AMCAN JUMAX INC.

Who we are

Amcan Jumax is the result of a merging between Boulons Jumax and Amcan Threaded Products, two successful companies well established, both with excellent reputations. The new entity is a bigger and stronger company with more resources, comprised of experienced and qualified labour and first class equipment and facilities.

Our head office, located in St-Hubert is spacious and functional. It includes our administrative departments, a well equipped assembly and machine shop and over 75 000 square feet of warehouse space. With the recent additions of our Edmonton, Mississauga, Vancouver and Greenfield NH branches, we are able to offer even greater service to both existing and new customers.
Despite this growth our core values remain the same. Customer satisfaction is our number one priority. We continue to promote innovative solutions and courteous fast service while distributing top quality products that meet and exceed industry requirements.

Recognized as a leader and stategic partner for structural bolt distribution in North America, Amcan Jumax is listening to its customers needs. Amcan Jumax offers quality products, innovative solutions, techical support and maintains a superior level of customer service.

Services

- We are able to manufacture various different anchor bolts or custom parts on request.
- We offer galvanization and other coating services.
- We currently own facilities to conduct tension and torque measurement.
- We offer our customers a variety of tools including wrenches, equipment for welding studs installation.

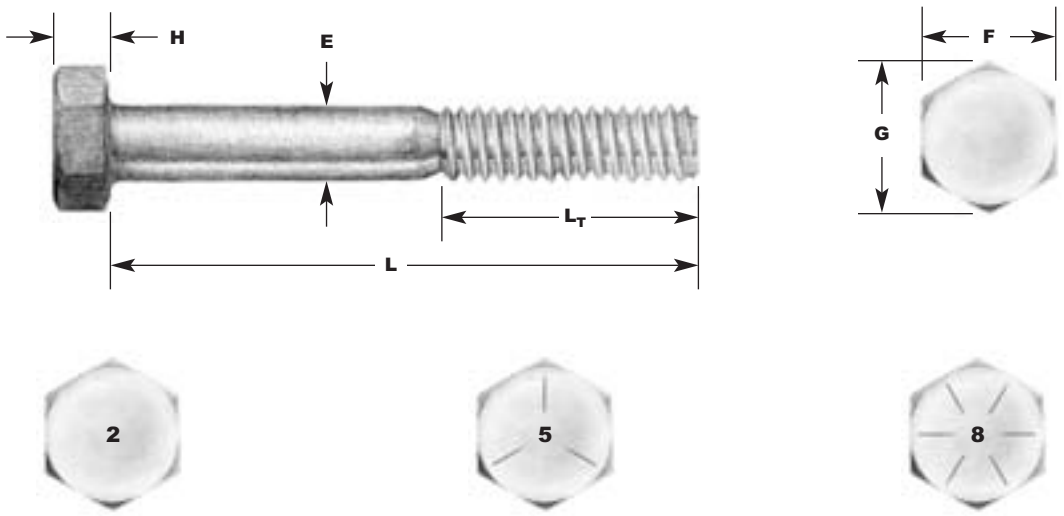
Contents

Hex Bolts
Grade 2, 5, 8

Tip: How to find the thread length of a bolt: Diameter of the bolt X 2 + 1/4 (up to 6 inches long)
Diameter of the bolt X 2 + 1/2 (over 6 inches)

Hex Bolts Grade 2, 5, 8

Head Markings and Dimensional Information



Dimensions of Hex Bolts grade 2, 5, 8

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

Available in grade 2 and 5 from 1/4” to 1 1/2” diameter in zinc, plain, and galvanized finishes, and in grade 8 from 1/4” to 1 1/2” diameter in plain and yellow zinc finishes.
Stainless Steel 304-316

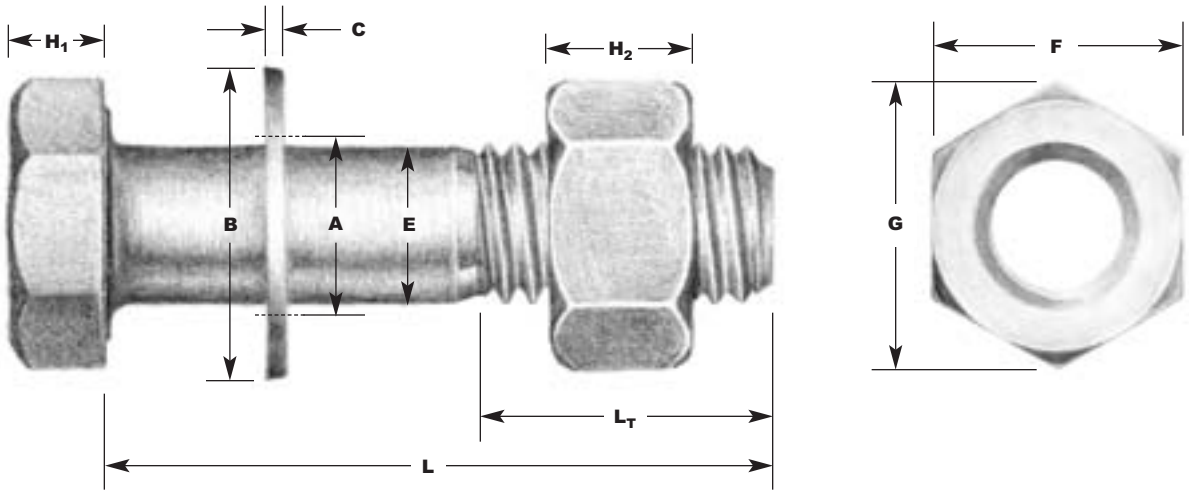
Phone Number: (450) 445-8888
Toll Free: 1-800-661-2658
Fax: (450) 445-0088

Heavy Hex Structural Bolts

A325 Type 1
A325 Type 3
A490 Type 1
A490 Type 3

Heavy Hex Head Structural Bolts and Heavy Hex Nuts

Dimensional Information



Dimensions of Heavy Hex Head Structural Bolts

Nominal Size in Inches	E		F			G		H_1			L_T
	Body Dia		Width Across Flats			Width Across Corners		Height			Thread Length
	Min	Max	Basic	Min	Max	Min	Max	Basic	Min	Max	Basic
1/2	0.482	0.515	**7/8**	0.850	0.875	0.969	1.010	5/16	0.302	0.323	**1.00**
5/8	0.605	0.642	**1 1/16**	1.031	1.062	1.175	1.227	25/64	0.378	0.403	**1.25**
3/4	0.729	0.768	**1 1/4**	1.212	1.250	1.383	1.443	15/32	0.455	0.483	**1.38**
7/8	0.852	0.895	**1 7/16**	1.394	1.438	1.589	1.660	35/64	0.531	0.563	**1.50**
1	0.976	1.022	**1 5/8**	1.575	1.625	1.796	1.876	39/64	0.591	0.627	**1.75**
1 1/8	1.098	1.149	**1 13/16**	1.756	1.812	2.002	2.093	11/16	0.658	0.718	**2.00**
1 1/4	1.223	1.277	**2**	1.938	2.000	2.209	2.309	25/32	0.749	0.813	**2.00**
1 3/8	1.345	1.404	**2 3/16**	2.119	2.188	2.416	2.526	27/32	0.810	0.878	**2.25**
1 1/2	1.470	1.531	**2 3/8**	2.300	2.375	2.622	2.742	15/16	0.902	0.974	**2.25**

Dimensions of Heavy Hex Structural Nuts A563

Nominal Size in Inches	F			G		H_2		
	Width Across Flats			Width Across Corners		Thickness		
	Basic	Min	Max	Min	Max	Basic	Min	Max
1/2	**7/8**	0.850	0.875	0.969	1.010	31/64	0.464	0.504
5/8	**1 1/16**	1.031	1.062	1.175	1.227	39/64	0.587	0.631
3/4	**1 1/4**	1.212	1.250	1.382	1.443	47/64	0.710	0.758
7/8	**1 7/16**	1.394	1.438	1.589	1.660	55/64	0.833	0.885
1	**1 5/8**	1.575	1.625	1.796	1.876	63/64	0.956	1.012
1 1/8	**1 13/16**	1.756	1.812	2.002	2.093	1 7/64	1.079	1.139
1 1/4	**2**	1.938	2.000	2.209	2.309	1 7/32	1.187	1.251
1 3/8	**2 3/16**	2.119	2.188	2.416	2.526	1 11/32	1.310	1.378
1 1/2	**2 3/8**	2.300	2.375	2.622	2.742	1 15/32	1.433	1.505

Available in plain, cadmium and galvanized finishes.

Phone Number: (450) 445-8888
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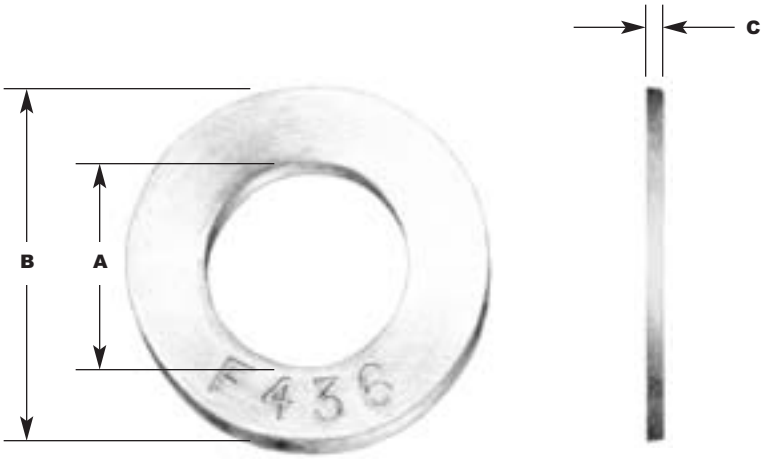
F436 Structural Washers

Dimensional Information



Dimensions of F436 Washers

Nominal Size in Inches	A	B	C	
	Inside Dia	Outside Dia	Thickness	
			Min	Max
1/2	17/32	1 1/16	0.097	0.177
5/8	11/16	1 5/16	0.122	0.177
3/4	13/16	1 15/32	0.122	0.177
7/8	15/16	1 3/4	0.136	0.177
1	1 1/8	2	0.136	0.177
1 1/8	1 1/4	2 1/4	0.136	0.177
1 1/4	1 3/8	2 1/2	0.136	0.177
1 3/8	1 1/2	2 3/4	0.136	0.177
1 1/2	1 5/8	3	0.136	0.177
1 3/4	1 7/8	3 3/8	0.178	0.280
2	2 1/8	3 3/4	0.178	0.280

Also stocking: 1 1/8” - 1 1/4” diameter, 5/16” thick.

Available in Type 1 and type 3.
Finish: Plain, zinc, galvanized, cadmium.

Tension-Torque

Tension-Torque of Hex Bolts

Body Dia	A325			A490		
	Ultimate Tensile Strength	Required Min. Bolt Tension*	Suggested Torque for Min. Bolt Tension	Ultimate tensile strength	Required Min. Bolt Tension*	Suggested Torque for Min. Bolt Tension
	LBS.	LBS.	FT.-LBS.	LBS.	LBS.	FT.-LBS.
1/2	17050	12000	79	21300	15000	98
5/8	27100	19000	155	33900	24000	195
3/4	40100	28000	275	50100	35000	345
7/8	55450	39000	448	69300	49000	565
1	72700	51000	670	90900	64000	840
1 1/8	80100	56000	825	114450	80000	1180
1 1/4	101700	71000	1165	145350	102000	1675
1 3/8	121300	85000	1535	173250	121000	2185
1 1/2	147500	103000	2025	210750	148000	2915

*Equal to 70% of specified min. tensile strength of bolts, rounded off to the nearest thousand pounds. Torque (ft.-lb.) for clean and oiled conditions. (K=D.15)

NOTE: These calculated torque values may give varying results in bolt tension, depending on the condition of the fastener components. To assure that the adequate bolt tension has been attained, it may be necessary to determine the exact torque with a bolt tension calibrator. The tables do not apply to hot galvanized bolts and nuts. Full certifications and rotational capacity testing available.

Important

"The torque values shown are ONLY a guide. Installation and inspection torques should be determined on a job-to-job basis applicable A.I.S.C. or C.I.S.C. recommended procedures."

Nut Rotation from Snug Tight Condition

Bolt Length	Disposition of Outer Faces of Bolted Parts		
(As measured from underside of head to extreme end of point)	Both faces normal to bolt axis	One face normal to bolt axis and other face sloped not more than 1:20 (bevel washer not used)	Both faces sloped not more than 1:20 from normal to bolt axis (bevel washer not used)
< or = 4 diameters	1/3 turn	1/2 turn	2/3 turn
Over 4 diameter but not exceeding 8 diameter	1/2 turn	2/3 turn	5/6 turn
Over 8 diameter but not exceeding 12 diameter	2/3 turn	5/6 turn	1 turn
Nut rotation is relative to bolt regardless of the element (nut or bolt) being turned. Tolerance on rotation: 30° (one-twelth turn) over or under. For 1/2 turn and less and 45° (one-eight turn) over or under for 2/3 turn or greater.			

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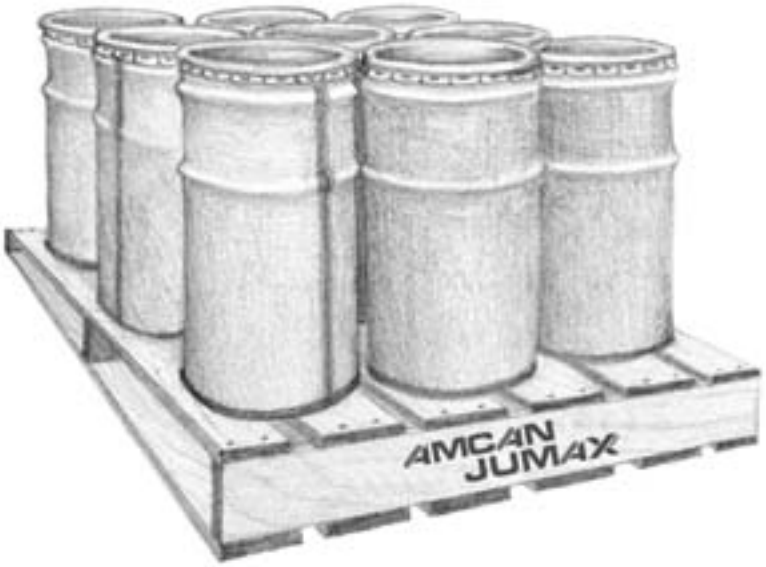
Keg Quantities and Weight



Heavy Hex Head Structural Bolts

Keg Quantities and Weight of A325 and A490 Heavy Hex Bolts

Length	Diameter															
	1/2				5/8				3/4				7/8			
	Assembly		Bolt only		Assembly		Bolt only		Assembly		Bolt only		Assembly		Bolt only	
	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100
1 1/4	900	19,9	1710	11,7	500	34,8	950	20,0	-	-	-	-	-	-	-	-
1 1/2	800	21,2	1560	12,8	500	37,0	900	21,7	340	56,7	650	33,9	-	-	-	-
1 3/4	750	22,5	1420	14,1	500	39,2	850	23,5	300	59,8	600	36,5	220	89,0	450	53,0
2	700	23,9	1290	15,5	450	41,3	825	25,6	300	62,5	550	39,0	200	93,2	425	56,6
2 1/4	650	25,3	1190	16,8	400	43,7	775	27,7	270	66,1	500	42,0	190	97,4	375	60,1
2 1/2	600	26,7	1100	18,2	400	45,6	725	29,8	260	69,2	475	45,0	180	101,7	350	64,2
2 3/4	550	28,1	1000	19,5	350	47,8	600	31,9	250	72,3	425	48,1	170	105,9	325	68,3
3	525	29,4	950	20,9	330	50,0	575	34,0	230	75,4	400	51,1	160	110,1	300	72,4
3 1/4	500	30,8	850	22,2	300	52,1	550	36,0	220	78,5	375	54,1	150	114,1	275	76,6
3 1/2	475	32,2	750	23,6	300	54,3	500	38,1	210	81,6	350	57,1	150	118,1	250	80,7
3 3/4	450	33,6	700	24,9	260	56,4	450	40,2	200	84,7	325	60,1	140	123,1	250	84,8
4	400	35,0	675	26,2	260	58,6	400	42,3	190	87,8	300	63,2	130	127,1	225	88,9
4 1/4	-	-	625	27,6	250	60,8	400	44,4	170	90,9	300	66,2	120	131,1	200	93,0
4 1/2	-	-	600	28,9	230	62,9	375	46,5	170	94,0	275	69,2	120	135,1	200	98,0
4 3/4	-	-	550	30,3	230	66,5	350	48,6	150	97,2	250	72,2	110	140,1	180	102,0
5	300	40,5	500	31,6	230	67,2	300	50,7	150	100,3	225	75,2	110	144,1	175	106,0
5 1/4	-	-	-	-	-	-	275	52,8	130	103,4	225	78,3	100	148,1	150	110,0
5 1/2	-	-	450	32,1	210	73,7	275	54,9	130	106,5	200	81,3	100	153,1	150	114,0
5 3/4	-	-	-	-	-	-	250	57,0	130	109,5	190	84,3	90	157,1	150	118,0
6	200	46,0	400	37,0	190	75,8	250	59,1	130	112,5	190	87,3	90	161,1	135	122,0
6 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 1/2	-	-	300	39,4	175	80,2	225	62,9	120	118,5	150	92,9	90	170,1	125	130,0
6 3/4	-	-	-	-	-	-	-	-	-	-			-	-	-	-
7	150	51,5	300	42,1	150	84,5	200	67,1	110	125,5	140	99,0	75	178,1	120	138,0
7 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 1/2	-	-	250	44,8	125	88,8	200	71,3	100	131,5	135	105,0	70	186,1	110	146,0
7 3/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	100	57,0	250	47,5	100	93,1	175	75,5	90	137,5	120	115,0	65	194,1	90	155,0
8 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 1/2	-	-	-	-	-	-	175	79,7	80	146,9	120	117,0	60	197,8	90	163,0
8 3/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	70	152,9	100	123,0	55	206,8	85	171,0
9 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 1/2	-	-	-	-	-	-	-	-	60	159,1	80	129,0	55	214,8	80	179,0
9 3/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	50	165,3	60	135,0	50	222,8	65	188,0

[1] Quantities are subject to change

[2] Approximate Weight

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Heavy Hex Head Structural Bolts

Keg Quantities and Weight of A325 and A490 Heavy Hex Bolts

Length	Diameter															
	1				1 1/8				1 1/4				1 1/2			
	Assembly		Bolt only		Assembly		Bolt only		Assembly		Bolt only		Assembly		Bolt only	
	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100	Qty	Lbs/100
1 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 1/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 3/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	150	130,6	300	78,8	-	-	-	-	-	-	-	-	-	-	-	-
2 1/4	140	133,3	275	83,4	100	178,3	-	-	80	234,1	-	-	-	-	-	-
2 1/2	140	139,3	250	88,0	100	185,3	-	-	80	243,0	-	-	-	-	-	-
2 3/4	130	144,3	225	94,0	100	192,5	-	-	75	251,1	-	-	-	-	-	-
3	130	150,3	225	99,0	90	199,0	170	128,0	70	260,0	130	167,0	-	412,0	-	262,0
3 1/4	120	155,3	200	104,0	90	206,0	160	134,0	70	268,0	125	175,0	-	423,0	-	273,0
3 1/2	110	160,3	175	110,0	85	213,0	135	141,0	65	277,0	110	183,0	-	436,0	-	286,0
3 3/4	110	166,3	175	115,0	85	220,0	135	148,0	65	286,0	100	192,0	-	448,0	-	298,0
4	100	171,3	175	120,0	80	227,0	125	155,0	60	294,0	100	200,0	-	461,0	-	311,0
4 1/4	90	177,3	150	126,0	80	234,0	125	162,0	60	303,0	95	209,0	-	473,0	-	323,0
4 1/2	90	182,3	150	131,0	70	241,0	115	168,0	55	312,0	90	217,0	-	485,0	-	335,0
4 3/4	85	188,3	130	137,0	70	248,0	110	175,0	55	320,0	85	225,0	-	498,0	-	348,0
5	85	193,3	130	142,0	65	255,0	105	182,0	50	329,0	85	234,0	-	510,0	-	360,0
5 1/4	80	199,3	125	147,0	60	262,0	100	189,0			-	-	-	523,0	-	373,0
5 1/2	80	205,3	110	153,0	60	269,0	90	196,0	45	346,0	75	251,0	-	535,0	-	385,0
5 3/4	70	210,3	105	158,0	55	276,0	-	-					-	547,0	-	397,0
6	70	216,3	105	163,0	55	283,0	85	209,0	40	363,0	70	267,0	-	560,0	-	410,0
6 1/4	-	-	-	-	50	290,0	-	-	-	-	-	-	-	-	-	-
6 1/2	65	227,3	100	173,0	50	297,0	75	222,0	35	381,0	65	283,0	-	585,0	-	435,0
6 3/4	-	-	-	-	50	304,0	-	-		-	-	-	-	-	-	-
7	60	238,3	90	184,0	45	311,0	70	235,0	30	398,0	55	300,0	-	609,0	-	459,0
7 1/4	-	-	-	-	40	318,2			-	-			-	-	-	-
7 1/2	55	249,3	80	195,0	40	325,3	65	249,0	30	415,0	50	317,0	-	634,0	-	484,0
7 3/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	50	260,3	75	206,0	35	339,0	60	263,0	30	432,0	50	333,0	-	659,0	-	509,0
8 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 1/2	50	264,8	70	216,0	30	345,0	40	276,0	30	449,0	40	350,0	-	684,0	-	534,0
8 3/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	40	275,8	65	227,0	30	367,3	40	290,0	15	473,0	40	367,0	-	709,0	-	559,0
9 1/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 1/2	40	286,8	50	241,5	25	375,0	40	303,0	15	491,0	40	384,0	-	715,0	-	565,0
9 3/4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	30	297,8	50	249,0	25	395,3	40	317,0	15	505,0	40	408,8	-	739,0	-	589,0

1 1 Quantities are subject to change

2 2 Approximate Weight

Tension Control Bolts

A325 and A490 Tension Control Bolts

Head Markings and Dimensional Information

Head Markings

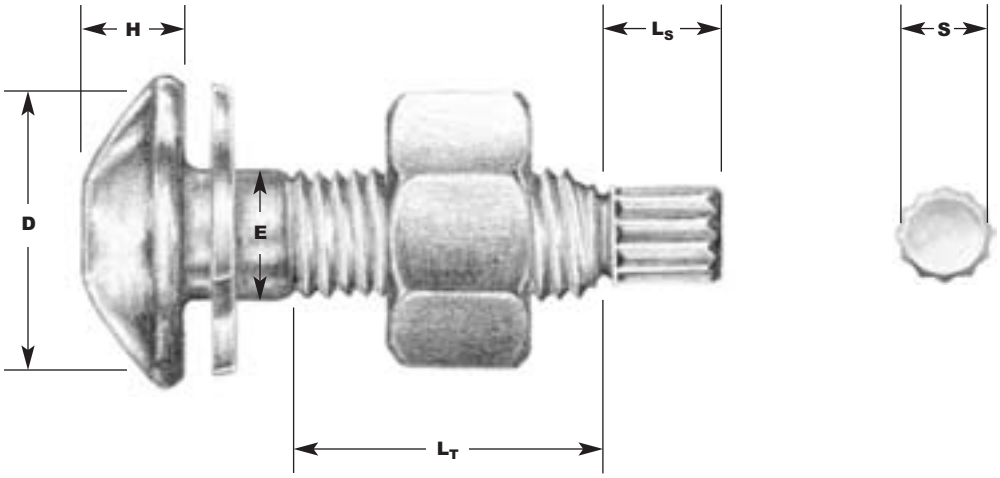
A325 Type 1

A325 Type 3

A490 Type 1

A490 Type 3

Dimensional Information

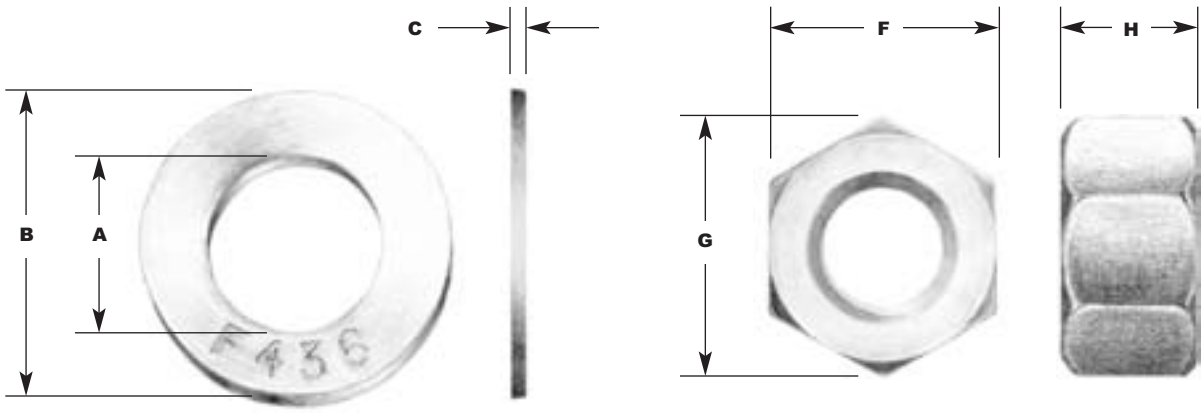


Dimensions of Tension Control Bolts

Nominal Size in Inches	E		D	H			L_T	L_S	S
	Body Dia		Bearing Face	Height			Thread Length	Spline Length	Width Across Flats
	Min	Max	Min	Basic	Min	Max	Basic	Basic	Basic
5/8	0.605	0.642	1.102	25/64	0.378	0.403	**1.25**	0.60	0.43
3/4	0.729	0.768	1.338	15/32	0.455	0.483	**1.38**	0.65	0.53
7/8	0.852	0.895	1.535	35/64	0.531	0.563	**1.50**	0.72	0.61
1	0.976	1.022	1.771	39/64	0.591	0.627	**1.75**	0.80	0.70
1 1/8	1.098	1.149	1.991	11/16	0.658	0.718	**2.00**	0.90	0.80

A325 and A490 Tension Control Bolts

Dimensional Information



Dimensions of F436 Washers and Hex Nuts

Nominal Size in Inches	A	B	C		F			G		H		
	Inside Dia	Outside Dia	Thickness		Width Across Flats			Width Across Corners		Thickness		
			Min	Max	Basic	Min	Max	Min	Max	Basic	Min	Max
5/8	11/16	1 5/16	0.122	0.177	**1 1/16**	1.031	1.062	1.175	1.227	39/64	0.587	0.631
3/4	13/16	1 15/32	0.122	0.177	**1 1/4**	1.212	1.250	1.382	1.443	47/64	0.710	0.758
7/8	15/16	1 3/4	0.136	0.177	**1 7/16**	1.394	1.438	1.589	1.660	55/64	0.833	0.885
1	1 1/8	2	0.136	0.177	**1 5/8**	1.575	1.625	1.796	1.876	63/64	0.956	1.012
1 1/8	1 1/4	2 1/4	0.136	0.177	**1 13/16**	1.756	1.812	2.002	2.093	1 7/64	1.079	1.139

Washer Requirements

Tension Control Bolts have a geometry which provides a bearing circle on the head with a diameter equal to or greater than the diameter of hardened washers meeting the requirements ASTM F436. This bearing circle eliminates the need for a second washer under the head of an A490 bolt when installed in material having a specified yield point less than 40 ksi. It further eliminates the requirement for a second washer on A325 bolts of any diameter and A490 bolts equal to or less than 1 inch in diameter when installed in an oversize or short slotted hole in an outer ply.

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A325 and A490 Tension Control Bolts

Scope

This specification covers material, inspection and testing of Tension Control Bolts. It is intended to be used as a supplement to the requirements of the Specifications for Structural Joints using ASTM A325 or A490 Bolts, issued by the Research Council on Structural Connections of the Engineering Foundation.

Bolts, Nuts, and Washers

Bolts Specifications

Bolts conform to the current edition of the Specifications of the American Society for Testing and Materials A325 And A490.*

Nut Specifications

Nuts shall conform to the current ASTM specifications and be mated with structural bolts according to the "Standard for Tension ..." table below.

Standard for Tension Control Bolts and Nut Combinations

A325 Bolt Type	Nut Specification, Grade, and Finish
1, plain (uncoated)	A563 DH, plain
1, galvanized	D563 DH, galvanized
3, plain	D563 DH3, plain

A490 Bolt Type	Nut Specification, Grade, and Finish
1, plain	A563 DH, plain

Washer Specifications

Flat circular washers conform to the current version of ASTM F436.

Optional Coating

Mechanical galvanizing is only used for ASTM B695 class 50. All nuts will be overtapped by the minimum amount required for fastener assembly and will be coated with a lubricant containing a visible dye.

Quality Assurance

Tension Control Bolts are assembled with a nut and washer. Each component of the assembly must conform to its individual standard. A set number is assigned to each assembly with three component lot numbers. When the lot of any of the components changes, a new set number is issued. Prior to assembly, the components are tested as a set and must meet the tension requirements of ASTM A325 or A490. Sets are also tested for rotational-capacity in accordance with current Federal Highway Administration specifications.* All test results are recorded for the set certification. Set certifications are provided with every shipment. Components of galvanized assemblies are further tested for coating thickness. Every shipping container is identified with the set number of the components it contains.

* ASTM A325 and A490 are component specifications. Tension Control Bolts are calibrated sets consisting of bolt, nut and washer. The button head Tension Control Bolt differ dimensionally from the component outlined in A325 and A490. Further, there is a rotational capacity requirement for A325 mechanically galvanized bolts. We recognize the importance of this test to prove nut stripping strength and fastener ductility. However, this test method outlines a head capture situation that is not applicable to a button head. We conduct rotational capacity tests, without head capture, to current FHWA specifications on all A325 Tension Control Bolts. FHWA requirements meet or exceed those of ASTM. This test evaluates nut stripping strength and fastener ductility without invalidating the calibration or operation of the Tension Control Bolt assembly. There is currently an ASTM committee working to resolve these minor discrepancies by creating a unique specification for this type of fastener.

A325 and A490 Tension Control Bolts

Installation

Normal installation of Tension Control Bolts requires a special electric wrench. This wrench with an inner and outer socket engages both the bolt tip and the nut, driving one against the other. Friction under the bolt head causes the bolt to remain stationary while the nut is driven against the bolt tip. When the two counter-forces become equal, torsional shear of the tip occurs and the fastener system has achieved the proper tension. The sheared bolt tip is retained in the wrench and should be ejected in a safe practical manner.

Bolts shall be installed in all holes of the connection, and initially brought to a snug tight condition. All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final tip-shear. In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening prior to final installation (tip-shear).

It should be recognized that the Tension Control Bolt is a structural bolt. The wrench significantly faciliates the installation procedure, but any of the standard installation procedures outlined in AISC must be considered viable.

Upon installation (tip-shear), bolts will be tensioned at or above the values in the “Fastener Tension Required...” table below. Tension Control Bolts may reach tensions substantially greater than the values given in that table, but this shall not be cause of rejection. The length of bolts shall be such that the end of the bolt will be flush with or outside the face of the nut when properly installed.

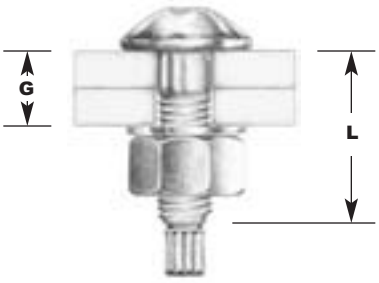
Fastener Tension Required for Slip-critical Connections and Connections Subject to Direct Tension

Nominal Size in Inches	Minimum Tension[1] in 1000’s of Pounds (kips)	
	A325	A490
5/8	19	24
3/4	28	35
7/8	39	49
1	51	64
1 1/8	56	80

1 Equal to 70 percent specified minimum tensile strength of bolts (as specified in ASTM specifications for tests of full size A325 and A490 bolts with UNC threads loaded in axial tension), plus the additional 5 percent required for installation by AISC, rounded to the nearest kip.

Determination of Bolt Length

Bolt length is the distance measured from the bearing plane to the center of the shear groove.



Determination of Bolt Length

Nominal Size in Inches	Add This Value to Grip (G) to Determine Correct Bolt Length (L)		
	No washer	1 washer	2 washers
5/8	7/8	1 1/32	1 3/16
3/4	1	1 5/32	1 5/16
7/8	1 1/8	1 9/32	1 7/16
1	1 1/4	1 13/32	1 9/16
1 1/8	1 3/8	1 21/32	1 13/16

Domestic Length Tolerance	3/4 Dia Through 1 1/8 Dia
Minus 0.000	Plus 0.079

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A325 and A490 Tension Control Bolts

Testing

Current AISC and FHWA specifications require that bolts be tested for proper tension in the field, prior to installation. The FHWA additionally requires that A325 bolts be tested for rotational-capacity in the field. Tension tests are required on not less than three assemblies of each unique set. Rotational-capacity tests are required on two assemblies per unique set. These tests can be performed at the same time to save both time and material.

Equipment Required

Calibrated Skidmore-Wilhelm tension testing device or equivalent with appropriate front plates and non-slotted rear spacers. Front plates should be marked off in 120 degrees sections. In order to properly simulate field conditions, it is imperative that bolt heads are captured during testing. Also required: a torque wrench and a shear wrench.

Procedure

1. Install the bolt, washer, and nut in the Skidmore using spacers to ensure full nut engagement, leaving three to five threads between the nut and the bolt head. The washer must be used under the nut component.

2. Manually snug the assembly to 15% of the specified test installation minimum tension in the “Fastener Tension Required for...” table of page 18.

3. Match mark the nut to the vertical stripe on the front plate of the Skidmore for rotation indication.

4. Using the wrench, install the bolt through tip-shear and record the tension indicated on the gauge of the Skidmore. This value must be equal to or greater than the installation tension listed in the “Fastener Tension Required for...” table of page 18.

5. Take a record torque reading with torque wrench. Torque must be measured with the nut in motion.

6. Further tighten the nut to the rotation listed in the “Required Rotation” table below. The rotation is measured from the initial marking in step 3. Record the tension. Assemblies which encounter stripping or fracture prior to this rotation fail the test.

Required Rotation

Bolt Length	4x bolt diameter or less	Greater than 4x but no more than 8x bolt diameter	Greater than 8x bolt diameter
Required Rotation	240 degrees	360 degrees	420 degrees

The bolt tension recorded in step 6 must be equal to or greater than values in the “Minimum Tension...” table below. Assemblies which do not meet tension have failed the test.

Minimum Tension After Rotation

Nominal Size in Inches	Tension A325 in kips	Tension A490 in kips
5/8	22	28
3/4	32	40
7/8	45	56
1	59	74
1 1/8	64	92

Loosen and remove nut. Examine the threads on the nut and bolt. No signs of thread shear failure or stripping of the bolt should be evident. Assemblies which have evidence of stripping have failed the test.

Calculate and record the value of 0.25x the tension in pounds measured in step 4 the bolt diameter in feet. The torque recorded in step 5 must be equal to or less than this calculated value. Assemblies with torque value exceeding this calculated value have failed the test.

Repeat this procedure for the second bolt assembly. It is only necessary to repeat steps 1 through 4 for the third bolt assembly to verify the installation tension.

Inspection

Inspection is normally visual for tip-shear only. However, it is sometimes necessary or desirable to perform an arbitrary inspection on previously installed bolts.

Job Inspection Torque

Equipment Required

Calibrated Skidmore-Wilhelm tension testing device or equivalent with appropriate front plates and non-slotted rear spacers. Front plates should be marked off in 120 degree sections. In order to properly simulate field conditions, it is imperative that the bolt heads are not captured during testing. Also required: a torque wrench.

Procedure

1. Install the bolt, washer, and nut in the Skidmore using spacers to ensure full nut engagement, leaving three to five threads between the nut and the bolt head. The washer must be used under the nut component.

2. Tension the assembly to the installation tension listed in the “Fastener Tension Required for...” table of page 18.

3. Take a record torque reading with the torque wrench.

Repeat this procedure on a total of five assemblies per unique set. The job inspection torque shall be taken as the average of three values thus determined after rejecting the high and low values.

Important

Handling and Storage

The following information, from the AISC/RCSC “Specification for Structural Joints using ASTM A325 or A490 Bolts”, is applicable to all high strength fasteners, including Tension Control Bolts: “Fasteners shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protected storage. Fasteners not used shall be returned to protected storage at the end of the shift. Fasteners shall not be cleaned of lubricant that is present as-delivered condition.” The last point is very important for Tension Control Bolts. The lubrication condition on the fasteners cannot be modified (That is: never clean, strip, or add additional lubrication to the product). Opened cans should be stored indoors, protected from the elements, to prevent environmental contamination (rain, dirt, rust, etc.).

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A325 and A490 Tension Control Bolts

Keg Quantities and Weight of Assembled Tension Control Bolts

Length	Diameter								
	5/8			3/4			7/8		
	Keg Qty[1]	Weight[2] per 100	Price	Keg Qty[1]	Weight[2] per 100	Price	Keg Qty[1]	Weight[2] per 100	Price
1 1/2	500	40.00		-	-		-	-	
1 3/4	470	43.00		300	63.00		-	-	
2	450	45.00		280	67.00		200	102.00	
2 1/4	410	47.00		270	70.00		190	106.00	
2 1/2	380	49.00		250	73.00		180	111.00	
2 3/4	-	-		250	76.00		160	115.00	
3	-	-		220	79.00		155	119.00	
3 1/4	-	-		210	85.00		150	123.00	
3 1/2	-	-		200	88.00		140	128.00	
3 3/4	-	-		200	91.00		140	132.00	
4	-	-		170	94.00		140	136.00	
4 1/4	-	-		170	97.00		130	141.00	
4 1/2	-	-		170	100.00		120	145.00	
4 3/4	-	-		160	103.00		120	149.00	
5	-	-		150	106.00		110	153.00	
5 1/4	-	-		-	-		-	-	
5 1/2	-	-		150	113.00		100	162.00	
5 3/4	-	-		-	-		-	-	
6	-	-		140	118.00		100	170.00	
6 1/4	-	-		-	-		-	-	
6 1/2	-	-		-	-		80	185.00	
6 3/4	-	-		-	-		-	-	
7	-	-		-	-		70	194.00	
7 1/4	-	-		-	-		-	-	
7 1/2	-	-		-	-		70	202.00	
7 3/4	-	-		-	-		-	-	
8	-	-		-	-		60	209.00	
8 1/4	-	-		-	-		-	-	
8 1/2	-	-		-	-		-	-	
8 3/4	-	-		-	-		-	-	
9	-	-		-	-		-	-	
9 1/4	-	-		-	-		-	-	
9 1/2	-	-		-	-		-	-	
9 3/4	-	-		-	-		-	-	
10	-	-		-	-		-	-	

Cont. next page

1 Quantities are subject to change

2 Approximate Weight

A325 and A490 Tension Control Bolts

Keg Quantities and Weight of Assembled Tension Control Bolts

Length	Diameter					
	1			1 1/8		
	Keg Qty[1]	Weight[2] per 100	Price	Keg Qty[1]	Weight[2] per 100	Price
1 1/2	-	-		-	-	
1 3/4	-	-		-	-	
2	-	-		-	-	
2 1/4	140	143.00		-	-	
2 1/2	130	149.00		80	217.00	
2 3/4	130	154.00		80	224.00	
3	120	160.00		80	232.00	
3 1/4	120	166.00		70	238.00	
3 1/2	110	171.00		70	245.00	
3 3/4	110	177.00		70	252.00	
4	100	183.00		70	260.00	
4 1/4	100	188.00		60	267.00	
4 1/2	100	194.00		60	273.00	
4 3/4	90	200.00		60	280.00	
5	90	205.00		60	288.00	
5 1/4	-	-		-	-	
5 1/2	80	217.00		50	302.00	
5 3/4	-	-		-	-	
6	80	228.00		50	316.00	
6 1/4	-	-		-	-	
6 1/2	60	251.00		50	330.00	
6 3/4	-	-		-	-	
7	50	262.00		40	344.00	
7 1/4	-	-		-	-	
7 1/2	50	273.00		40	358.00	
7 3/4	-	-		-	-	
8	50	288.00		30	372.00	
8 1/4	-	-		-	-	
8 1/2	40	305.00		30	386.00	
8 3/4	-	-		-	-	
9	35	320.00		30	400.00	
9 1/4	-	-		-	-	
9 1/2	35	335.00		30	416.00	
9 3/4	-	-		-	-	
10	-	-		-	-	

1 Quantities are subject to change

2 Approximate Weight

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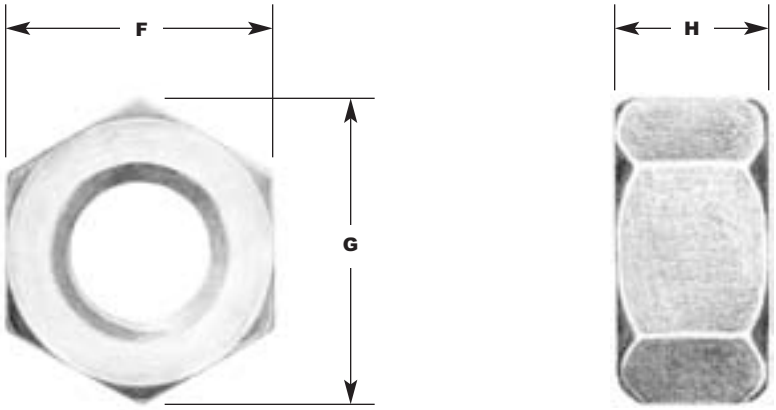
Nuts

Hex Nuts

Dimensional Information



Dimensions of Hex Nuts

Nominal Size in Inches	F			G		H		
	Width Across Flats			Width Across Corners		Thickness		
	Basic	Min	Max	Min	Max	Basic	Min	Max
1/4	7/16	0.428	0.438	0.488	0.505	7/32	0.212	0.226
5/16	1/2	0.489	0.500	0.557	0.577	17/64	0.258	0.273
3/8	9/16	0.551	0.562	0.628	0.650	21/64	0.320	0.337
7/16	11/16	0.675	0.688	0.768	0.794	3/8	0.365	0.385
1/2	3/4	0.736	0.750	0.840	0.866	7/16	0.427	0.448
9/16	7/8	0.861	0.875	0.982	1.010	31/64	0.473	0.496
5/8	15/16	0.922	0.938	1.051	1.083	35/64	0.535	0.559
3/4	1 1/8	1.088	1.125	1.240	1.299	41/64	0.617	0.665
7/8	1 5/16	1.269	1.312	1.447	1.516	3/4	0.724	0.776
1	1 1/2	1.450	1.500	1.653	1.732	55/64	0.831	0.887
1 1/8	1 11/16	1.631	1.688	1.859	1.949	31/32	0.939	0.999
1 1/4	1 7/8	1.812	1.875	2.066	2.165	1 1/16	1.030	1.094
1 3/8	2 1/16	1.994	2.062	2.273	2.382	1 11/64	1.138	1.206
1 1/2	2 1/4	2.175	2.250	2.480	2.598	1 9/32	1.245	1.317

Available in grade 2, 5, 8, Stainless Steel, zinc, zinc yellow, cadmium, hot dip galvanized oversized.

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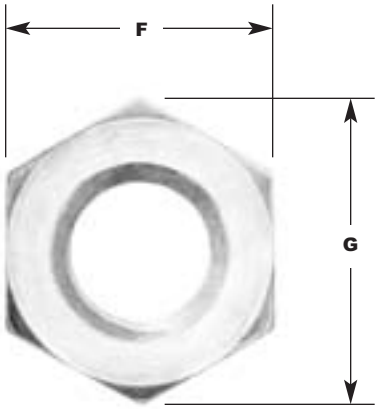
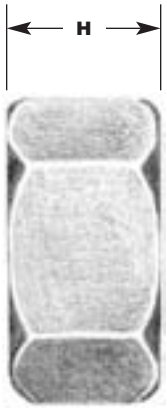
Heavy Hex Structural Nuts
ASTM A563 or 194 gr. 2H

Dimensional Information





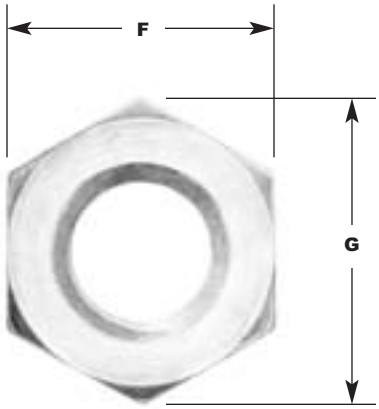
Dimensions of Heavy Hex Structural Nuts

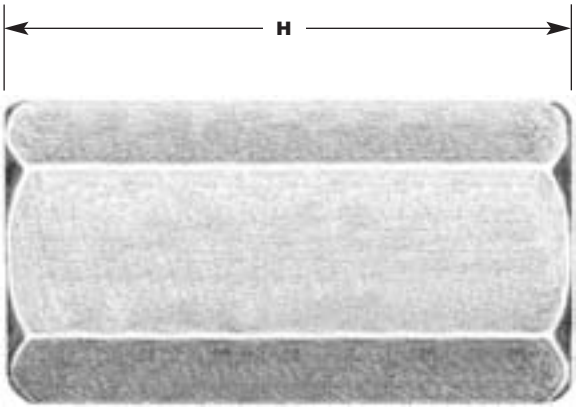
Nominal Size in Inches	F			G		H		
	Width Across Flats			Width Across Corners		Thickness		
	Basic	Min	Max	Min	Max	Basic	Min	Max
1/2-13	7/8	0.850	0.875	0.969	1.010	31/64	0.464	0.504
5/8-11	1 1/16	1.031	1.062	1.175	1.227	39/64	0.587	0.631
3/4-10	1 1/4	1.212	1.250	1.382	1.443	47/64	0.710	0.758
7/8-9	1 7/16	1.394	1.438	1.589	1.660	55/64	0.833	0.885
1-8	1 5/8	1.575	1.625	1.796	1.876	63/64	0.956	1.012
1 1/8-7 or 8	1 13/16	1.756	1.812	2.002	2.093	1 7/64	1.079	1.139
1 1/4-7 or 8	2	1.938	2.000	2.209	2.309	1 7/32	1.187	1.251
1 3/8-6 or 8	2 3/16	2.119	2.188	2.416	2.526	1 11/32	1.310	1.378
1 1/2-6 or 8	2 3/8	2.300	2.375	2.622	2.742	1 15/32	1.433	1.505
1 3/4-5 or 8	2 3/4	2.662	2.750	3.035	3.175	1 23/32	1.679	1.759
2-4 1/2 or 8	3 1/8	3.025	3.125	3.449	3.608	1 31/32	1.925	2.013
2 1/4-4 or 8	3 1/2	3.388	3.500	3.862	4.041	2 13/64	2.155	2.251
2 1/2-4 or 8	3 7/8	3.750	3.875	4.275	4.474	2 29/64	2.401	2.505

Available in grade C, C3, DH, DH3, DH galvanized oversized, 2H, plain, galvanized oversized

Hex Coupling Nuts

Dimensional Information





Dimensions of Hex Coupling Nuts

Nominal Size in Inches	F			G		H		
	Width Across Flats			Width Across Corners		Thickness		
	Basic	Min	Max	Min	Max	Basic	Min	Max
1/4	3/8	0.365	0.375	0.416	0.433	3/4	0.74	0.76
5/16	1/2	0.489	0.500	0.557	0.577	15/16	0.93	0.95
3/8	9/16	0.551	0.562	0.628	0.650	1 1/8	1.11	1.13
7/16	11/16	0.675	0.688	0.769	0.794	1 5/16	1.30	1.32
1/2	3/4	0.736	0.750	0.839	0.866	1 1/2	1.49	1.51
9/16	7/8	0.861	0.875	0.981	1.010	1 11/16	1.67	1.70
5/8	15/16	0.922	0.938	1.051	1.083	1 7/8	1.86	1.89
3/4	1 1/8	1.088	1.125	1.240	1.299	2 1/4	2.22	2.27
7/8	1 5/16	1.269	1.312	1.447	1.516	2 5/8	2.65	2.60
1	1 1/2	1.450	1.500	1.653	1.732	3	2.97	3.03
1 1/8	1 11/16	1.631	1.688	1.859	1.949	3 3/8	3.34	3.40
1 1/4	1 7/8	1.812	1.875	2.066	2.165	3 3/4	3.71	3.78
1 3/8	2 1/16	1.994	2.062	2.273	2.382	4 1/8	4.09	4.16
1 1/2	2 1/4	2.175	2.250	2.480	2.598	4 1/2	4.46	4.54

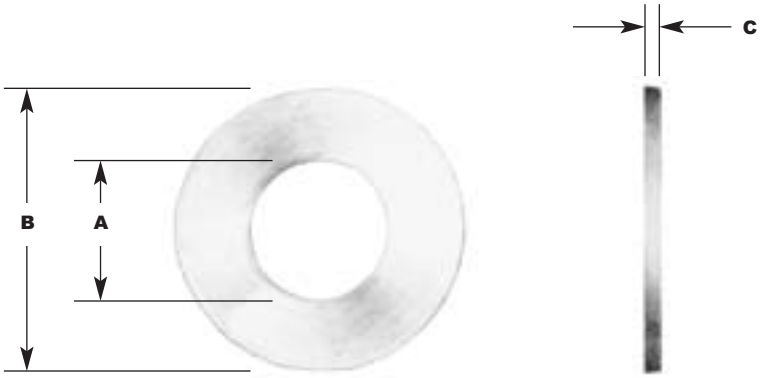
Available in grade 2, 5, 8, plain, zinc, hot dip galvanized oversized.

Phone Number: (450) 445-8888
Toll Free: 1-800-661-2658
Fax: (450) 445-0088

Washers

U.S.S. Flat Washers

Dimensional Information



Dimensions of U.S.S. Flat Washers

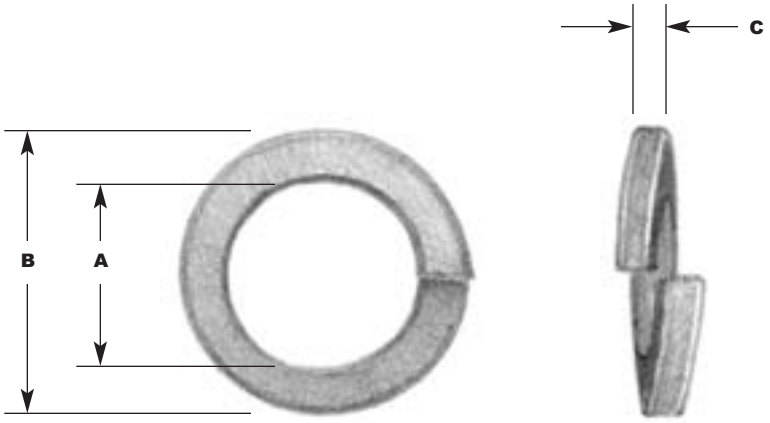
Bolt Diameter in Inches	A	B	C		Weight per 100 pieces
	Inside Dia	Outside Dia	Thickness		
			No.	Inches	
1/8	3/16	7/16	18	3/64	0.18
3/16	1/4	9/16	18	3/64	0.34
1/4	5/16	3/4	16	1/16	0.62
5/16	3/8	7/8	14	5/64	1.04
3/8	7/16	1	14	5/64	1.34
7/16	1/2	1 1/4	13	3/32	2.62
1/2	9/16	1 3/8	12	7/64	3.66
9/16	5/8	1 1/2	12	7/64	4.33
5/8	11/16	1 3/4	10	9/64	7.75
5/8	3/4	1 3/4	10	9/64	7.48
3/4	13/16	2	10	9/64	10.00
3/4	7/8	2	9	5/32	10.76
7/8	15/16	2 1/4	9	5/32	13.92
7/8	1	2 1/4	9	5/32	13.52
1 S	1 1/16	2 1/2	9	5/32	17.04
1 L	1 1/8	2 1/2	9	5/32	16.59
1 1/8 S	1 3/16	2 3/4	9	5/32	20.47
1 1/8 L	1 1/4	2 3/4	9	5/32	19.97
1 1/4 S	1 5/16	2 3/4	9	5/32	19.43
1 1/4 L	1 3/8	3	9	5/32	23.66
1 3/8	1 1/2	3 1/4	9	5/32	27.66
1 1/2 S	1 9/16	3 1/4	8	11/64	29.72
1 1/2 L	1 5/8	3 1/2	8	11/64	35.16
1 5/8	1 3/4	3 3/4	8	11/64	40.25
1 3/4 S	1 13/16	3 3/4	7	3/16	43.01
1 3/4 L	1 7/8	4	7	3/16	49.83
2 S	2 1/16	4 1/4	7	3/16	55.11
2 L	2 1/8	4 1/2	7	3/16	62.80

Available in plain, zinc, hot dip galvanized and stainless steel finishes.

Phone Number: (450) 445-8888
Toll Free: 1-800-661-2658
Fax: (450) 445-0088

Lock Washers

Dimensional Information



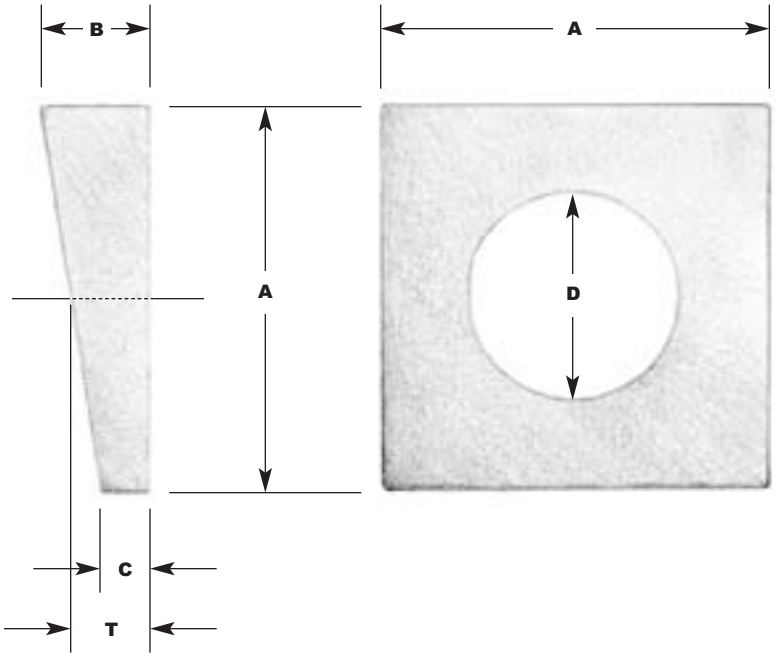
Dimensions of Lock Washers

Nominal Size in Inches	A	B	C	
	Inside Dia	Outside Dia	Thickness	
			Min	Max
1/2	17/32	1 1/16	0.097	0.177
5/8	11/16	1 5/16	0.122	0.177
3/4	13/16	1 15/32	0.122	0.177
7/8	15/16	1 3/4	0.136	0.177
1	1 1/8	2	0.136	0.177
1 1/8	1 1/4	2 1/4	0.136	0.177
1 1/4	1 3/8	2 1/2	0.136	0.177
1 3/8	1 1/2	2 3/4	0.136	0.177
1 1/2	1 5/8	3	0.136	0.177
1 3/4	1 7/8	3 3/8	0.178	0.280
2	2 1/8	3 3/4	0.178	0.280

We stock heavy duty lockwashers for tower 5/8” and 3/4”.
Available in plain, zinc, hot dip galvanized and stainless steel finishes.

Beveled Washers

Dimensional Information



Dimensions of Beveled Washers

Bolt Diameter	Malleable Iron					F436				
	A	B	C	T	D	A	B	C	T	D
Tolerance	±0.03	±0.03	±0.03	Nom	±0.03	±0.03	+0.02 -0.03	±0.03	Nom	+0.03 -0.01
1/4	0.69	0.22	0.09	0.16	0.31	0.88	0.26	0.12	0.19	0.28
5/16	1.00	0.31	0.16	0.23	0.38	0.88	0.26	0.12	0.19	0.34
3/8	1.25	0.34	0.12	0.23	0.44	0.88	0.26	0.12	0.19	0.41
1/2	1.25	0.34	0.12	0.23	0.56	1.75	0.45	0.16	0.31	0.53
5/8	1.50	0.38	0.12	0.25	0.69	1.75	0.45	0.16	0.31	0.69
3/4	1.50	0.44	0.19	0.31	0.81	1.75	0.45	0.16	0.31	0.81
7/8	2.00	0.56	0.22	0.39	0.94	1.75	0.45	0.16	0.31	0.94
1	2.00	0.56	0.22	0.39	1.06	1.75	0.45	0.16	0.31	1.12
1 1/8	2.25	0.62	0.25	0.44	1.25	2.25	0.50	0.12	0.31	1.25
1 1/4	2.25	0.72	0.31	0.52	1.38	2.25	0.50	0.12	0.31	1.38
1 3/8	2.75	0.78	0.31	0.55	1.50	2.25	0.50	0.12	0.31	1.50
1 1/2	3.00	0.81	0.31	0.56	1.62	2.25	0.50	0.12	0.31	1.62

Available in plain and hot dip galvanized finishes.

Phone Number: (450) 445-8888
Toll Free: 1-800-661-2658
Fax: (450) 445-0088

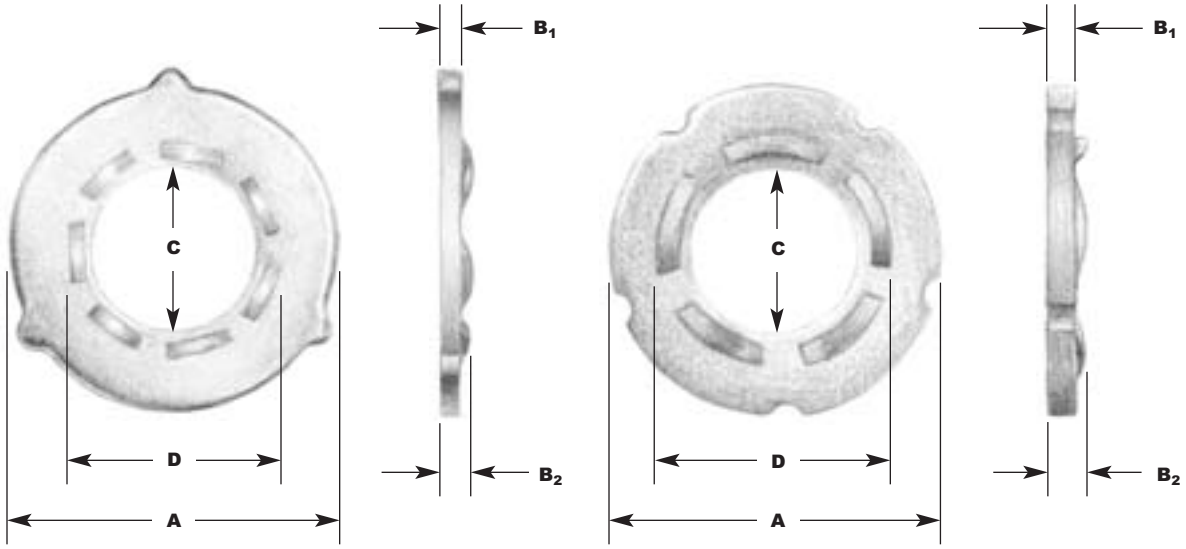
Direct Tension Indicator Washers

Note: Parts may vary according to MFG.

Direct Tension Indicator Washers

Available in: classic & squirter type

Dimensional Information



Dimensions of Direct Tension Indicator Washers

Nominal Size in Inches	A325*				A490				All Types		
	A		B		A		B		C		D
	Outside Dia		Thickness		Outside Dia		Thickness		Inside Dia		Protrusion Tangential Diameter
	Min	Max	B_1	B_2	Min	Max	B_1	B_2	Min	Max	
1/2	1.167	1.187	0.104	0.180	1.355	1.375	0.104	0.180	0.523	0.527	0.788
5/8	1.355	1.375	0.126	0.220	1.605	1.625	0.126	0.220	0.654	0.658	0.956
3/4	1.605	1.625	0.126	0.230	1.730	1.750	0.142	0.240	0.786	0.790	1.125
7/8	1.855	1.875	0.142	0.240	1.980	2.000	0.158	0.260	0.917	0.921	1.294
1	1.980	2.000	0.158	0.270	2.230	2.250	0.158	0.270	1.048	1.052	1.463
1 1/8	2.230	2.250	0.158	0.270	2.480	2.500	0.158	0.280	1.179	1.183	1.631
1 1/4	2.480	2.500	0.158	0.270	2.730	2.750	0.158	0.280	1.311	1.315	1.800
1 3/8	2.730	2.750	0.158	0.270	2.980	3.000	0.158	0.280	1.442	1.446	1.969
1 1/2	2.980	3.000	0.158	0.270	3.230	3.250	0.158	0.280	1.573	1.577	2.138

* A325 also available in mechanically galvanized finish.

Phone Number: (450) 445-8888
Toll Free: 1-800-661-2658
Fax: (450) 445-0088

Direct Tension Indicator Washers

Installation

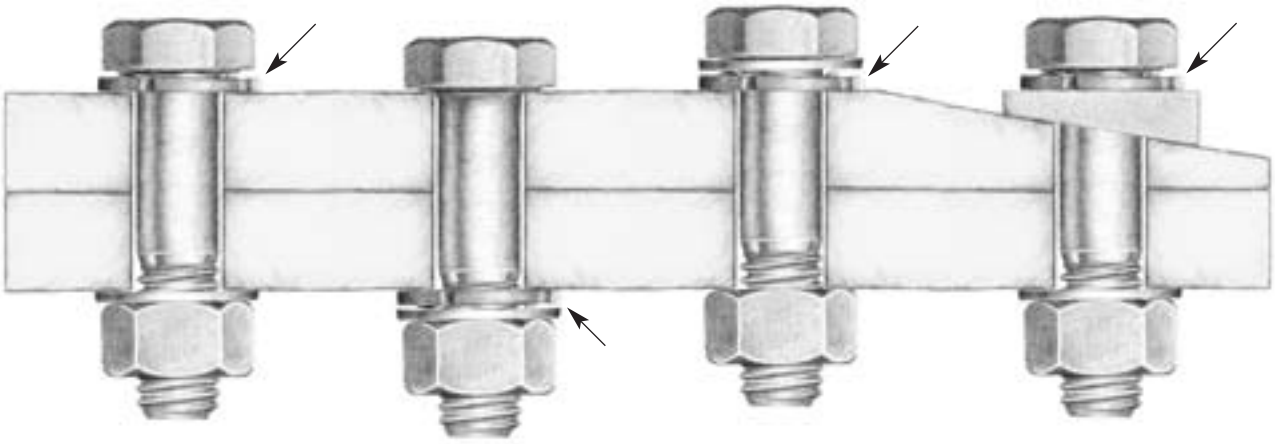
DTI's are installed in the following three ways. Method 1 should be used whenever possible. Method 2 and 3 are suggested but should only be used when Method 1 cannot be.

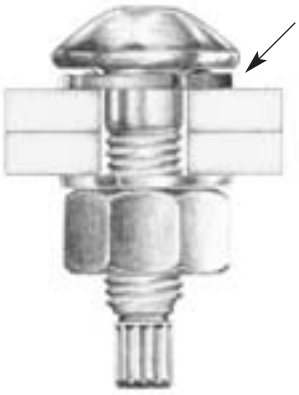
Method 1
(Preferred method) DTI under head, turn nut to tighten, bolt head held.

Method 2
DTI under the nut. Turn the nut to tension.

Method 3
DTI under the bolt head. Turn the bolt head to tension.

Beveled Washers
DTI's can also be used with beveled washers to accommodate over a 1:20 beveled.





DTI Washers can also be used with Tension Control Bolts.

Number of Protrusions (equally spaced)

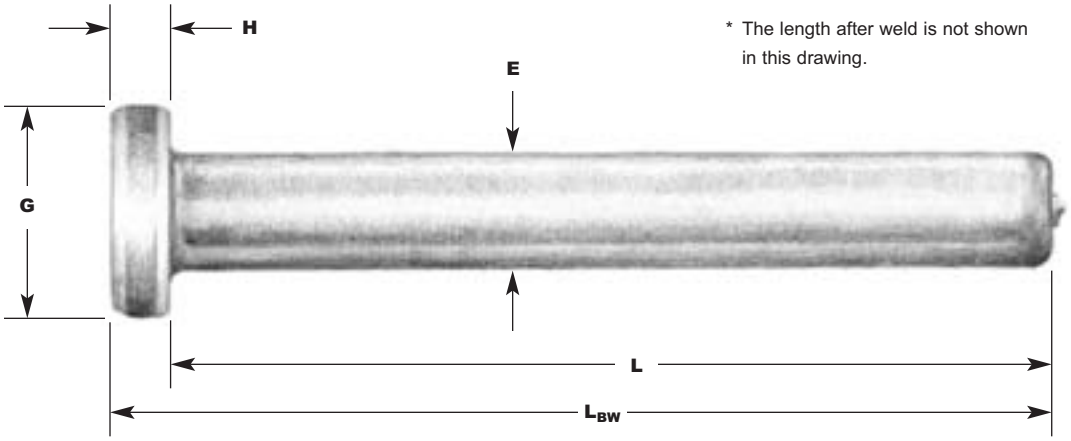
Nominal Size in Inches	Number of Protrusions	
	A325	A490
1/2	4	5
5/8	4	5
3/4	5	6
7/8	5	6
1	6	7
1 1/8	6	7
1 1/4	7	8
1 3/8	7	8
1 1/2	8	9

Studs

“Weld Studs”

Weld Studs

Dimensional Information



* The length after weld is not shown in this drawing.

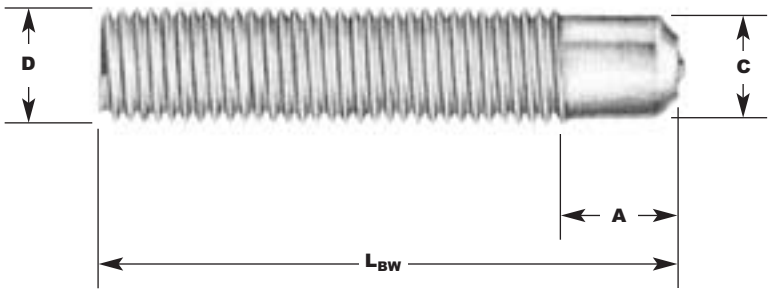
Dimensions, Box Quantities and Weight of Weld Studs

Description		E	G	H	L_{BW}	L_{AW}*	L	Box Quantity	Weight per 100 pieces	Price (Call us for prices)
		Body Dia	Head Dia	Height	Length Before Weld	Length After Weld	Length			
H4L	1/4 x 2 11/16	0.250	0.500	0.187	2 11/16	2 9/16	2 3/8	1000	4.39	
	1/4 x 4 1/8	0.250	0.500	0.187	4 1/8	4	3 13/16	600	6.94	
	3/8 x 3 1/8	0.375	0.750	0.281	3 1/8	3	2 23/32	500	12.33	
	3/8 x 4 1/8	0.375	0.750	0.281	4 1/8	4	3 23/32	350	16.80	
	3/8 x 6 1/8	0.375	0.750	0.281	6 1/8	6	5 23/32	200	21.43	
	1/2 x 2 1/8	0.500	1.000	0.312	2 1/8	2	1 11/16	400	16.75	
	1/2 x 2 5/8	0.500	1.000	0.312	2 5/8	2 1/2	2 3/16	315	19.37	
	1/2 x 3 1/8	0.500	1.000	0.312	3 1/8	3	2 11/16	300	22.90	
	1/2 x 3 5/8	0.500	1.000	0.312	3 5/8	3 1/2	3 3/16	240	25.42	
	1/2 x 4 1/8	0.500	1.000	0.312	4 1/8	4	3 11/16	200	27.78	
	1/2 x 5 5/16	0.500	1.000	0.312	5 5/16	5 3/16	4 7/8	150	34.17	
	1/2 x 6 1/8	0.500	1.000	0.312	6 1/8	6	5 11/16	125	38.10	
	1/2 x 8 1/8	0.500	1.000	0.312	8 1/8	8	7 11/16	100	50.77	
	5/8 x 2 11/16	0.625	1.250	0.312	2 11/16	2 1/2	2 3/16	250	31.28	
	5/8 x 4 3/16	0.625	1.250	0.312	4 3/16	4	3 11/16	150	44.00	
	5/8 x 6 9/16	0.625	1.250	0.312	6 9/16	6 3/8	6 1/16	80	64.29	
	5/8 x 8 3/16	0.625	1.250	0.312	8 3/16	8	7 11/16	50	80.00	
S3L	3/4 x 3 3/16	0.750	1.250	Min. 3/8	3 3/16	3	2 5/8	125	46.92	
	3/4 x 3 3/8	0.750	1.250	Min. 3/8	3 3/8	3 3/16	2 13/16	125	49.17	
	3/4 x 3 7/8	0.750	1.250	Min. 3/8	3 7/8	3 11/16	3 5/16	100	54.55	
	3/4 x 4 3/16	0.750	1.250	Min. 3/8	4 3/16	4	3 5/8	100	58.95	
	3/4 x 4 3/8	0.750	1.250	Min. 3/8	4 3/8	4 3/16	3 13/16	100	62.22	
	3/4 x 4 7/8	0.750	1.250	Min. 3/8	4 7/8	4 11/16	4 5/16	75	67.50	
	3/4 x 5 3/16	0.750	1.250	Min. 3/8	5 3/16	5	4 5/8	60	71.25	
	3/4 x 5 3/8	0.750	1.250	Min. 3/8	5 3/8	5 3/16	4 13/16	60	74.67	
	3/4 x 5 7/8	0.750	1.250	Min. 3/8	5 7/8	5 11/16	5 5/16	60	81.43	
	3/4 x 6 3/16	0.750	1.250	Min. 3/8	6 3/16	6	5 5/8	60	83.33	
	3/4 x 7 3/16	0.750	1.250	Min. 3/8	7 3/16	7	6 5/8	60	94.55	
	3/4 x 8 3/16	0.750	1.250	Min. 3/8	8 3/16	8	7 5/8	50	107.05	
	7/8 x 3 11/16	0.875	1.375	Min. 3/8	3 11/16	3 1/2	3 1/8	100	71.76	
	7/8 x 4 3/16	0.875	1.375	Min. 3/8	4 3/16	4	3 5/8	100	80.00	
	7/8 x 5 3/16	0.875	1.375	Min. 3/8	5 3/16	5	4 5/8	75	96.67	
	7/8 x 6 3/16	0.875	1.375	Min. 3/8	6 3/16	6	5 5/8	50	114.00	
	7/8 x 7 3/16	0.875	1.375	Min. 3/8	7 3/16	7	6 5/8	45	130.00	
	7/8 x 8 3/16	0.875	1.375	Min. 3/8	8 3/16	8	7 5/8	40	142.86	

CPL Pitch Diameter Base Studs

Dimensional Information

* The length after weld is not shown in this drawing.



Dimensions of CPL Pitch Diameter Base Studs

Description	D	C	A	L_{BW}	L_{AW}*
	Thread Dia	Body Dia	Head	Length Before Weld	Length After Weld
1/4-20 x 1 1/4	0.2500	0.215	0.375	1 1/4	1 1/8
1/4-20 x 1 1/2	0.2500	0.215	0.375	1 1/2	1 3/8
1/4-20 x 1 3/4	0.2500	0.215	0.375	1 3/4	1 5/8
1/4-20 x 2	0.2500	0.215	0.375	2	1 7/8
5/16-18 x 1	0.3125	0.275	0.375	1	7/8
5/16-18 x 1 1/4	0.3125	0.275	0.375	1 1/4	1 1/8
5/16-18 x 1 1/2	0.3125	0.275	0.375	1 1/2	1 3/8
5/16-18 x 1 3/4	0.3125	0.275	0.375	1 3/4	1 5/8
5/16-18 x 2	0.3125	0.275	0.375	2	1 7/8
5/16-18 x 2 1/2	0.3125	0.275	0.375	2 1/2	2 3/8
3/8-16 x 1	0.3750	0.330	0.385	1	7/8
3/8-16 x 1 1/8	0.3750	0.330	0.385	1 1/8	1
3/8-16 x 1 1/4	0.3750	0.330	0.385	1 1/4	1 1/8
3/8-16 x 1 3/8	0.3750	0.330	0.385	1 3/8	1 1/4
3/8-16 x 1 1/2	0.3750	0.330	0.385	1 1/2	1 3/8
3/8-16 x 1 5/8	0.3750	0.330	0.385	1 5/8	1 1/2
3/8-16 x 1 3/4	0.3750	0.330	0.385	1 3/4	1 5/8
3/8-16 x 2	0.3750	0.330	0.385	2	1 7/8
3/8-16 x 2 1/8	0.3750	0.330	0.385	2 1/8	2
3/8-16 x 2 1/4	0.3750	0.330	0.385	2 1/4	2 1/8
3/8-16 x 2 1/2	0.3750	0.330	0.385	2 1/2	2 3/8
3/8-16 x 2 3/4	0.3750	0.330	0.385	2 3/4	2 5/8
3/8-16 x 3	0.3750	0.330	0.385	3	2 7/8
3/8-16 x 3 1/2	0.3750	0.330	0.385	3 1/2	3 3/8

Phone Number: (450) 445-8888
Toll Free: 1-800-661-2658
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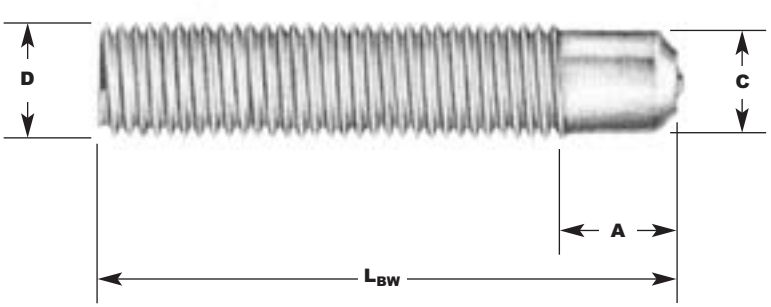
CPL Pitch Diameter Base Studs

Dimensional Information

* The length after weld is not shown in this drawing.

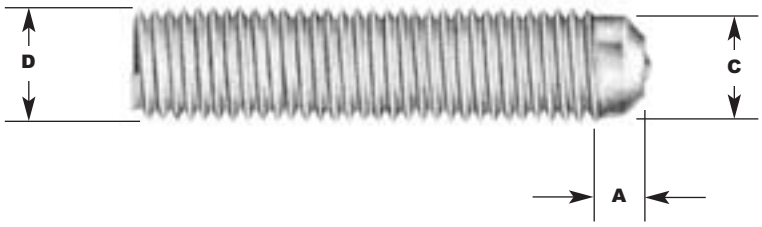


Dimensions of CPL Pitch Diameter Base Studs (continued)

Description	D	C	A	L_{BW}	L_{AW}*
	Thread Dia	Body Dia	Head	Length Before Weld	Length After Weld
1/2-13 x 1 1/4	0.5000	0.448	0.500	1 1/4	1 1/8
1/2-13 x 1 3/8	0.5000	0.448	0.500	1 3/8	1 1/4
1/2-13 x 1 1/2	0.5000	0.448	0.500	1 1/2	1 3/8
1/2-13 x 1 5/8	0.5000	0.448	0.500	1 5/8	1 1/2
1/2-13 x 1 3/4	0.5000	0.448	0.500	1 3/4	1 5/8
1/2-13 x 1 7/8	0.5000	0.448	0.500	1 7/8	1 3/4
1/2-13 x 2	0.5000	0.448	0.500	2	1 7/8
1/2-13 x 2 1/8	0.5000	0.448	0.500	2 1/8	2
1/2-13 x 2 1/4	0.5000	0.448	0.500	2 1/4	2 1/8
1/2-13 x 2 3/8	0.5000	0.448	0.500	2 3/8	2 1/4
1/2-13 x 2 1/2	0.5000	0.448	0.500	2 1/2	2 3/8
1/2-13 x 2 5/8	0.5000	0.448	0.500	2 5/8	2 1/2
1/2-13 x 2 3/4	0.5000	0.448	0.500	2 3/4	2 5/8
1/2-13 x 2 7/8	0.5000	0.448	0.500	2 7/8	2 3/4
1/2-13 x 3	0.5000	0.448	0.500	3	2 7/8
1/2-13 x 3 1/4	0.5000	0.448	0.500	3 1/4	3 1/8
5/8-11 x 1 1/2	0.6250	0.562	0.625	1 1/2	1 3/8
5/8-11 x 1 3/4	0.6250	0.562	0.625	1 3/4	1 5/8
5/8-11 x 2	0.6250	0.562	0.625	2	1 7/8
5/8-11 x 2 1/4	0.6250	0.562	0.625	2 1/4	2 1/8
5/8-11 x 2 1/2	0.6250	0.562	0.625	2 1/2	2 3/8
5/8-11 x 2 3/4	0.6250	0.562	0.625	2 3/4	2 5/8
5/8-11 x 3	0.6250	0.562	0.625	3	2 7/8
3/4-10 x 1 1/2	0.7500	0.680	0.791	1 1/2	1 3/8
3/4-10 x 1 3/4	0.7500	0.680	0.791	1 3/4	1 5/8
3/4-10 x 2	0.7500	0.680	0.791	2	1 7/8
3/4-10 x 2 1/4	0.7500	0.680	0.791	2 1/4	2 1/8
3/4-10 x 2 1/2	0.7500	0.680	0.791	2 1/2	2 3/8
3/4-10 x 3	0.7500	0.680	0.791	3	2 7/8

CFL Full Threaded Base Studs

Dimensional Information



Dimensions of CFL Full Threaded Base Studs

Description	D	C	A
	Thread Dia	Body Dia	Head
1/4-20	0.2500	0.215	0.142
5/16-18	0.3125	0.275	0.142
3/8-16	0.3750	0.330	0.190
7/16-14	0.4375	0.389	0.205
1/2-13	0.5000	0.448	0.221
9/16-12	0.5625	0.503	0.221
5/8-11	0.6250	0.562	0.284
3/4-10	0.7500	0.680	0.346
7/8-9	0.8750	0.798	0.377
1-8	1.000	0.913	0.500

Note: The CFL and CPL length are the same.
(page 38-39)

Phone Number: (450) 445-8888
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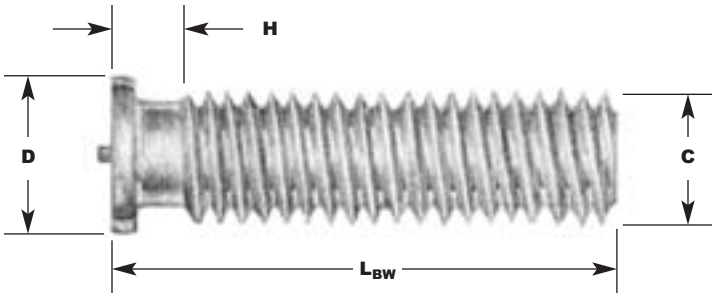
Capacitor Discharge Studs

Dimensional Information



Dimensions of Capacitor Discharge Studs

C	D	H
Thread Dia	Base Dia	Height
4-40	3/16	1/32
6-32	7/32	1/32
8-32	1/4	1/32
10-32	1/4	1/32
10-24	1/4	1/32
1/4-20	5/16	1/32
5/16-18	3/8	1/32

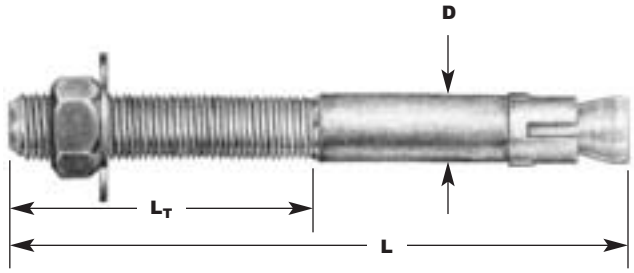
Length:
Available in lengths as required. Note that there is no length loss after weld. Capacitor Discharge Studs are available in cold drawn low carbon steel with copper flash plating, stainless steel and aluminum.

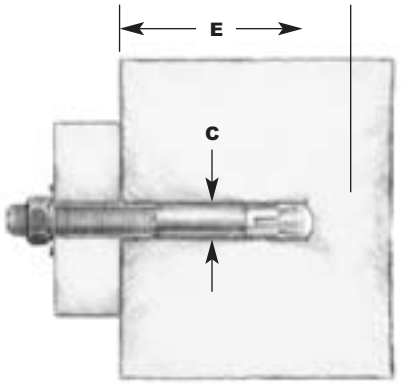
Equipment and accessories page 61

Wedge Anchors

Wedge Anchors

Dimensional Information





Dimensions of Wedge Anchors

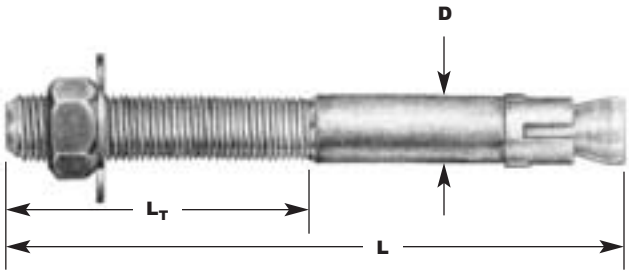
Description	C	D	L	L_T	E
	Hole Dia	Body Dia	Length	Thread Length	Minimal Embed
1/4 x 1 3/4	1/4	1/4	1 3/4	3/4	1 1/8
1/4 x 2 1/4	1/4	1/4	2 1/4	3/4	1 1/8
1/4 x 3 1/4	1/4	1/4	3 1/5	3/4	1 1/8
3/8 x 2 1/4	3/8	3/8	2 1/4	7/8	1 5/8
3/8 x 2 3/4	3/8	3/8	2 3/4	1 1/8	1 5/8
3/8 x 3	3/8	3/8	3	1 1/8	1 5/8
3/8 x 3 3/4	3/8	3/8	3 3/4	1 1/8	1 5/8
3/8 x 5	3/8	3/8	5	1 1/8	1 5/8
1/2 x 2 3/4	1/2	1/2	2 3/4	1 1/4	2 1/4
1/2 x 3 3/4	1/2	1/2	3 3/4	1 1/4	2 1/4
1/2 x 4 1/4	1/2	1/2	4 1/4	1 1/4	2 1/4
1/2 x 5 1/2	1/2	1/2	5 1/2	1 1/4	2 1/4
1/2 x 7	1/2	1/2	7	1 1/4	2 1/4
1/2 x 8 1/2	1/2	1/2	8 1/2	1 1/4	2 1/4
1/2 x 10	1/2	1/2	10	1 1/4	2 1/4

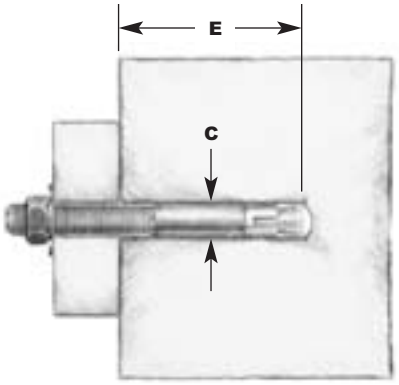
cont. next page

Available in zinc, stainless steel and galvanized (upon request) finishes.

Wedge Anchors

Dimensional Information





Dimensions of Wedge Anchors (continued)

Description	C	D	L	L_T	E
	Drill Dia	Body Dia	Length	Thread Length	Minimal Embed
5/8 x 3 1/2	5/8	5/8	3 1/2	1 1/2	2 3/4
5/8 x 4 1/2	5/8	5/8	4 1/2	1 1/2	2 3/4
5/8 x 5	5/8	5/8	5	1 1/2	2 3/4
5/8 x 6	5/8	5/8	6	1 1/2	2 3/4
5/8 x 7	5/8	5/8	7	1 1/2	2 3/4
5/8 x 8 1/2	5/8	5/8	8 1/2	1 1/2	2 3/4
5/8 x 10	5/8	5/8	10	1 1/2	2 3/4
3/4 x 4 1/4	3/4	3/4	4 1/4	1 1/2	3 1/4
3/4 x 4 3/4	3/4	3/4	4 3/4	1 1/2	3 1/4
3/4 x 5 1/2	3/4	3/4	5 1/2	1 1/2	3 1/4
3/4 x 6 1/4	3/4	3/4	6 1/4	1 1/2	3 1/4
3/4 x 7	3/4	3/4	7	1 1/2	3 1/4
3/4 x 8 1/2	3/4	3/4	8 1/2	1 1/2	3 1/4
3/4 x 10	3/4	3/4	10	1 1/2	3 1/4
3/4 x 12	3/4	3/4	12	1 1/2	3 1/4
7/8 x 6	7/8	7/8	6		
7/8 x 8	7/8	7/8	8		
7/8 x 10	7/8	7/8	10		
1 x 6	1	1	6	2 1/4	4 1/2
1 x 9	1	1	9	2 1/4	4 1/2
1 x 12	1	1	12	2 1/4	4 1/2
1 1/4 x 9	1 1/4	1 1/4	9	1 1/4	
1 1/4 x 12	1 1/4	1 1/4	12	1 1/2	

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Heavy Load Anchors

Dimensional Information

Technical Data of Heavy Load Anchors

Body Dia (mm)	Installation Data (mm)			Load Data in 4000 psi (28 MPa)			
	Hole Dia (mm)	Embed-ment (mm)	Torque (Nm)	Allowable Loads		Ultimate Loads	
				Tension	Shear	Tension	Shear
6	10	45	10	1,190	1,610	4,180	5,605
8	12	55	13	1,663	2,423	5,845	8,475
10	14	65	16	2,338	3,754	8,183	13,151
12	18	80	21	3,275	5,508	11,465	19,300
16	24	100	26	6,070	9,577	21,130	33,350
20	28	125	31	7,260	12,724	25,403	44,512

Drop-In Anchors

Dimensional Information

Technical Data of Drop-In Anchors

Body Dia	Installation Data (Inches)			Load Data in 4000 psi (28 MPa)			
	Hole Dia	Embed-ment	Torque	Allowable Loads		Ultimate Loads	
				Tension	Shear	Tension	Shear
1/4	5/16	1	3	542	588	2,167	2,353
3/8	1/2	1 1/2	12	990	1,037	3,960	4,147
1/2	5/8	2	22	1,560	1,748	6,239	6,992
5/8	3/4	2 1/2	55	2,165	2,767	8,661	11,068
3/4	1	3	90	4,146	5,400	16,583	21,598

Hammer Caps

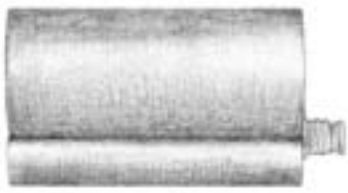
Dimensional Information

Technical Data of Hammer Caps

Body Dia	Installation Data (Inches)			Load Data in 4000 psi (28 MPa)			
	Hole Dia	Embed-ment	Torque	Allowable Loads		Ultimate Loads	
				Tension	Shear	Tension	Shear
3/8	7/16	3 1/2	9	1,162	698	4,650	2,790
1/2	9/16	4	16	2,129	1,277	8,514	5,108
5/8	3/4	5	35	3,390	2,034	13,560	8,136
3/4	7/8	5	75	4,659	3,006	18,636	12,024
7/8	1	6 1/2	95	5,810	4,158	23,238	16,632
1	1 1/8	8	110	8,714	5,454	34,854	21,816
1 1/4	1 1/2	13	225	14,535	8,721	58,140	34,884

Flo-Rok FR5

Dimensional Information



Technical Data of Flo-Rok FR5

Body Dia	Installation Data (Inches)			Load Data in 4000 psi (28 MPa)			
	Hole Dia	Embed-ment	Torque	Allowable Loads		Ultimate Loads	
				Tension	Shear	Tension	Shear
3/8	1/2	3 1/2	13	1,480	1,395	5,920	5,580
1/2	5/8	4 1/2	22	2,267	2,554	9,067	10,217
5/8	3/4	5 1/2	55	3,607	4,068	14,427	16,272
3/4	7/8	6 1/2	106	4,993	6,012	19,973	24,048
7/8	1	7 1/2	135	6,627	8,316	26,507	33,264
1	1 1/8	8 1/2	185	7,693	10,908	30,773	43,632

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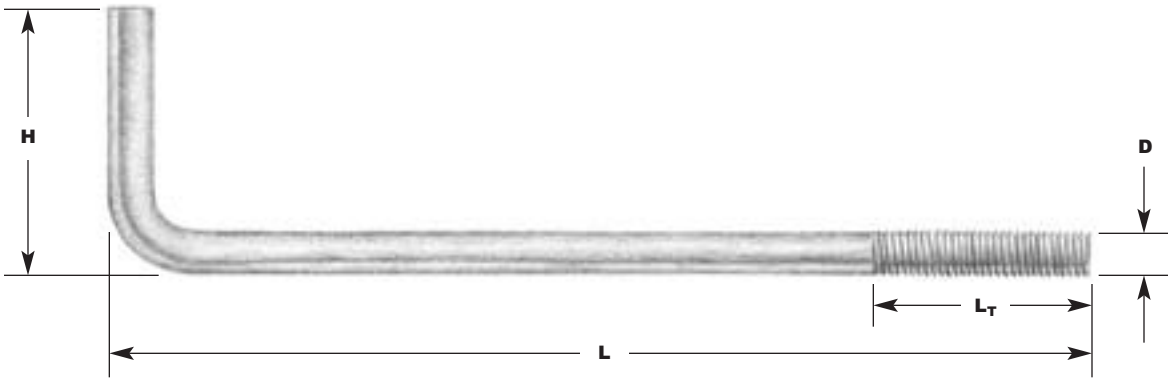
Anchor Bolts

Anchor Bolts

Dimensional Information



Dimensions of Anchor Bolts (fax us your dimensions)

Diameter: _____

Length: _____

Hook: _____

Thread Length: _____

Finish: _____

Material: _____

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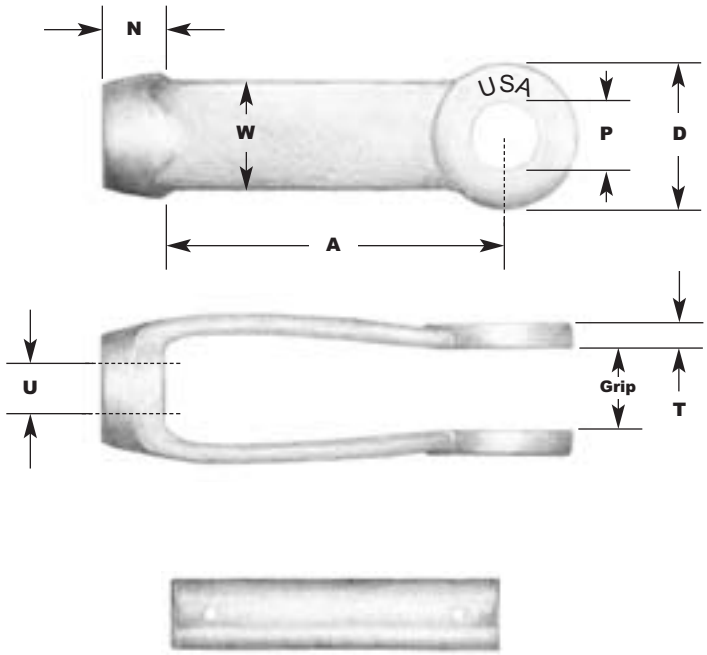
Clevises

Clevises

Dimensional Information



Dimensions of Clevises

Clevis Number	D	P	N	U	W	A	Tolerance	Max Working Load in Kips	Weight in Lbs.
	Outside Dia	Max. Hole Dia	Thread Length	Max. Tap Size	Height	Length			
2	1 7/16	3/4	5/8	5/8	1 1/16	3 9/16	5/16 + 1/32 - 0	3.5	1
2 1/2	2 1/2	1 1/2	1 1/8	7/8	1 1/4	4	5/16 + 1/32 - 0	7.5	2 1/2
3	3	1 3/4	1 1/4	1 3/8	1 1/2	5 1/16	1/2 + 1/16 - 1/32	15.0	4
3 1/2	3 1/2	2	1 1/2	1 1/2	1 3/4	6	1/2 + 1/16 -1/16	18.0	6
4	4	2 1/4	1 3/4	1 3/4	2	5 15/16	1/2 + 1/16 - 1/16	21.0	8
5	5	2 1/2	2 1/4	2 1/8	2 1/2	7	5/8 + 3/32 - 0	37.5	16
6	6	3	2 3/4	2 1/2	3	8	3/4 + 3/32 - 0	54.0	26
7	7	3 3/4	3	3	3 1/2	9	7/8 + 1/8 - 1/16	68.5	36
8	8	4 1/4	4	4	4	10 1/8	1 1/2 + 1/8 - 1/16	135.0	90

Available in plain or galvanized finishes, in stainless steel 304-316. Made in USA.

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Clevises

Dimensions of Clevises

Pin Diameter

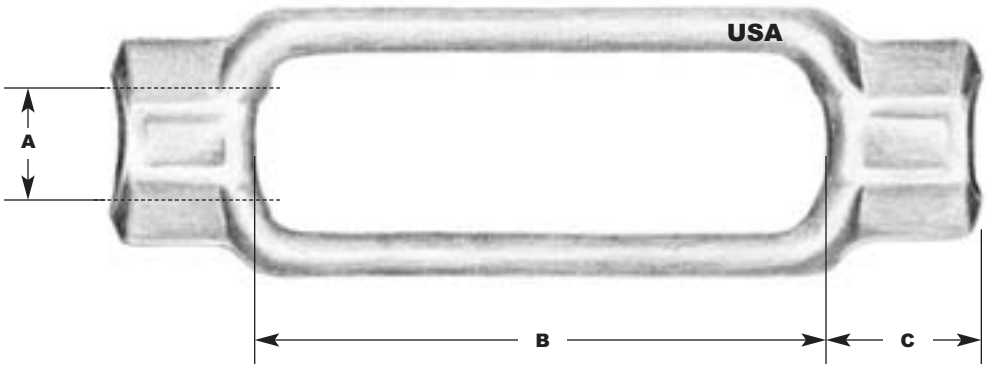
Tap Diameter

	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	3 3/4	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 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	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	6	6	6	6	-	-	-	-	-
2 1/4	-	-	-	-	-	-	-	-	6	6	6	6	6	7	7	-	-	-
2 3/8	-	-	-	-	-	-	-	-	6	6	6	6	7	7	7	7	-	-
2 1/2	-	-	-	-	-	-	-	-	6	6	6	7	7	7	7	7	-	-
2 5/8	-	-	-	-	-	-	-	-	-	-	7	7	7	7	7	8	-	-
2 3/4	-	-	-	-	-	-	-	-	-	-	7	7	7	7	8	8	-	-
2 7/8	-	-	-	-	-	-	-	-	-	-	7	8	8	8	8	8	8	8
3	-	-	-	-	-	-	-	-	-	-	7	8	8	8	8	8	8	8
3 1/8	-	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8	8
3 1/4	-	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8	8
3 3/8	-	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8	8
3 1/2	-	-	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	8
3 5/8	-	-	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	-
3 3/4	-	-	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	-
3 7/8	-	-	-	-	-	-	-	-	-	-	-	-	-	8	8	8	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	8	8	-	-	-

Turnbuckles

Turnbuckles

Dimensional Information



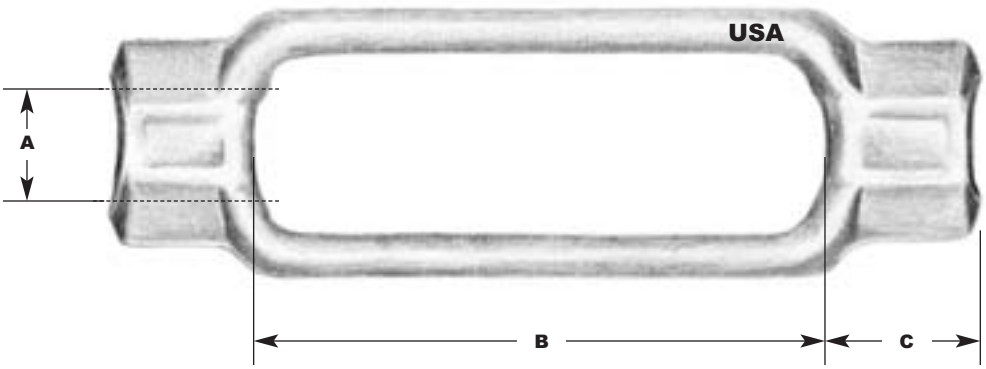
Dimensions of Turnbuckles

Description	A	B	C	Wt. per 100		Max Working Load in Kips
	Thread Dia	Take Up	Thread Length	Without Stubs	With Stubs	
3/8 x 6	3/8	6	9/16	42	78	1.2
1/2 x 4	1/2	4	25/32	82	-	2.2
1/2 x 6	1/2	6	25/32	65	138	2.2
1/2 x 9	1/2	9	25/32	90	175	2.2
1/2 x 12	1/2	12	25/32	120	225	2.2
5/8 x 4	5/8	4	15/16	82	-	3.5
5/8 x 6	5/8	6	15/16	98	223	3.5
5/8 x 9	5/8	9	15/16	135	290	3.5
5/8 x 12	5/8	12	15/16	158	320	3.5
3/4 x 6	3/4	6	1 1/16	145	328	5.2
3/4 x 9	3/4	9	1 1/16	184	405	5.2
3/4 x 12	3/4	12	1 1/16	235	481	5.2
7/8 x 6	7/8	6	1 5/16	185	450	7.2
7/8 x 12	7/8	12	1 7/16	302	670	7.2
1 x 6	1	6	1 7/16	260	632	9.3
1 x 12	1	12	1 7/16	402	890	9.3
1 1/8 x 6	1 1/8	6	1 9/16	406	850	11.6
1 1/4 x 6	1 1/4	6	1 9/16	400	925	15.2
1 1/4 x 12	1 1/4	12	1 9/16	649	1,385	15.2
1 3/8 x 6	1 3/8	6	1 13/16	615	1,555	17.4
1 1/2 x 6	1 1/2	6	1 7/8	615	1,555	21.0
1 1/2 x 12	1 1/2	12	1 7/8	970	2,250	21.0

Cont. next page

Available in plain or galvanized finishes, in stainless steel 304-316. Made in USA.

Turnbuckles



Dimensions of Turnbuckles (continued)

Description	A	B	C	Wt. per 100		Max Working Load in Kips
	Thread Dia	Take Up	Thread Length	Without Stubs	With Stubs	
1 5/8 x 6	1 5/8	6	2 1/2	980	1,950	24.5
1 3/4 x 6	1 3/4	6	2 1/2	980	2,334	28.3
1 3/4 x 12	1 3/4	12	2 1/2	1,525	3,435	28.3
1 7/8 x 6	1 7/8	6	2 13/16	1,400	3,200	37.2
1 7/8 x 12	1 7/8	12	2 3/4	1,525	3,660	37.2
2 x 6	2	6	2 13/16	1,400	3,430	37.2
2 x 12	2	12	2 3/4	1,525	3,980	37.2
2 1/4 x 6	2 1/4	6	3 5/16	1,960	4,350	48.0
2 1/4 x 12	2 1/4	12	3 13/16	3,092	6,690	48.0
2 3/8 x 6	2 3/8	6	3 3/4	2,325	5,315	52.5
2 1/2 x 6	2 1/2	6	3 3/4	2,325	5,675	60.0
2 1/2 x 12	2 1/2	12	3 3/4	3,092	7,276	60.0
2 5/8 x 6	2 5/8	6	4 3/16	3,150	6,980	65.5
2 3/4 x 6	2 3/4	6	4 3/16	3,150	7,380	75.0
2 7/8 x 6	2 7/8	6	4 3/8	3,950	8,710	79.4
3 x 6	3	6	4 5/16	3,950	9,270	96.7
3 1/4 x 6	3 1/4	6	5 7/16	6,050	12,850	104.0
3 1/4 x 12	3 1/4	12	5 1/4	7,950	16,373	104.0
3 1/2 x 6	3 1/2	6	5 7/16	6,050	13,950	122.2
3 1/2 x 9	3 1/2	9	5 1/4	7,000	15,660	122.2
3 1/2 x 12	3 1/2	12	5 1/4	7,950	17,216	122.2
4 x 6	4	6	6	9,500	22,200	167.8
4 1/2 x 9	4 1/2	9	6 3/4	15,200	32,300	233.8

Available in plain and galvanized finishes, in stainless steel 304-316. Made in USA.

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Studs

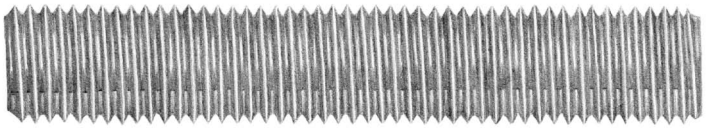
Threaded one end

Threaded both ends

Threaded one side or both. Rigth hand thread or left hand thread from 1/4” diamater to 4” diameter.
A307, A449, 4140 in plain, zinc, galvanized and stainless steel finishes.

Threaded Rods

Threaded Rods

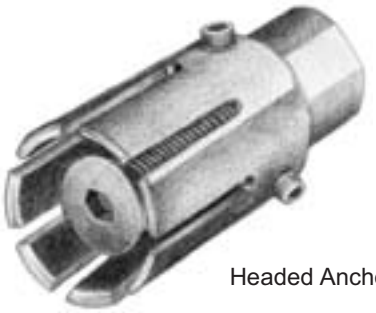


Length	24”	36”	72”	120”	144”
Diameter in Inches	Plain	Plain, Zinc, B-7	Plain, Zinc, H. D. Galv.	Plain, Zinc, H. D. Galv.	Plain, B-7
1/4-20					
5/16-18					
3/8-16					
7/16-14					
1/2-13					
5/8-11					
3/4-10					
7/8-9					
1-8					
1 1/8-7					
1 1/4-7					
1 3/8-6					
1 1/2-6					
1 3/4-5					
2-4 1/2					

Also available: UNF, Left Hand Thread, Metric, Acme.

Stud Accessories

Stud Accessories



Headed Anchor Chuck

Welding Gun

Standard Split Feet

Split Bi-Pod Feet

Weld Thru Deck Ferrule Holder

Heavy Duty Ferrule Grip

Split Ferrule Grip Brass

Adjustable Chuck

Adjustable Chuck

“B” Collets AGM Style

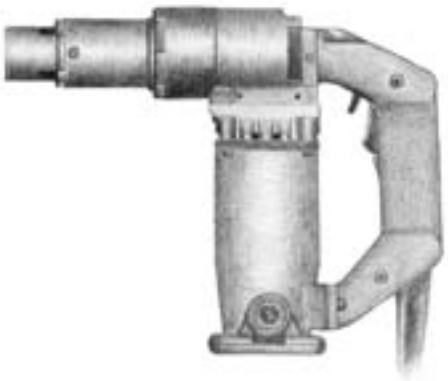
Arc Stud Welding Leg

Tension Control Tools and Accessories

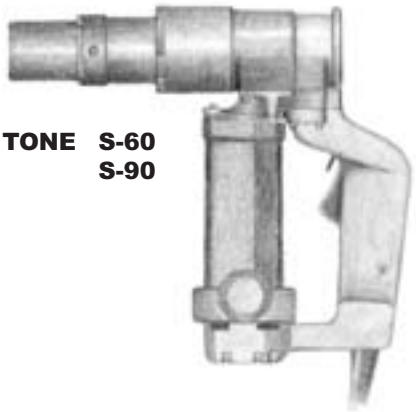
Tension Control Tools and Accessories

We carry MAKITA and TONE

See page 63 for details.



TONE S-110



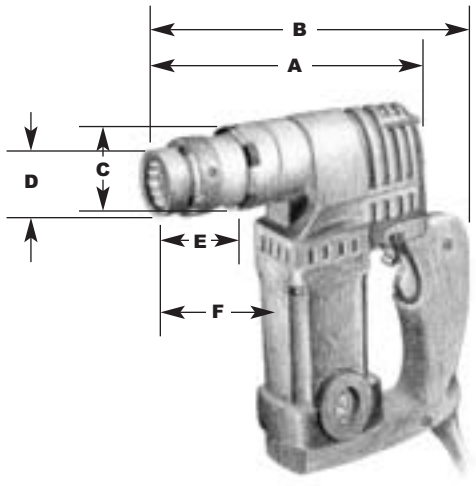
TONE S-60
S-90

MAKITA
6922NB

TONE S-80

Electric TC Wrenches

TC Wrench Makita 6922 NB

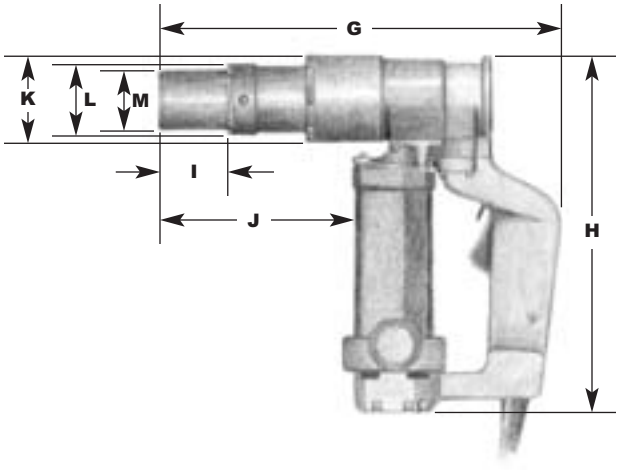


Voltage	115V-220V
Max Current	12.0A-6.5A
Frequency	50/60 HZ
Max Torque	593FT/LB
No Load Speed	10 RPM
Weight	10.6 LBS

3/4, 5/8 and 7/8 Inch Inner and Outer Sockets available

A	B	C	D	E	F
8 5/16	9 13/16	3 1/8	1 13/16	2 9/16	3 3/4

TC Wrench Tone S-60EZA

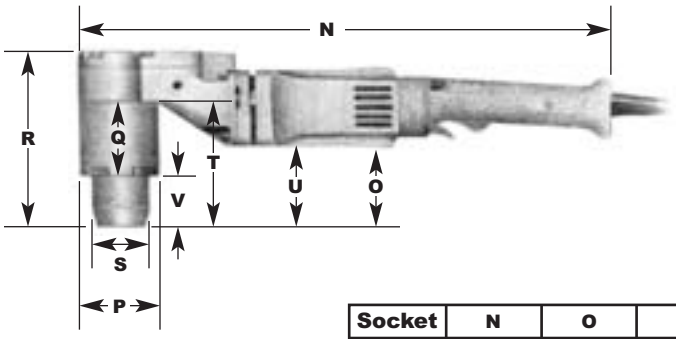


Voltage	115V-220V
Max Current	13.5A-5.5A
Frequency	50/60 HZ
Max Torque	435FT/LB
No Load Speed	22 RPM-20 RPM
Weight	13 LBS

3/4, 5/8 and 7/8 Inch Inner and Outer Sockets available

G	H	I	J	K	L	M
11	9 5/8	1 9/16	5 5/16	2 7/8	2 1/8	1 7/8

TC Wrench Tone S-80EZA



Voltage	115V-220V
Max Current	11.5A-5.5A
Frequency	50/60 HZ
Max Torque	595FT/LB
No Load Speed	12 RPM
Weight	18 LBS

3/4, 7/8 and 1 Inch Inner and Outer Sockets available

Socket	N	O	P	Q	R	S	T	U	V
3/4	20 1/4	2 3/4	3 3/4	3	7 1/4	1 3/4	4 3/4	3 1/8	1 1/4
7/8	20 1/4	2 3/4	3 3/4	3	7 1/4	2	4 3/4	3 1/8	1 1/4
1	20 1/4	2 3/4	3 3/4	3	8	2 1/4	5 1/2	3 7/8	1 1/2

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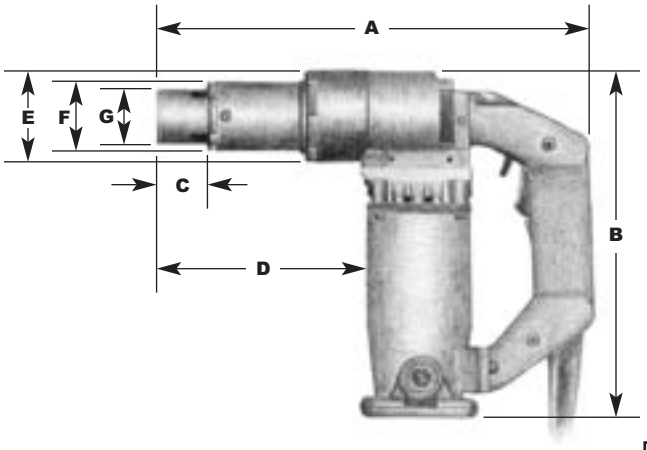
Electric TC Wrenches

TC Wrench Tone S-90EZ

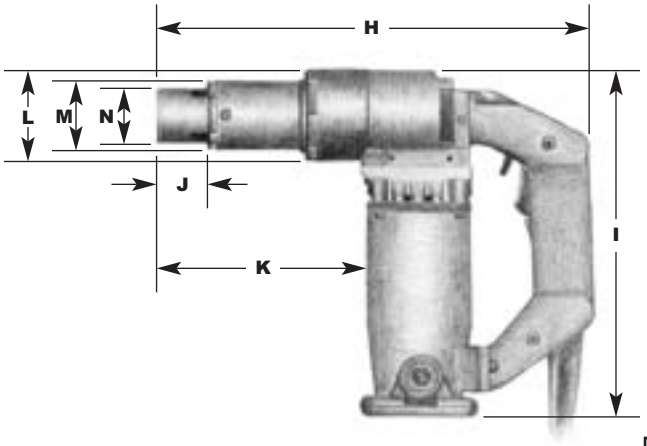


Voltage	115V-220V
Max Current	12A-6.5A
Frequency	50/60 HZ
Max Torque	595FT/LB
No Load Speed	15 RPM-16 RPM
Weight	19 LBS

3/4, 7/8 and 1 Inch Inner and Outer Sockets available

A	B	C	D	E	F	G
13 3/4	10 1/4	1 5/16	7 1/16	3 3/8	2 7/16	1 15/16

TC Wrench Tone S-110EZ



Voltage	115V-220V
Max Current	13.5A-7.5A
Frequency	50/60 HZ
Max Torque	745FT/LB
No Load Speed	16 RPM
Weight	27 LBS

3/4, 7/8, 1 and 1 1/8 Inch Inner and Outer Sockets available

H	I	J	K	L	M	N
14 3/4	10 5/8	1	8 1/8	3 15/16	2 3/4	2 1/4

We also rent these wrenches for a weekly or a monthly fee. Call us for details.

TC Tools and Accessories

T22-00000	TC Wrench 6922 NB (3/4 & 7/8)	
T22-00134	3/4 outer socket	
T22-00234	3/4 inner socket	
T22-00158	5/8 outer socket	
T22-00258	5/8 inner socket	
T22-00178	7/8 outer socket	
T22-00278	7/8 inner socket	

T60-00000	TC Wrench S-60EZA (3/4)	
T60-00134	3/4 outer socket	
T60-00234	3/4 inner socket	
T60-00158	5/8 outer socket	
T60-00258	5/8 inner socket	
T60-00178	7/8 outer socket	
T60-00278	7/8 inner socket	

T80-00000	TC Wrench S-80EZA (7/8)	
T80-00134	3/4 outer socket	
T80-00234	3/4 inner socket	
T80-00178	7/8 outer socket	
T80-00278	7/8 inner socket	
T80-00110	1 outer socket	
T80-00210	1 inner socket	

T90-00000	TC Wrench S-90EZA (7/8)	
T90-00134	3/4 outer socket	
T90-00234	3/4 inner socket	
T90-00178	7/8 outer socket	
T90-00278	7/8 inner socket	
T90-00110	1 outer socket	
T90-00210	1 inner socket	

T910-00000	TC Wrench S-110EZA (1)	
T910-00134	3/4 outer socket	
T910-00234	3/4 inner socket	
T910-00178	7/8 outer socket	
T910-00278	7/8 inner socket	
T910-00297	1 outer socket	
T910-00295	1 inner socket	
T910-00300	1 1/8 outer socket	
T910-00345	1 1/8 inner socket	

TC Wrench Makita 6922 NB

Phone Number: (450) 445-8888
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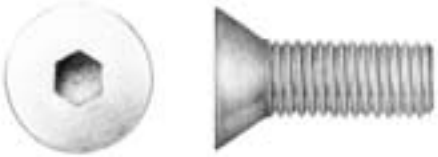
Miscellaneous

Miscellaneous

Socket Head Cap Screw

Socket Shoulder Screw

Socket Set Screw



Flat Socket Cap Screw

Button Socket Cap Screw

Tek Screw

U-Bolt

Wing Nut

Lag Bolt

Phone Number: (450) 445-8888
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Miscellaneous

Frame Hook

Sleeve Anchors

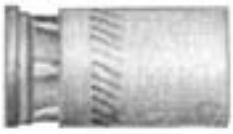
Lag Shield

Toggle Bolt

Sleeve Head

Insert Round

Insert Flat



Shield

Drive Type Anchor

Pin Bolt

Plastic Plug

Hollow Wall Anchor

Pin Bolt with Nail

Miscellaneous

Rivet Tool

MWA Insallation Tool

Assorted Rivet # 1

Assorted Rivet # 2

Assorted Rivet # 3

Tie Wire Anchor

Sealing Washer

Masonry Drill Bit

Drop-In Anchor

Wedge Anchor Bolt

Nylon Drywall Anchor

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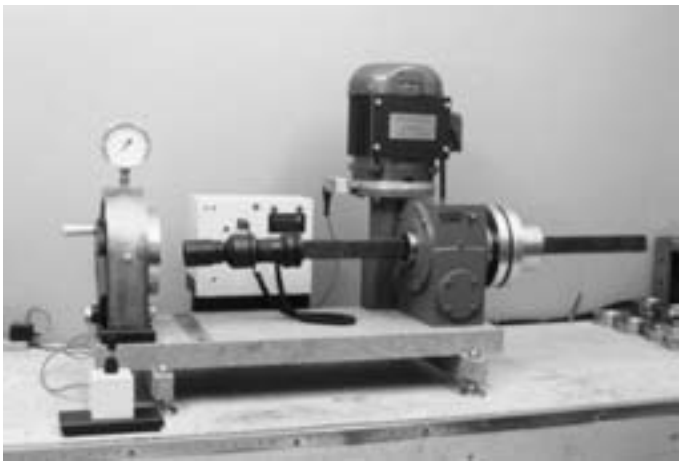

Sensor Developments Inc.

CERTIFICATE OF TRACEABILITY

The reference load cell used to calibrate your transducer was calibrated by the National Institute of Standards and Technology in Gaithersburg, Maryland. Calibration due dates and report numbers are shown below. Torque arms are measured by Line Precision, Inc. in Farmington Hills, Michigan.

Load Cell	N.I.S.T. Cal Due Date	N.I.S.T. [illegible]	Cell #
500 lbs. Tension	[illegible]	[illegible]	[illegible]
1,000 lbs. T[illegible]	[illegible]	[illegible]	81588
[illegible] lbs. T&[illegible]	01 Feb 2002	822.07/263239	6158
[illegible],000 lbs. T&C	20 Jan 2001	822.07/261081	10K-Std Ref

Torque Arm	Cal Due Date	Line Precision Report #	Serial #
20/24 Inch	24 Sept 2000	6734	12K-1
36 Inch	24 Sept 2000	6734	300K-1

AMCAN JUMAX

SPECIMEN

Rotational Capacity Test (Rocaps): The rotational capacity test is intended to evaluate the presence of a lubricant, the efficiency of the lubricant, and the compatibility of assemblies as represented by the components selected for testing.

Rocap Tests

Date/Time mm/dd/yy hh:mm:ss	Elapsed Time Seconds	Rotation Deg.	Tension #	Torque #Ft.
06/20/01 09:38:04.539	9,539166451	35	12099	129
06/20/01 09:38:04.689	9,689167023	38	13009	137
06/20/01 09:38:04.839	9,839166641	41	13988	145
06/20/01 09:38:04.989	9,98916626	45	14967	156
06/20/01 09:38:05.139	10,13916683	48	15737	167
06/20/01 09:38:05.289	10,28916645	51	16646	174
06/20/01 09:38:05.439	10,43916702	54	17696	183
06/20/01 09:38:05.589	10,58916664	58	18675	194
06/20/01 09:38:05.739	10,73916626	61	19724	204
06/20/01 09:38:05.889	10,88916683	64	20564	216
06/20/01 09:38:06.039	11,03916645	67	21613	227
06/20/01 09:38:06.189	11,18916702	71	22732	240
06/20/01 09:38:06.339	11,33916664	74	23852	253
06/20/01 09:38:06.489	11,48916626	77	24901	262
06/20/01 09:38:06.639	11,63916683	80	26090	275
06/20/01 09:38:06.789	11,78916645	83	27350	289
06/20/01 09:38:06.939	11,93916702	87	28749	306
06/20/01 09:38:07.089	12,08916664	90	29728	319
06/20/01 09:38:07.239	12,23916626	93	31057	339
06/20/01 09:38:07.389	12,38916683	96	32386	348
06/20/01 09:38:07.539	12,53916645	100	33576	360
06/20/01 09:38:07.689	12,68916702	103	34765	378
06/20/01 09:38:07.839	12,83916664	106	6094	393
06/20/01 09:38:07.989	12,98916626	109	353	413
06/20/01 09:38:08.139	13,13916683	112	02	429
06/20/01 09:38:08.289	13,2891	116	39802	441
06/20/01 09:38:08.439	13,4 6702	119	41131	461
06/20/01 09:38:08.589	13,5 6664	122	42390	479
06/20/01 09:38:08.739	13,7 626	125	43369	494
06/20/01 09:38:08.889	13,8891	129	44559	513
06/20/01 09:38:09.039	14,03916645	132	45888	525
06/20/01 09:38:09.189	14,18916702	135	47077	544
06/20/01 09:38:09.339	14,33916664	138	47916	559
06/20/01 09:38:09.489	14,48916626	141	49106	579
06/20/01 09:38:09.639	14,63916683	145	50086	595
06/20/01 09:38:09.789	14,78916645	148	50994	610
06/20/01 09:38:09.939	14,93916702	151	51554	623
06/20/01 09:38:10.089	15,08916664	154	51904	636
06/20/01 09:38:10.239	15,23916626	157	52254	649
06/20/01 09:38:10.389	15,38916683	161	52813	664
06/20/01 09:38:10.539	15,53916645	164	53163	675
06/20/01 09:38:10.689	15,68916702	167	53233	684
06/20/01 09:38:10.839	**15,83916664**	**170**	**53583**	**694**
06/20/01 09:38:10.989	15,98916626	174	53723	701
06/20/01 09:38:11.139	16,13916588	177	53793	706
06/20/01 09:38:11.289	16,2891674	180	53793	715
06/20/01 09:38:11.439	16,43916702	183	53863	720
06/20/01 09:38:11.589	16,58916664	186	53933	723
06/20/01 09:38:11.739	16,73916626	190	53933	730
06/20/01 09:38:11.889	16,88916588	193	54003	735
06/20/01 09:38:12.039	17,0391674	196	54003	738
06/20/01 09:38:12.189	17,18916702	199	54003	745
06/20/01 09:38:12.339	17,33916664	203	54003	750
06/20/01 09:38:12.489	17,48916626	206	54003	754
06/20/01 09:38:12.639	17,63916588	209	54003	759
06/20/01 09:38:12.789	17,7891674	212	54073	763
06/20/01 09:38:12.939	17,93916702	215	54003	767
06/20/01 09:38:13.089	18,08916664	219	54003	769
06/20/01 09:38:13.239	18,23916626	222	53863	771
06/20/01 09:38:13.389	18,38916588	225	53933	775
06/20/01 09:38:13.539	18,5391674	228	53793	778
06/20/01 09:38:13.689	18,68916702	231	53863	782
06/20/01 09:38:13.839	18,83916664	235	53793	782
06/20/01 09:38:13.989	18,98916626	238	53723	786
06/20/01 09:38:14.139	19,13916588	241	53583	785

Rocap Tests
A-325 Heavy hex structural bolts with A-563 gr. C heavy hex nuts and one F-436 structural washers
PLAIN FINISH

1 - 8 x 2 1/2

Minimum tension required **53550 min.**

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Books

Also available at Amcan Jumax:

Industrial Fasteners Institute's (IFI).

Annual Book of ASTM Standards.

Glossary of Terms

Fastener: A fastener is a mechanical device for holding two or more bodies in definite positions with respect to each other.

High Strength Fastener: A high strength fastener is a fastener having high tensile and shear strengths attained through combinations of materials, work-hardening and heat treatment.

Mechanical Properties: Mechanical Properties are those properties wich involve a relationship between strain and stress. Hardness, proof load, yield strength and ultimate tensile strength are examples of mechanical properties.

Proof Load: A proof load is a specified test load which a fastener must withstand without any indication of significant deformation or failure.

Shear Fastener: A shear fastener is a fastener whose primary function is to resist forces which tend to shear it.

Tension Fastener: A tension fastener is a fastener whose primary function is to resist forces which tend to elongate it.

Annealed: A fastener is considered in the annealed state when it has been heated and cooled to make it soft – that is, free of hardness caused by working or previous heat treatment.

Case Hardened: A case hardened fastener is a fastener of ferrous material having a surface which has been made harder than the core.

Stainless Steel: Stainless steel is a corrosion resistant type of alloy steel which contains a minimum of 12 percent chromium.

Strain Hardening: Strain hardening is the increase in hardness, and hence strength, resulting from plastic deformation at a temperature below the recrystallization range. Sometimes called Work Hardening.

Coating: Coating is the application of some material such as a metal, organic compound, etc. to the surface of a fastener.

Plain: Plain as applied to finish of fasteners is used to indicate that the fastener has had no supplementary surface treatment, such as plating, coating, etc., other than being oiled.

Galvanizing: Galvanizing is the process of coating iron or steel with zinc – originally by using direct current and a zinc anode. Methods of zinc deposition used are:

Electro-Galvanizing: Electro-galvanizing is the process of coating metal with zinc by electrodeposition.

Hot Dip Galvanizing: Hot dip galvanizing is the process of immersing the parts to be coated in a bath of molten zinc.

Mechanical Galvanized: Mechanical galvanizing is a process in which powdered zinc is applied to a base metal using the principles of cold welding and barrel finishing techniques.

Cut Thread: A cut thread is a thread produced by removing material from the surface with a form cutting tool.

Forging: Forging is the process of forming a product by hammering or pressing. When the material is forged below the recrystallization temperature it is said to be cold forged. When worked above the recrystallization temperature it is said to be hot forged.

Rolled Thread: A rolled thread is a thread produced by the action of a form tool which, when pressed into the surface of a blank, displaces material radially.

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Bolts Identification Marking

Grade Identification Marking	Specification	Material	Nominal Size in Inches	Proof Load Stress ksi	Tensile Strength Min ksi	Hardness Rockwell	
						Min	Max
	SAE J429-Grade 1	Low or Medium Carbon Steel	1/4 thru 1 1/2	33	60	B70	B100
	SAE J429-Grade 2		1/4 thru 3/4	55	74	B80	B100
			over 3/4 thru 1 1/2	33	60	B70	B100
	ASTM A307-Grade A		1/4 thru 4	-	60	B69	B100
	ASTM A307-Grade B		1/4 thru 4	-	60 min	B69	B95
					100 max	B69	B95
	SAE J429-Grade 5	Medium Carbon Steel, Quenched and Tempered	1/4 thru 1	85	120	C25	C34
	ASTM A449-Type 1		over 1 thru 1 1/2	74	105	C19	C30
	ASTM A449-Type 1		over 1 1/2 thru 3	55	90	183	235
	ASTM A325-Type 1	Medium Carbon Steel, Quenched and Tempered	1/2 thru 1	85	120	C24	C35
	ASTM A325-Type 3	Atmospheric Corrosion, Resistant Steel, Quenched and Tempered	over 1 to 1 1/2	74	105	C19	C31
	ASTM A354-Grade BC	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 2 1/2	105	125	C26	C36
			over 2 1/2 thru 4	95	115	C22	C33
	SAE J429-Grade 8	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 1 1/2	120	150	C33	C39
	ASTM A354-Grade BD		1/4 thru 2 1/2	120	150	C33	C39
			over 2 1/2 thru 4	105	140	C31	C39
	ASTM A490-Type 1	Medium Carbon Alloy Steel, Quenched and Tempered	1/2 thru 1 1/2	120	150 min 170 max	C33	C38
	ASTM A490-Type 3	Atmospheric Corrosion, Resistant Steel, Quenched and Tempered					

Nuts Identification Marking

Grade Identification Marking	Specification	Material	Nominal Size in Inches	Proof Load Stress ksi	Hardness Rockwell	
					Min	Max
	ASTM A563-Grade 0	Carbon Steel	1/4 thru 1 1/2	69	B55	C32
	ASTM A563-Grade A		1/4 thru 1 1/2	90	B68	C32
	ASTM A563-Grade B		1/4 thru 1	120	B69	C32
			over 1 thru 1 1/2	105	B69	C32
	ASTM A563-Grade C	Carbon Steel, May be Quenched and Tempered	1/4 thru 4	144	B78	C38
	ASTM A563-Grade C3	Atmospheric Corrosion, Resistant Steel, May be Quenched and Tempered	1/4 thru 4	144	B78	C38
	ASTM A563-Grade D	Carbon Steel, May be Quenched and Tempered	1/4 thru 4	150	B84	C38
	ASTM A563-Grade DH	Carbon Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38
	ASTM A563-Grade DH3	Atmospheric Corrosion, Resistant Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38

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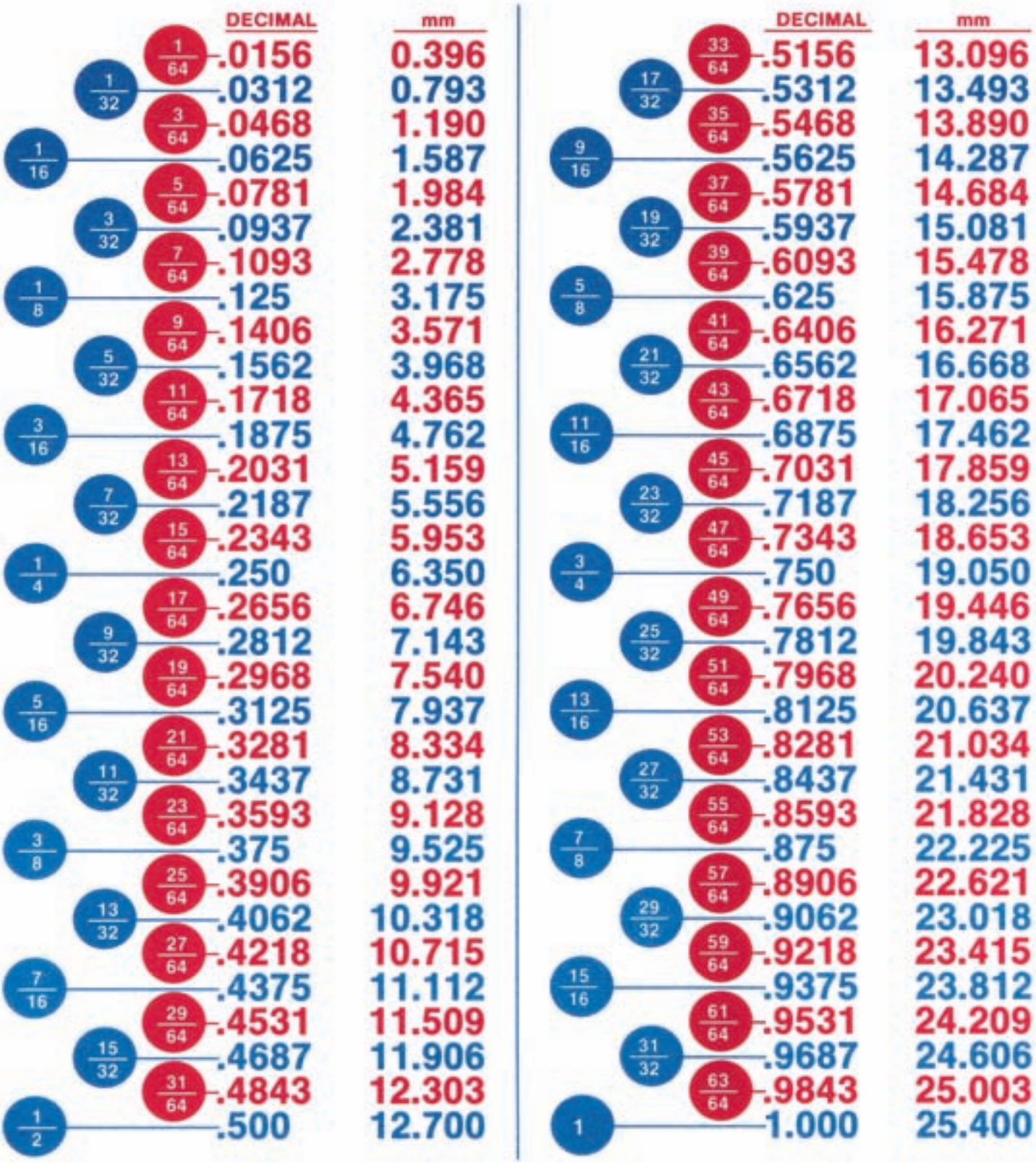
Nuts Identification Marking

Grade Identification Marking	Specification	Material	Nominal Size in Inches	Proof Load Stress ksi	Hardness Rockwell	
					Min	Max
	ASTM A194-Grade 2H	Medium Carbon Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38
	ASTM A194-Grade 2HM	Medium Carbon Steel, Quenched and Tempered	1/4 thru 4	150	159	237
	ASTM A194-Grade 4	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38
	ASTM A194-Grade 7	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38
	ASTM A194-Grade 7M	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 4	150	159	237


DECIMAL
mm
1/64 .0156 0.396
1/32 .0312 0.793
3/64 .0468 1.190
1/16 .0625 1.587
5/64 .0781 1.984
3/32 .0937 2.381
7/64 .1093 2.778
1/8 .125 3.175
9/64 .1406 3.571
5/32 .1562 3.968
11/64 .1718 4.365
3/16 .1875 4.762
13/64 .2031 5.159
7/32 .2187 5.556
15/64 .2343 5.953
1/4 .250 6.350
17/64 .2656 6.746
9/32 .2812 7.143
19/64 .2968 7.540
5/16 .3125 7.937
21/64 .3281 8.334
11/32 .3437 8.731
23/64 .3593 9.128
3/8 .375 9.525
25/64 .3906 9.921
13/32 .4062 10.318
27/64 .4218 10.715
7/16 .4375 11.112
29/64 .4531 11.509
15/32 .4687 11.906
31/64 .4843 12.303
1/2 .500 12.700
DECIMAL
mm
33/64 .5156 13.096
17/32 .5312 13.493
35/64 .5468 13.890
9/16 .5625 14.287
37/64 .5781 14.684
19/32 .5937 15.081
39/64 .6093 15.478
5/8 .625 15.875
41/64 .6406 16.271
21/32 .6562 16.668
43/64 .6718 17.065
11/16 .6875 17.462
45/64 .7031 17.859
23/32 .7187 18.256
47/64 .7343 18.653
3/4 .750 19.050
49/64 .7656 19.446
25/32 .7812 19.843
51/64 .7968 20.240
13/16 .8125 20.637
53/64 .8281 21.034
27/32 .8437 21.431
55/64 .8593 21.828
7/8 .875 22.225
57/64 .8906 22.621
29/32 .9062 23.018
59/64 .9218 23.415
15/16 .9375 23.812
61/64 .9531 24.209
31/32 .9687 24.606
63/64 .9843 25.003
1 1.000 25.400

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