4	●	●	●	●	●					
1	●	●	●	●	●	●	●	●		
1 1/4	●	●	●	●	●		●			
1 1/2	●	●		●	●	●	●	●	●	
1 3/4		●		●	●	●				
2	●	●	●	●	●	●	●	●	●	●
2 1/2	●	●		●	●	●	●	●	●	
3				●	●	●	●	●	●	●
3 1/2				●	●	●	●	●	●	
4						●	●	●	●	●
5							●		●	●
6							●		●	●



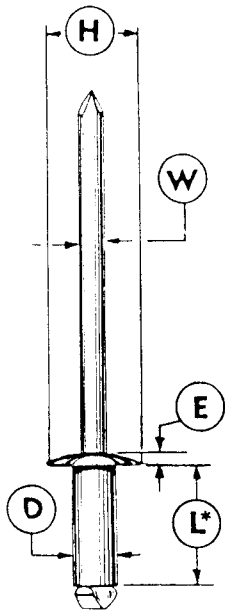
Blind Rivets

● - denotes stock size - other sizes on application

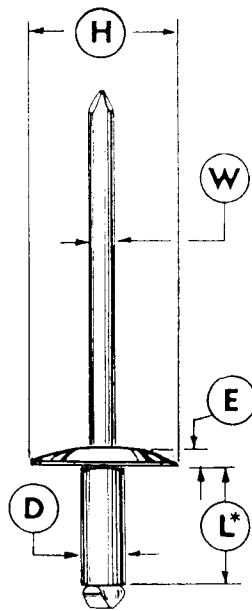
SSP = Steel Body/Steel Mandrel—Protruding (Dome) Head
 SSL = Steel Body/Steel Mandrel—Large Flange Head
 AAP = Aluminum Body/Aluminum Mandrel—Protruding (Dome) Head
 AAL = Aluminum Body/Aluminum Mandrel—Large Flange Head
 BSP = Aluminum Body/Steel Mandrel—Protruding (Dome) Head
 ASL = Aluminum Body/Steel Mandrel—Large Flange Head
 BTT = Stainless Body/Stainless Mandrel—Protruding (Dome) Head

Rivet Size	Dia.	Grip Range	Drill Size	SSP	SSL	AAP	AAL	BSP	ASL	BTT
42	1/8	0-1/8	#30	●		●		●		●
43	1/8	1/8-3/16	#30	●		●		●		
44	1/8	3/16-1/4	#30	●	●	●	●	●		●
46	1/8	5/16-3/8	#30	●		●		●		●
48	1/8	3/8-1/2	#30	●		●		●		●
52	5/32	1/16-1/8	#20	●		●				
53	5/32	1/8-3/16	#20	●		●				
54	5/32	3/16-1/4	#20	●		●				
56	5/32	1/4-3/8	#20	●						
62	3/16	0-1/8	#10	●		●				
64	3/16	1/8-1/4	#10	●		●	●	●		●
66	3/16	1/4-3/8	#10	●	●	●	●	●	●	●
68	3/16	3/8-1/2	#10	●	●	●	●	●	●	●
610	3/16	1/2-5/8	#10	●		●				
612	3/16	5/8-3/4	#10	●		●		●	●	
84	1/4	1/8-1/4	#F	●				●		
86	1/4	1/4-3/8	#F	●				●		
88	1/4	3/8-1/2	#F	●						
812	1/4	5/8-3/4	#F	●						

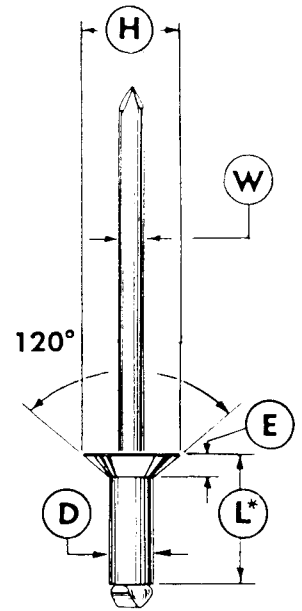
Blind Rivets



PROTRUDING HEAD



LARGE HEAD



FLUSH HEAD

Nom. Rivet Diam.	Hole Size and Drill Number	W Mand. Diam.	D Rivet Diam.	PROTRUDING HEAD		LARGE HEAD		FLUSH HEAD	
				H Head Diam.	E Head Thick.	H Head Diam.	E Head Thick.	H Head Diam.	E Head Thick.
3/32	.097-.100(#40)	.057	.094	.187	.028	.281	.030	.192	.032
1/8	.129-.133(#30)	.076	.125	.250	.037	.375	.039	.236	.037
5/32	.160-.164(#20)	.095	.156	.312	.045	.469	.054	.263	.037
3/16	.192-.196(#10)	.114	.187	.375	.051	.625	.079	.319	.046
1/4	.257-.261(F)	.151	.250	.500	.071	.750	.100	.418	.058

*L varies with each grip length (see below)

RIVET IDENTIFICATION CODE—

First letter is rivet material: _____

A = 5052 Aluminum B = 5056 Aluminum C = Stainless
M = Monel S = Steel U = Copper

Second letter is mandrel material: _____

A = 7178 Aluminum S = Steel C = Stainless

Third letter is head style: _____

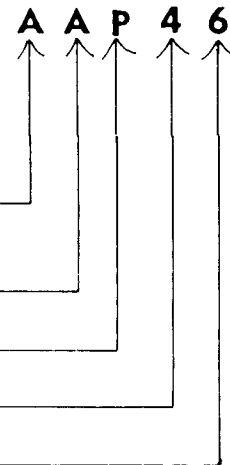
P = Protruding L = Large C = Flush

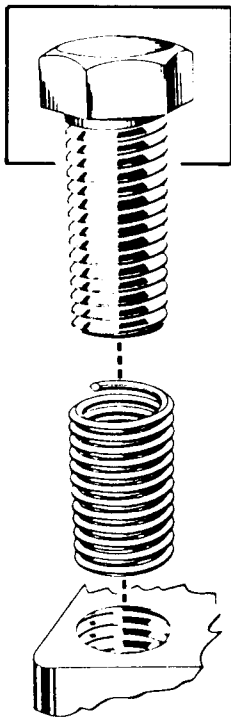
First number is rivet diameter in 32nds of an inch: _____

For example, —4 is 4/32nds of 1/8" diameter

Second number is rivet maximum grip length in 16ths of an inch: _____

For example, —6 is 6/16ths or 3/8" grip length





Heli-Coil Thread Repair System

Heli-Coil Inserts work in any type of material: Aluminum, magnesium, cast iron, bronze, etc. Increasing use of light weight (and soft) materials means more thread damage - there is a *Heli-Coil* repair for virtually every application.

Damaged threads can be restored to better than new condition. The *Heli-Coil* system makes all other thread repair methods obsolete: Welding, plugging, oversized fasteners and oversized drilling of mating parts. It's faster - you save time, increase your repair capabilities and restore parts that otherwise would have to be scrapped.

Heli-Coil has the most effective and universally accepted method of thread repair. *Heli-Coil* Inserts quickly and permanently restore stripped, worn or damaged threads to their original size and condition.

Stainless Steel *Heli-Coil* Inserts eliminate:

- Thread Wear
 - Corrosion
 - Galling
 - Rust
- and provide:
- Stronger Assemblies
 - High Quality and Reliability
 - Fastening Integrity Superior to the Original

Inch Coarse Thread Repair Kits

Kit Contents and Replacement Parts

Thread Size = Length	Kit P/N	Inserts Per Kit	Tap P/N	Installation Tool P/N	Insert Pkg. P/N	Insert Quantity	Drill Size
4-40 x .168	5401-04	24	04CPB	7551-04	R1185-04	12	#31
5-40 x .189	5401-05	24	05CPB	7551-05	R1185-05	12	#29
6-32 x .207	5401-06	24	06CPB	2288-06	R1185-06	12	#25
8-32 x .246	5401-2	24	2CPB	2288-2	R1185-2	12	11/64
10-24 x .285	5401-3	24	3CPB	2288-3	R1185-3	12	13/64
12-24 x .324	5401-1	24	1CPB	2288-1	R1185-1	12	15/64
1/4-20 x .375*	5401-4	24	4CPB	2288-4	R1185-4	12	17/64
5/16-18 x .469*	5401-5	24	5CPB	2288-5	R1185-5	12	21/64
3/8-16 x .562*	5401-6	12	6CPB	2288-6	R1185-6	12	25/64
7/16-14 x .656*	5401-7	6	7CPB	2288-7	R1185-7	6	29/64
1/2-13 x .750*	5401-8	6	8CPB	2288-8	R1185-8	6	17/32
9/16-12 x .844	5401-9	6	187-9	2288-9	R1185-9	6	19/32
5/8-11 x .938*	5401-10	6	8187-10	2288-10	R1185-10	6	21/32
3/4-10 x 1.125	5401-12	4	8187-12	2288-12	R1185-12	4	25/32
7/8-9 x 1.312	5521-14	6	8187-14	3724-14	K1185-14	1	29/32
1-8 x 1.500	5521-16	6	8187-16	3724-16	K1185-16	1	1—1/32
1-1/8-7 x 1.688	5521-18	5	8187-18	3724-18	K1185-18	1	1—5/32
1-1/4-7 x 1.875	5521-20	4	8187-20	3724-20	K1185-20	1	1—9/32
1-3/8-6 x 2.062	5521-22	4	8187-22	3724-22	K1185-22	1	1—13/32
1-1/2-6 x 2.250	5521-24	4	8187-24	3724-24	K1185-24	1	1—17/32

*Also included in Master Thread Repair Set—Part No. 4934

Continued next page

Heli-Coil Thread Repair System, continued

Inch Fine Thread Repair Kits

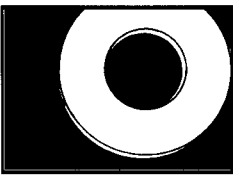
Thread Size = Length	Kit P/N	Kit Contents and Replacement Parts						
		Inserts Per Kit	Tap P/N	Installation Tool P/N	Insert Pkg. P/N	Insert Quantity	Drill Size	
6-40 x .207	5402-06	24	06FPB	7552-06	R1191-06	12	#25	
8-36 x .246	5402-2	24	2FPB	7552-2	R1191-2	12	#17	
10-32 x .285†	5402-3	24	3FPB	2299-3	R1191-3	12	13/64	
1/4-28 x .375†	5402-4	24	4FPB	2299-4	R1191-4	12	17/64	
5/16-24 x .469†	5402-5	24	5FPB	2299-5	R1191-5	12	21/64	
3/8-24 x .562†	5402-6	12	6FPB	2299-6	R1191-6	12	25/64	
7/16-20 x .656†	5402-7	6	7FPB	2299-7	R1191-7	6	29/64	
1/2-20 x .750†	5402-8	6	8FPB	2299-8	R1191-8	6	33/64	
9/16-18 x .844	5402-9	6	38193-9	2299-9	R1191-9	6	37/64	
5/8-18 x .938	5402-10	6	8193-10	2299-10	R1191-10	6	41/64	
3/4-16 x 1.125	5402-12	4	8193-12	2299-12	R1191-12	4	49/64	
7/8-14 x 1.312	5528-14	6	8193-14	535-14	K1191-14	1	57/64	
1-14 x 1.500	5528-16	6	8193-16	535-16	K1191-16	1	1—1/64	
1-12 x 1.500	5528-161	6	8193-161	535-161	K1191-161	1	1—1/64	
1-1/8-12 x 1.688	5528-18	5	8193-18	535-18	K1191-18	1	1—5/32	
1-1/4-12 x 1.875	5528-20	4	8193-20	535-20	K1191-20	1	1—9/32	
1-3/8-12 x 2.062	5528-22	4	8193-22	535-22	K1191-22	1	1—13/32	
1-1/2-12 x 2.250	5528-24	4	8193-24	535-24	K1191-24	1	1—17/32	

† also included in Master Thread Repair Set—Part No. 4936

All Heli-Coil Inserts are available in different lengths. The popular (middle length) is shown above. Please inquire for information on other lengths.



THE WOODWARD CO.



U.S.S. Flat Washers

● - denotes stock size - other sizes and special washers on application

Bolt Size	Plain Steel	Zinc Plt.	H.D. Galv.	I.D. (Inches)	O.D. (Inches)	Approx. Thickness (Inches)	Approx. pieces per lb.	Approx. pieces 50# ctn.
3/16	●	●		1/4	9/16	3/64	362	18,000
1/4	●	●		5/16	3/4	1/16	149	7,500
5/16	●	●		3/8	7/8	5/64	90	4,500
3/8	●	●		7/16	1	5/64	67	3,300
7/16	●	●		1/2	1 1/4	5/64	41	2,000
1/2	●	●	●	9/16	1 3/8	7/64	26	1,300
9/16	●	●		5/8	1 1/2	7/64	22	1,100
5/8	●	●	●	11/16	1 3/4	9/64	13	650
3/4	●	●	●	13/16	2	5/32	9.1	450
7/8	●	●	●	15/16	2 1/4	11/64	6.5	320
1	●	●	●	1 1/16	2 1/2	11/64	5.3	260
1 1/8	●	●	●	1 1/4	2 3/4	11/64	4.5	220
1 1/4	●	●	●	1 3/8	3	11/64	3.8	190
1 3/8	●	●		1 1/2	3 1/4	3/16	3.0	150
1 1/2	●	●		1 5/8	3 1/2	3/16	2.6	130
1 3/4	●			1 7/8	4	3/16	2.0	100
2	●			2 1/8	4 1/2	3/16	1.6	80
2 1/2	●			2 5/8	5	15/64	1.0	50
3	●			3 1/8	5 1/2	9/32	0.8	40



Fender Washers

Zinc Plate

Bolt Size	Zinc Plt..	O.D. (Inches)	I.D. (Inches)	Approx. Thickness (inches)	Approx. Pieces per pound	Approximate Pieces per 50# ctn.
3/16	●	1	7/32	1/16	70	3,500
1/4	●	1	9/32	1/16	75	3,700
1/4	●	1 1/4	9/32	1/16	45	2,200
1/4	●	1 1/2	9/32	1/16	32	1,600
5/16	●	1 1/4	11/32	1/16	48	2,400
5/16	●	1 1/2	11/32	1/16	33	1,600
3/8	●	1 1/4	11/32	1/16	50	2,500
3/8	●	1 1/2	13/32	1/16	35	1,700
1/2	●	2	17/32	1/16	18	900



S.A.E. Flat Washers

Zinc Plated

● - denotes stock size - other sizes and special washers on application

Bolt Size	Zinc Plt.	I.D. (Inches)	O.D. (Inches)	Thickness (Inches)	Approximate Pieces per pound	Approx. pieces 50# ctn.
#10	●	7/32	1/2	3/64	435	21,000
1/4	●	9/32	5/8	1/16	222	11,000
5/16	●	11/32	11/16	1/16	192	9,500
3/8	●	13/32	13/16	1/16	140	7,000
7/16	●	15/32	59/64	1/16	105	5,000
1/2	●	17/32	1 1/16	3/32	55	2,600
5/8	●	21/32	1 5/16	3/32	36	1,800
3/4	●	13/16	1 1/2	9/64	21	1,000
7/8	●	15/16	1 3/4	9/64	16	800
1	●	1 1/16	2	9/64	12	600

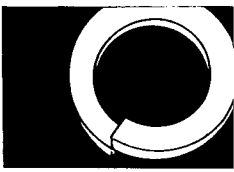


Hardened Round Structural Washers

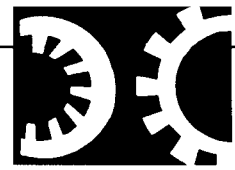
Spec. ASTM A—325

● - denotes stock size - other sizes on application

Bolt Size	Plain Fin.	H.D. Galv.	I.D. (Inches)	O.D. (Inches)	Approximate Thickness (inches)	Approximate Pieces per pound	Approximate Pieces per 50# ctn.
1/2	●	●	17/32	1 1/16	.137	24	1,200
5/8	●	●	21/32	1 5/16	.150	13	650
3/4	●	●	13/16	1 15/32	.150	11	550
7/8	●	●	15/16	1 3/4	.157	7	350
1	●	●	1 1/16	2	.157	5.5	270
1 1/8	●	●	1 1/4	2 1/4	.157	4.3	210
1 1/4	●	●	1 3/8	2 1/2	.157	3.5	170
1 3/8	●	●	1 1/2	2 3/4	.157	3.0	150
1 1/2	●	●	1 5/8	3	.157	2.5	120



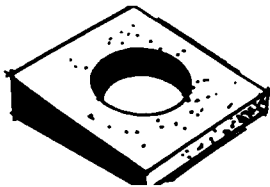
Lockwashers



● - denotes stock size - other sizes on application

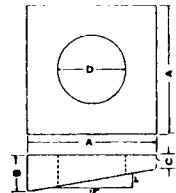
	Split Plain	Split Zinc Plt.	Split H.D. Galv.	Hi Collar Plain	Ext. Tooth Zinc Plt.	Int. Tooth Zinc Plt.
#4		●		●	●	●
#6		●		●	●	●
#8		●		●	●	●
#10		●		●	●	●
1/4	●	●		●	●	●
5/16	●	●		●	●	●
3/8	●	●	●	●	●	●
7/16	●	●		●	●	●
1/2	●	●	●	●	●	●
9/16	●	●				
5/8	●	●	●	●	●	●
3/4	●	●	●	●	●	●
7/8	●	●	●	●		
1	●	●	●	●		
1 1/8	●		●			
1 1/4	●		●			
1 3/8	●					
1 1/2	●					
1 3/4	●					
2	●					

We also can furnish a wide variety of special washers and spacers to your specifications. Please inquire.

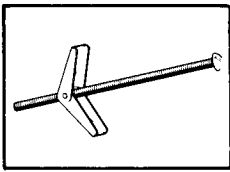


Square Bevel Washer

Malleable Plain



Diam of Bolt Inch	A	B	C	D	Wt. Per 100 Pieces lbs.
1/4	11/16"	7/32"	5/64"	5/16"	1.6
3/8	1 1/4"	11/32"	5/32"	7/16"	10.2
1/2	1 1/4"	11/32"	5/32"	9/16"	9.5
5/8	1 1/2"	13/32"	5/32"	11/16"	15.4
3/4	1 1/2"	15/32"	7/32"	13/16"	16.5
7/8	2"	9/16"	7/32"	15/16"	34.2
1	2"	9/16"	7/32"	1-3/32"	32.5



Toggle Bolts

Round Head and Flat Head



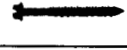





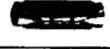
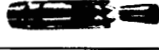
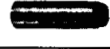

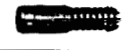





All dimensions are in inches

Size	Hole Size	Std. Pkg.	Std. Ctn.	Wt./100 (lbs.)
1/8 x 2	3/8	100	500	1½
1/8 x 3	3/8	100	500	2
1/8 x 4	3/8	100	500	2
3/16 x 2	1/2	100	500	2½
3/16 x 3	1/2	100	500	3½
3/16 x 4	1/2	100	500	4½
3/16 x 5	1/2	100	500	5
3/16 x 6	1/2	100	500	5½
1/4 x 3	5/8	100	500	6½
1/4 x 4	5/8	100	500	8
1/4 x 5	5/8	100	500	8½
1/4 x 6	5/8	100	500	10
5/16 x 3	7/8	50	250	13
5/16 x 4	7/8	50	250	15
5/16 x 5	7/8	50	250	15½
5/16 x 6	7/8	50	250	18
3/8 x 3	1	50	250	16
3/8 x 4	1	50	250	18½
3/8 x 5	1	50	250	20½
3/8 x 6	1	50	250	23
1/2 x 4	1¼	50	100	40
1/2 x 5	1¼	50	100	45
1/2 x 6	1¼	50	100	50



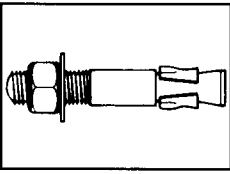
THE WOODWARD CO.

Anchor Selection Guide

	TYPE	USE IN	USE WITH	MADE OF	SIZE RANGE	GENERAL INFORMATION
ONE-STEP ANCHORS						
	Stud Anchor	Concrete, brick, stone	No other fastener needed	Steel, 303 & 316 S.S. galvanized	1/4" x 1-3/4" to 1-1/4" x 12"	Heavy duty one-piece expansion bolt. Custom lengths on special order.
	Sleeve Anchor	Concrete, block, brick, stone	No other fastener needed	Steel	1/4" x 5/8" to 3/4" x 5-3/4"	Pre-assembled, all-purpose anchor. 5 head styles, 6 diameters, 20 lengths
	Tapcon® Confas	Concrete, block, brick	No other fastener needed	Steel	3/16" x 1-1/4" to 1/4" x 6"	Fast, easy to install. No hole spotting. removable, 2 head styles, 30 sizes
	Metal Nailin	Concrete, block, brick, stone	No other fastener needed	Zinc alloy and steel	3/16" x 7/8" to 1/4" x 2"	Fast, east to install. Mushroom or flat head styles. Available with S/S nails
	Nylon Nailin	Concrete, block, brick, wallboard	No other fastener needed	Nylon and steel	3/16" x 1" to 1/4" x 6"	Fast, light duty anchor, 3 head styles. Available with S/S nails
BOLT ANCHORS						
	Caulking Anchor	Concrete, brick, stone	Machine screw or bolt	Zinc alloy and lead	6-32 to 3/4-10	Single unit calking anchor, can be set shallow (flush) or deep in hole.
	Multi Anchor	Concrete, brick, stone	Machine screw or bolt	Zinc alloy and lead	1/2" to 1"	Heavy duty multi-unit calking anchor. Use with bolt head down for stud applications.
	Single Mach. Bolt Anchor	Concrete, brick, stone	Machine screw or bolt	Rustproof zinc alloy	1/4" to 3/4"	Non-calking bolt anchor, easy to install. Tightening bolt sets anchor
	Double Mach. Bolt Anchor	Concrete, brick, stone	Machine screw zinc alloy	Rustproof or bolt	1/4" to 1"	Heavy duty non-calking bolt anchor. 7/8" and 1" sizes in malleable iron.
	Self-Drill Anchor	Concrete, dense brick, stone	Machine screw or bolt	Steel	1/4" to 7/8"	Self-drilling anchor, installed by power hammer or manually.
	Steel Drop-in	Concrete, brick, stone	Machine screw or bolt	Steel, Stainless Steel	1/4" to 3/4"	Heavy duty use in solid masonry. Internal plug cannot be lost.
SCREW ANCHORS						
	Fiberplug	All masonry material	Sheet metal, wood, lag screws	Jute fiber w. lead liner	#6 x 3/4" to 3/8" x 3"	All-purpose screw anchor in 26 sizes. No hole spotting. Vibration resistant.
	Lag Shield	Mortar joint concrete	Lag bolt	Rustproof zinc alloy	1/4" to 3/4"	Available in short and long styles. Long style recommended for weaker masonry.
	Lead Screw Anchor	Concrete, block, brick	Sheet metal, wood, lag screws	Lead alloy	#6-8 x 3/4" to #16-18 x 1-1/2"	Light duty, multi-size anchor. Use with dead loads
	Taper Plastic Anchor	Concrete, block, tile, brick	Sheet metal, wood, lag screws	Corrosion-resistant plastic	#6-8 x 3/4" to #14-16 x 1-1/2"	Light duty, multi-size anchor. Has collar for hollow materials.
	Fluted Plastic Anchor	Concrete, brick, stone	Sheet metal, wood, lag screws	Ductile plastic	#4-6 x 1" to #14 x 1-1/2"	Color-coded diameters, fluted, acid-resistant. 7 sizes.
HOLLOW WALL ANCHORS						
	Toggle Bolt	Block, wallboard, plaster, tile	No other fastener needed	Steel, Stainless Steel	1/8" x 2" to 1/2" x 6"	Fully threaded machine screw. Can be used with any lgth. thrdded. rod.
	Hollow Wall Anchor	Wallboard, plaster, paneling	No other fastener needed	Steel	1/8" extra short to 1/4" extra long	Also slotted hex head or drive type. Remove screw as often as needed.



THE WOODWARD CO.



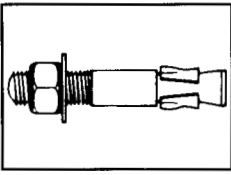
Stud Anchors

● - Denotes stock sizes.

All dimensions are in inches

SEE PULLOUT TEST DATA ON PAGE 48

Size	Zinc Plt.	Stainless Steel	H.D. Galv.	Min. Depth	Thrd. Lgth.	Std. Box	Wt./100 (.lbs.)
1/4 x 1 3/4	●	●		1 1/8	3/4	100	3 1/4
1/4 x 2 1/4	●	●		1 1/8	7/8	100	3 3/4
1/4 x 3	●	●		1 1/8	7/8	100	5 1/4
5/16 x 2 1/2	●			1 1/2	1 1/8	100	
3/8 x 2 1/4	●	●		1 3/4	1 1/8	100	8 3/4
3/8 x 2 3/4	●	●		1 3/4	1 1/8	100	10 1/2
3/8 x 3	●	●		1 3/4	1 1/8	100	11
3/8 x 3 1/2	●	●		1 3/4	1 1/8	100	12 1/2
3/8 x 3 3/4	●	●	●	1 3/4	1 1/8	100	13
3/8 x 5	●	●		1 3/4	1 1/8	50	17 1/4
3/8 x 6	●			1 3/4	1 1/8	50	21
1/2 x 2 3/4	●	●		2 1/4	1 1/4	50	18
1/2 x 3 3/4	●	●		2 1/4	1 1/4	50	24
1/2 x 4 1/2	●	●	●	2 1/4	1 1/4	25	30
1/2 x 5 1/2	●	●	●	2 1/4	1 1/4	25	34
1/2 x 7	●	●	●	2 1/4	1 1/4	25	44
1/2 x 10	●			2 1/4	1 1/4	25	60
5/8 x 3 1/2	●	●		2 7/8	1 5/8	25	40
5/8 x 4 1/2	●	●	●	2 7/8	1 5/8	25	54
5/8 x 5	●	●	●	2 7/8	1 5/8	25	57
5/8 x 6	●	●	●	2 7/8	1 5/8	25	64
5/8 x 7	●		●	2 7/8	1 5/8	25	72
5/8 x 8 1/2	●	●	●	2 7/8	1 5/8	25	84
3/4 x 4 1/4	●	●		3 3/8	1 3/4	20	70
3/4 x 4 3/4	●			3 3/8	1 3/4	20	76
3/4 x 5 1/2	●	●	●	3 3/8	1 3/4	20	85
3/4 x 6 1/4	●	●		3 3/8	1 3/4	20	95
3/4 x 7	●	●	●	3 3/8	1 3/4	10	105
3/4 x 8 1/2	●	●	●	3 3/8	1 3/4	10	120
3/4 x 10	●	●		3 3/8	1 3/4	10	140
3/4 x 12	●			3 3/8	1 3/4	10	155
7/8 x 6	●			4	2	5	120
7/8 x 8	●	●		4	2	5	160
7/8 x 10	●	●		4	2	5	200
7/8 x 12	●			4	2	5	240
1 x 6	●	●		4 1/2	2 3/8	5	170
1 x 9	●	●		4 1/2	2 3/8	5	240
1 x 12	●			4 1/2	2 3/8	5	300
1 1/4 x 9	●			5 5/8	2 3/8	5	360
1 1/4 x 12	●			5 5/8	2 3/8	5	480

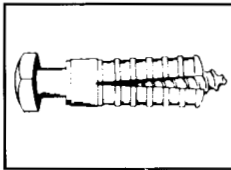


Stud Anchors – Pullout Load Tests*

All dimensions are in inches

AT 4.5D EMBEDMENT				AT 8D EMBEDMENT			
Anchor Size	Hole Depth	Tensile Load (lbs.)	Shear Load (lbs.)	Hole Depth	Tensile Load (lbs.)	Shear Load (Lbs.)	Install. Torque (ft.-lbs.)
1/4	1 1/8	2,700	2,600	2	3,533	3,700	6-8
3/8	1 3/4	4,390	4,320	3	4,560	4,650	22-28
1/2	2 1/4	6,110	7,560	4	9,210	7,820	45-60
5/8	2 7/8	7,320	11,900	5	13,020	14,900	65-90
3/4	3 3/8	11,020	16,410	6	17,640	17,800	75-100
7/8	4	13,200	22,750	7	24,900	27,500	85-110
1	4 1/2	21,700	27,850	8	31,100	30,200	95-120
1 1/4	5 5/8	25,400	39,700	10	46,000	54,850	110-150

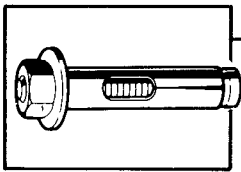
*NOTE: Test Data above represents average ultimate load sustained in concrete having minimum compressive strength of 4,000 psi.



Lag Screw Anchors

All dimensions are in inches

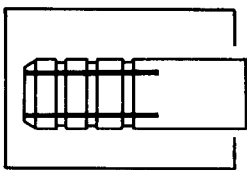
Size	Drill Dia.	Hole Depth	Std. Box	Std. Ctn.	Wt./100 (lbs.)
1/4 Short	1/2	1	50	500	3
1/4 Long	1/2	1 1/2	50	500	4
5/16 Short	1/2	1 1/4	50	500	3
5/16 Long	1/2	1 3/4	50	500	4 1/4
3/8 Short	5/8	1 3/4	50	500	6 3/4
3/8 Long	5/8	2 1/2	50	250	9 1/2
1/2 Short	3/4	2	50	500	9 1/4
1/2 Long	3/4	3	50	200	14 1/4
5/8 Short	7/8	2	25	125	13
5/8 Long	7/8	3 1/2	25	125	22
3/4 Short	1	2	25	125	16
3/4 Long	1	3 1/2	25	100	24 1/2



Sleeve Anchors

All dimensions are in inches

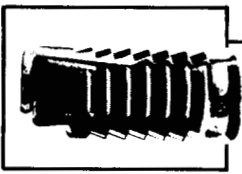
Style	Size	Std. Box	Std. Ctn.	Wt./100 (lbs.)
Hex Nut	5/16 x 1 1/2	100	1000	4 1/4
	5/16 x 2 1/2	100	500	5 3/4
	3/8 x 1 7/8	50	500	7
	3/8 x 3	50	500	10
	1/2 x 2 1/4	25	250	14
	1/2 x 3	25	250	17 1/4
	1/2 x 4	25	125	22
	5/8 x 2 1/4	25	125	25 1/2
	5/8 x 4 1/4	10	100	41
	5/8 x 6	10	100	49
	3/4 x 2 1/2	10	100	46
	3/4 x 4	10	10	70
	3/4 x 5 3/4	10	10	90
Acorn Nut	1/4 x 5/8	100	1000	2
	1/4 x 1 3/8	100	1000	2 3/4
	1/4 x 2 1/4	100	1000	3 1/4
Round Head	1/4 x 1 1/8	100	1000	2
	1/4 x 2	100	1000	2 3/4
	5/16 x 2 3/8	100	1000	4 3/4
	5/16 x 3 3/8	100	500	6 1/2
Flat Head	1/4 x 1 1/8	100	1000	2
	1/4 x 2	100	1000	2 3/4
	1/4 x 3	100	1000	3 3/4
	1/4 x 5 1/4	100	500	6 1/2
	3/8 x 4	50	250	10 3/4
	3/8 x 6	50	250	16



Drop-in Anchors

All dimensions are in inches

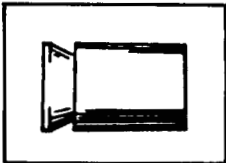
Size	Drill Dia.	Min Depth	Std. Box	Std. Ctn.	Wt./100 (lbs.)
1/4	3/8	1 1/4	100	1000	2 1/2
3/8	1/2	1 7/8	50	500	6
1/2	5/8	2 3/8	50	250	12 1/2
5/8	3/4	3	25	125	21
3/4	1	3 1/2	10	50	48



Four-Way Anchors

All dimensions are in inches

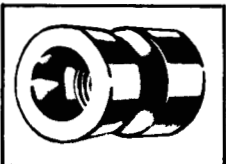
Size	Shield Length (in.)	Drill Size (in.)	Std. Pkg.	Std. Ctn.	Wt./100 (lbs.)
1/4	1 1/4	1/2	100	500	4
5/16	1 1/2	9/16	100	500	4 1/2
3/8	1 3/4	11/16	50	250	6 1/2
1/2	2 1/4	7/8	50	250	16 1/4
5/8	2 5/8	1 1/8	25	125	26
3/4	3 1/4	1 1/4	25	100	46



Machine Screw Anchors

All dimensions are in inches

Size	Drill Dia.	Min. Depth	Std. Box	Std. Ctn.	Wt./100 (lbs.)
10 - 24	3/8	5/8	100	1000	1 3/4
1/4 - 20	1/2	7/8	100	1000	4 1/2
5/16 - 18	5/8	1	50	250	7 3/4
3/8 - 16	3/4	1 1/4	50	250	14
1/2 - 13	7/8	1 1/2	50	250	19

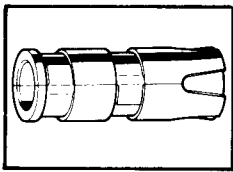


Multi- Anchors



All dimensions are in inches

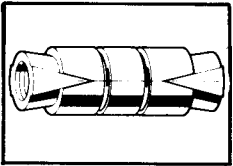
Size	Drill Dia.	Std. Box	Std. Ctn.	Wt./100 (lbs.)	
				Plain	Threaded
1/4	1/2	100	1000	2	2 1/2
3/8	3/4	50	500	5 1/2	7
1/2	1	50	250	10	15
5/8	1 1/8	50	250	14	20
3/4	1 3/8	25	125	22	35
7/8	1 1/2	25	25	32	44
1	1	5/8	25	37	54



Single Machine Bolt Anchors

All dimensions are in inches

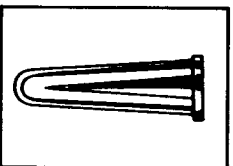
Size	Dia.	Hole Depth	Std. Box	Std. Ctn.	Wt./100 (lbs.)
1/4	1/2	1 3/8	50	250	3 ³ / ₄
5/16	5/8	1 5/8	50	250	5 ¹ / ₂
3/8	5/8	1 5/8	50	250	5 ¹ / ₄
1/2	7/8	2 1/2	25	125	15 ¹ / ₄
5/8	1	2 3/4	25	125	24
3/4	1 1/4	2 7/8	10	50	43



Double Machine Bolt Anchors

All dimensions are in inches

Size	Drill Dia.	Hole Depth	Std. Box	Std. Ctn.	Wt./100 (lbs.)
1/4	1/2	1 1/4	50	250	4
5/16	5/8	1 1/2	50	250	7 ¹ / ₂
3/8	3/4	1 3/4	50	250	12 ¹ / ₂
1/2	7/8	2 1/4	25	125	18
5/8	1	2 1/2	25	125	25 ¹ / ₂
3/4	1 1/4	3 1/2	10	50	54 ¹ / ₂

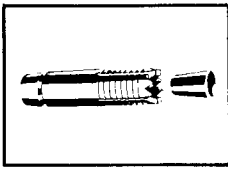


Taper Plastic Anchors

(Also available in kits)

All dimensions are in inches

Size	Drill Dia.	Std. Box	Std. Ctn.	Wt./1000(lbs.)
6-8 x 3/4	3/16	100	1000	1
8-10 x 7/8	3/16	100	1000	1 ¹ / ₂
10-12 x 1	1/4	100	1000	3
14-16 x 1 ¹ / ₂	5/16	100	500	6

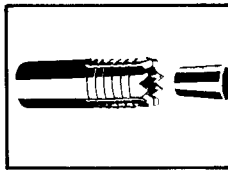


Self Drill Anchors

Snap-Off Type

All dimensions are in inches

Size	Outside Dia.	Hole Depth	Thrd. Depth	Std. Box	Std. Ctn.	Wt./100 (lbs.)
5/16	15/32	1 9/32	3/8	100	500	6
3/8	9/16	1 17/32	9/16	50	250	10
1/2	11/16	2 1/32	3/4	50	200	17½
5/8	27/32	2 15/32	7/8	25	125	36
3/4	1	3 1/4	1 3/16	10	50	50
7/8	1 1/8	3 11/16	1 3/8	10	50	76

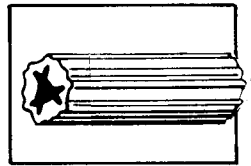


Self-Drill Anchors

Flush Type

All dimensions are in inches

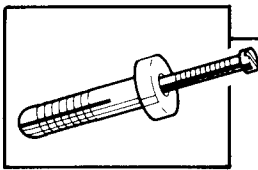
Size	Outside Dia.	Hole Depth	Thrd. Depth	Std. Box	Std. Ctn.	Wt./100 (lbs.)
1/4	7/16	1 1/4	3/8	100	1000	4¼
5/16	15/32	1 7/32	3/8	100	1000	4½
3/8	9/16	1 7/16	7/16	50	500	7½
1/2	11/16	1 15/16	3/4	50	250	14½
5/8	27/32	2 3/8	7/8	25	125	30
3/4	1	3	1 1/8	10	50	44



Fluted Plastic Anchors

All dimensions are in inches

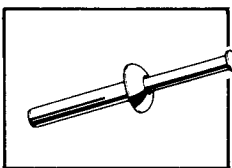
Size	Drill Dia.	Std. Box	Std. Ctn.	Wt./1000 (lbs.)
6-8 x 3/4	3/16	100	1000	1
8-10 x 7/8	7/32	100	1000	1½
10-12 x 1	1/4	100	1000	3



Hammer Drive Nylon Anchors

All dimensions are in inches

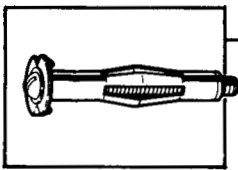
Size	Std. Box	Std. Ctn.	Wt./100 (lbs.)
ROUND HEAD			
3/16 x 1	100	1000	1/2
3/16 x 1 1/2	100	1000	3/4
1/4 x 1	100	1000	3/4
1/4 x 1 1/2	100	1000	1
1/4 x 2	100	1000	1
FLAT HEAD			
3/16 x 1	100	1000	1/2
3/16 x 1 1/2	100	1000	3/4
1/4 x 1	100	1000	3/4
1/4 x 1 1/2	100	1000	1
MUSHROOM HEAD			
3/16 x 1	100	1000	1/2
1/4 x 3/4	100	1000	1/2
1/4 x 1	100	1000	3/4
1/4 x 1 1/2	100	1000	1
1/4 x 2	100	1000	1
1/4 x 3	100	1000	2 1/4



Hammer Drive Steel Anchors

All dimensions are in inches

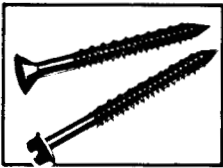
Size	Work Thickness	Std. Box	Std. Ctn.	Wt./100 (lbs.)
MUSHROOM HEAD				
1/4 x 1	1/8 - 1/4	100	500	1 3/4
1/4 x 1 1/4	1/4 - 1/2	100	500	2 1/4
1/4 x 1 1/2	1/2 - 3/4	100	500	2 1/2
1/4 x 2	3/4 - 1 1/4	100	500	3



Hollow Wall Anchors

All dimensions are in inches

Size	Drill Dia.	Wall Th.	Std. Box	Std. Ctn.	Wt./100 (lbs.)
1/8 Short	5/16	1/8-5/8	100	500	1 1/2
1/8 Long	5/16	5/8-1 1/4	100	500	2
1/8 Ex. Long	5/16	1 1/4-1 3/4	50	250	2 1/2
3/16 Short	3/8	1/8-5/8	50	250	3 1/2
3/16 Long	3/8	5/8-1 1/4	50	250	4
1/4 Short	7/16	1/8-5/8	50	250	5
1/4 Long	7/16	5/8-1 1/4	50	250	6 1/4
1/4 Ex. Long	7/16	1 1/4-1 3/4	25	125	7 1/2

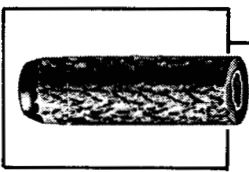


Concrete Self-Tapping Screws Tapcon Threaded Screw Anchors

Hex Washer Head & Phillips Flat Head

All dimensions are in inches

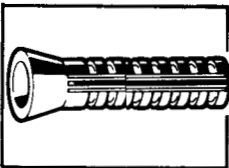
Size	Work Thickness	Drill Size	Std. Box	Std. Ctn.	Wt./100 lbs.	
3/16 (#12) x	1 1/4	1/4	5/32 x 3 1/2	100	500	1.0
	1 3/4	3/4	5/32 x 3 1/2	100	500	1.3
	2 1/4	1 1/4	5/32 x 4 1/2	100	500	1.5
	2 3/4	1 3/4	5/32 x 4 1/2	100	500	1.8
	3 1/4	2 1/4	5/32 x 5 1/2	100	500	2.1
	3 3/4	2 3/4	5/32 x 5 1/2	100	500	2.4
	4	3	5/32 x 5 1/2	100	500	2.6
1/4 (#14) x	1 1/4	1/4	3/16 x 3 1/2	100	500	1.9
	1 3/4	3/4	3/16 x 3 1/2	100	500	2.4
	2 1/4	1 1/4	3/16 x 4 1/2	100	500	2.9
	2 3/4	1 3/4	3/16 x 4 1/2	100	500	3.4
	3 1/4	2 1/4	3/16 x 5 1/2	100	500	3.9
	3 3/4	2 3/4	3/16 x 5 1/2	100	500	4.4
	4	3	3/16 x 5 1/2	100	500	4.7



Fibre Plugs

All dimensions are in inches

Size	Drill Size & Dia.	Std. Box	Std. Ctn.	Wt./1000 (lbs.)
6 x 3/4	#6 (5/32)	100	1000	1 1/4
6 x 1	#6 (5/32)	100	1000	1 3/4
8 x 5/8	#8 (11/64)	100	1000	1 1/2
8 x 3/4	#8 (11/64)	100	1000	1 3/4
8 x 1	#8 (11/64)	100	1000	2 1/4
10 x 3/4	#10 (3/16)	100	1000	2
10 x 1	#10 (3/16)	100	1000	2 1/2
10 x 1 1/2	#10 (3/16)	100	1000	3 1/2
10 x 2	#10 (3/16)	100	1000	4 3/4
12 x 1	#12 (1/4)	100	1000	3 1/2
12 x 1 1/2	#12 (1/4)	100	1000	5
14 x 1	#14 (9/32)	100	1000	4 1/4
14 x 1 1/4	#14 (9/32)	100	1000	4 3/4
14 x 1 1/2	#14 (9/32)	100	1000	5 3/4
14 x 2	#14 (9/32)	100	1000	7
16 x 1 1/2	#16 (5/16)	100	500	7 1/2
16 x 2	#16 (5/16)	100	500	9
20 x 2	#20 (3/8)	100	500	11



Lead Screw Anchors

All dimensions are in inches

Size	Hole Size	Std. Pkg.	Std. Ctn.	Wt./100 (lbs.)
10-12-14 x 3/4	5/16	100	1000	1 1/2
10-12-14 x 1	5/16	100	1000	2
10-12-14 x 1 1/2	5/16	100	1000	3 1/2
16-18 x 1	3/8	100	1000	2 1/2
16-18 x 1 1/2	3/8	100	1000	4 1/2

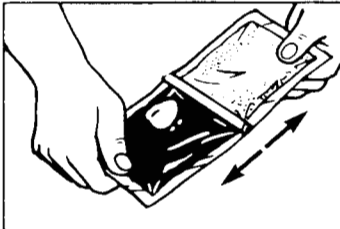
The GROUT POUCH™



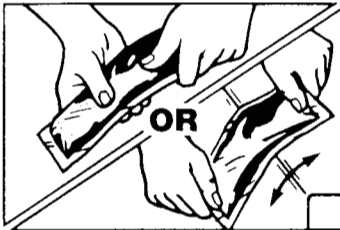
A truly fool-proof, completely predictable, efficient method for mixing and applying adhesive resin, Grout Pouch™ saves time, money, and materials in many ways. Components are pre-measured and packaged in ready-to-mix pouches, insuring proper proportions. The pouch package makes shipping safe and the mixing process simple. Nearly anyone can prepare the resin for application. Once mixed, adhesive resin is easily poured, filling all parts of the hole, forming an amazingly strong bond in minutes. Resin can be poured directly from its pouch in vertical applications and is applied horizontally with a standard caulking gun and cartridge.

Lowest
"In-Place
Cost"

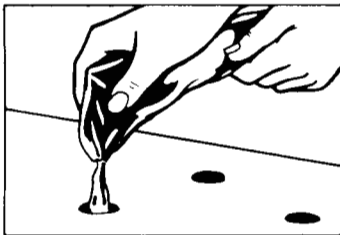
HOW TO USE GROUT-POUCH DIRECTLY



1. Hold each end of the pack and pull firmly to remove dividers

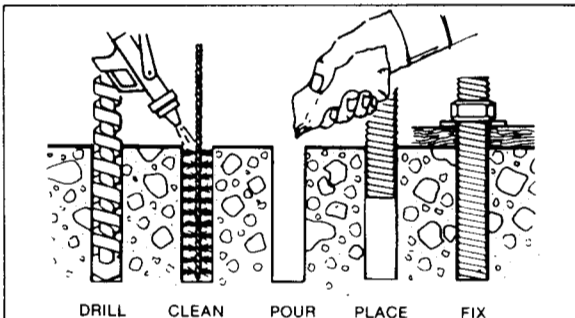


2. Mix thoroughly in the pouch with fingers until color is uniform **OR** mix by rubbing pack against a smooth, firm edge using a back and forth motion as shown. (Caution: avoid rough, uneven or sharp edges.)



3. Cut corner and apply. See page 7 for sidewall anchoring instructions

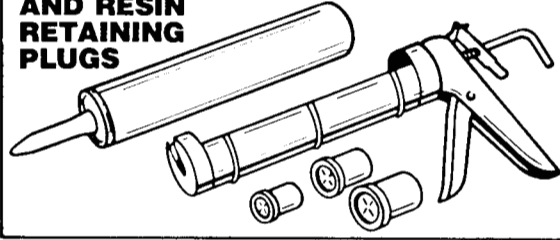
HOW TO USE GROUT POUCH™



- 1. PREPARATION**
Surfaces should be clean and dry. Can be used on damp surfaces if clean.
- 2. MIXING INSTRUCTIONS: GROUT POUCH**
 - a. Hold each end of the pak and pull firmly to remove dividers.
 - b. Mix thoroughly in pak until color is uniform. Do not use excessive pressure or puncture pak while mixing.
 - c. Cut corner and apply.
- 3. MIXING INSTRUCTIONS: BULK PACKAGING**
A mixture of 1/4 to 1 by volume (1/4 filler to 1 resin) is recommended by the manufacturer. The filler should be added to the liquid resin and thoroughly blended in until all the aggregate has been wetted and a uniform cream-like consistency has been obtained.

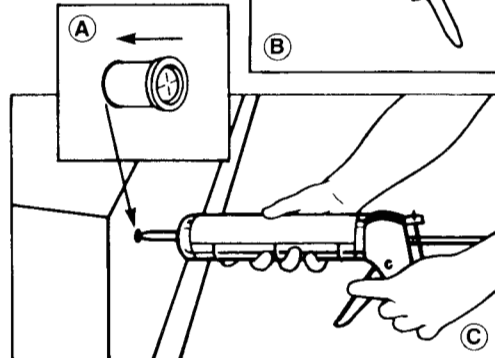
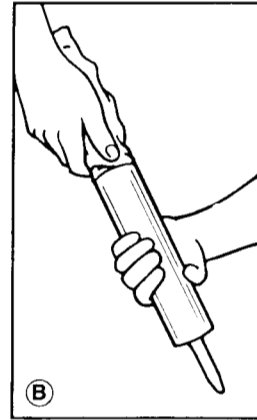
USING GROUT POUCH™ WITH A STANDARD CARTRIDGE GUN

DISPENSING TUBE AND RESIN RETAINING PLUGS

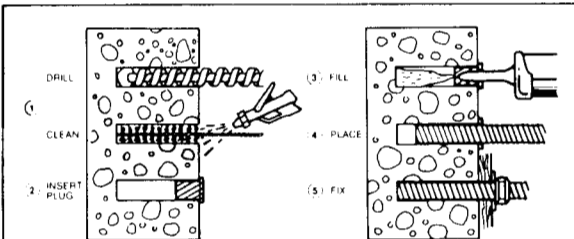


USING GROUT POUCH™ FOR SIDEWALL APPLICATIONS

- A.** Place Resin Retaining plug into correctly sized, drilled, and cleaned hole. The die-cut end of the plug should face user.
- B.** After performing mixing instructions, insert Grout Pouch™ and plunger cap into dispensing tube provided. Push contents to the opposite end of tube (where plastic applicator is located). Cut tip off plastic applicator guide a sharp object through applicator nozzle and into Grout Pouch™, puncturing it several times. Insert dispensing tube into the caulking gun.
- C.** Push plastic applicator nozzle through die-cut end of Resin Retaining plug and dispense resin into hole. Retaining plug is to be left in place to prevent leakage of grout. This will not affect anchor performance in any way.



SIDEWALL APPLICATION OF GROUT POUCH



- 1.** Drill hole according to length and depth of stud. Clean hole, remove excess water.
- 2.** Insert appropriate resin retaining plug into hole with die-cut end facing user.
- 3.** Perform mixing instructions and insert Grout Pouch™ and plunger cap into dispensing tube provided. Push contents to opposite end of tube. Cut tip off plastic applicator, guide sharp object through applicator nozzle and into Grout Pouch™, puncturing it several times. Insert tube into caulking gun. Push nozzle through retaining plug and dispense proper amount of resin.
- 4.** Place stud, leaving retaining plug in hole to prevent leakage. Plug does not affect anchor performance in any way.
- 5.** Fix stud assembly according to conventional Grout Pouch™ application guidelines.

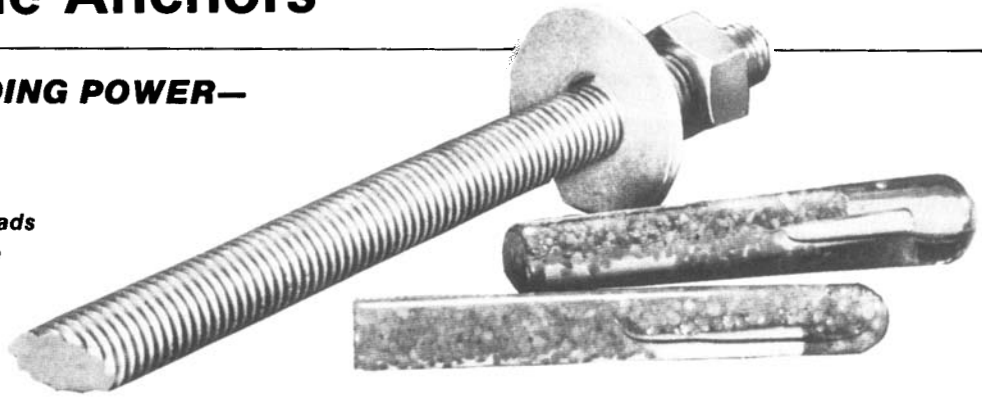
Capsule Anchors

TREMENDOUS HOLDING POWER— VIBRATION-PROOF

THE ANSWER TO:

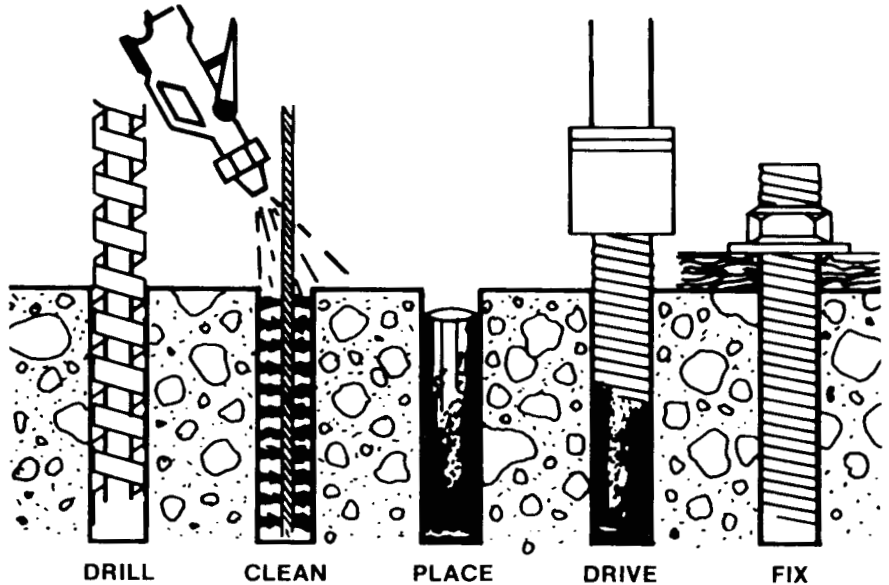
- Extreme vibratory or cyclic loads
- Installations close to the edge of the concrete
- Installation in wet areas
- Stress-Free
- Zero Slippage

I.C.B.O. Report No. 4274



HOW TO USE

1. Select the correct drill size for the anchor you are using.
2. Use a rotary-hammer drill and drill the base material to correct size and depth.
3. Remove dust and rubble from the hole with compressed air, a brush or water. Excess water must also be removed although the hole may be damp.
4. Insert the capsule in the hole, either end first.
5. Insert the stud into the hole to break the capsule.
6. Under power, push the stud to full depth, maintaining power for two or three seconds after the stud bottoms.
7. Promptly and carefully release the installation tool from the stud, leaving it undisturbed right through the prescribed curing time consistent with the on-site temperature.



CAPSULES

Cat. No.	Capsule Size	Drill Dia.	Embed. Depth (In.)	Ultimate Strength in Concrete*		Qty./Box
				Tensile	Shear	
TB14	1/4"	3/8"	2-1/2	2,240 lbs.	1,125 lbs.	10
TB38	3/8"	7/16"	3-1/2	6,140 lbs.	4,030 lbs.	10
TB12	1/2"	9/16"	4-1/4	10,430 lbs.	7,210 lbs.	10
TB58	5/8"	11/16"	5	17,080 lbs.	11,260 lbs.	10
TB34	3/4"	7/8"	6-5/8	27,525 lbs.	18,800 lbs.	6
TB78	7/8"	1"	6-5/8	31,660 lbs.	23,810 lbs.	6
TB1	1"	1-1/8"	8-1/4	41,210 lbs.	28,870 lbs.	6
TB114	1-1/4"	1-3/8"	11	62,220 lbs.	49,100 lbs.	6

This table refers to threaded rod spec ASTM A307.
*Recommended safe working load is one-fourth of ultimate.

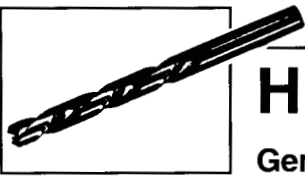
STUD ASSEMBLIES

Cat. No.	Size	Qty./Box
TBS14	1/4" — 20 x 3-3/4"	10
TBS38	3/8" — 16 x 5-1/8"	10
TBS12	1/2" — 13 x 6-1/2"	10
TBS58	5/8" — 11 x 7-5/8"	10
TBS34	3/4" — 10 x 10-1/4"	6
TBS78	7/8" — 9 x 10-1/4"	6
TBS1	1" — 8 x 12"	6
TBS114	1-1/4" — 7 x 15"	6

(Complete with studs/nuts/washers)
Drive Units Available

MINIMUM CURING TIME

68° F (20° C)	10 min.
50° F (10°)	20 min.
32° F (0° C)	1 hr.
23° F (-5° C)	5 hrs.
14° F (-10° C)	24 hrs.



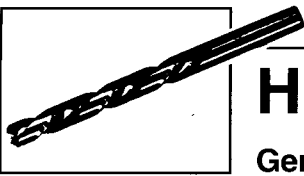
High Speed Twist Drills

General Purpose - Straight Shank

● - denotes stock size - other sizes on application

Size	Decimal Equiv. Inches	Jobbers Length	Short Length	Size	Decimal Equiv. Inches	Jobbers Length	Short Length
1/64	.0156	●		7/64	.1094	●	●
1/32	.0312	●		#35	.1100	●	
#60	.0400	●		#34	.1100	●	
#59	.0410	●		#33	.1130	●	●
#58	.0420	●		#32	.1160	●	●
#57	.0430	●		#31	.1200	●	
#56	.0465	●		1/8	.1250	●	●
3/64	.0469	●		#30	.1285	●	●
#55	.0520	●		#29	.1360	●	●
#54	.0550	●		#28	.1405	●	
#53	.0595	●		9/64	.1406	●	●
1/16	.0625	●		#27	.1440	●	
#52	.0635	●		#26	.1470	●	
#51	.0670	●		#25	.1495	●	●
#50	.0700	●		#24	.1520	●	
#49	.0730	●		#23	.1540	●	
#48	.0760	●		5/32	.1562	●	●
5/64	.0781	●		#22	.1570	●	
#47	.0785	●		#21	.1590	●	
#46	.0810	●		#20	.1610	●	
#45	.0820	●		#19	.1660	●	
#44	.0860	●		#18	.1695	●	
#43	.0890	●		11/64	.1719	●	●
#42	.0935	●		#17	.1730	●	
3/32	.0938	●	●	#16	.1770	●	
#41	.0960	●		#15	.1800	●	
#40	.0980	●		#14	.1820	●	
#39	.0995	●	●	#13	.1850	●	
#38	.1015	●					
#37	.1040	●	●				
#36	.1065	●					

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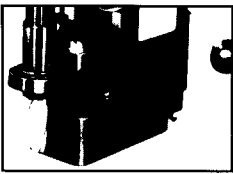


High Speed Twist Drills, continued

General Purpose - Straight Shank

● - denotes stock size - other sizes on application

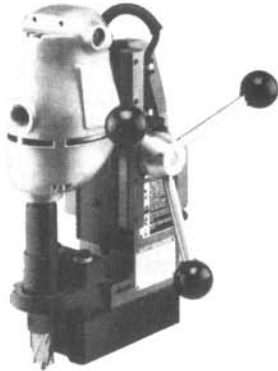
Size	Decimal Equiv. Inches	Jobbers Length	Short Length	Size	Decimal Equiv. Inches	Jobbers Length	1/2" Shank Jobbers Length
3/16	.1875	●	●	3/8	.3750	●	
#12	.1890	●		25/64	.3906	●	
#11	.1910	●		13/32	.4062	●	
#10	.1935	●		27/64	.4219	●	
#9	.1960	●		7/16	.4375	●	
#8	.1990	●		29/64	.4531	●	
#7	.2010	●		15/32	.4688	●	
13/64	.2031	●	●	31/64	.4844	●	
#6	.2040	●	●	1/2	.5000	●	
#5	.2055	●		17/32	.5312		●
#4	.2090	●		9/16	.5625		●
#3	.2130	●		19/32	.5938		●
7/32	.2188	●	●	5/8	.6250		●
#2	.2210	●		21/32	.6562		●
#1	.2280	●		11/16	.6875		●
15/64	.2344	●	●	23/32	.7188		●
1/4	.2500	●	●	3/4	.7500		●
17/64	.2656	●	●	25/32	.7812		●
9/32	.2812	●	●	13/16	.8125		●
19/64	.2969	●		7/8	.8750		●
5/16	.3125	●		15/16	.9375		●
21/64	.3281	●		1	1.0000		●
11/32	.3438	●		1 1/8	1.1250		●
23/64	.3594	●		1 1/4	1.2500		●



Hougen Portable Magnetic Drills

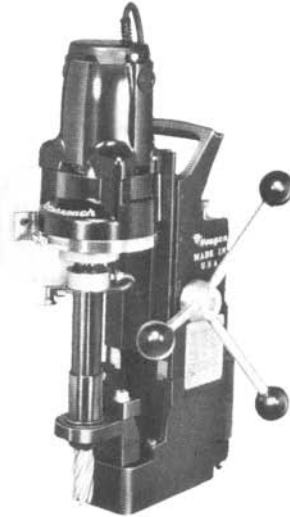
We stock a variety of the more popular Hougen drill parts and a large inventory of Rotabroach High Speed Cutters, pilot points, and cutting oil. Model for Model, the Best Value and Productivity Available.

10904



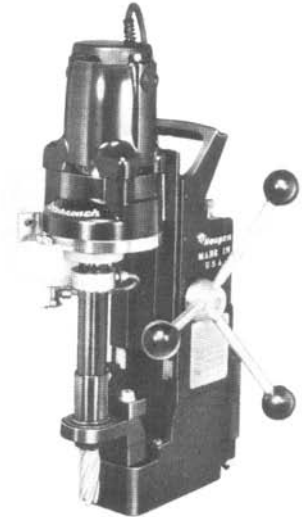
For contractors, fabricators — the Model 10904, weighing just 28 lbs, is the smallest, lightest portable magnetic drill available with 1-3/8" diameter and 2" depth of cut hole making capacity. Features a reversible handle, powerful yet compact magnet, and uses "12,000-Series" Rotabroach Cutters. Plastic carrying case is standard; options are pipe adapter, twist drill adapter, tap unit, and ratchet han-

10914



Day in, day out, in highly repetitive, production environments, these single speed "workhorses" perform. 2-1/16" diameter holemaking capacity to 3" depth of cut. The 10909 offers the option of 230V electrical service; the 10914 is for 115V power. Both models weigh just 44 lbs and have reversible feed handles and all of Hougen's Safety Features. Use with "12,000-Series" Rotabroach Cutters.

10912



The variable speed, "portable machine shop" brings RPM control and versatility to a wide range of jobs — drill, ream, tap, countersink — all at the work site. Reversible feed handle, automatic oiler, double insulated motor, and solid state circuitry are featured, with capacity for 2-1/16" diameter holes to 3" depths. Weighs 44 lbs, uses "12,000-Series" cutters. With coolant bottle and safety fea-

Model No.		10904
Electrical Rating		115 V 60 Hz. 7.2 Amp
No Load RPM		450
Hole Capacity	Diameter	1-3/8"
	Depth	2"
Arbor Bore*		3/4"
Dimensions	Height	16-7/16"
	Width	7-3/16"
	Length	8-1/4"
Base Size		3-1/8" x 6-7/16"
Net Weight (Approximate)		28 lbs.
Magnet on 1" Plate	Drill Point	775 lbs**
	Dead Lift	1742 lbs**

*Use optional Arbor Adapter (10851) for cutters with 1/2" shank diameter.
** Average.

Model No.		10914
Electrical Rating		115 V 60 Hz. 11.2 Amp
No Load RPM		350
Hole Capacity	Diameter	2-1/16"
	Depth	3"
Arbor Bore*		3/4"
Dimensions	Height	20-1/2"
	Width	8-3/16"
	Length	13-3/4"
Base Size		3-1/2" x 8-1/4"
Net Weight (Approximate)		44 lbs.
Shipping Weight		54 lbs

*Use optional Arbor Adapter (10851) for cutters with 1/2" shank diameter.

Model No.		10912
Electrical Rating		115 V 60 Hz. 11.2 Amp
No Load RPM		230-350
Hole Capacity	Diameter	2-1/16"
	Depth	3"
Arbor Bore*		3/4"
Dimensions	Height	20-1/2"
	Width	8-3/16"
	Length	13-3/4"
Base Size		3-1/2" x 8-1/4"
Net Weight (Approximate)		44 lbs.
Shipping Weight		54 lbs

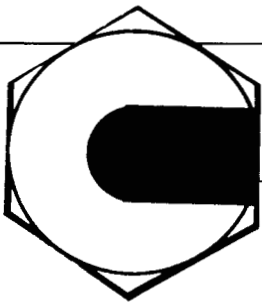
*Use optional Arbor Adapter (10851) for cutters with 1/2" shank diameter.

Hougen Cutters

● - denotes stock size - other sizes on application

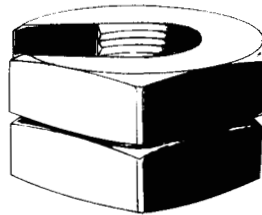


Dia.	Dec. Equiv. (in.)	Shank Dia.	for 1" mtl.	for 2" mtl.	for 3" mtl.
7/16	.437	1/2"	●	●	
1/2	.500	1/2"	●	●	
9/16	.562	1/2"	●	●	
5/8	.625	1/2"	●	●	
11/16	.687	1/2"	●	●	
3/4	.750	3/4"	●	●	●
13/16	.812	3/4"	●	●	●
7/8	.875	3/4"	●	●	●
15/16	.937	3/4"	●	●	●
1	1.000	3/4"	●	●	
1 1/16	1.062	3/4"	●	●	●
1 1/8	1.125	3/4"	●	●	
1 3/16	1.187	3/4"	●	●	
1 1/4	1.250	3/4"	●	●	
1 5/16	1.312	3/4"	●	●	
1 3/8	1.375	3/4"	●	●	
1 7/16	1.437	3/4"	●	●	
1 1/2	1.500	3/4"	●	●	
1 9/16	1.562	3/4"		●	
1 5/8	1.625	3/4"		●	
1 11/16	1.687	3/4"		●	
1 3/4	1.750	3/4"	●	●	
1 13/16	1.812	3/4"		●	
1 7/8	1.875	3/4"	●		
1 15/16	1.937	3/4"		●	
2	2.000	3/4"	●		
2 1/16	2.062	3/4"		●	
17mm	.669	1/2"	●	●	
20mm	.787	3/4"	●	●	
23mm	.905	3/4"	●	●	
26mm	1.024	3/4"	●		



Slip-On Lock Nut

“A BETTER WAY”



The Slip-ON® Lock Nut has been developed with the ability to be positioned on threaded rod at any point, without the time consuming nuisance of threading. Just open the Slip-ON® Lock Nut and insert where needed. Twist close and tighten with a wrench. It's that simple!

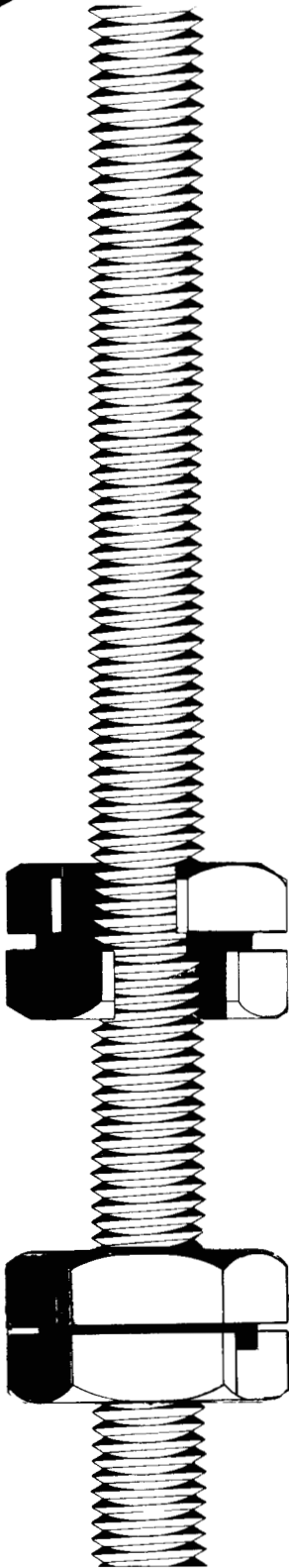
The Slip-ON® Lock Nut offers a savings of time and effort with these advantages:

- Save time and \$\$\$
- Eliminate the threading of nuts
- Reduce initial installation cost
- Especially useful in a stack situation
- Ideal for retrofit — Just add on where needed
- Adjustable without dismantling existing system
- Damaged or burred rod is no longer a problem
- Replace welded nuts or conventional jam nuts in high vibratory situations
- Greater strength than the rod itself

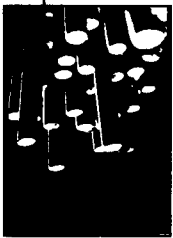
Additional Applications:

Used as stops or quick-change adjustments on molds, dies, fixtures and jigs utilizing bending machines, lathes, extruders, industrial cutters and fabricating machinery in general.

• Contact your local distributor *today* and ask about *volume discounts*.



Patent pending
Made in U.S.A.



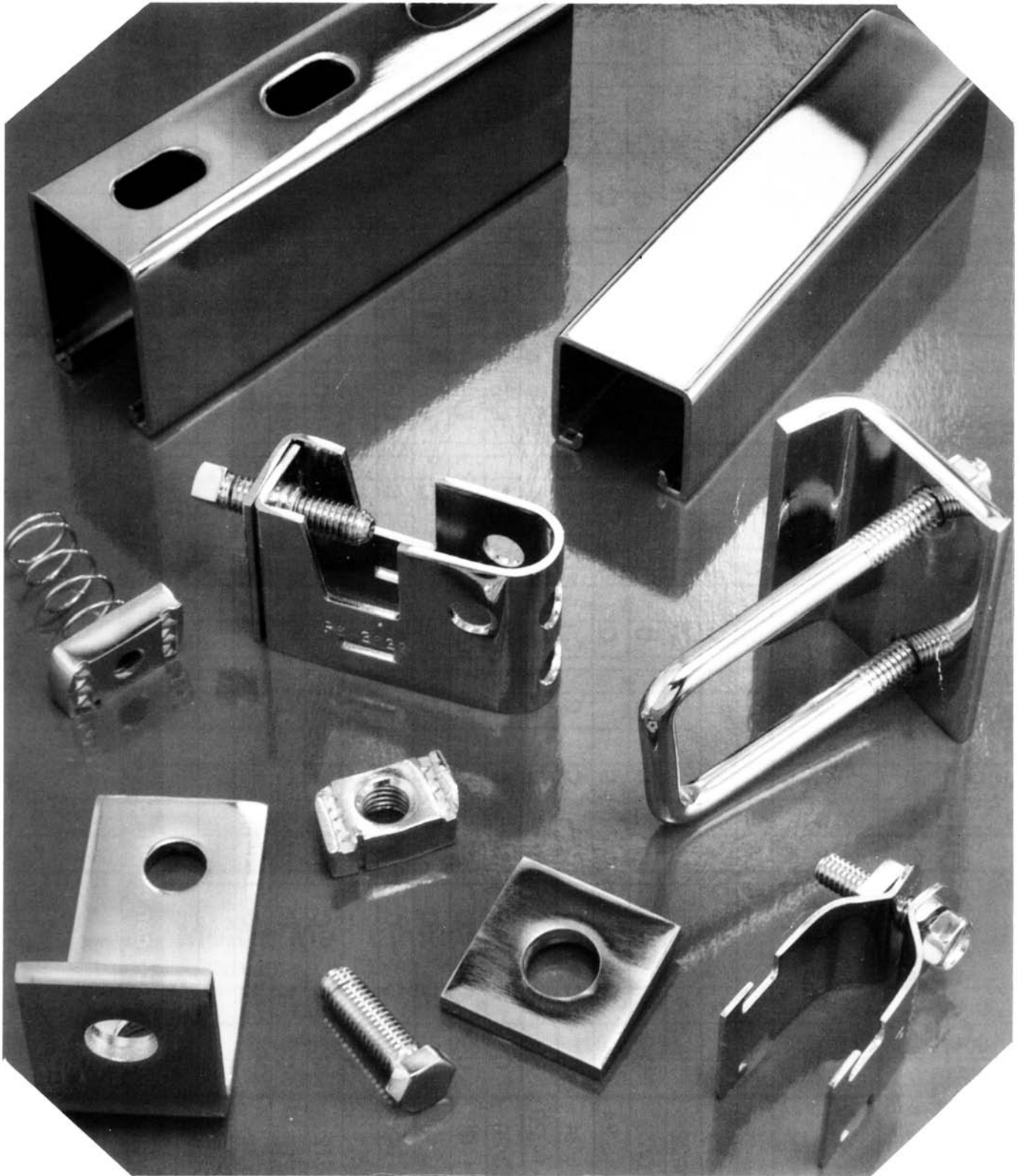
Continuous Threaded Rod

"C" (Coarse) & "F" (Fine) denotes stock size - other sizes on application

Dia.	Length Plain Carbon Steel		Length Zinc Plated		Length 18-8 Stainless		Length B-7 Alloy		Length Brass	Acme 12'	H.D. Galv. Lengths Vary	App. Wt. per 100 ft.
	3' 6' 12'	C C C	3' 6' 12'	C C C	3' 6' 12'	C C C	6' 12'	C C C				
6-32		C		C		C			C			3#
8-32		C		C		C			C			5#
10-24/32		C/F		C/F		C/F			C/F			7#
1/4-20/28	C	C/F	C	C	C	C	C/F	C	C			12#
5/16-18/24	C	C	C	C	C	C	C/F	C	C			20#
3/8-16/24	C	C	C	C	C	C	C/F	C	C			29#
7/16-14/20	C	C	C	C	C	C	C/F	C	C			40#
1/2-13/20	C	C	C	C	C	C	C/F	C	C		C	54#
5/8-11/18	C	C	C	C	C	C	C/F	C	C		C	84#
3/4-10/16	C	C	C	C	C	C	C/F	C	C	6thr	C	124#
7/8-9/14	C	C	C	C	C	C	C/F	C	C	6thr	C	168#
1-8/14	C	C	C	C	C	C	C/F	C	C	5thr	C	225#
1 1/8-7/12	C	C	C	C	C	C	8thrC/F	8thrC			C	280#
1 1/4-7/12	C	C	C	C	C	C	8thrC/F	8thrC		5thr	C	355#
1 1/2-6	C	C					8thrC	8thrC			C	510#
1 3/4-5	C	C					8thr	8thr				700#
2-4 1/2	C	C					8thr	8thr				920#

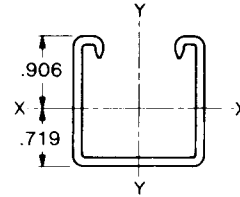
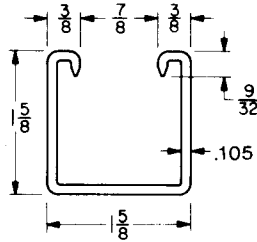
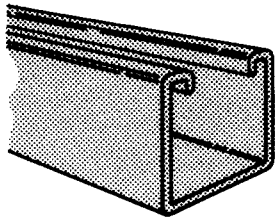
All Threaded Rod can be cut to length and chamfered to make full thread studs for a wide variety of needs.

Strut Metal Framing



Strut Metal Framing

PS 200 Steel Channel (1 5/8 x 1 5/8 x 12 ga.)



Elements of Section

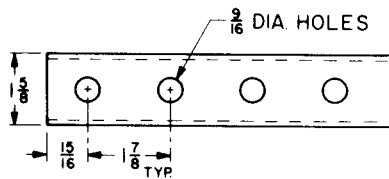
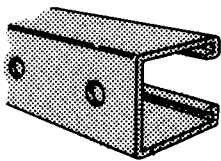
Weight/100 Ft.		Area Of Section Sq./In.	X - X Axis			Y - Y Axis		
PLN GRN	PGAL		Moment of Inertia Inches ⁴	Section Modulus Inches ³	Radius of Gyration Inches	Moment of Inertia Inches ⁴	Section Modulus Inches ³	Radius of Gyration Inches
191	194	.561	.189	.209	.580	.239	.294	.653

Modulus of Elasticity: 29,500,000 PSI

Fabricated Channel

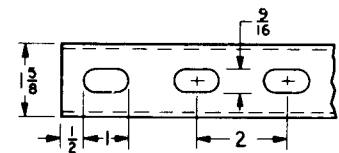
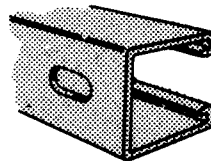
PS 200 H Channel With Holes

Weight/100 ft: PLN,GRN 186 lbs.
PGAL 189 lbs.



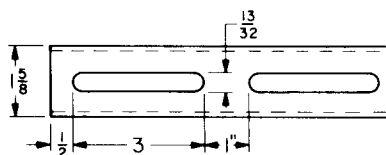
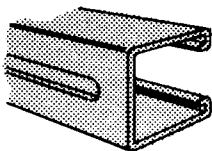
PS 200 EH Elongated Holes

Weight/100 ft: PLN,GRN 182 lbs.
PGAL 185 lbs.



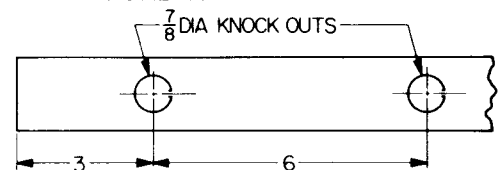
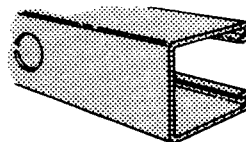
PS 200 S Slotted Channel

Weight/100 ft: PLN,GRN 180 lbs.
PGAL 183 lbs.



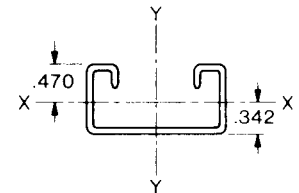
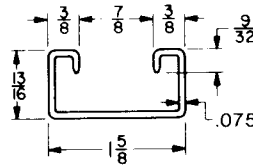
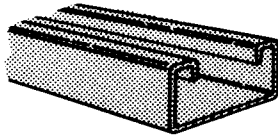
PS 200 KO6 Knockout Channel

Weight/100 ft: PLN,GRN 191 lbs.
PGAL 194 lbs.



Strut Metal Framing

PS 500 Steel Channel (1 5/8 x 13/16 x 14 ga.)



Elements of Section

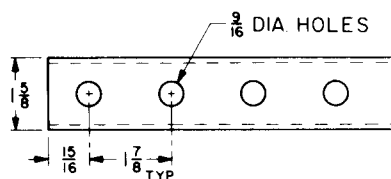
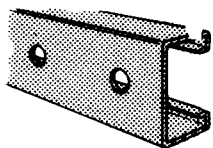
Weight/100 Ft.		Area Of Section Sq./In.	X - X Axis			Y - Y Axis		
PLN GRN	PGAL		Moment of Inertia Inches ⁴	Section Modulus Inches ³	Radius of Gyration Inches	Moment of Inertia Inches ⁴	Section Modulus Inches ³	Radius of Gyration Inches
100	105	.295	.027	.056	.302	.110	.135	.610

Modulus of Elasticity: 29,500,000 PSI

Fabricated Channel

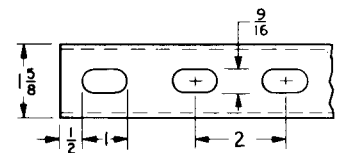
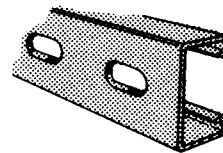
PS 500 H Channel With Holes

Weight/100 ft: PLN,GRN 97 lbs.
PGAL 102 lbs.



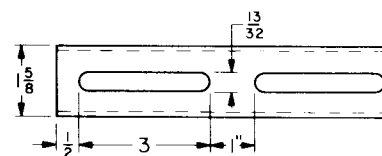
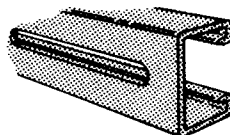
PS 500 EH Elongated Holes

Weight/100 ft: PLN,GRN 94 lbs.
PGAL 99 lbs.



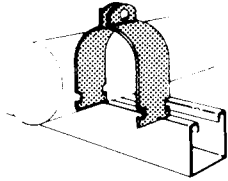
PS 500 S Slotted Channel

Weight/100 ft: PLN,GRN 92 lbs.
PGAL 97 lbs.



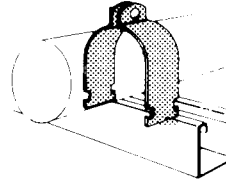
Strut Accessories

PS 1000 EMT Conduit Clamp



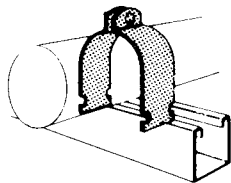
EMT Size	Stock Thickness	Hanging Load Rating/lbs.	Wt./ 100 pcs
3/8"	.060	400	8
1/2"	.060	400	9
3/4"	.060	400	10
1"	.075	600	14
1 1/4"	.075	600	16
1 1/2"	.105	800	27
2"	.105	800	30

PS 1100 Standard Pipe Clamp (GRC and IMC)



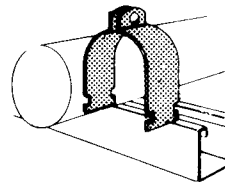
Pipe Size	Stock Thickness	Hanging Load Rating/lbs.	Wt./ 100 pcs
3/8"	.060	400	9
1/2"	.060	400	10
3/4"	.075	600	13
1"	.075	600	15
1 1/4"	.075	600	18
1 1/2"	.105	800	28
2"	.105	800	33
2 1/2"	.105	800	39
3"	.105	800	44
3 1/2"	.125	1000	55
4"	.125	1000	61
5"	.125	1000	73
6"	.135	1000	98
8"	.135	1000	123
10"	.135	1000	143
12"	.135	1000	174

PS 1200 O. D. Tubing Clamp
Copper Plated



O.D. Size	Stock Thickness	Hanging Load Rating/lbs.	Wt./ 100 pcs.
5/8"	.060	400	8
7/8"	.060	400	12
1 1/8"	.075	600	14
1 3/8"	.075	600	15
1 5/8"	.075	600	17
2 1/8"	.105	800	31
2 5/8"	.105	800	35
3 1/8"	.105	800	41

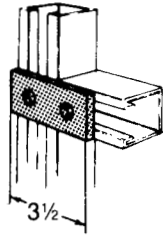
PS 1300 Universal Pipe Clamp for EMT, IMC & GRC



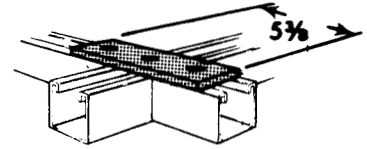
Nom Size	Fits O.D.	Stock Thickness	Hanging Load Rating/lbs.	Wt./ 100 pcs
1/2"	.706-.840	.060	250	11
3/4"	.922-1.050	.075	400	15
1"	1.163-1.315	.075	400	17
1 1/4"	1.510-1.660	.075	400	19
1 1/2"	1.740-1.900	.105	500	30
2"	2.197-2.375	.105	500	35

Strut Accessories

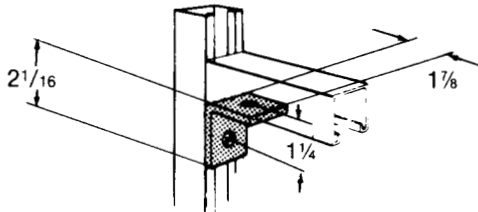
PS 601 *Two Hole Splice Plate*



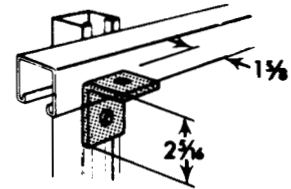
PS 602 *Three Hole Splice Plate*



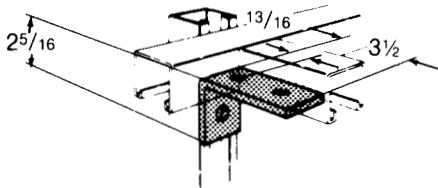
PS 603 *Two Hole End Angle*



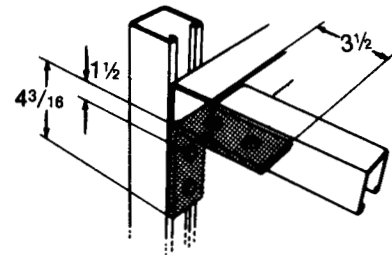
PS 604 *Two Hole Corner Angle*



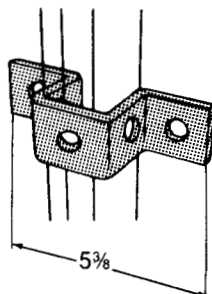
PS 605 *Three Hole Corner Angle*



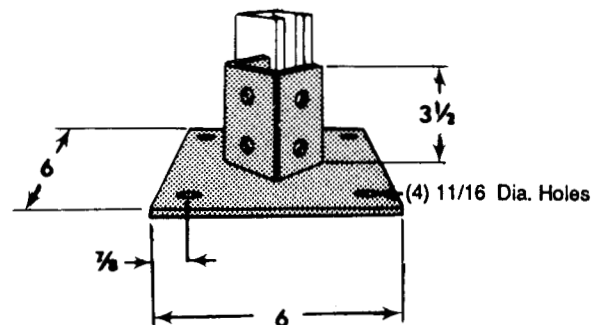
PS 607 *Four Hole Corner Angle*



PS 613 *"U" Support*

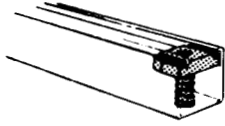


PS 3033 *Post Base*



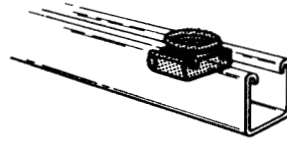
Strut Accessories

PS RS Clamping Nut with Regular Spring



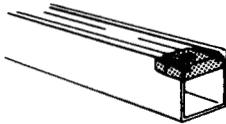
Part #	Size	Threads
PS RS	1/4"	20
PS RS	5/16"	18
PS RS	3/8"	16
PS RS	1/2"	13
PS RS	5/8"	11
PS RS	3/4"	10

PS TG Top Grip Nut with Spring on Top



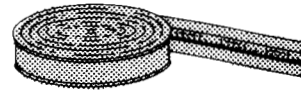
Part #	Size	Threads
PS TG	1/4"	20
PS TG	3/8"	16
PS TG*	1/2"	13

PS NS Clamping Nut without Spring

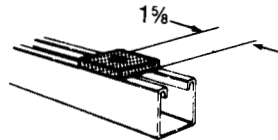


Part #	Size	Threads
PS NS*	1/4"	20
PS NS*	5/16"	18
PS NS*	3/8"	16
PS NS	1/2"	13
PS NS	5/8"	11
PS NS	3/4"	10

PS 3792 Power-Wrap™

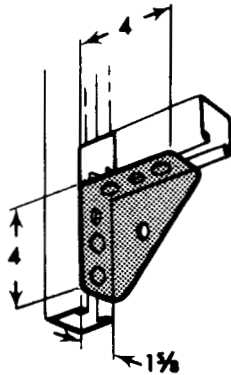


PS 619 Square Washer

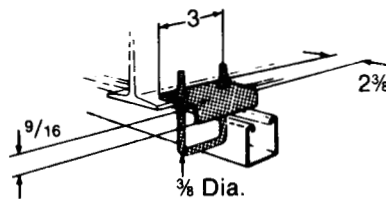


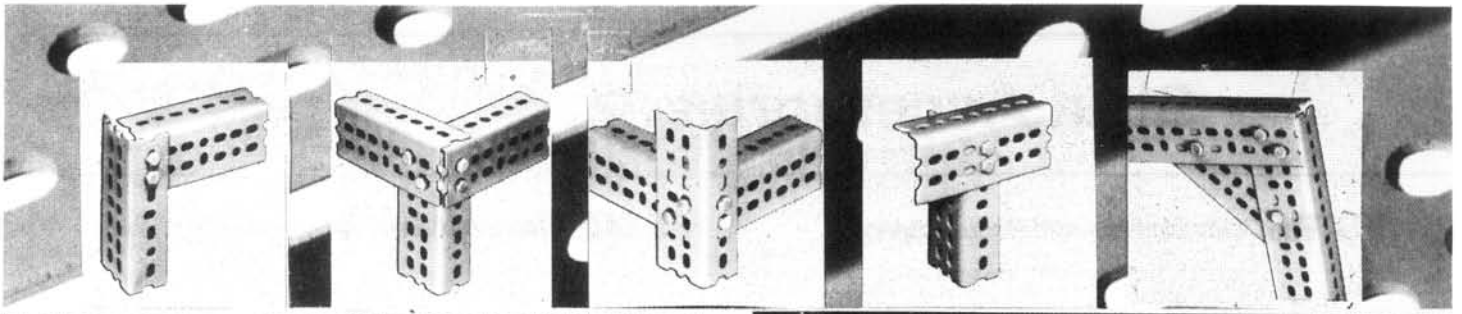
Part #	Rod Size	Hole Size
PS 619	1/4	11/32"
PS 619	3/8	7/16"
PS 619	1/2	9/16"
PS 619	5/8	11/16"
PS 619	3/4	13/16"

PS 3373 Universal Angle Bracket



PS 2651 Beam Clamp





FLEX-ANGLE

Universal Slotted Angle System

HOT DIPPED GALVANIZED SLOTTED ANGLES

Fabricated from hot dip galvanized steel with a zinc coating thickness of at least .001 inch.
3 Standard Sizes

Ga.	Outside Dimensions	Length	Shipping Wt. /100 Ft.
14	.080 x 1½" x 1½"	10 ft.	78#
14	.080 x 1½" x 2¼"	10 ft.	95#
12	.104 x 1½" x 3"	10 ft.	135#

Forged Hardware/ Construction Fasteners



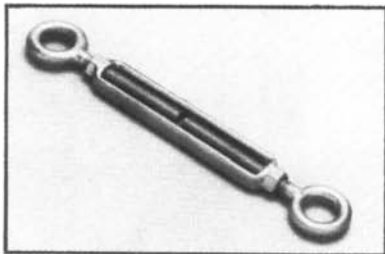
ANCHOR BOLTS
ANCHOR SHACKLES
CHAIN SHACKLES
CLEVISES
CLEVIS HOOKS
CLEVIS LINKS
CLEVIS PINS
CROSS BRACING RODS
EYE BOLTS

EYE NUTS
FOUNDATION BOLTS
GRAB HOOKS
HANGER RODS
HOOK BOLTS
J-BOLTS
RING BOLTS
ROD ENDS
SAG RODS

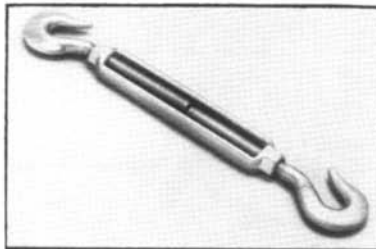
SLIP HOOKS
SWAGED BOLTS
SWIVELS
TIE RODS
TURNBUCKLES
U-BOLTS
WIRE ROPE CLIPS
YOKE ENDS

Turnbuckles – Forged, H.D. Galvanized

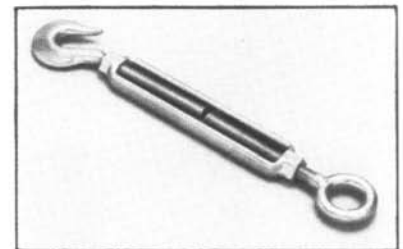
Eye & Eye



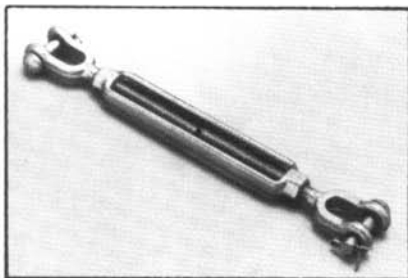
Hook & Hook



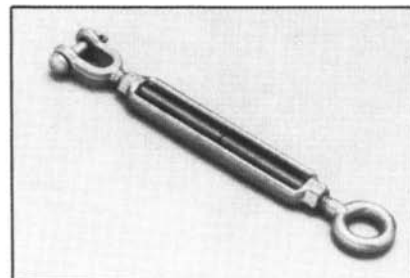
Hook & Eye



Jaw & Jaw



Jaw & Eye



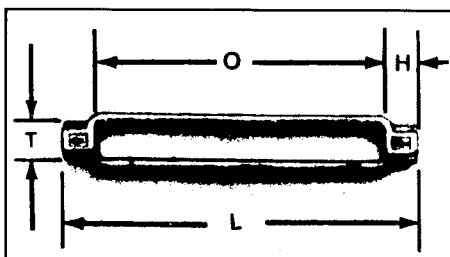
Size in Inches		App. Overall Length Closed
Thread Dia.	Take-Up	
1/4 *	x 4	8
5/16	x 4 1/4	9
3/8	x 6	12
1/2	x 6	13
1/2	x 9	16
1/2	x 12	19

Size in Inches		App. Overall Length Closed
Thread Dia.	Take-Up	
5/8	x 6	16
5/8	x 9	19
5/8	x 12	22
3/4	x 6	17
3/4	x 9	20
3/4	x 12	23
3/4	x 18	29

Size in Inches		App. Overall Length Closed
Thread Dia.	Take-Up	
7/8	x 12	25
7/8	x 18	31
1	x 6	18
1	x 12	24
1	x 18	36

Turnbuckle Bodies

Forged • Self-Colored



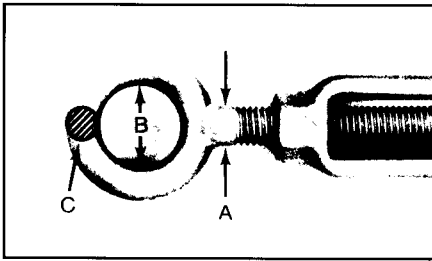
Size in Inches		Head H	Body Length L	Rated Capacity
Thread Dia.-T	Take Up-O			
1/4	x 4	7/16	4 7/8	500
1 5/16	x 4 1/4	1/2	5 1/4	800
3/8	x 6	9/16	7 1/8	1,200
1/2	x 3	3/4	4 1/2	2,200
1/2	x 6	3/4	7 1/2	2,200
1/2	x 9	3/4	10 1/2	2,200
1/2	x 12	3/4	13 1/2	2,200
5/8	x 3	7/8	4 3/4	3,500
5/8	x 6	7/8	7 3/4	3,500
5/8	x 9	7/8	10 3/4	3,500
5/8	x 12	7/8	13 3/4	3,500
3/4	x 6	1 1/16	8 1/8	5,200
3/4	x 9	1 1/16	11 1/8	5,200
3/4	x 12	1 1/16	14 1/8	5,200
3/4	x 18	1 1/16	20 1/8	5,200

Size in Inches		Head H	Body Length L	Rated Capacity
Thread Dia.-T	Take Up-O			
7/8	x 6	1 3/16	8 3/8	7,200
7/8	x 12	1 3/16	14 3/8	7,200
7/8	x 18	1 3/16	20 3/8	7,200
1	x 6	1 3/8	8 3/4	10,000
1	x 12	1 3/8	14 3/4	10,000
1	x 18	1 3/8	20 3/4	10,000
1 1/8	x 6	1 9/16	9 1/8	12,400
1 1/4	x 6	1 3/4	9 1/2	15,200
1 1/2	x 6	2 1/8	10 1/4	21,400
1 3/4	x 6	2 3/8	10 3/4	27,600
2	x 6	2 11/16	11 3/8	34,500

Turnbuckle Fittings

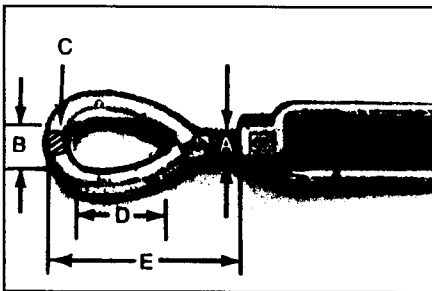
Dimensions in inches

ROUND EYE



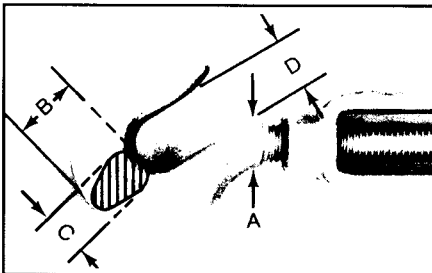
A	B	C	Rated Capacity
1/4	1/2	1/4	500
5/16	5/8	5/16	800
3/8	3/4	3/8	1,200
1/2	1	7/16	2,100
5/8	1 3/8	9/16	3,200
3/4	1 1/2	2 1/32	5,000
7/8	1 11/16	3/4	7,000
1	1 13/16	7/8	10,000

OVAL EYE



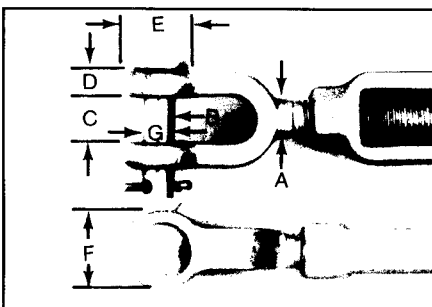
A	B	C	D	E	Rated Capacity
1/4	11/32	7/32	25/32	1 25/32	500
5/16	7/16	9/32	15/16	2 3/16	800
3/8	1 1/32	1 1/32	1 1/8	2 7/16	1,200
1/2	2 3/32	7/16	1 7/16	3 7/32	2,200
5/8	7/8	1/2	1 3/4	3 7/8	3,500
3/4	1	5/8	2 1/8	4 11/16	5,200
7/8	1 1/4	3/4	2 3/8	5 1/4	7,200
1	1 7/16	7/8	3	6 3/8	10,000

HOOK



A	B	C	D	Rated Capacity
1/4	3/8	1/4	9/32	300
5/16	1/2	5/16	13/32	500
3/8	1 9/32	3/8	1 7/32	700
1/2	1 3/16	1/2	2 1/32	1,040
5/8	7/8	5/8	1 5/16	1,600
3/4	1	3/4	2 1/32	2,000
7/8	1 1/8	7/8	1 1/4	2,400
1	1 5/16	1	1 1/4	2,900

JAW

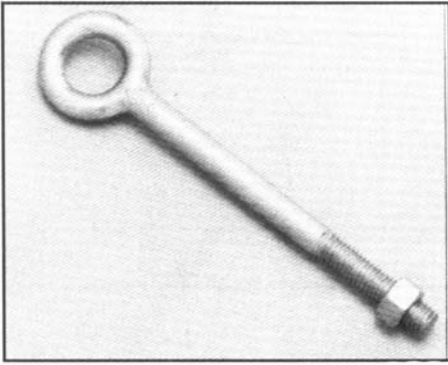


A	B	C	D	E	F	G	Rated Cap.
1/4	5/8	7/16	7/32	7/16	5/8	1/4	500
5/16	3/4	1/2	1/4	1/2	1 1/16	1/4	800
3/8	1 3/16	9/16	5/16	9/16	1 3/16	3/16	1,200
1/2	1	5/8	3/8	3/4	1	7/16	2,100
5/8	1 5/16	3/4	7/16	1	1 5/16	1/2	3,200
3/4	1 1/2	1 9/16	7/16	1 3/16	1 5/8	5/8	5,000
7/8	1 3/4	1 1/16	1/2	1 5/16	1 3/4	3/4	7,000
1	2	1 3/16	5/8	1 5/8	2 1/8	1	10,000

Nut Eye Bolts

Forged • 1030 Carbon Steel • Hot Galvanized • Plain Pattern

Dimensions in inches



WARNING

RATED CAPACITY IS DRASTICALLY REDUCED WHEN LOADING AT ANY ANGLE.

LOADING MUST NEVER BE MADE AT AN ANGLE GREATER THAN 45° FROM BOLT CENTERLINE. AT AN ANGLE OF 45° RATED CAPACITY IS REDUCED TO 1/4 OF THE TABULATED VALUE.

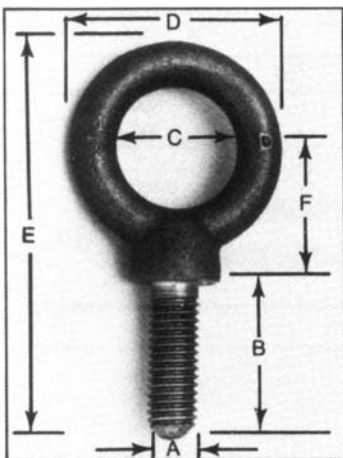
Stock Size	Thread Dia.	Shank Length	I.D. Eye	O.D. Eye	App. Thread Length	Rated Capacity (Pounds)
●	1/4	2	1/2	1	1	400
●	1/4	3	1/2	1	1	400
●	1/4	4	1/2	1	1	400
●	1/4	5	1/2	1	1	400
●	1/4	6	1/2	1	1	400
●	5/16	2 1/4	3/8	1 1/4	1 1/4	800
●	5/16	3	3/8	1 1/4	1 1/4	800
●	5/16	4	3/8	1 1/4	1 1/4	800
●	5/16	5	3/8	1 1/4	1 1/4	800
●	5/16	6	3/8	1 1/4	1 1/4	800
●	3/8	2 1/2	3/4	1 1/2	1 1/2	1,200
●	3/8	3	3/4	1 1/2	1 1/2	1,200
●	3/8	4	3/4	1 1/2	1 1/2	1,200
●	3/8	4 1/2	3/4	1 1/2	1 1/2	1,200
●	3/8	5	3/4	1 1/2	1 1/2	1,200
●	3/8	6	3/4	1 1/2	1 1/2	1,200
●	3/8	8	3/4	1 1/2	1 1/2	1,200
●	3/8	10	3/4	1 1/2	1 1/2	1,200
●	1/2	3 1/4	1	1 5/16	2	2,100
●	1/2	4	1	1 5/16	2	2,100
●	1/2	6	1	1 5/16	2	2,100
●	1/2	8	1	1 5/16	2	2,100
●	1/2	10	1	1 5/16	2	2,100
●	1/2	12	1	1 5/16	2	2,100
●	1/2	AL	1	1 5/16	2	2,100
●	5/8	4	1 3/8	2 1/2	2 1/2	3,200
●	5/8	5	1 3/8	2 1/2	2 1/2	3,200
●	5/8	6	1 3/8	2 1/2	2 1/2	3,200
●	5/8	8	1 3/8	2 1/2	2 1/2	3,200

Stock Size	Thread Dia.	Shank Length	I.D. Eye	O.D. Eye	App. Thread Length	Rated Capacity (Pounds)
●	5/8	10	1 3/8	2 1/2	2 1/2	3,200
●	5/8	12	1 3/8	2 1/2	2 1/2	3,200
●	5/8	15	1 3/8	2 1/2	2 1/2	3,200
●	5/8	AL	1 3/8	2 1/2	2 1/2	3,200
●	3/4	4	1 1/2	2 13/16	3	4,500
●	3/4	6	1 1/2	2 13/16	3	4,500
●	3/4	8	1 1/2	2 13/16	3	4,500
●	3/4	10	1 1/2	2 13/16	3	4,500
●	3/4	12	1 1/2	2 13/16	3	4,500
●	3/4	15	1 1/2	2 13/16	3	4,500
●	3/4	18	1 1/2	2 13/16	3	4,500
●	3/4	AL	1 1/2	2 13/16	3	4,500
●	7/8	5	1 11/16	3 1/4	3	7,000
●	7/8	6	1 11/16	3 1/4	3	7,000
●	7/8	8	1 11/16	3 1/4	3	7,000
●	7/8	10	1 11/16	3 1/4	3	7,000
●	7/8	12	1 11/16	3 1/4	3	7,000
●	7/8	AL	1 11/16	3 1/4	3	7,000
●	1	6	1 13/16	3 3/4	3 1/2	8,500
●	1	8	1 13/16	3 3/4	3 1/2	8,500
●	1	10	1 13/16	3 3/4	3 1/2	8,500
●	1	12	1 13/16	3 3/4	3 1/2	8,500
●	1	15	1 13/16	3 3/4	3 1/2	8,500
●	1	18	1 13/16	3 3/4	3 1/2	8,500
●	1	AL	1 13/16	3 3/4	3 1/2	8,500
●	1 1/4	6	2 1/16	4 7/16	4	13,500
●	1 1/4	8	2 1/16	4 7/16	4	13,500
●	1 1/4	12	2 1/16	4 7/16	4	13,500
●	1 1/2	12	2 1/2	5 3/16	4	20,000
●	1 1/2	AL	2 1/2	5 3/16	4	20,000

AL = Any length shank.

Shoulder Pattern

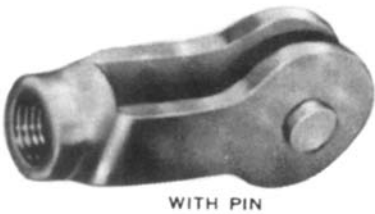
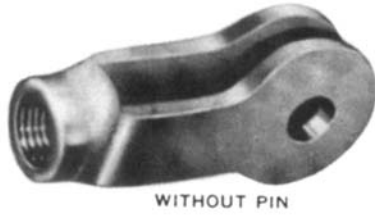
Forged • Carbon Steel • Self-Colored



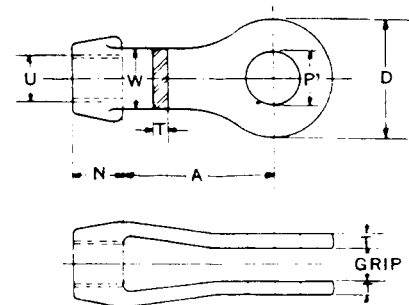
Stock Size	Thread Size A	Shank Lgth. B	I.D. Eye C	O.D. Eye D	Overall Lgth. E	Center of Eye to Shoulder F	Rated Capacity (Pounds)
●	1/4-20	1	3/4	1 3/16	2 3/8	3/4	500
●	5/16-18	1 1/8	7/8	1 1/16	2 3/16	15/16	900
●	3/8-16	1 1/4	1	1 11/16	3 1/4	1 1/8	1,300
●	7/16-14	1 3/8	1 1/16	1 13/16	3 3/16	1 1/4	1,800
●	1/2-13	1 1/2	1 3/16	1 7/8	3 31/32	1 3/8	2,400
●	9/16-12	1 3/4	1 3/8	2 1/16	4 3/4	1 21/32	3,200
●	5/8-11	1 3/4	1 3/8	2 3/16	4 3/4	1 21/32	4,000
●	3/4-10	2	1 1/2	2 13/16	5 1/4	1 13/16	5,000
●	7/8-9	2 1/4	1 5/8	3 3/16	6	2 1/8	7,000
●	1-8	2 1/2	1 13/16	3 3/16	6 3/8	2 1/16	9,000
●	1-1/8-7	2 3/4	2	4 1/16	7 17/32	2 1/16	12,000
●	1-1/4-7	3	2 1/16	4 7/16	8 1/32	2 15/16	15,000
●	1-1/2-6	3 1/2	2 1/2	5 3/16	9 15/32	5 1/16	21,000
●	1-3/4-5	3 3/4	2 7/8	6	10 13/16	4	28,000
●	2-4-1/2	4	3 1/4	6 7/8	11 7/8	4 3/8	38,000

Clevises

Drop Forged



We do not have clevises on the shelf. They can be furnished to a wide variety of specifications as shown promptly from manufacturers blanks.



These Clevises are interchangeable with American Bridge Standard.

Grip equals thickness of plate plus 1/4".

DIAMETER OF PIN — Inches

Tap Diam.	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	4	4 1/4	
3/8	2	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1/2	2	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5/8	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	—	—	—	—	—	—	—	—	—	—	—
3/4	—	—	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	—	—	—	—	—	—	—	—	—	—	—
7/8	—	—	—	2 1/2	2 1/2	2 1/2	2 1/2	3	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	3	3	3	3	—	—	—	—	—	—	—	—	—	—
1 1/8	—	—	—	—	3	3	3	3	3 1/2	—	—	—	—	—	—	—	—	—
1 1/4	—	—	—	—	3	3	3	3	3 1/2	—	—	—	—	—	—	—	—	—
1 3/8	—	—	—	—	3	3	3	3 1/2	3 1/2	4	—	—	—	—	—	—	—	—
1 1/2	—	—	—	—	—	3 1/2	3 1/2	4	4	5	—	—	—	—	—	—	—	—
1 5/8	—	—	—	—	—	4	4	4	5	5	5	—	—	—	—	—	—	—
1 3/4	—	—	—	—	—	4	4	5	5	5	5	—	—	—	—	—	—	—
1 7/8	—	—	—	—	—	—	5	5	5	5	5	—	—	—	—	—	—	—
2	—	—	—	—	—	—	5	5	5	5	5	6	6	—	—	—	—	—
2 1/8	—	—	—	—	—	—	5	5	5	6	6	6	6	—	—	—	—	—
2 1/4	—	—	—	—	—	—	—	6	6	6	6	6	6	7	7	—	—	—
2 3/8	—	—	—	—	—	—	—	6	6	6	6	6	7	7	7	7	—	—
2 1/2	—	—	—	—	—	—	—	6	6	6	7	7	7	7	7	7	—	—
2 5/8	—	—	—	—	—	—	—	—	7	7	7	7	7	7	8	—	—	—
2 3/4	—	—	—	—	—	—	—	—	7	7	7	7	8	8	8	—	—	—
2 7/8	—	—	—	—	—	—	—	—	7	8	8	8	8	8	8	8	8	—
3	—	—	—	—	—	—	—	—	7	8	8	8	8	8	8	8	8	—
3 1/8	—	—	—	—	—	—	—	—	—	8	8	8	8	8	8	8	8	—
3 1/4	—	—	—	—	—	—	—	—	—	8	8	8	8	8	8	8	8	—
3 3/8	—	—	—	—	—	—	—	—	—	8	8	8	8	8	8	8	8	—
3 1/2	—	—	—	—	—	—	—	—	—	8	8	8	8	8	8	8	8	—
3 5/8	—	—	—	—	—	—	—	—	—	8	8	8	8	8	8	8	8	—
3 3/4	—	—	—	—	—	—	—	—	—	8	8	8	8	8	8	8	8	—
3 7/8	—	—	—	—	—	—	—	—	—	—	8	8	8	8	8	8	8	—
4	—	—	—	—	—	—	—	—	—	—	—	8	8	8	8	8	8	—

To find the proper size of eye for any combination of tap and pin size, find the point where a horizontal line from the tap diameter meets a vertical line dropped from the pin diameter.

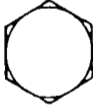






The above chart conforms with the recommendations of the American Institute of Steel Construction; that is the net area thru the pinhole is at least 125% of the tensile stress area of the rod.

STANDARD CLEVIS DIMENSIONS — Inches

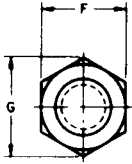
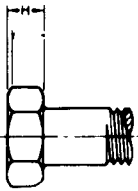
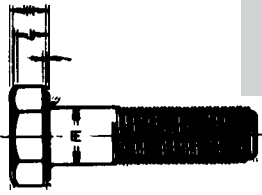
Clevis No	D	N	Max. U	W	T Tolerance	A	Max. P	Safe Working Load Kips*	Weight Each Lbs.
2	1 7/16	5/8	5/8	1 1/16	5/16 + 1/32 - 0	3 7/8	3/4	3.5	1
2 1/2	2 1/2	1 1/8	7/8	1 1/4	5/16 + 1/32 - 0	4	1 1/2	7.5	2 1/2
3	3	1 5/16	1 3/8	1 1/2	1/2 + 1/32 - 0	5	1 3/4	15	4
3 1/2	3 1/2	1 5/8	1 1/2	1 3/4	1/2 + 1/16 - 0	6	2	18	6
4	4	1 3/4	1 3/4	2	1/2 + 1/16 - 0	6	2 1/4	21	8
5	5	2 1/4	2 1/8	2 1/2	5/8 + 1/16 - 0	7	2 1/2	37.5	16
6	6	2 3/4	2 1/2	3	3/4 + 3/32 - 0	8	3 1/4	54	26
6	6	2 3/4	2 1/2	3	3/4 + 3/32 - 0	8	3 1/4	54	26
7	7	3	3	3 1/2	7/8 + 1/8 - 0	9	3 3/4	68.5	36
8	8	4	4	4	1 1/2 + 1/8 - 0	10	4 1/4	135	90

NOTE: In ordering be sure to state size of tap, whether R.H., or L.H., size of pin or pinhole and size of grip opening. Also advise if pins and cotters are required.

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	ASTM A307 Grades A & B	Bolts, Screws, Studs	Low Carbon Steel	¼ thru 4	—	—	60,000
	SAE J429 Grade 2		Low or Medium Carbon Steel	¼ thru ¾ Over ¾ to 1½	55,000 33,000	57,000 36,000	74,000 60,000
	SAE J429 Grade 5	Bolts, Screws, Studs	Medium Carbon Steel Quenched and Tempered	¼ thru 1 Over 1 to 1½	85,000 74,000	92,000 81,000	120,000 105,000
	ASTM A449			¼ thru 1 Over 1 thru 1½ Over 1½ thru 3	85,000 74,000 55,000	92,000 81,000 58,000	120,000 105,000 90,000
	SAE J429 Grade 8	Bolts, Screws, Studs	Medium Carbon Alloy Steel, Quenched and Tempered	¼ thru 1½	120,000	130,000	150,000
	ASTM A354 Grade BD		Alloy Steel, Quenched and Tempered				
	ASTM A325 Type 1	High Strength Structural Bolts	Medium Carbon Steel, Quenched and Tempered	½ thru 1 1½ thru 1½	85,000 74,000	92,000 81,000	120,000 105,000
	ASTM A325 Type 3		Atmospheric Corrosion Resisting Steel, Quenched and Tempered	½ thru 1 1½ thru 1½	85,000 74,000	92,000 81,000	120,000 105,000
	ASTM A490		Alloy Steel, Quenched and Tempered	½ thru 1½	120,000	130,000	150,000 min 170,000 max
	ASTM A193 Grade B7	Bolts, Screws, Studs for High-Temperature Service	AISI 4140, 4142 or 4145	¼ thru 2½ Over 2½ thru 4 Over 4 thru 7		105,000 95,000 75,000	125,000 115,000 100,000

Hex Cap Screw Dimensions



Thread Lengths: Twice the diameter plus 1/4" up to and including 6"; Twice the diameter plus 1/2" bolts over 6"

Nominal Size or Basic Product Dia	E		F			G		H		
	Body Diameter		Width Across Flats			Width Across Corners		Height		
	Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min
1/4 0.2500	0.2500	0.2450	7/16	0.438	0.428	0.505	0.488	5/32	0.163	0.150
5/16 0.3125	0.3125	0.3065	1/2	0.500	0.489	0.577	0.557	13/64	0.211	0.195
3/8 0.3750	0.3750	0.3690	9/16	0.562	0.551	0.650	0.628	15/64	0.243	0.226
7/16 0.4375	0.4375	0.4305	5/8	0.625	0.612	0.722	0.698	9/32	0.291	0.272
1/2 0.5000	0.5000	0.4930	3/4	0.750	0.736	0.866	0.840	5/16	0.323	0.302
9/16 0.5625	0.5625	0.5545	13/16	0.812	0.798	0.938	0.910	23/64	0.371	0.348
5/8 0.6250	0.6250	0.6170	15/16	0.938	0.922	1.083	1.051	25/64	0.403	0.378
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
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
1 1.0000	1.0000	0.9900	1-1/2	1.500	1.469	1.732	1.675	39/64	0.627	0.591
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
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
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
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
1-3/4 1.7500	1.7500	1.7380	2-5/8	2.625	2.538	3.031	2.893	1-3/32	1.134	1.054
2 2.0000	2.0000	1.9880	3	3.000	2.900	3.464	3.306	1-7/32	1.263	1.175
2-1/4 2.2500	2.2500	2.2380	3-3/8	3.375	3.262	3.897	3.719	1-3/8	1.423	1.327
2-1/2 2.5000	2.5000	2.4880	3-3/4	3.750	3.625	4.330	4.133	1-17/32	1.583	1.479
2-3/4 2.7500	2.7500	2.7380	4-1/8	4.125	3.988	4.763	4.546	1-11/16	1.744	1.632
3 3.0000	3.0000	2.9880	4-1/2	4.500	4.350	5.196	4.959	1-7/8	1.935	1.815

Heavy Hex Cap Screw Dimensions

Nominal Size or Basic Product Dia	E		F			G		H		
	Body Dia		Width Across Flats			Width Across Corners		Height		
	Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min
1/2 0.5000	0.5000	0.482	7/8	0.875	0.850	1.010	0.969	5/16	0.323	0.302
5/8 0.6250	0.6250	0.605	1-1/16	1.062	1.031	1.227	1.175	25/64	0.403	0.378
3/4 0.7500	0.7500	0.729	1-1/4	1.250	1.212	1.443	1.383	15/32	0.483	0.455
7/8 0.8750	0.8750	0.852	1-7/16	1.438	1.394	1.660	1.589	35/64	0.563	0.531
1 1.0000	1.0000	0.976	1-5/8	1.625	1.575	1.876	1.796	39/64	0.627	0.591
1-1/8 1.1250	1.1250	1.098	1-13/16	1.812	1.756	2.093	2.002	11/16	0.718	0.658
1-1/4 1.2500	1.2500	1.223	2	2.000	1.938	2.309	2.209	25/32	0.813	0.749
1-3/8 1.3750	1.3750	1.345	2-3/16	2.188	2.119	2.526	2.416	27/32	0.878	0.810
1-1/2 1.5000	1.5000	1.470	2-3/8	2.375	2.300	2.742	2.622	15/16	0.974	0.902
1-3/4 1.7500	1.7500	1.716	2-3/4	2.750	2.662	3.175	3.035	1-3/32	1.134	1.054
2 2.0000	2.0000	1.964	3-1/8	3.125	3.025	3.608	3.449	1-7/32	1.263	1.175
2-1/4 2.2500	2.2500	2.214	3-1/2	3.500	3.388	4.041	3.862	1-3/8	1.423	1.327
2-1/2 2.5000	2.5000	2.461	3-7/8	3.875	3.750	4.474	4.275	1-17/32	1.583	1.479
2-3/4 2.7500	2.7500	2.711	4-1/4	4.250	4.112	4.907	4.688	1-11/16	1.744	1.632
3 3.0000	3.0000	2.961	4-5/8	4.625	4.475	5.340	5.102	1-7/8	1.935	1.815

Torque Guide

This information is offered as a guide only. All figures are advisory and their use by anyone is entirely voluntary. Reliance on this information by anyone is at the sole risk of that person and the Woodward Co. is not responsible for any loss, claim, or damage therefrom.

SAE GRADE 8 Coarse Thread

SIZE	CLAMP LOAD	PLAIN	PLATED
1/4 - 20 (.250)	2,850	12 ft. lbs.	9 ft. lbs.
5/16 - 18 (.3125)	4,725	25 ft. lbs.	18 ft. lbs.
3/8 - 16 (.375)	6,975	44 ft. lbs.	33 ft. lbs.
7/16 - 14 (.4375)	9,600	70 ft. lbs.	52 ft. lbs.
1/2 - 13 (.500)	12,750	106 ft. lbs.	80 ft. lbs.
9/16 - 12 (.5625)	16,350	153 ft. lbs.	115 ft. lbs.
5/8 - 11 (.625)	20,325	212 ft. lbs.	159 ft. lbs.
3/4 - 10 (.750)	30,075	376 ft. lbs.	282 ft. lbs.
7/8 - 9 (.875)	41,550	606 ft. lbs.	454 ft. lbs.
1 - 8 (1.000)	54,525	909 ft. lbs.	682 ft. lbs.
1-1/8 - 7 (1.125)	68,700	1288 ft. lbs.	966 ft. lbs.
1-1/4 - 7 (1.250)	87,225	1817 ft. lbs.	1363 ft. lbs.
1-3/8 - 6 (1.375)	103,950	2382 ft. lbs.	1787 ft. lbs.
1-1/2 - 6 (1.500)	126,450	3161 ft. lbs.	2371 ft. lbs.

Fine Thread

SIZE	CLAMP LOAD	PLAIN	PLATED
1/4 - 28 (.250)	3,263	14 ft. lbs.	10 ft. lbs.
5/16 - 24 (.3125)	5,113	27 ft. lbs.	20 ft. lbs.
3/8 - 24 (.375)	7,875	49 ft. lbs.	37 ft. lbs.
7/16 - 20 (.4375)	10,650	78 ft. lbs.	58 ft. lbs.
1/2 - 20 (.500)	14,400	120 ft. lbs.	90 ft. lbs.
9/16 - 18 (.5625)	18,300	172 ft. lbs.	129 ft. lbs.
5/8 - 18 (.625)	23,025	240 ft. lbs.	180 ft. lbs.
3/4 - 16 (.750)	33,600	420 ft. lbs.	315 ft. lbs.
7/8 - 9 (.875)	45,825	668 ft. lbs.	501 ft. lbs.
1 - 12 (1.000)	59,700	995 ft. lbs.	746 ft. lbs.
1 - 14 (1.000)	61,125	1019 ft. lbs.	764 ft. lbs.
1-1/8 - 12 (1.125)	77,025	1444 ft. lbs.	1083 ft. lbs.
1-1/4 - 12 (1.250)	96,600	2012 ft. lbs.	1509 ft. lbs.
1-3/8 - 12 (1.375)	118,350	2712 ft. lbs.	2034 ft. lbs.
1-1/2 - 12 (1.500)	142,275	3557 ft. lbs.	2668 ft. lbs.

SAE GRADE 5 Coarse Thread

SIZE	CLAMP LOAD	PLAIN	PLATED
1/4 - 20 (.250)	2,025	8 ft. lbs.	76 in. lbs.
5/16 - 18 (.3125)	3,338	17 ft. lbs.	13 ft. lbs.
3/8 - 16 (.375)	4,950	31 ft. lbs.	23 ft. lbs.
7/16 - 14 (.4375)	6,788	50 ft. lbs.	37 ft. lbs.
1/2 - 13 (.500)	9,075	76 ft. lbs.	57 ft. lbs.
9/16 - 12 (.5625)	11,625	109 ft. lbs.	82 ft. lbs.
5/8 - 11 (.625)	14,400	150 ft. lbs.	112 ft. lbs.
3/4 - 10 (.750)	21,300	266 ft. lbs.	200 ft. lbs.
7/8 - 9 (.875)	29,475	430 ft. lbs.	322 ft. lbs.
1 - 8 (1.000)	38,625	644 ft. lbs.	483 ft. lbs.
1-1/8 - 7 (1.125)	42,375	794 ft. lbs.	596 ft. lbs.
1-1/4 - 7 (1.250)	53,775	1120 ft. lbs.	840 ft. lbs.
1-3/8 - 6 (1.375)	64,125	1470 ft. lbs.	1102 ft. lbs.
1-1/2 - 6 (1.500)	78,000	1950 ft. lbs.	1462 ft. lbs.

Fine Thread

SIZE	CLAMP LOAD	PLAIN	PLATED
1/4 - 28 (.250)	2,325	10 ft. lbs.	87 in. lbs.
5/16 - 24 (.3125)	3,675	19 ft. lbs.	14 ft. lbs.
3/8 - 24 (.375)	5,588	35 ft. lbs.	26 ft. lbs.
7/16 - 20 (.4375)	7,575	55 ft. lbs.	41 ft. lbs.
1/2 - 20 (.500)	10,200	85 ft. lbs.	64 ft. lbs.
9/16 - 18 (.5625)	12,975	122 ft. lbs.	91 ft. lbs.
5/8 - 18 (.625)	16,350	170 ft. lbs.	128 ft. lbs.
3/4 - 16 (.750)	23,775	297 ft. lbs.	223 ft. lbs.
7/8 - 14 (.875)	32,475	474 ft. lbs.	355 ft. lbs.
1 - 12 (1.000)	42,300	705 ft. lbs.	529 ft. lbs.
1 - 14 (1.000)	32,275	721 ft. lbs.	541 ft. lbs.
1-1/8 - 12 (1.125)	47,475	890 ft. lbs.	668 ft. lbs.
1-1/4 - 12 (1.250)	59,550	1241 ft. lbs.	930 ft. lbs.
1-3/8 - 12 (1.375)	72,975	1672 ft. lbs.	1254 ft. lbs.
1-1/2 - 12 (1.500)	87,750	2194 ft. lbs.	1645 ft. lbs.

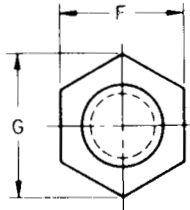
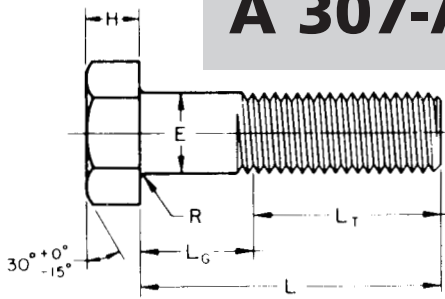
SAE GRADE 2 Coarse Thread

SIZE	CLAMP LOAD	PLAIN	PLATED
1/4 - 20 (.250)	1,313	66 in. lbs.	49 in. lbs.
5/16 - 18 (.3125)	2,175	11 ft. lbs.	8 ft. lbs.
3/8 - 16 (.375)	3,188	20 ft. lbs.	15 ft. lbs.
7/16 - 14 (.4375)	4,388	32 ft. lbs.	24 ft. lbs.
1/2 - 13 (.500)	5,850	49 ft. lbs.	37 ft. lbs.
9/16 - 12 (.5625)	7,500	70 ft. lbs.	53 ft. lbs.
5/8 - 11 (.625)	9,300	97 ft. lbs.	73 ft. lbs.
3/4 - 10 (.750)	13,800	173 ft. lbs.	129 ft. lbs.
7/8 - 9 (.875)	11,400	166 ft. lbs.	125 ft. lbs.
1 - 8 (1.000)	15,000	250 ft. lbs.	188 ft. lbs.
1-1/8 - 7 (1.125)	18,900	354 ft. lbs.	266 ft. lbs.
1-1/4 - 7 (1.250)	24,000	500 ft. lbs.	375 ft. lbs.
1-3/8 - 6 (1.375)	28,575	655 ft. lbs.	491 ft. lbs.
1-1/2 - 6 (1.500)	34,800	870 ft. lbs.	652 ft. lbs.

Fine Thread

SIZE	CLAMP LOAD	PLAIN	PLATED
1/4 - 28 (.250)	1,500	75 in. lbs.	56 in. lbs.
5/16 - 24 (.3125)	2,400	13 ft. lbs.	9 ft. lbs.
3/8 - 24 (.375)	3,600	23 ft. lbs.	17 ft. lbs.
7/16 - 20 (.4375)	4,913	36 ft. lbs.	27 ft. lbs.
1/2 - 20 (.500)	6,600	55 ft. lbs.	41 ft. lbs.
9/16 - 18 (.5625)	8,400	79 ft. lbs.	59 ft. lbs.
5/8 - 18 (.625)	10,575	110 ft. lbs.	83 ft. lbs.
3/4 - 16 (.750)	15,375	192 ft. lbs.	144 ft. lbs.
7/8 - 14 (.875)	12,600	184 ft. lbs.	138 ft. lbs.
1 - 12 (1.000)	16,425	274 ft. lbs.	205 ft. lbs.
1 - 14 (1.000)	16,800	280 ft. lbs.	210 ft. lbs.
1-1/8 - 12 (1.125)	21,150	397 ft. lbs.	297 ft. lbs.
1-1/4 - 12 (1.250)	26,550	553 ft. lbs.	415 ft. lbs.
1-3/8 - 12 (1.375)	32,550	746 ft. lbs.	559 ft. lbs.
1-1/2 - 12 (1.500)	39,150	979 ft. lbs.	734 ft. lbs.

A 307-A Hex Bolt Dimensions

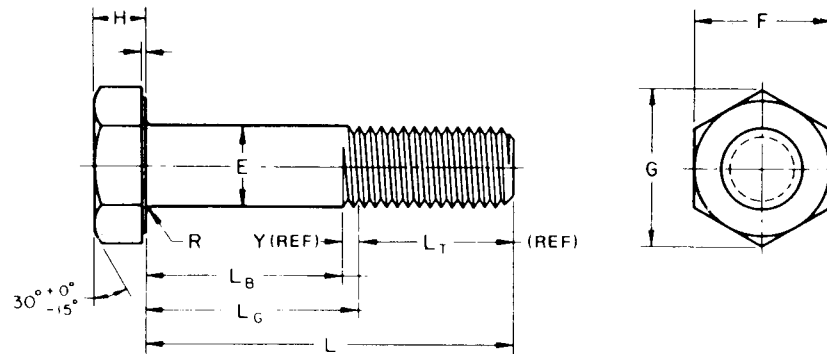


Nominal Size or Basic Bolt Dia	E		F				G		H			R		L _T (Ref)	
	Body Dia	Max	Width Across Flats		Width Across Corners		Height			Radius of Fillet		Thread Length			
			Basic	Max	Min	Max	Min	Basic	Max	Min	Max	Min	For Bolt Lengths ≤ 6 in.	For Bolt Lengths > 6 in.	
1/4	0.2500	0.260	7/16	0.438	0.425	0.505	0.484	11/64	0.188	0.150	0.03	0.01	0.750	1.000	
5/16	0.3125	0.324	1/2	0.500	0.484	0.577	0.552	7/32	0.235	0.195	0.03	0.01	0.875	1.125	
3/8	0.3750	0.388	9/16	0.562	0.544	0.650	0.620	1/4	0.268	0.226	0.03	0.01	1.000	1.250	
7/16	0.4375	0.452	5/8	0.625	0.603	0.722	0.687	19/64	0.316	0.272	0.03	0.01	1.125	1.375	
1/2	0.5000	0.515	3/4	0.750	0.725	0.866	0.826	11/32	0.364	0.302	0.03	0.01	1.250	1.500	
5/8	0.6250	0.642	15/16	0.938	0.906	1.083	1.033	27/64	0.444	0.378	0.06	0.02	1.500	1.750	
3/4	0.7500	0.768	1-1/8	1.125	1.088	1.299	1.240	1/2	0.524	0.455	0.06	0.02	1.750	2.000	
7/8	0.8750	0.895	1-5/16	1.312	1.269	1.516	1.447	37/64	0.604	0.531	0.06	0.02	2.000	2.250	
1	1.0000	1.022	1-1/2	1.500	1.450	1.732	1.653	43/64	0.700	0.591	0.09	0.03	2.250	2.500	
1-1/8	1.1250	1.149	1-11/16	1.688	1.631	1.949	1.859	3/4	0.780	0.658	0.09	0.03	2.500	2.750	
1-1/4	1.2500	1.277	1-7/8	1.875	1.812	2.165	2.066	27/32	0.876	0.749	0.09	0.03	2.750	3.000	
1-3/8	1.3750	1.404	2-1/16	2.062	1.994	2.382	2.273	29/32	0.940	0.810	0.09	0.03	3.000	3.250	
1-1/2	1.5000	1.531	2-1/4	2.250	2.175	2.598	2.480	1	1.036	0.902	0.09	0.03	3.250	3.500	
1-3/4	1.7500	1.785	2-5/8	2.625	2.538	3.031	2.893	1-5/32	1.196	1.054	0.12	0.04	3.750	4.000	
2	2.0000	2.039	3	3.000	2.900	3.464	3.306	1-11/32	1.388	1.175	0.12	0.04	4.250	4.500	
2-1/4	2.2500	2.305	3-3/8	3.375	3.262	3.897	3.719	1-1/2	1.548	1.327	0.19	0.06	4.750	5.000	
2-1/2	2.5000	2.559	3-3/4	3.750	3.625	4.330	4.133	1-21/32	1.708	1.479	0.19	0.06	5.250	5.500	
2-3/4	2.7500	2.827	4-1/8	4.125	3.988	4.763	4.546	1-13/16	1.869	1.632	0.19	0.06	5.750	6.000	
3	3.0000	3.081	4-1/2	4.500	4.350	5.196	4.959	2	2.060	1.815	0.19	0.06	6.250	6.500	
3-1/4	3.2500	3.335	4-7/8	4.875	4.712	5.629	5.372	2-3/16	2.251	1.936	0.19	0.06	6.750	7.000	
3-1/2	3.5000	3.589	5-1/4	5.250	5.075	6.062	5.786	2-5/16	2.380	2.057	0.19	0.06	7.250	7.500	
3-3/4	3.7500	3.858	5-5/8	5.625	5.437	6.495	6.198	2-1/2	2.572	2.241	0.19	0.06	7.750	8.000	
4	4.0000	4.111	6	6.000	5.800	6.928	6.612	2-11/16	2.764	2.424	0.19	0.06	8.250	8.500	

A 307-B Heavy Hex Bolt Dimensions

Nominal Size or Basic Bolt Dia	E		F				G		H			R		L _T	
	Body Dia	Max	Width Across Flats		Width Across Corners		Height			Radius of Fillet		Thread Length			
			Basic	Max	Min	Max	Min	Basic	Max	Min	Max	Min	For Bolt Lengths ≤ 6 in.	For Bolt Lengths > 6 in.	
1/2	0.5000	0.515	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	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	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	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	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	1-13/16	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	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	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	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	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	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	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	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	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	4-5/8	4.625	4.475	5.340	5.102	2	2.060	1.815	0.19	0.06	6.250	6.500	

A-325 & A-490 Heavy Hex Structural Bolts Dimensions



Nominal Size or 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	39/64	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
See Notes 15		5		2										10		3

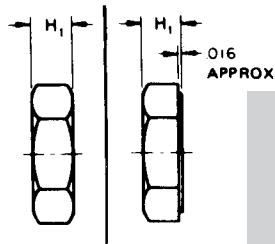
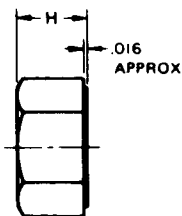
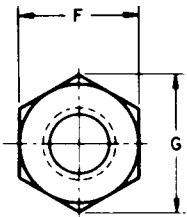
STRENGTH PROPERTIES OF HIGH STRENGTH BOLTS AND NUTS

Nominal Bolt/Nut Size, Thds Per Inch and Thread Series	A325 Bolts		A490 Bolts		A325 Nuts	A194 Grade 2H Nuts
	Proof ¹ Load	Tensile ² Strength Min	Proof ¹ Load	Tensile ² Strength Min	Proof ³ Load	Proof ³ Load
	lb	lb	lb	lb	lb	lb
1/2 - 13 UNC	12,050	17,050	17,050	21,300	20,450	24,850
5/8 - 11 UNC	19,200	27,100	27,100	33,900	32,550	39,550
3/4 - 10 UNC	28,400	40,100	40,100	50,100	48,100	58,450
7/8 - 9 UNC	39,250	55,450	55,450	69,300	66,550	80,850
1 - 8 UNC	51,500	72,700	72,700	90,900	87,250	106,000
1-1/8 - 7 UNC	56,450	80,100	91,550	114,450	109,900	133,500
1-1/8 - 8 UN	58,450	82,950	94,800	118,500	113,800	138,200
1-1/4 - 7 UNC	71,700	101,700	116,300	145,350	139,500	169,600
1-1/4 - 8 UN	74,000	105,000	120,000	150,000	144,000	175,000
1-3/8 - 6 UNC	85,450	121,300	138,600	173,250	166,300	202,100
1-3/8 - 8 UN	91,250	129,500	148,000	185,000	177,600	215,800
1-1/2 - 6 UNC	104,000	147,500	168,600	210,750	202,300	245,900
1-1/2 - 8 UN	110,400	156,700	175,050	223,800	214,800	261,100

NOTES: 1. Proof load of bolt is the load the bolt must support in axial tension without permanent deformation.
 2. Tensile strength of bolt is the minimum load the bolt must support in axial tension without failure of the

bolt.

3. Proof load of nut is the load the nut must support axially without evidence of thread stripping or rupture.



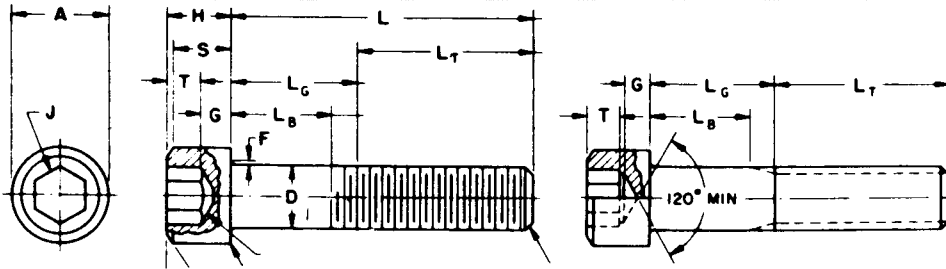
Hex Nuts and Hex Jam Nuts Dimensions

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	0.150
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

Heavy Hex Nuts & Heavy Hex Jam Nuts Dimensions

Nominal Size or Basic Major Dia of Thread	F			G		H			H ₁		
	Width Across Flats			Width Across Corners		Thickness Heavy Hex Nuts			Thickness Heavy Hex Jam Nuts		
	Basic	Max	Min	Max	Min	Basic	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	11/16	0.188	0.156
5/16 0.3125	9/16	0.562	0.546	0.650	0.622	19/64	0.314	0.280	13/64	0.220	0.186
3/8 0.3750	11/16	0.688	0.669	0.794	0.763	23/64	0.377	0.341	15/64	0.252	0.216
7/16 0.4375	3/4	0.750	0.728	0.866	0.830	27/64	0.441	0.403	17/64	0.285	0.247
1/2 0.5000	7/8	0.875	0.850	1.010	0.969	31/64	0.504	0.464	19/64	0.317	0.277
9/16 0.5625	15/16	0.938	0.909	1.083	1.037	35/64	0.568	0.526	21/64	0.349	0.307
5/8 0.6250	1-1/16	1.062	1.031	1.227	1.175	39/64	0.631	0.587	23/64	0.381	0.337
3/4 0.7500	1-1/4	1.250	1.212	1.443	1.382	47/64	0.758	0.710	27/64	0.446	0.398
7/8 0.8750	1-7/16	1.438	1.394	1.660	1.589	55/64	0.885	0.833	31/64	0.510	0.458
1 1.0000	1-5/8	1.625	1.575	1.876	1.796	63/64	1.012	0.956	35/64	0.575	0.519
1-1/8 1.1250	1-13/16	1.812	1.756	2.093	2.002	1-7/64	1.139	1.079	39/64	0.639	0.579
1-1/4 1.2500	2	2.000	1.938	2.309	2.209	1-7/32	1.251	1.187	23/32	0.751	0.687
1-3/8 1.3750	2-3/16	2.188	2.119	2.526	2.416	1-11/32	1.378	1.310	25/32	0.815	0.747
1-1/2 1.5000	2-3/8	2.375	2.300	2.742	2.622	1-15/32	1.505	1.433	27/32	0.880	0.808
1-5/8 1.6250	2-9/16	2.562	2.481	2.959	2.828	1-19/32	1.632	1.556	29/32	0.944	0.868
1-3/4 1.7500	2-3/4	2.750	2.662	3.175	3.035	1-23/32	1.759	1.679	31/32	1.009	0.929
1-7/8 1.8750	2-15/16	2.938	2.844	3.392	3.242	1-27/32	1.886	1.802	1-1/32	1.073	0.989
2 2.0000	3-1/8	3.125	3.025	3.608	3.449	1-31/32	2.013	1.925	1-3/32	1.138	1.050
2-1/4 2.2500	3-1/2	3.500	3.388	4.041	3.862	2-13/64	2.251	2.155	1-13/64	1.251	1.155
2-1/2 2.5000	3-7/8	3.875	3.750	4.474	4.275	2-29/64	2.505	2.401	1-29/64	1.505	1.401
2-3/4 2.7500	4-1/4	4.250	4.112	4.907	4.688	2-45/64	2.759	2.647	1-37/64	1.634	1.522
3 3.0000	4-5/8	4.625	4.475	5.340	5.102	2-61/64	3.013	2.893	1-45/64	1.763	1.643
3-1/4 3.2500	5	5.000	4.838	5.774	5.515	3-3/16	3.252	3.124	1-13/16	1.876	1.748
3-1/2 3.5000	5-3/8	5.375	5.200	6.207	5.928	3-7/16	3.506	3.370	1-15/16	2.006	1.870
3-3/4 3.7500	5-3/4	5.750	5.562	6.640	6.341	3-11/16	3.760	3.616	2-1/16	2.134	1.990
4 4.0000	6-1/8	6.125	5.925	7.073	6.755	3-15/16	4.014	3.862	2-3/16	2.264	2.112

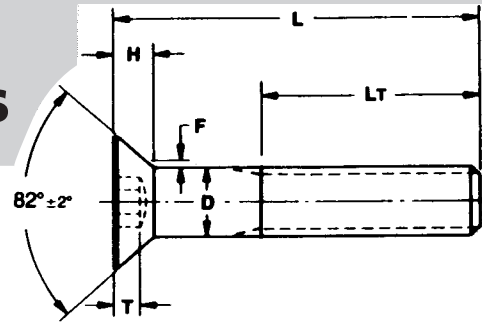
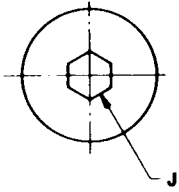
Socket Head Cap Screws Dimensions (1960 Series)



Nominal Size or Basic Screw Diameter	D		A		H		J		T	G
	Body Diameter		Head Diameter		Head Height		Hexagon Socket Size		Key Engagement	Wall Thickness
	Max	Min	Max	Min	Max	Min	Nom	Min	Min	
No. 0	0.0600	0.0600	0.0568	0.096	0.091	0.060	0.057		0.025	0.020
1	0.0730	0.0730	0.0695	0.118	0.112	0.073	0.070	1/16	0.031	0.025
2	0.0860	0.0860	0.0822	0.140	0.134	0.086	0.083	5/64	0.038	0.029
3	0.0990	0.0990	0.0949	0.161	0.154	0.099	0.095	5/64	0.044	0.034
4	0.1120	0.1120	0.1075	0.183	0.176	0.112	0.108	3/32	0.051	0.038
5	0.1250	0.1250	0.1202	0.205	0.198	0.125	0.121	3/32	0.057	0.043
6	0.1380	0.1380	0.1329	0.226	0.218	0.138	0.134	7/64	0.064	0.047
8	0.1640	0.1640	0.1585	0.270	0.262	0.164	0.159	9/64	0.077	0.056
10	0.1900	0.1900	0.1840	0.312	0.303	0.190	0.185	5/32	0.090	0.065
1/4	0.2500	0.2500	0.2435	0.375	0.365	0.250	0.244	3/16	0.120	0.095
5/16	0.3125	0.3125	0.3053	0.469	0.457	0.312	0.306	1/4	0.151	0.119
3/8	0.3750	0.3750	0.3678	0.562	0.550	0.375	0.368	5/16	0.182	0.143
7/16	0.4375	0.4375	0.4294	0.656	0.642	0.438	0.430	3/8	0.213	0.166
1/2	0.5000	0.5000	0.4919	0.750	0.735	0.500	0.492	3/8	0.245	0.190
5/8	0.6250	0.6250	0.6163	0.938	0.921	0.625	0.616	1/2	0.307	0.238
3/4	0.7500	0.7500	0.7406	1.125	1.107	0.750	0.740	5/8	0.370	0.285
7/8	0.8750	0.8750	0.8647	1.312	1.293	0.875	0.864	3/4	0.432	0.333
1	1.0000	1.0000	0.9886	1.500	1.479	1.000	0.988	3/4	0.495	0.380
1-1/8	1.1250	1.1250	1.1086	1.688	1.665	1.125	1.111	7/8	0.557	0.428
1-1/4	1.2500	1.2500	1.2336	1.875	1.852	1.250	1.236	7/8	0.620	0.475
1-3/8	1.3750	1.3750	1.3568	2.062	2.038	1.375	1.360	1	0.682	0.523
1-1/2	1.5000	1.5000	1.4818	2.250	2.224	1.500	1.485	1	0.745	0.570
1-3/4	1.7500	1.7500	1.7295	2.625	2.597	1.750	1.734	1-1/4	0.870	0.665
2	2.0000	2.0000	1.9780	3.000	2.970	2.000	1.983	1-1/2	0.995	0.760
2-1/4	2.2500	2.2500	2.2280	3.375	3.344	2.250	2.232	1-3/4	1.120	0.855
2-1/2	2.5000	2.5000	2.4762	3.750	3.717	2.500	2.481	1-3/4	1.245	0.950
2-3/4	2.7500	2.7500	2.7262	4.125	4.090	2.750	2.730	2	1.370	1.045
3	3.0000	3.0000	2.9762	4.500	4.464	3.000	2.979	2-1/4	1.495	1.140
3-1/4	3.2500	3.2500	3.2262	4.875	4.837	3.250	3.228	2-1/4	1.620	1.235
3-1/2	3.5000	3.5000	3.4762	5.250	5.211	3.500	3.478	2-3/4	1.745	1.330
3-3/4	3.7500	3.7500	3.7262	5.625	5.584	3.750	3.727	2-3/4	1.870	1.425
4	4.0000	4.0000	3.9762	6.000	5.958	4.000	3.976	3	1.995	1.520

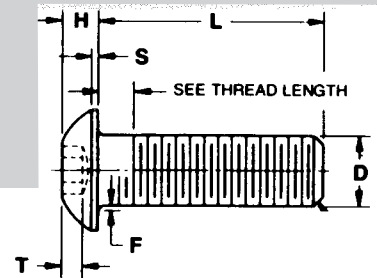
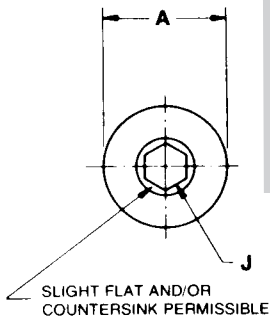
Nominal Size or Basic Screw Diameter		L _T	L _{TT}	Nominal Size or Basic Screw Diameter		L _T	L _{TT}
		Thread Length	Total Thread Length			Thread Length	Total Thread Length
		Min	Max			Min	Max
No. 0	0.0600	0.50	0.62	7/8	0.8750	2.25	3.69
1	0.0730	0.62	0.77	1	1.0000	2.50	4.12
2	0.0860	0.62	0.80	1-1/8	1.1250	2.82	4.65
3	0.0990	0.62	0.83	1-1/4	1.2500	3.12	5.09
4	0.1120	0.75	0.99	1-3/8	1.3750	3.44	5.65
5	0.1250	0.75	1.00	1-1/2	1.5000	3.75	6.08
6	0.1380	0.75	1.05	1-3/4	1.7500	4.38	7.13
8	0.1640	0.88	1.19	2	2.0000	5.00	8.11
10	0.1900	0.88	1.27	2-1/4	2.2500	5.62	8.99
1/4	0.2500	1.00	1.50	2-1/2	2.5000	6.25	10.00
5/16	0.3125	1.12	1.71	2-3/4	2.7500	6.88	10.87
3/8	0.3750	1.25	1.94	3	3.0000	7.50	11.75
7/16	0.4375	1.38	2.17	3-1/4	3.2500	8.12	12.63
1/2	0.5000	1.50	2.38	3-1/2	3.5000	8.75	13.50
5/8	0.6250	1.75	2.82	3-3/4	3.7500	9.38	14.37
3/4	0.7500	2.00	3.25	4	4.0000	10.00	15.25

Flat Socket Cap Screws Dimensions



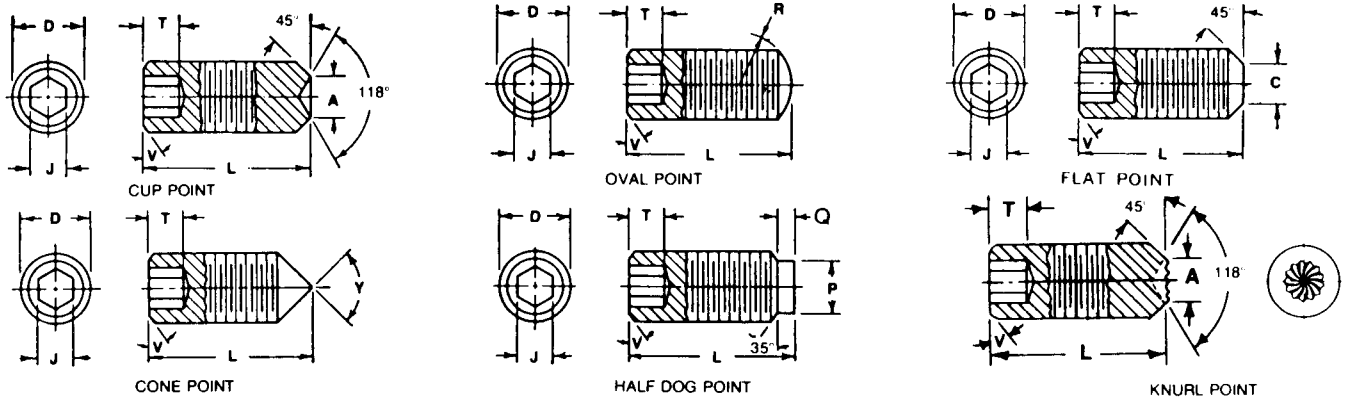
Nominal Size or Basic Screw Diameter	D		A		H		J	T	F	LT		
	Body Diameter		Head Diameter		Head Height		Hexagon Socket Size	Key Engagement	Fillet Extension Above D Max.	Basic Thread Length		
			Theoretical Sharp Max.	Abs. Min.	Reference	Flushness Tolerance						
	Max.	Min.	Max.	Min.	Reference	Flushness Tolerance	Nom.	Min.	Max.	Min.		
4	0.1120	0.1120	0.1075	0.255	0.218	0.083	0.011	1/16	0.062	0.055	0.012	0.750
5	0.1250	0.1250	0.1202	0.281	0.240	0.090	0.012	5/64	0.078	0.061	0.014	0.750
6	0.1380	0.1380	0.1329	0.307	0.263	0.097	0.013	5/64	0.078	0.066	0.015	0.750
8	0.1640	0.1640	0.1585	0.359	0.311	0.112	0.014	3/32	0.094	0.076	0.015	0.875
10	0.1900	0.1900	0.1840	0.411	0.359	0.127	0.015	1/8	0.125	0.087	0.015	0.875
1/4	0.2500	0.2500	0.2435	0.531	0.480	0.161	0.016	5/32	0.156	0.111	0.015	1.000
5/16	0.3125	0.3125	0.3053	0.656	0.600	0.198	0.017	3/16	0.188	0.135	0.015	1.125
3/8	0.3750	0.3750	0.3678	0.781	0.720	0.234	0.018	7/32	0.219	0.159	0.015	1.250
7/16	0.4375	0.4375	0.4294	0.844	0.781	0.234	0.018	1/4	0.250	0.159	0.015	1.375
1/2	0.5000	0.5000	0.4919	0.938	0.872	0.251	0.018	5/16	0.312	0.172	0.015	1.500
5/8	0.6250	0.6250	0.6163	1.188	1.112	0.324	0.022	3/8	0.375	0.220	0.015	1.750
3/4	0.7500	0.7500	0.7406	1.438	1.355	0.396	0.024	1/2	0.500	0.220	0.015	2.000

Button Socket Cap Screws Dimensions

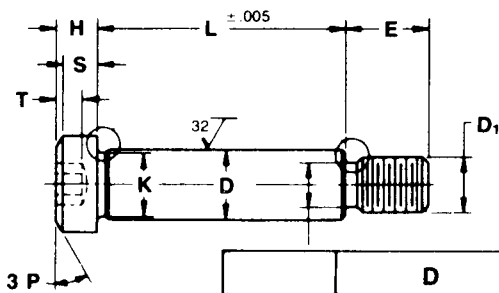


Nominal Size or Basic Screw Diameter	D		A		H		S	J	T	F		L
	Body Diameter		Head Diameter		Head Height		Head Side Height	Hexagon Socket Size	Key Engagement	Fillet Extension Above D		Maximum Standard Length
			Max.	Min.	Max.	Min.				Ref.	Nom.	Min.	Max.	Min.	Nom.
0	0.0600	0.114	0.104	0.032	0.026	0.010	0.035	0.020	0.010	0.005		1/2
1	0.0730	0.139	0.129	0.039	0.033	0.010	0.050	0.028	0.010	0.005		1/2
2	0.0860	0.164	0.154	0.046	0.038	0.010	0.050	0.028	0.010	0.005		1/2
3	0.0990	0.188	0.176	0.052	0.044	0.010	1/16	0.062	0.035	0.010	0.005	1/2
4	0.1120	0.213	0.201	0.059	0.051	0.015	1/16	0.062	0.035	0.010	0.005	1/2
5	0.1250	0.238	0.226	0.066	0.058	0.015	5/64	0.078	0.044	0.010	0.005	1/2
6	0.1380	0.262	0.250	0.073	0.063	0.015	5/64	0.078	0.044	0.010	0.005	5/8
8	0.1640	0.312	0.298	0.087	0.077	0.015	3/32	0.094	0.052	0.015	0.010	3/4
10	0.1900	0.361	0.347	0.101	0.091	0.020	1/8	0.125	0.070	0.015	0.010	1
1/4	0.2500	0.437	0.419	0.132	0.122	0.031	5/32	0.156	0.087	0.020	0.015	1
5/16	0.3125	0.547	0.527	0.166	0.152	0.031	3/16	0.188	0.105	0.020	0.015	1
3/8	0.3750	0.656	0.636	0.199	0.185	0.031	7/32	0.219	0.122	0.020	0.015	1 1/4
1/2	0.5000	0.875	0.851	0.265	0.245	0.046	5/16	0.312	0.175	0.030	0.020	2
5/8	0.6250	1.000	0.970	0.331	0.311	0.062	3/8	0.375	0.210	0.030	0.020	2

Socket Set Screws Dimensions



Nominal Diameter	A		C		R	Y		P		Q	J	T	Shortest Length to which Col. T Applies	
	Knurl and Cup Point Diameter		Flat Point Diameter			Oval Point Radius	Cone Point Angle		Half Dog Point'					
	Max.	Min.	Max.	Min.			118° ± 2° for these Lengths and Under	90° ± 2° for these Lengths and Over	Diameter					
									Max.					Min.
#0	0.032	0.027	0.033	0.027	0.045	1/16	5/64	0.040	0.037	0.015	0.028	0.050	7/64	
#1	0.038	0.033	0.040	0.033	0.055	5/64	3/32	0.049	0.045	0.019	0.035	0.060	1/8	
#2	0.043	0.038	0.047	0.039	0.064	3/32	7/64	0.057	0.053	0.022	0.035	0.060	1/8	
#3	0.050	0.045	0.054	0.045	0.074	7/64	1/8	0.066	0.062	0.025	0.050	0.070	9/64	
#4	0.056	0.051	0.061	0.051	0.084	1/8	5/32	0.075	0.070	0.028	0.050	0.070	9/64	
#5	0.062	0.056	0.067	0.057	0.094	1/8	3/16	0.083	0.078	0.03	1/16	0.080	3/16	
#6	0.069	0.062	0.074	0.064	0.104	1/8	3/16	0.092	0.087	0.035	1/16	0.080	11/64	
#8	0.082	0.074	0.087	0.076	0.123	3/16	1/4	0.109	0.103	0.04	5/64	0.090	3/16	
#10	0.095	0.086	0.102	0.088	0.142	3/16	1/4	0.127	0.120	0.045	3/32	0.100	3/16	
1/4	0.125	0.114	0.132	0.118	0.188	1/4	5/16	5/32	0.149	5/64	1/8	0.125	1/4	
5/16	0.156	0.144	0.172	0.156	0.234	5/16	3/8	13/64	0.195	1/64	5/32	0.156	5/16	
3/8	0.187	0.174	0.212	0.194	0.281	3/8	7/16	1/4	0.241	3/32	3/16	0.188	3/8	
7/16	0.218	0.204	0.252	0.232	0.328	7/16	1/2	19/64	0.287	7/64	7/32	0.219	7/16	
1/2	0.250	0.235	0.291	0.270	0.375	1/2	9/16	11/32	0.334	1/8	1/4	0.250	1/2	
5/8	0.312	0.295	0.371	0.347	0.469	5/8	3/4	15/32	0.456	5/32	5/16	0.312	5/8	
3/4	0.375	0.357	0.450	0.425	0.562	3/4	7/8	5/16	0.549	3/16	3/8	0.375	3/4	
7/8	0.437	0.418	0.530	0.502	0.656	7/8	1	21/32	0.642	7/32	1/2	0.500	7/8	
1	0.500	0.480	0.609	0.579	0.750	1	1 1/8	3/4	0.734	1/4	9/16	0.562	1	



Socket Shoulder Screws Dimensions

Nominal Size	D		A		H		S	D ₁	E	J	T
	Shoulder Diameter		Head Diameter		Head Height		Head Side Height				
	Max.	Min.	Max.	Min.	Max.	Min.	Min.				
1/4	0.2480	0.2460	3/8	0.357	3/16	0.182	0.157	10-24	0.375	1/8	0.094
5/16	0.3105	0.3085	7/16	0.419	7/32	0.213	0.183	1/4-20	0.438	5/32	0.117
3/8	0.3730	0.3710	9/16	0.543	1/4	0.244	0.209	5/16-18	0.500	3/16	0.141
1/2	0.4980	0.4960	3/4	0.729	5/16	0.306	0.262	3/8-16	0.625	1/4	0.188
5/8	0.6230	0.6210	7/8	0.853	3/8	0.368	0.315	1/2-13	0.750	5/16	0.234
3/4	0.7480	0.7460	1	0.977	1/2	0.492	0.421	5/8-11	0.875	3/8	0.281
1	0.9980	0.9960	1 5/16	1.287	5/8	0.616	0.527	3/4-10	1.000	1/2	0.375
1 1/4	1.2480	1.2460	1 3/4	1.723	3/4	0.741	0.633	7/8-9	1.125	5/8	0.469

Hex Socket Screw Products

Typical Physical Properties

PRODUCT	ULTIMATE TENSILE STRENGTH P.S.I.		YIELD POINT P.S.I.		MIN. % ELONG. IN 2"	MIN. REDUCTION IN AREA %	HARDNESS ROCKWELL "C"
	Min.	Max.	Min.	Max.			
Socket Head Cap Screws (Alloy)	160,000	185,000	135,000	160,000	10	38	36-40
Socket Set Screws (Alloy)	245,000	275,000	225,000	255,000	8	25	45-53
Socket Shoulder Screws	160,000	185,000	135,000	160,000	10	38	36-40
Hexagon Keys	—	—	—	—	—	—	50-54
Dowel Pins	250,000	275,000	225,000	250,000	10	—	60-64 Surface

Key Application Table

Key Dimensions Across Flats	SCREW DIAMETERS							Key Dimensions Across Flats
	Socket Head Cap Screws		Socket Set Screws and Low Heads	Flat Head Cap Screws	Button Head Socket Screws	Shoulder Screws	Pressure Plugs	
	1936 Series	1960 Series						
.028			#0					.028
.035			#1, 2	#0	#0			.035
.050	#0, 1	#0	#3, 4	#1, 2	#1, 2			.050
¹ / ₁₆	#2	#1	#5, 6	#3, 4	#3, 4			.063
⁵ / ₆₄	#3, 4	#2, 3	#8	#5, 6	#6			.078
³ / ₃₂	#5, 6	#4, 5	#10	#8	#8			.094
⁷ / ₆₄		#6						.109
¹ / ₈	#8		¹ / ₄	#10	#10	¹ / ₄		.125
⁹ / ₆₄		#8						.141
⁵ / ₃₂	#10	#10	⁵ / ₁₆	¹ / ₂	¹ / ₄	⁵ / ₁₆	¹ / ₁₆	.156
³ / ₁₆	¹ / ₄	¹ / ₄	³ / ₈	⁵ / ₁₆	⁵ / ₁₆	³ / ₈	¹ / ₈	.188
⁷ / ₃₂	⁵ / ₁₆		⁷ / ₁₆	³ / ₈	³ / ₈			.219
¹ / ₄		⁵ / ₁₆	¹ / ₂ , ⁹ / ₁₆	⁷ / ₁₆		¹ / ₂	¹ / ₄	.250
⁵ / ₁₆	³ / ₈ , ⁷ / ₁₆	³ / ₈	⁵ / ₈	¹ / ₂ , ⁹ / ₁₆	¹ / ₂	⁵ / ₈	³ / ₈	.313
³ / ₈	¹ / ₂ , ⁹ / ₁₆	⁷ / ₁₆ , ¹ / ₂	³ / ₄	⁵ / ₈	⁵ / ₈	³ / ₄	¹ / ₂	.375
⁷ / ₁₆		⁹ / ₁₆						.438
¹ / ₂	⁵ / ₈	⁵ / ₈	⁷ / ₈	³ / ₄		⁷ / ₈ , 1		.500
⁹ / ₁₆	³ / ₄ , ⁷ / ₈		1, 1 ¹ / ₈	⁷ / ₈			³ / ₄	.563
⁵ / ₈	1	³ / ₄	1 ¹ / ₄ , 1 ³ / ₈	1		1 ¹ / ₄	1	.625
³ / ₄	1 ¹ / ₈ , 1 ¹ / ₄ , 1 ³ / ₈	⁷ / ₈ , 1	1 ¹ / ₂				1 ¹ / ₄	.750
⁷ / ₈		1 ¹ / ₈ , 1 ¹ / ₄						.875
1	1 ¹ / ₂	1 ³ / ₈ , 1 ¹ / ₂	1 ³ / ₄ , 2				1 ¹ / ₂ , 2	1.000

Tapping Screws A & B

Hole Size Recommendations



TYPE A

Diam. of Screw	Thickness of Metal		Pierced Hole	Drilled or Clean Punched Hole		Diam. of Screw	Thickness of Metal		Pierced Hole	Drilled or Clean Punched Hole	
	U.S.S. Gage No.	Equivalent	Hole Diam.	Hole Diam.	Drill Size		U.S.S. Gage No.	Equivalent	Hole Diam.	Hole Diam.	Drill Size
4 .112	28	.0156	.086	.0860	44	8 .165	26	.0188	.137	.1130	33
	26	.0188	.086	.0860	44		24	.0250	.137	.1130	33
	24	.0250	.093	.0935	42		22	.0313	.137	.1160	32
	22	.0313	.098	.0935	42		20	.0375	.137	.1200	31
	20	.0375	.100	.0980	40		18	.0500	—	.1280	30
6 .138	28	.0156	.111	.0995	39	10 .191	26	.0188	.158	.1285	30
	26	.0188	.111	.0995	39		24	.0250	.158	.1285	30
	24	.0250	.111	.0995	39		22	.0313	.158	.1285	30
	22	.0313	.111	.1015	38		20	.0375	.158	.1360	29
	20	.0375	.111	.1065	36		18	.0500	.158	.1495	25
7 .155	28	.0156	.121	.1040	37	12 .218	24	.0250	—	.1470	26
	26	.0188	.121	.1040	37		22	.0313	.185	.1495	25
	24	.0250	.121	.1100	35		20	.0375	.185	.1520	24
	22	.0313	.121	.1130	33		18	.0500	.185	.1570	22
	20	.0375	.121	.1160	32		14 .251	24	.0250	—	.1800	15
18	.0500	—	.1200	31	22	.0313		.212	.1890	12	
						20	.0375	.212	.1910	11	
						18	.0500	.212	.1960	9	

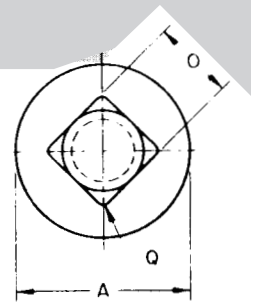
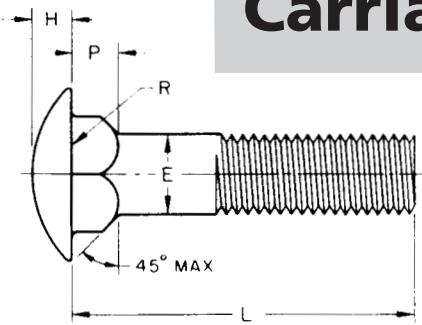


TYPE B

Diam. of Screw	Thickness of Metal		Pierced Hole	Drilled or Clean Punched Hole		Diam. of Screw	Thickness of Metal		Pierced Hole	Drilled or Clean Punched Hole		
	U.S.S. Gage No.	Equivalent	Hole Diam.	Hole Diam.	Drill Size		U.S.S. Gage No.	Equivalent	Hole Diam.	Hole Diam.	Drill Size	
2 .086	28	.0156	—	.0635	52	8 .163	16	.0625	—	.1360	29	
	26	.0188	—	.0635	52		14	.0781	—	.1405	28	
	24	.0250	—	.0670	51		12	.1094	—	.1495	25	
	22	.0313	—	.0700	50		1/8	.1250	—	.1495	25	
	20	.0375	—	.0730	49		10	.1406	—	.1520	24	
	18	.0500	—	.0730	49		10 .186	26	.0188	.144	.1440	27
	16	.0625	—	.0760	48			24	.0250	.144	.1440	27
4 .112	28	.0156	.086	.0860	44	22		.0313	.144	.1440	27	
	26	.0188	.086	.0860	44	20		.0375	.147	.1440	27	
	24	.0250	.093	.0890	43	18		.0500	.155	.1440	27	
	22	.0313	.098	.0935	42	16		.0625	—	.1520	24	
	20	.0375	.100	.0935	42	14		.0781	—	.1570	22	
	18	.0500	—	.0960	41	12	.1094	—	.1610	20		
	16	.0625	—	.0995	39	1/8	.1250	—	.1695	18		
6 .137	14	.0781	—	.1015	38	10	.1406	—	.1695	18		
	7 .151	28	.0156	.106	.1040	37	8	.1719	—	.1730	17	
		26	.0188	.106	.1040	37	12 .212	24	.0250	.185	.1660	19
		24	.0250	.106	.1065	36		22	.0313	.185	.1660	19
		22	.0313	.110	.1065	36		20	.0375	.185	.1660	19
		20	.0375	.110	.1100	35		18	.0500	.185	.1695	18
		18	.0500	—	.1110	34		16	.0625	—	.1770	16
16		.0625	—	.1160	32	14		.0781	—	.1820	14	
14	.0781	—	.1200	31	12	.1094		—	.1850	13		
8 .163	12	.1094	—	.1285	30	1/8	.1250	—	.1960	9		
	7 .151	26	.0188	.121	.1160	32	10	.1406	—	.1960	9	
		24	.0250	.121	.1160	32	8	.1719	—	.2010	7	
		22	.0313	.121	.1160	32	1/4 .243	22	.0313	.209	.1850	13
		20	.0375	.121	.1160	32		20	.0375	.209	.1850	13
		18	.0500	.121	.1200	31		18	.0500	.209	.1910	11
		16	.0625	—	.1285	30		16	.0625	—	.1990	8
14		.0781	—	.1360	29	14		.0781	—	.2040	6	
12	.1094	—	.1405	28	12	.1094		—	.2090	4		
8 .163	26	.0188	.131	.1160	32	1/8		.1250	—	.2280	1	
	24	.0250	.131	.1160	32	10	.1406	—	.2280	1		
	22	.0313	.131	.1160	32	8	.1719	—	.2343	1 1/4		
	20	.0375	.136	.1160	32	3/16	.1875	—	.2343	1 1/4		
	18	.0500	.140	.1285	30	6	.2031	—	.2343	1 1/4		

*Sizes of holes recommended for average application. Slightly larger or smaller holes may be required.

Carriage Screws Dimensions



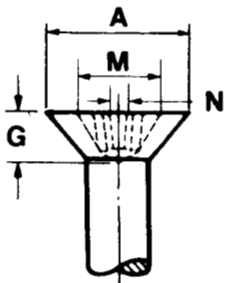
ROUND HEAD SQUARE NECK BOLTS

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

Self-Drilling (Tek-Type) Screws – Drilling Capacities

Standard Fasteners					
Application	To Use	Diameter	Recommended Material Thickness	POINT LENGTH	
				Inches	Decimal
Light Gage Metals	Type/2 & Type/2F	No. 4	.035 To .080	9/64	.140
		No. 6	.035 To .090	9/64	.140
		No. 8	.035 To .100	5/32	.156
		No. 10	.035 To .110	13/64	.203
		No. 12	.035 To .140	15/64	.234
		1/4"	.035 To .175	19/64	.296
Heavier Gage Metals	Type/3	No. 6	.090 To .110	11/64	.171
		No. 8	.100 to .140	13/64	.203
		No. 10	.110 To .175	1/4	.250
		No. 12	.110 To .210	9/32	.281
Heavier Gage Metals	Type/4	1/4"	.110 To .250	5/16	.312
		No. 12	.175 To .210	9/32	.281
Heavier Gage Metals	Special Type/3 or 4	1/4"	.175 To .250	5/16	.312
		No. 8	.140 To .225	9/32	.281
		No. 10	.175 To .315	13/32	.406
		No. 12	.210 To .345	7/16	.437
Heavy Gage Metals	Type 5	1/4"	.250 To .375	15/32	.468
		No. 12	.250 To .500	5/8	.625
1/4"					

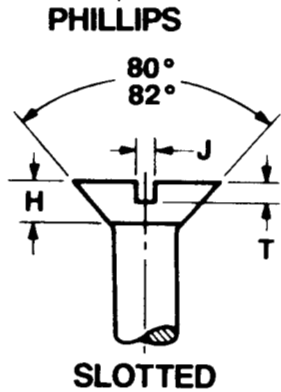
DECIMAL EQUIVALENTS OF STANDARD GAGES OF SHEET STEEL AND SHEET ALUMINUM		
Number of Gage	ALUMINUM (B & S)	SHEET STEEL (Mfg. Std.)
	(Thickness in decimal parts of an inch)	
7	.1443	.1793
8	.1285	.1644
9	.1144	.1495
10	.1019	.1345
11	.0907	.1196
12	.0808	.1046
13	.0720	.0897
14	.0641	.0747
15	.0571	.0673
16	.0508	.0598
18	.0403	.0478
20	.0320	.0359
22	.0253	.0299
24	.0201	.0239
26	.0159	.0179
28	.0126	.0149
29	.0113	.0135
30	.0100	.0120



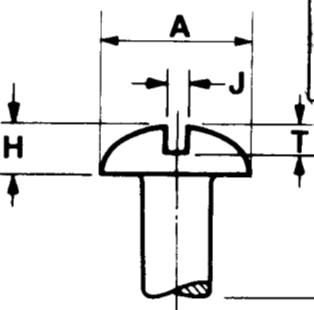
Head Dimensions

Flat Head

Machine Screws, Wood Screws*, Tapping Screws

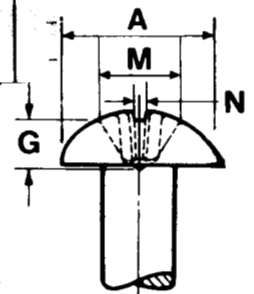


Nominal Size	A		H		J		T		M			G	N	Phillips Driver Size
	Head Diameter		Height of Head		Width of Slot		Depth of Slot		Dimensions of Recess			Depth	Width	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.				Min.
2	.172	.147	.051	.040	.031	.023	.023	.015	.102	.089	.063	.017	1	
4	.225	.195	.067	.055	.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	-	-	-	-	-	



Round Head

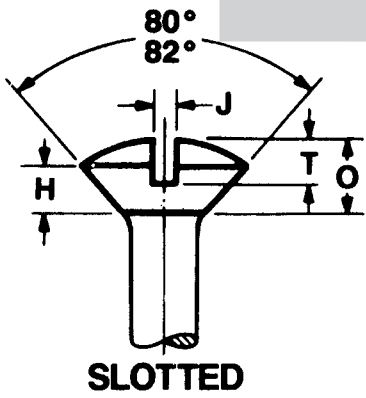
Machine Screws, Wood Screws, Tapping Screws



SLOTTED

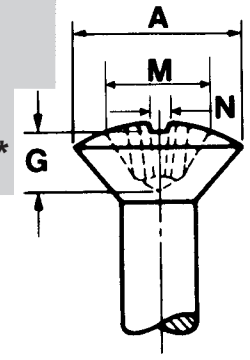
PHILLIPS

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			Depth	Width	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	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	-	-	-	-	-	



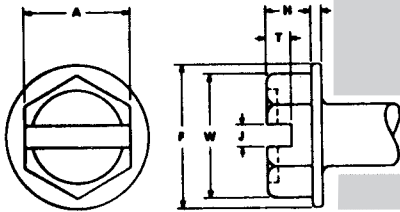
Head Dimensions Oval Head

Machine Screws, Tapping Screws, Wood Screws*



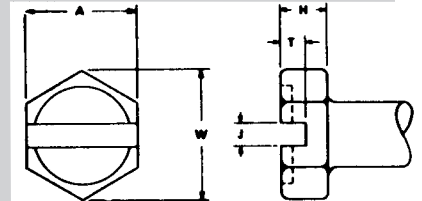
PHILLIPS

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

Machine Screws, Tapping Screws, Self Drilling Screws



SLOTTED

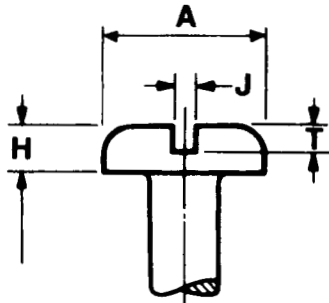
SLOTTED

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

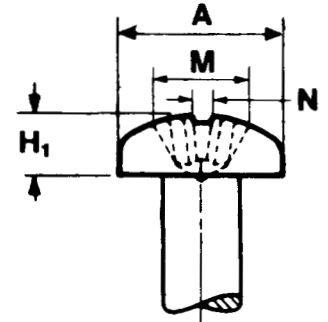
Head Dimensions

Pan Head

Machine Screws, Tapping Screws, Self-Drilling Screws



SLOTTED



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
1/4	.492	.473	.144	.130	.175	.162	.075	.064	.087	.070	.281	.268	.161	.036	3

Basic Diameters & Threads/inch

Machine Screws, Tapping Screws, Wood Screws

Nom. Size	Basic Screw Dia.	Tapping Screws		Machine Screws	Wood Screws
		Type: AB, B, BP, BF, BT	Type: C, D, F, G, T		
0	0.060	48			32
1	0.073	42			28
2	0.086	32	56, 64	56, 64	26
3	0.099	28	48, 56	48, 56	24
4	0.112	24	40, 48	40, 48	22
5	0.125	20	40, 44	40, 44	20
6	0.138	20	32, 40	32, 40	18
7	0.151	19			16
8	0.164	18	32, 36	32, 36	15
9	0.177				14
10	0.190	16	24, 32	24, 32	13
12	0.216	14	24, 28	24, 28	11
14	0.242				10
1/4	0.250	14	20, 28	20, 28	
16	0.268				9
18	0.294				8
5/16	0.313	12	18, 24	18, 24	7
20	0.320				8
24	0.372				7
3/8	0.375	12	16, 24	16, 24	
7/16	0.438	10	14, 20	14, 20	
1/2	0.500	10	13, 20	13, 20	

Suggested Hole Sizes In Sheet Metal

IMPORTANT: For satisfactory results holes must be neither too large nor too small. The size of hole depends upon the kind of material, its hardness, uniformity, etc. In most cases hole sizes shown are suitable; but if the material is very hard a size larger drill might be necessary. If the material is very soft, a size smaller drill should be used.

Screw Diam.	Steel, Stainless Steel, Monel Metal, Brass, Aluminum Alloy				
	Metal Thickness	Pierced or Extruded Hole		Drilled or Clean-Punched Hole	
		Hole Required	Hole Required	Drill Size No.	
No. 4	.015"	.....	.086"	44	
	.018"	.....	.086"	44	
	.024"	.098"	.093"	42	
	.030"	.098"	.093"	42	
	.036"	.098"	.098"	40	
No. 6	.015"	.....	.104"	37	
	.018"	.....	.104"	37	
	.024"	.111"	.104"	37	
	.030"	.111"	.104"	37	
	.036"	.111"	.104"	37	
No. 7	.015"	.....	.116"	32	
	.018"	.....	.116"	32	
	.024"	.120"	.116"	32	
	.030"	.120"	.116"	32	
	.036"	.120"	.116"	32	
No. 8	.018"	.....	.125"	1/8	
	.024"	.136"	.125"	1/8	
	.030"	.136"	.125"	1/8	
	.036"	.136"	.125"	1/8	
	.048"	.136"	.125"	30	
No. 10	.018"	.....	.136"	29	
	.024"	.157"	.136"	29	
	.030"	.157"	.136"	29	
	.036"	.157"	.136"	29	
	.048"	.157"	.149"	25	
No. 12	.024"	.....	.161"	20	
	.030"	.185"	.161"	20	
	.036"	.185"	.161"	20	
	.048"	.185"	.161"	20	
No. 14	.024"	.....	.185"	13	
	.030"	.209"	.189"	12	
	.036"	.209"	.191"	11	
	.048"	.209"	.196"	9	

Weights of Hex Cap Screws and Finished Hex Bolts (without nuts)

(Approximate weight of 100 steel bolts in pounds)

Length (Inches)	Diameter (Inches)															
	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2	1-3/4	2	
3/4	1.64	2.67	3.96	—	—	—	—	—	—	—	—	—	—	—	—	—
1	1.89	3.08	4.56	6.21	9.34	16.9	—	—	—	—	—	—	—	—	—	—
1-1/4	2.23	3.54	5.16	7.03	10.5	18.7	—	—	—	—	—	—	—	—	—	—
1-1/2	2.56	4.07	5.92	7.96	11.7	20.4	31.9	46.0	65.7	—	—	—	—	—	—	—
1-3/4	2.90	4.59	6.68	8.99	13.1	22.1	34.4	49.5	70.3	—	—	—	—	—	—	—
2	3.24	5.12	7.44	10.02	14.5	24.2	37.0	53.1	74.9	—	—	—	—	—	—	—
2-1/4	3.57	5.64	8.20	11.2	15.9	26.3	39.9	56.6	79.5	—	—	—	—	—	—	—
2-1/2	3.91	6.17	8.96	12.2	17.2	28.4	43.0	60.7	84.1	111	147	178	224	330	462	—
2-3/4	4.25	6.69	9.71	13.3	18.6	30.6	46.0	64.8	89.5	117	154	186	235	344	481	—
3	4.58	7.22	10.5	14.3	20.0	32.6	49.1	68.9	94.8	124	161	195	246	358	499	—
3-1/4	4.92	7.74	11.2	15.4	21.4	34.7	52.1	73.1	100	131	170	206	256	373	518	—
3-1/2	5.26	8.27	12.0	16.4	22.8	36.8	55.1	77.2	106	137	178	216	269	387	537	—
3-3/4	5.59	8.79	12.7	17.4	24.2	38.9	58.1	81.3	111	144	187	227	281	402	556	—
4	5.93	9.32	13.5	18.5	25.6	41.0	61.2	85.4	117	151	195	237	294	419	575	—
4-1/4	6.27	9.84	14.3	19.5	26.9	43.1	64.2	89.5	122	158	203	248	306	436	594	—
4-1/2	6.61	10.4	15.0	20.5	28.3	45.2	67.2	93.7	127	165	212	258	319	453	616	—
4-3/4	6.94	10.9	15.8	21.8	29.6	47.3	70.2	97.8	133	171	220	269	331	470	639	—
5	7.28	11.5	16.6	22.8	31.1	49.4	73.2	102	138	178	229	279	344	487	661	—
5-1/4	7.62	12.0	17.3	23.8	32.4	51.5	76.3	107	143	185	237	290	356	504	683	—
5-1/2	7.96	12.6	18.1	24.8	33.8	53.6	79.3	111	149	192	245	300	369	521	705	—
5-3/4	8.29	13.0	18.8	25.7	35.2	55.7	82.3	115	154	199	254	310	381	538	728	—
6	8.65	13.7	19.7	26.9	36.5	57.8	85.3	119	160	205	262	321	394	555	750	—
6-1/4	8.88	14.0	20.2	27.3	37.2	59.5	87.9	122	164	211	270	330	405	569	769	—
6-1/2	9.22	14.5	20.9	28.3	38.6	61.6	90.9	127	170	218	278	341	417	586	791	—
6-3/4	9.55	15.0	21.7	29.4	39.5	63.7	93.9	131	175	225	286	351	430	603	813	—
7	9.89	15.6	22.5	30.4	40.9	65.8	96.9	135	180	232	295	362	442	621	835	—
7-1/4	10.2	16.1	23.2	31.4	42.3	67.9	100	139	186	238	303	372	455	638	858	—
7-1/2	10.6	16.6	24.0	32.5	43.5	70.0	103	143	191	245	311	383	467	654	880	—
7-3/4	10.9	17.1	24.7	33.5	44.9	72.0	106	147	196	252	320	393	480	672	902	—
8	11.2	17.7	25.5	34.5	46.1	74.1	109	151	202	259	328	404	492	689	925	—
8-1/2	11.9	18.7	27.0	36.6	48.8	78.3	115	159	213	272	345	424	517	723	969	—
9	12.6	19.8	28.5	38.6	51.5	82.4	121	168	223	286	362	446	542	757	1013	—
9-1/2	13.3	20.8	30.1	40.7	54.2	86.6	127	176	234	300	379	466	567	792	1058	—
10	13.9	21.9	31.6	42.8	57.0	90.8	133	184	245	313	395	488	592	825	1103	—
10-1/2	14.6	22.9	33.1	44.8	59.6	94.9	139	192	255	327	412	508	617	860	1147	—
11	15.3	24.0	34.6	46.9	62.3	99.1	145	201	266	340	429	530	642	893	1191	—
11-1/2	15.9	25.0	36.1	48.9	65.0	103	151	209	277	354	446	550	667	927	1237	—
12	16.6	26.1	37.6	51.0	67.6	107	158	217	288	368	462	572	692	961	1280	—
12-1/2	17.3	27.1	39.2	53.1	70.4	112	164	225	298	381	479	592	717	996	1324	—
13	18.0	28.2	40.7	55.1	73.0	115	170	234	309	395	496	614	742	1030	1369	—
13-1/2	18.6	29.2	42.2	57.2	75.7	119	176	242	320	408	513	634	767	1064	1413	—
14	19.3	30.3	43.7	59.2	78.4	123	182	250	331	422	530	656	792	1096	1458	—
14-1/2	20.1	31.3	45.2	61.3	81.1	127	188	258	341	436	546	677	817	1115	1503	—
15	20.7	32.4	46.7	63.4	83.8	132	194	267	352	449	563	698	842	1166	1547	—
15-1/2	21.3	33.4	48.3	65.4	86.5	136	200	275	363	463	591	719	867	1200	1593	—
16	22.0	34.5	49.8	67.5	89.2	140	206	283	374	476	597	739	892	1234	1638	—
16-1/2	22.7	35.5	51.3	69.5	91.9	144	212	291	384	490	613	760	917	1268	1683	—
17	23.4	36.6	52.8	71.6	94.5	148	218	300	395	504	630	781	942	1302	1725	—
17-1/2	24.0	37.8	54.3	73.7	97.2	152	224	308	406	517	647	803	967	1336	1771	—
18	24.7	38.7	55.9	75.7	99.6	157	230	316	417	531	664	824	992	1371	1823	—
18-1/2	25.4	39.7	57.4	77.8	102	161	236	324	427	544	681	844	1017	1404	1861	—
19	26.1	40.8	58.9	79.8	105	165	242	333	438	558	697	865	1042	1439	1903	—
19-1/2	26.7	41.8	60.4	81.9	108	169	248	341	449	572	714	886	1067	1474	1948	—
20	27.4	42.9	61.9	84.0	110	173	254	349	460	585	731	908	1092	1506	1993	—
21	—	—	—	—	116	182	266	365	481	612	765	949	1142	1576	2083	—
22	—	—	—	—	121	190	278	382	502	640	798	991	1192	1644	2171	—
23	—	—	—	—	127	199	290	398	524	667	832	1034	1242	1711	2261	—
24	—	—	—	—	132	207	302	415	544	694	865	1074	1292	1780	2349	—
25	—	—	—	—	—	—	315	431	566	721	899	1117	1342	1847	2441	—
26	—	—	—	—	—	—	327	448	587	748	932	1159	1392	1916	2528	—
27	—	—	—	—	—	—	339	464	609	776	966	1200	1442	1983	2622	—
28	—	—	—	—	—	—	351	481	630	803	999	1244	1492	2054	2708	—
29	—	—	—	—	—	—	363	497	652	830	1033	1286	1542	2124	2793	—
30	—	—	—	—	—	—	375	514	673	857	1067	1328	1592	2189	2883	—

Weights of ASTM A324 and A490 Heavy Hex Structural Bolts with Heavy Hex Nuts - approx. lbs./100

Diameter (Inches) Length (Inches)	Length (Inches)								
	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2
1	16.5	29.4	47.0	—	—	—	—	—	—
1-1/4	17.8	31.1	49.6	74.4	104	—	—	—	—
1-1/2	19.2	33.1	52.2	78.0	109	148	197	—	—
1-3/4	20.5	35.3	55.3	81.9	114	154	205	261	333
2	21.9	37.4	58.4	86.1	119	160	212	270	344
2-1/4	23.3	39.8	61.6	90.3	124	167	220	279	355
2-1/2	24.7	41.7	64.7	94.6	130	174	229	290	366
2-3/4	26.1	43.9	67.8	98.8	135	181	237	300	379
3	27.4	46.1	70.9	103	141	188	246	310	391
3-1/4	28.8	48.2	74.0	107	146	195	255	321	403
3-1/2	30.2	50.4	77.1	111	151	202	263	332	416
3-3/4	31.6	52.5	80.2	116	157	209	272	342	428
4	33.0	54.7	83.3	120	162	216	280	353	441
4-1/4	34.3	56.9	86.4	124	168	223	289	363	453
4-1/2	35.7	59.0	89.5	128	173	230	298	374	465
4-3/4	37.1	61.2	92.7	133	179	237	306	384	478
5	38.5	63.3	95.8	137	184	244	315	395	490
5-1/4	39.9	65.5	98.9	141	190	251	324	405	503
5-1/2	41.2	67.7	102	146	196	258	332	416	515
5-3/4	42.6	69.8	105	150	201	265	341	426	527
6	44.0	71.9	108	154	207	272	349	437	540
6-1/4	45.4	74.1	111	158	212	279	358	447	552
6-1/2	46.8	76.3	114	163	218	286	367	458	565
6-3/4	48.1	78.5	118	167	223	293	375	468	577
7	49.5	80.6	121	171	229	300	384	479	589
7-1/4	50.9	82.8	124	175	234	307	392	489	602
7-1/2	52.3	84.9	127	179	240	314	401	500	614
7-3/4	53.6	87.1	130	183	246	321	410	510	626
8	55.0	89.2	133	187	251	328	418	521	639
8-1/4	56.4	91.4	136	192	257	335	427	531	651
8-1/2	57.8	93.5	139	196	262	342	435	542	664
8-3/4	59.1	95.7	142	200	268	349	444	552	676
9	60.5	97.8	145	204	273	356	453	563	689

Weights of Nuts - approx. lbs./1,000

Nut Type Nominal Size	Nut Type												
	Square	Hex Flat	Hex Flat Jam	Hex	Hex Jam	Hex Slotted	Hex Thick	Hex Thick Slotted	Hex Castle	Heavy Square	Heavy Hex	Heavy Hex Jam	Heavy Hex Slotted
1/4	8.93	—	—	7.35	5.15	6.03	9.53	8.21	7.84	13.7	11.6	8.52	9.90
5/16	18.1	—	—	11.0	7.67	9.40	13.7	12.1	11.5	20.6	17.2	11.7	15.1
3/8	26.3	—	—	16.0	10.5	13.1	20.0	17.1	16.8	37.4	31.4	20.2	26.9
7/16	43.6	—	—	28.4	18.6	23.6	34.5	29.7	28.0	50.1	41.6	26.1	35.9
1/2	57.8	—	—	37.5	26.2	31.6	48.4	42.5	40.8	78.7	65.4	40.0	57.0
9/16	—	—	—	58.3	36.8	49.4	74.1	65.2	62.0	—	81.5	49.1	71.3
5/8	108	—	—	73.3	49.3	60.7	97.4	84.8	80.4	143	119	69.6	102
3/4	154	—	—	119	77.0	103	153	137	128	235	193	110	171
7/8	245	—	—	190	120	171	232	213	202	362	297	167	272
1	363	—	—	283	176	250	331	298	284	515	425	235	385
1-1/8	525	403	247	403	247	358	489	444	415	724	592	324	537
1-1/4	706	543	361	543	361	475	642	574	545	955	786	458	706
1-3/8	945	730	479	730	479	655	860	785	751	1250	1020	593	933
1-1/2	1220	943	609	943	609	829	1110	996	948	1610	1310	748	1180
1-5/8	—	—	—	—	—	—	—	—	—	—	1620	916	—
1-3/4	—	—	—	—	—	—	—	—	—	—	2040	1140	1840
1-7/8	—	—	—	—	—	—	—	—	—	—	2410	1340	—
2	—	—	—	—	—	—	—	—	—	—	2990	1650	2740
2-1/4	—	—	—	—	—	—	—	—	—	—	4190	2270	3910
2-1/2	—	—	—	—	—	—	—	—	—	—	5640	3320	5160
2-3/4	—	—	—	—	—	—	—	—	—	—	7380	4290	6860
3	—	—	—	—	—	—	—	—	—	—	9500	5450	8820
3-1/4	—	—	—	—	—	—	—	—	—	—	11940	6510	11210
3-1/2	—	—	—	—	—	—	—	—	—	—	15260	8510	14490
3-3/4	—	—	—	—	—	—	—	—	—	—	18120	10050	17300
4	—	—	—	—	—	—	—	—	—	—	21800	12000	20930

CONVERSION TABLE

INCH - MILLIMETRE EQUIVALENTS

TO CONVERT TO MILLIMETRES
MULTIPLY INCHES × 25.4

TO CONVERT TO INCHES
MULTIPLY MILLIMETRES × 0.039370

INCHES		mm
FRACT.	DECIMALS	
	.00004	.001
	.00039	.01
	.00079	.02
	.001	.025
	.00118	.03
	.00157	.04
	.00197	.05
	.002	.051
	.00236	.06
	.00276	.07
	.003	.0762
	.00315	.08
	.00354	.09
	.00394	.1
	.004	.1016
	.005	.1270
	.006	.1524
	.007	.1778
	.00787	.2
	.008	.2032
	.009	.2286
	.00984	.25
	.01	.254
1/64	.01181	.3
	.01563	.3969
	.01575	.4
	.01969	.5
	.02	.508
	.02362	.6
	.025	.635
	.02756	.7
	.0295	.75
1/32	.03	.762
	.03125	.7938
	.0315	.8
	.03543	.9
	.03937	1
	.04	1.016
3/64	.04687	1.191
	.04724	1.2
	.05	1.27
	.05512	1.4
	.05906	1.5
1/16	.06	1.524
	.06250	1.5875
	.06299	1.6
	.06693	1.7
	.07	1.778
	.07087	1.8
	.075	1.905
5/64	.07813	1.9844
	.07874	2
	.08	2.032
	.08661	2.2
	.09	2.286
	.09055	2.3
3/32	.09375	2.3812
	.09843	2.5
	.1	2.54
	.10236	2.6
7/64	.10937	2.7781
	.11811	3
1/8	.1250	3.175

INCHES		mm
FRACT.	DECIMALS	
	.13780	3.5
9/64	.14063	3.5719
	.150	3.810
5/32	.15625	3.9688
	.15748	4
11/64	.17188	4.3656
	.1750	4.445
	.17717	4.5
3/16	.18750	4.7625
	.19685	5
	.20	5.08
13/64	.20313	5.1594
	.21654	5.5
7/32	.21875	5.5562
	.2250	5.715
15/64	.23438	5.9531
	.23622	6
1/4	.250	6.35
	.25591	6.5
17/64	.26563	6.7469
	.275	6.985
	.27559	7
9/32	.28125	7.1438
	.29528	7.5
19/64	.29688	7.5406
	.30	7.62
5/16	.3125	7.9375
	.31496	8
21/64	.32813	8.3344
	.33465	8.5
11/32	.34375	8.7312
	.350	8.89
	.35433	9
23/64	.35938	9.1281
	.37402	9.5
3/8	.375	9.525
25/64	.39063	9.9219
	.39370	10
	.400	10.16
13/32	.40625	10.3188
	.41339	10.5
27/64	.42188	10.7156
	.43307	11
7/16	.43750	11.1125
	.450	11.430
	.45276	11.5
29/64	.45313	11.5094
15/32	.46875	11.9062
	.47244	12
31/64	.48438	12.3031
	.49213	12.5
1/2	.50	12.7
	.51181	13
33/64	.51563	13.0969
17/32	.53125	13.4938
	.53150	13.5
35/64	.54688	13.8906
	.550	13.970
	.55118	14
9/16	.56250	14.2875
	.57087	14.5
37/64	.57813	14.6844
	.59055	15

INCHES		mm
FRACT.	DECIMALS	
19/32	.59375	15.0812
	.600	15.24
39/64	.60938	15.4781
	.61024	15.5
5/8	.6250	15.875
	.62992	16
41/64	.64063	16.2719
	.64961	16.5
	.650	16.51
21/32	.65625	16.6688
	.66929	17
43/64	.67188	17.0656
11/16	.68750	17.4625
	.68898	17.5
	.700	17.78
45/64	.70313	17.8594
	.70866	18
23/32	.71875	18.2562
	.72835	18.5
47/64	.73438	18.6531
	.74803	19
3/4	.750	19.050
49/64	.76563	19.4469
	.76772	19.5
25/32	.78125	19.8438
	.78740	20
51/64	.79688	20.2406
	.800	20.320
	.80709	20.5
13/16	.81250	20.6375
	.82677	21
53/64	.82813	21.0344
27/32	.84375	21.4312
	.84646	21.5
	.850	21.590
55/64	.85938	21.8281
	.86614	22
7/8	.875	22.225
	.88583	22.5
57/64	.89063	22.6219
	.900	22.860
	.90551	23
29/32	.90625	23.0188
59/64	.92188	23.4156
	.92520	23.5
15/16	.93750	23.8125
	.94488	24
	.950	24.130
61/64	.95313	24.2094
	.96457	24.5
31/32	.96875	24.6062
	.98425	25
63/64	.98438	25.0031
1	1.00000	25.4
	1.06299	27
	1.10240	28
	1.18110	30
1 ¼	1.250	31.75
	1.29921	33
	1.3780	35
	1.41732	36
1 ½	1.500	38.1
	1.53543	39

INCHES		mm
FRACT.	DECIMALS	
	1.57480	40
	1.65354	42
1 ¾	1.750	44.45
	1.77170	45
	1.88976	48
	1.96850	50
2	2.000	50.8
	2.04724	52
	2.16540	55
	2.20472	56
2 ¼	2.250	57.15
	2.36220	60
2 ½	2.500	63.5
	2.51968	64
2 ¾	2.750	69.85
	2.83464	72
	2.95280	75
3	3.000	76.2
	3.14960	80
3 ½	3.500	88.9
	3.54330	90
	3.9370	100
4	4.000	101.6
	4.33070	110
4 ½	4.500	114.3
	4.72440	120
5	5.000	127
	5.51180	140
	5.90550	150
6	6.000	152.4
	6.29920	160
	7.08660	180
	7.8740	200
8	8.000	203.2
	8.66140	220
	9.44880	240
	9.84250	250
10	10.000	254
	10.23620	260
	11.02360	280
	11.8110	300
1 Foot	12.000	304.8
	12.59840	320
	13.38580	340
	13.77950	350
	14.17320	360
	14.96060	380
	15.7480	400
16	16.000	406.4
	17.71650	450
	19.6850	500
20	20.000	508
	23.6220	600
2 Feet	24.000	609.6
3 Feet	36.000	914.4
	39.370	1 Metre
4 Feet	48.000	1,219.2
5 Feet	60.000	1,524
6 Feet	72.000	1,828.8
	78.740	2 Metres
8 Feet	96.000	2,438.4
	118.110	3 Metres
	196.850	5 Metres





THE WOODWARD CO.

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