



# HASM

Nickel Alloy Fasteners

HASM

Nickel Alloy Fasteners

# The Best of the **Best**

**Global provider of high-performance bolts, nuts, screws, studs, washers, and anchors.**

HASM's research and development is focused on producing an extensive range of fasteners with nickel alloys, titanium, zirconium, duplex stainless steel, and other special metals.

# HASM KOREA

Inconel®

Hastelloy®

Incoloy®

A-286

Titanium

Nickel

Monel

AL-6XN®

Duplex

Super Duplex

6% Moly

Stainless Steel





## Standard and Custom Fasteners



# Endlessly Striving for Global Success

Headquartered in Ansan, South Korea, HASM is a privately-owned company that specializes in the development, manufacture, and worldwide distribution of standard, and custom fasteners engineered from high-performance, nickel-based superalloys.

As the emerging leader of high-quality nickel alloy fasteners, we are proud to serve our distributors, EPCs, OEMs, and MROs customers worldwide. Since 2005, HASM has grown from a single facility to four locations. Most recently, HASM opened our North American sales office in Toronto, Canada.

The markets we serve include: Aerospace, Chemical Processing, Semiconductor, Power Generation, Oil & Gas, Pharmaceutical, Marine, Pulp & Paper, Petrochemical & Refining, Air Pollution Control, Food & Beverage, and Water Treatment.







# Company History and Quality Management Systems

HASM is an ISO 9001:2015, ISO 14001:2015, and AS9100 Revision D (2016) certified manufacturer of high-performance fasteners. We source the raw materials we use from the most trusted suppliers in the USA and Germany (DFARS compliant), such as Carpenter, ATI Specialty Materials, Special Metals Corporation, Deutsche Nickel, and ThyssenKrupp VDM. We maintain a multimillion-dollar inventory of finished products as well as raw materials such as: Inconel®, Hastelloy®, Incoloy®, A-286, Titanium, Nickel, Monel, AL-6XN®, Duplex, Super Duplex, Molybdenum, Zirconium, and Stainless Steel.

- Aug 2005:** HASM was incorporated in Ansan, Korea.
- Apr 2006:** Expanded manufacturing capabilities by adding more production lines. Started production of cold formed hastelloy socket bolts, the first time ever in Korea.
- Mar 2007:** Acquired ISO 9001:2001 certificate.
- Jun 2008:** Registered as ServeOne partner (MRO of LG Group).
- Aug 2009:** Opened 2nd location in Paju, Korea.
- Oct 2009:** Opened 3rd location in Gumi, Korea.
- Dec 2010:** Acquired ISO 14001:2004 certificate.
- Mar 2011:** HQ moved to larger facility.
- Feb 2014:** HQ moved to brand new, larger facility in Sihwa Multi-Techno Industrial Complex.
- Apr 2015:** Registered as partner company of Doosan Heavy Industries & Construction.
- Jun 2015:** Registered as partner company of K-Water's Sihwa Lake Tidal Power plant.
- Aug 2015:** Registered as strategic partner of The Korea Aerospace Research Institute (KARI).
- Mar 2018:** Opened the North American sales office in Toronto, Canada.
- Nov 2018:** Acquired AS9100:2016 Rev D Certificate for Aviation, Space, and Defense Organizations.





# Production Capabilities

- Metric and Imperial Sizes
- Standard and Custom Products
- Cold Forming Division
- Hot Forming Division
- Precision Machining Division
- Research and Development
- Testing
- Inventory



**Multimillion-Dollar Inventory**

HASM in Korea maintains a multimillion-dollar inventory of standard fasteners as well as an extensive inventory of raw materials to enable us to adapt quickly, and custom engineer products to our customers requirements.

**Fast Delivery**

Need it now? We pride ourselves on providing the fastest deliveries in the industry. Most deliveries arrive to site within 2 weeks.



# Our Products



HASM's large inventory of corrosion resistant alloy fasteners includes: bolts, nuts, screws, studs, washers, threaded rods, and anchors. We can also provide custom fasteners upon request in high or low volumes in both imperial, and metric sizes.



# Alloys

Raw Material	Unified Numbering System (UNS)	Common Trade Name
Alloy C276	UNS N10276	Hastelloy® C-276
Alloy 22	UNS N06022	Hastelloy® C-22
Alloy B2	UNS N10665	Hastelloy® B-2
Alloy G-30	UNS N06030	Hastelloy® G-30
Alloy 200	UNS N02200	Nickel 200
Alloy 201	UNS N02201	Nickel 201
Alloy 400	UNS N04400	Monel® 400
Alloy K500	UNS N05500	Monel® K-500
Alloy 59	UNS N06059	Nicrofer® 59
Alloy 600	UNS N06600	Inconel® 600
Alloy 601	UNS N06601	Inconel®601
Alloy 625	UNS N06625	Inconel®625
Alloy 718	UNS N07718	Inconel®718
Alloy 800HT®	UNS N08811	Incoloy® 800HT®
Alloy B2	UNS N10665	Hastelloy® B-2
Alloy 825	UNS N08825	Incoloy® 825
Alloy 925	UNS N09925	Incoloy® 925
Alloy A-286	UNS S66286	Incoloy® A-286, A-286 Stainless
Alloy MP35N	UNS R30035	MP35N®
Zr 702	UNS R60702	Zirconium 702
Zr 705	UNS R60705	Zirconium 705
Ti-Gr-2	UNS R50400	Titanium Grade 2
Ti-6Al-4V	UNS R56400	Titanium Grade 5
Ti-Gr-7	UNR R52400	Titanium Grade 7
Ti6AL-4V ELI	UNR RS6401	Titanium Grade 23
6% Molybdenum Alloy	UNS S31254	Alloy 254SMO
6% Molybdenum Alloy	UNS N08925	n/a
6% Molybdenum Alloy	UNS N08926	Alloy 25-6Mo, Alloy 926
6% Molybdenum Alloy	UNS N08367	AL-6XN
Alloy 218	UNS S21800	Nitronic® 60, N-60 Stainless
Alloy 2205	UNS S32205/S31803	Duplex 2205
Alloy 2507	UNS S32750	Super Duplex 2507
Alloy 310S	UNS S31008	Stainless Steel 310S (SS 310S)
Alloy 321	UNS S32100	Stainless Steel 321 (SS 321)
Alloy 317L	UNS S31703	Stainless Steel 317L (SS 317L)
Alloy 904L	UNS N08904	Stainless Steel 904L (SS 904L)
Alloy 32760	UNS S32760	Super Duplex S32782

NOTE: OTHER MATERIALS AVAILABLE.



# HASM

Nickel Alloy Fasteners

**Bolts**

**Nuts**

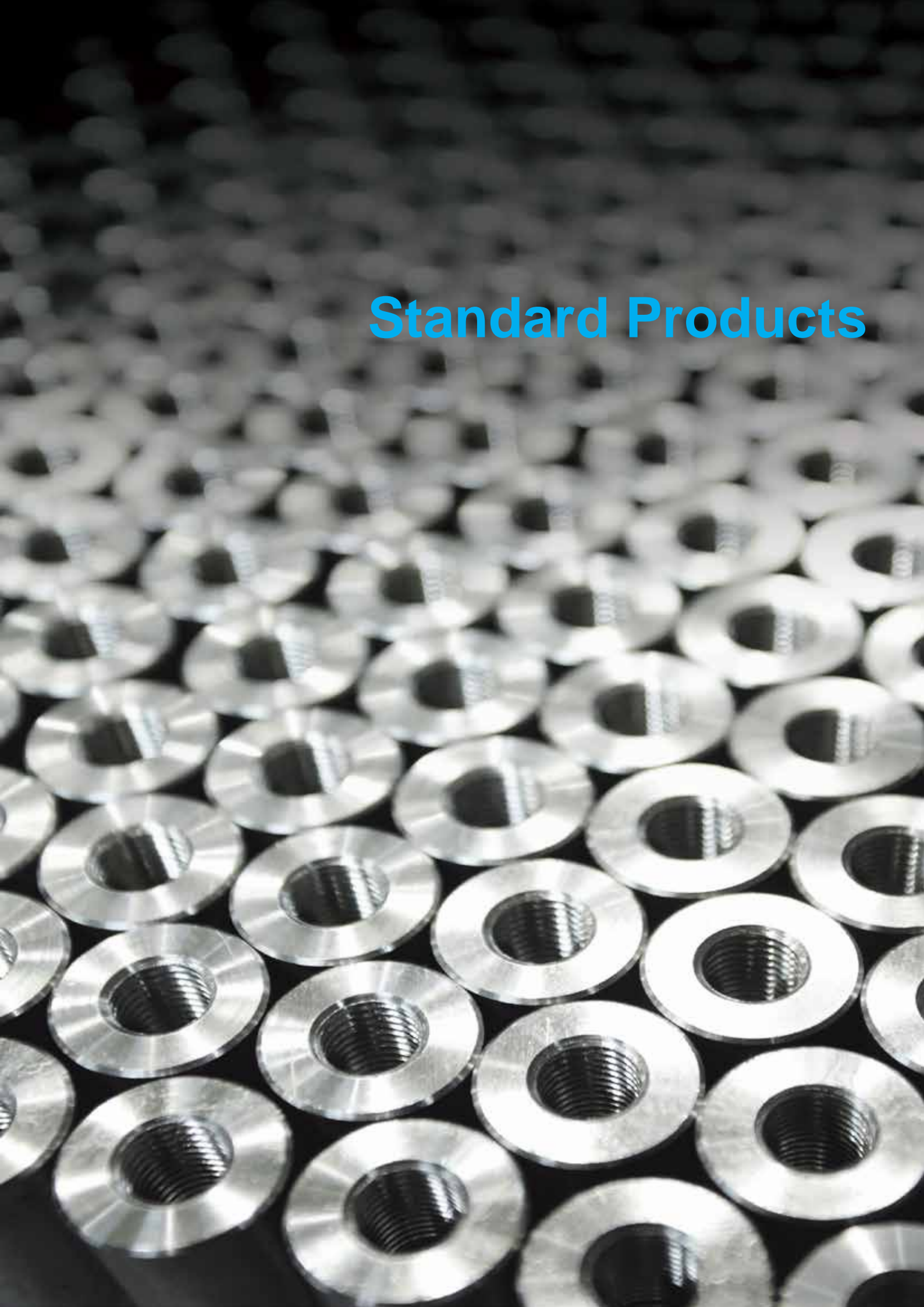
**Screws**

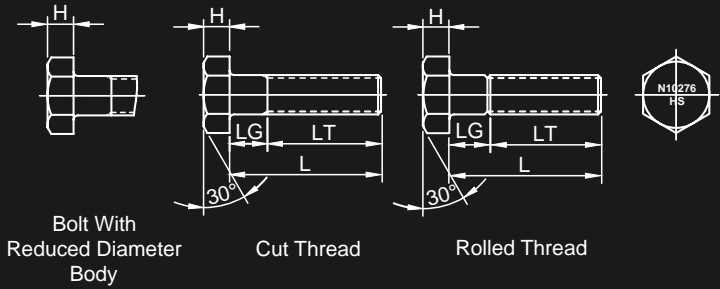
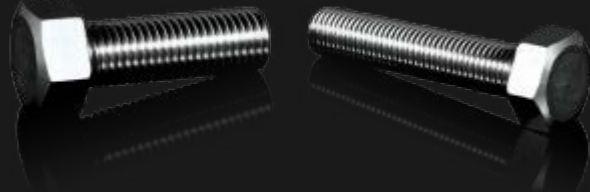
**Studs**

**Washers**

**Anchors**

# Standard Products



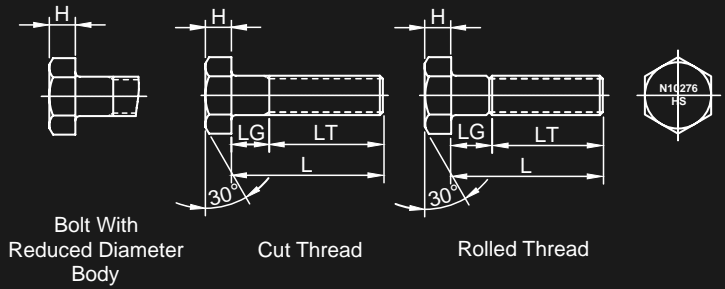
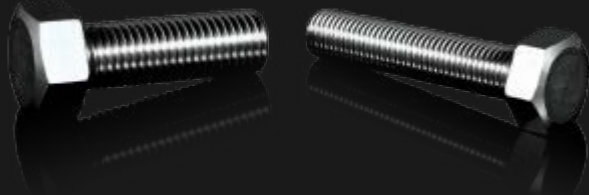


## Dimensions of Hex Bolts

ANSI B 18.2.1-2012

Nominal Size or Basic Product Diameter		E		F			G		H			R		LT	
		Full-size Body Diameter		Width Across Flats			Width Across Corners		Height			Radius of Fillet		Nominal Thread Length for Bolt Lengths	
		Max.	Min.	Basic	Max.	Min.	Max.	Min.	Basic	Max.	Min.	Max.	Min.	6 in. and Shorter	Over 6 in.
1/4	0.2500	0.260	0.237	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	0.298	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	0.360	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	0.421	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	0.482	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	0.605	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	0.729	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	0.852	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	0.976	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	1.098	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	1.223	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	1.345	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	1.470	2-1/4	2.250	2.175	2.598	2.480	1	1.036	0.902	0.09	0.03	3.250	3.500
1-5/8	1.6250	1.658	1.591	2-7/16	2.438	2.356	2.815	2.616	1-3/32	1.116	0.978	0.09	0.03	3.500	3.750
1-3/4	1.7500	1.785	1.716	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
1-7/8	1.8750	1.912	1.839	2-13/16	2.812	2.719	3.248	3.099	1-1/4	1.276	1.130	0.12	0.04	4.000	4.250
2	2.0000	2.039	1.964	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	2.214	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	2.461	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	2.711	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	2.961	4-1/2	4.500	4.350	5.196	4.959	2	2.060	1.815	0.19	0.06	6.250	6.500

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



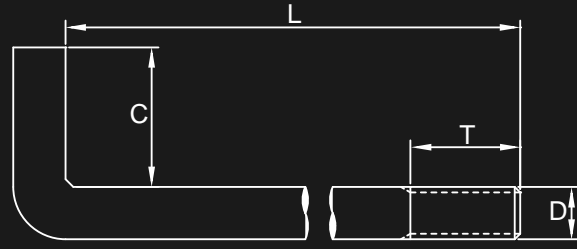
## Dimensions of Heavy Hex Bolts

ANSI B 18.2.1-2012

Nominal Size or Basic Product Diameter		E		F			G		H			R		LT	
		Full-size Body Diameter		Width Across Flats			Width Across Corners		Height			Radius of Fillet		Nominal Thread Length for Bolt Lengths	
		Max.	Min.	Basic	Max.	Min.	Max.	Min.	Basic	Max.	Min.	Max.	Min.	6 in. and Shorter	Over 6 in.
3/8	0.3750	0.388	0.360	11/16	0.688	0.669	0.794	0.763	1/4	0.268	0.226	0.03	0.01	1.000	1.250
1/2	0.5000	0.515	0.482	7/8	0.875	0.850	1.010	0.969	11/32	0.364	0.302	0.03	0.01	1.250	1.500
5/8	0.6250	0.642	0.605	1-1/16	1.062	1.031	1.227	1.175	27/64	0.444	0.378	0.06	0.02	1.500	1.750
3/4	0.7500	0.768	0.729	1-1/4	1.250	1.212	1.443	1.383	1/2	0.524	0.455	0.06	0.02	1.750	2.000
7/8	0.8750	0.895	0.852	1-7/16	1.438	1.394	1.660	1.589	37/64	0.604	0.531	0.06	0.02	2.000	2.250
1	1.0000	1.022	0.976	1-5/8	1.625	1.575	1.876	1.796	43/64	0.700	0.591	0.09	0.03	2.250	2.500
1-1/8	1.1250	1.149	1.098	1-13/16	1.812	1.756	2.093	2.002	3/4	0.780	0.658	0.09	0.03	2.500	2.750
1-1/4	1.2500	1.277	1.223	2	2.000	1.938	2.309	2.209	27/32	0.876	0.749	0.09	0.03	2.750	3.000
1-3/8	1.3750	1.404	1.345	2-3/16	2.188	2.119	2.526	2.416	29/32	0.940	0.810	0.09	0.03	3.000	3.250
1-1/2	1.5000	1.531	1.470	2-3/8	2.375	2.300	2.742	2.622	1	1.036	0.902	0.09	0.03	3.250	3.500
1-5/8	1.6250	1.658	1.591	2-9/16	2.562	2.481	2.959	2.829	1-3/32	1.116	0.978	0.09	0.03	3.500	3.750
1-3/4	1.7500	1.785	1.716	2-3/4	2.750	2.662	3.175	3.035	1-5/32	1.196	1.054	0.12	0.04	3.750	4.000
1-7/8	1.8750	1.912	1.839	2-15/16	2.938	2.844	3.392	3.242	1-1/4	1.276	1.130	0.12	0.04	4.000	4.250
2	2.0000	2.039	1.964	3-1/8	3.125	3.025	3.608	3.449	1-11/32	1.388	1.175	0.12	0.04	4.250	4.500
2-1/4	2.2500	2.305	2.214	3-1/2	3.500	3.388	4.041	3.862	1-1/2	1.548	1.327	0.19	0.06	4.750	5.000
2-1/2	2.5000	2.559	2.461	3-7/8	3.875	3.750	4.474	4.275	1-21/32	1.708	1.479	0.19	0.06	5.250	5.500
2-3/4	2.7500	2.827	2.711	4-1/4	4.250	4.112	4.907	4.688	1-13/16	1.869	1.632	0.19	0.06	5.750	6.000
3	3.0000	3.081	2.961	4-5/8	4.625	4.475	5.340	5.102	2	2.060	1.815	0.19	0.06	6.250	6.500

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.





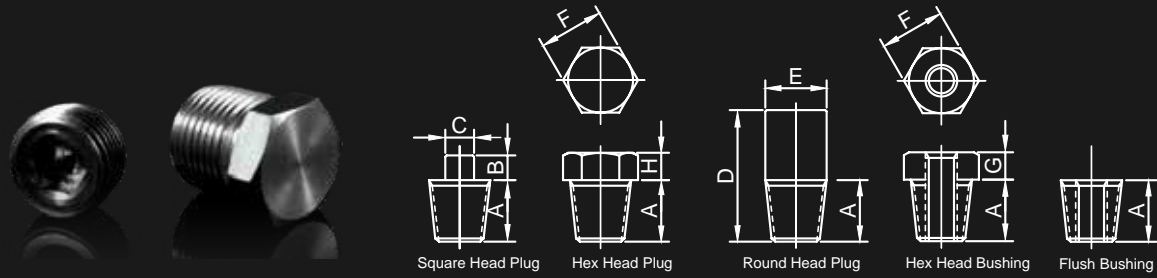
D x L x C x T

## Dimensions of Hook Bolts, Right Angle Bend

ASME B 18.31.5-2011

PIN Fields		D Diameter and UNC Thread	L Inside Length			C Inside Width			T Thread Length	
3, D	5, LCT		Basic	Max.	Min.	Basic	Max.	Min.	Max.	Min.
06	060	3/8-16	6.000	6.125	5.875	1.000	1.125	0.875	1.625	1.375
06	080	3/8-16	8.000	8.125	7.875	1.000	1.125	0.875	1.625	1.375
06	100	3/8-16	10.000	10.125	9.875	1.000	1.125	0.875	1.625	1.375
06	120	3/8-16	12.000	12.125	11.875	1.000	1.125	0.875	1.625	1.375
06	140	3/8-16	14.000	14.125	13.875	1.000	1.125	0.875	1.625	1.375
06	160	3/8-16	16.000	16.125	15.875	1.000	1.125	0.875	1.625	1.375
08	060	1/2-13	6.000	6.125	5.875	1.000	1.125	0.875	2.125	1.875
08	080	1/2-13	8.000	8.125	7.875	1.000	1.125	0.875	2.125	1.875
08	100	1/2-13	10.000	10.125	9.875	1.000	1.125	0.875	2.125	1.875
08	120	1/2-13	12.000	12.125	11.875	1.000	1.125	0.875	2.125	1.875
08	140	1/2-13	14.000	14.125	13.875	1.000	1.125	0.875	2.125	1.875
08	160	1/2-13	16.000	16.125	15.875	1.000	1.125	0.875	2.125	1.875
08	180	1/2-13	18.000	18.125	17.875	1.000	1.125	0.875	2.125	1.875
10	060	5/8-11	6.000	6.125	5.875	2.000	2.125	1.875	4.188	3.812
10	080	5/8-11	8.000	8.125	7.875	2.000	2.125	1.875	4.188	3.812
10	100	5/8-11	10.000	10.125	9.875	2.000	2.125	1.875	4.188	3.812
10	120	5/8-11	12.000	12.125	11.875	2.000	2.125	1.875	4.188	3.812
10	140	5/8-11	14.000	14.125	13.875	2.000	2.125	1.875	4.188	3.812
10	160	5/8-11	16.000	16.125	15.875	2.000	2.125	1.875	4.188	3.812
10	180	5/8-11	18.000	18.125	17.875	2.000	2.125	1.875	4.188	3.812
12	080	3/4-10	8.000	8.188	7.812	3.000	3.188	2.812	4.250	3.750
12	100	3/4-10	10.000	10.188	9.812	3.000	3.188	2.812	4.250	3.750
12	120	3/4-10	12.000	12.188	11.812	3.000	3.188	2.812	4.250	3.750
12	140	3/4-10	14.000	14.188	13.812	3.000	3.188	2.812	4.250	3.750
12	160	3/4-10	16.000	16.188	15.812	3.000	3.188	2.812	4.250	3.750
12	180	3/4-10	18.000	18.188	17.812	3.000	3.188	2.812	4.250	3.750
12	240	3/4-10	24.000	24.250	23.750	3.000	3.188	2.812	4.250	3.750
16	100	1-8	10.000	10.188	9.812	3.500	3.688	3.312	6.250	5.750
16	120	1-8	12.000	12.188	11.812	3.500	3.688	3.312	6.250	5.750
16	140	1-8	14.000	14.188	13.812	3.500	3.688	3.312	6.250	5.750
16	160	1-8	16.000	16.188	15.812	3.500	3.688	3.312	6.250	5.750
16	180	1-8	18.000	18.188	17.812	3.500	3.688	3.312	6.250	5.750
16	240	1-8	24.000	24.250	23.750	3.500	3.688	3.312	6.250	5.750

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

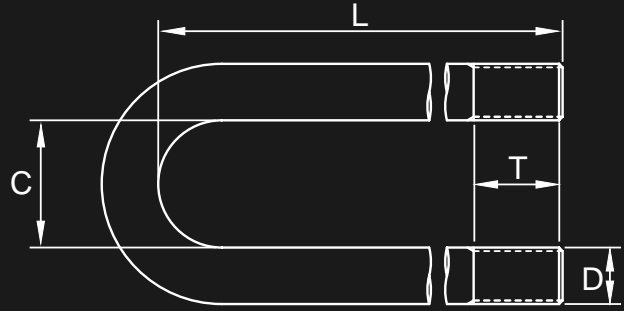


## Dimensions of Plugs and Bushings

ASME B 16.11-2016

Nominal Pipe Size	Minimum Length	Square Head Plugs		Round Head Plugs		Hex Plugs & Bushings		
		Minimum Square Height	Minimum Width Flats	Nominal Head Diameter	Minimum Length	Nominal Width Flats (Min.)	Minimum Hex Height	
							Bushing	Plug
A	B	C	E	D	F	G	H	
1/8	10	6	7.15	10	35	11.11	...	6
1/4	11	6	9.55	14	41	15.88	3	6
3/8	13	8	11.11	18	41	17.46	4	8
1/2	14	10	14.29	21	44	22.23	5	8
3/4	16	11	15.88	27	44	26.99	6	10
1	19	13	20.64	33	51	34.93	6	10
1-1/4	21	14	23.81	43	51	44.45	7	14
1-1/2	21	16	28.58	48	51	50.80	8	16
2	22	18	33.27	60	64	63.50	9	18
2-1/2	27	19	38.10	73	70	76.20	10	19
3	28	21	42.86	89	70	88.90	10	21

**NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.**

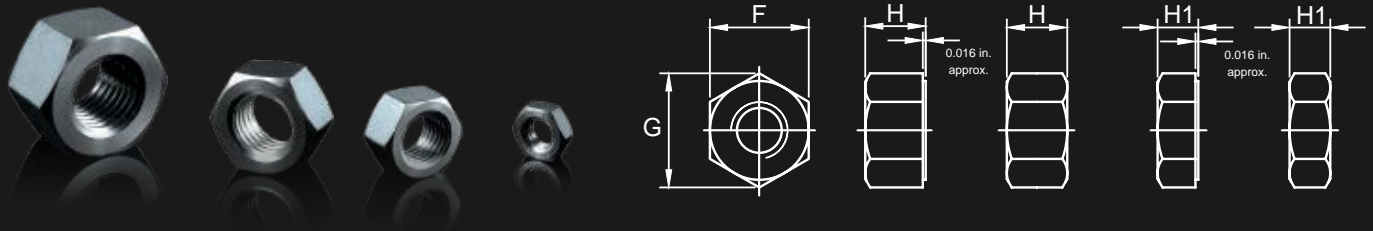


## Dimensions of U-Bolts, Round Bend

ASME B 18.31.5-2011

PIN Fields		D Diameter and UNC Thread	L Inside Length			C Inside Width			T Thread Length		Nominal Pipe Size
3, D	5, LCT		Basic	Max.	Min.	Basic	Max.	Min.	Max.	Min.	
04	012	1/4-20	1.250	1.280	1.220	0.563	0.593	0.533	0.810	0.690	1/4
04	013	1/4-20	1.250	1.280	1.220	0.750	0.780	0.720	0.685	0.565	3/8
04	022	1/4-20	2.250	2.280	2.220	0.750	0.780	0.720	1.560	1.440	3/8
04	017	1/4-20	1.750	1.780	1.720	1.000	1.030	0.970	1.060	0.940	1/2
04	020	1/4-20	2.000	2.030	1.970	1.000	1.030	0.970	1.060	0.940	3/4
04	031	1/4-20	3.125	3.155	3.095	1.000	1.030	0.970	1.560	1.440	3/4
04	023	1/4-20	2.250	2.280	2.220	1.125	1.155	1.095	1.310	1.190	3/4
04	027	1/4-20	2.750	2.780	2.720	1.125	1.155	1.095	1.435	1.315	1
04	034	1/4-20	3.438	3.468	3.408	1.125	1.155	1.095	2.435	2.315	1
04	030	1/4-20	3.000	3.030	2.970	1.250	1.280	1.220	1.435	1.315	1-1/4
04	032	1/4-20	3.250	3.280	3.220	1.250	1.280	1.220	1.435	1.315	1-1/2
05	021	5/16-18	2.188	2.218	2.158	1.375	1.405	1.345	1.435	1.315	1/2
05	022	5/16-18	2.188	2.218	2.158	1.375	1.405	1.345	1.060	0.940	3/4
05	023	5/16-18	2.188	2.218	2.158	1.500	1.530	1.470	1.060	0.940	1
05	026	5/16-18	2.688	2.718	2.658	1.500	1.530	1.470	1.185	1.065	1-1/4
05	045	5/16-18	4.500	4.530	4.470	1.750	1.780	1.720	2.060	1.940	1-1/4
05	027	5/16-18	2.688	2.718	2.658	1.750	1.780	1.720	1.060	0.940	1-1/2
05	047	5/16-18	4.750	4.780	4.720	1.750	1.780	1.720	3.060	2.940	1-1/2
05	032	5/16-18	3.188	3.218	3.158	1.750	1.780	1.720	1.060	0.940	2
05	056	5/16-18	5.625	5.685	5.565	2.000	2.030	1.970	3.060	2.940	2
05	037	5/16-18	3.688	3.718	3.658	2.000	2.030	1.970	1.060	0.940	2-1/2
06	022	3/8-16	2.250	2.280	2.220	2.000	2.030	1.970	1.310	1.190	1/2
06	023	3/8-16	2.250	2.280	2.220	2.000	2.030	1.970	1.310	1.190	3/4
06	025	3/8-16	2.500	2.530	2.470	2.500	2.530	2.470	1.310	1.190	1
06	027	3/8-16	2.750	2.780	2.720	2.500	2.530	2.470	1.185	1.065	1-1/4
06	026	3/8-16	2.625	2.655	2.595	2.500	2.530	2.470	1.310	1.190	1-1/2
06	031	3/8-16	3.125	3.155	3.095	3.000	3.030	2.970	1.310	1.190	2
06	036	3/8-16	3.625	3.655	3.595	3.000	3.030	2.970	1.310	1.190	2-1/2
06	066	3/8-16	6.625	6.685	6.565	3.000	3.030	2.970	3.060	2.940	2-1/2
06	041	3/8-16	4.125	4.155	4.095	3.000	3.030	2.970	1.310	1.190	3
06	055	3/8-16	5.500	5.560	5.440	3.500	3.530	3.470	2.310	2.190	3-1/2
08	045	1/2-13	4.500	4.530	4.470	3.500	3.530	3.470	1.685	1.565	2-1/2
08	050	1/2-13	5.000	5.060	4.940	3.500	3.530	3.470	1.560	1.440	3
08	085	1/2-13	8.500	8.590	8.410	4.000	4.030	3.970	3.060	2.940	3
08	055	1/2-13	5.500	5.560	5.440	4.000	4.030	3.970	1.560	1.440	3-1/2

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



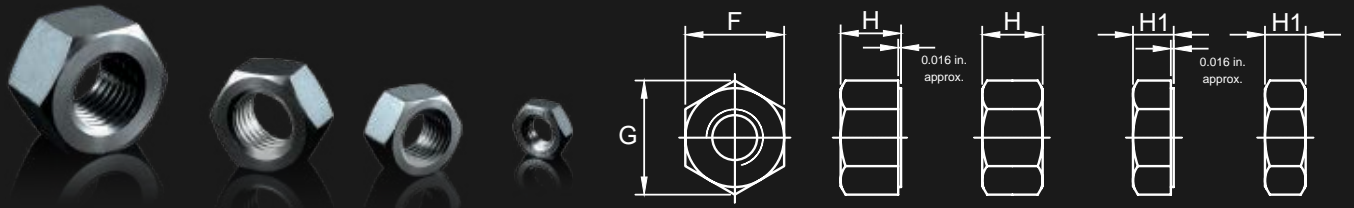
## Dimensions of Hex Nuts and Hex Jam Nuts

ANSI B 18.2.2-2010

Nominal Size	Basic Major Diameter of Thread	F		G		H		H1		Maximum Runout of Bearing Surface to Thread Axis, FIM		
		Width Across Flats		Width Across Corners		Thickness Hex Nuts		Thickness Jam Nuts		Hex Nuts		Hex Jam Nuts
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Specified Proof Load		
										Up to 150,000 psi	150,000 psi and Greater	All Strength Levels
1/4	0.2500	0.428	0.438	0.488	0.505	0.212	0.226	0.150	0.163	0.015	0.010	0.015
5/16	0.3125	0.489	0.500	0.557	0.577	0.258	0.273	0.180	0.195	0.016	0.011	0.016
3/8	0.3750	0.551	0.563	0.628	0.650	0.320	0.337	0.210	0.227	0.017	0.012	0.017
7/16	0.4375	0.675	0.688	0.768	0.794	0.365	0.385	0.240	0.260	0.018	0.013	0.018
1/2	0.5000	0.736	0.750	0.840	0.866	0.427	0.448	0.302	0.323	0.019	0.014	0.019
9/16	0.5625	0.861	0.875	0.982	1.010	0.473	0.496	0.301	0.324	0.020	0.015	0.020
5/8	0.6250	0.922	0.938	1.051	1.083	0.535	0.559	0.363	0.387	0.021	0.016	0.021
3/4	0.7500	1.088	1.125	1.240	1.299	0.617	0.665	0.398	0.446	0.023	0.018	0.023
7/8	0.8750	1.269	1.312	1.447	1.516	0.724	0.776	0.458	0.510	0.025	0.020	0.025
1	1.0000	1.450	1.500	1.653	1.732	0.831	0.887	0.519	0.575	0.027	0.022	0.027
1-1/8	1.1250	1.631	1.688	1.859	1.949	0.939	0.999	0.579	0.639	0.030	0.025	0.030
1-1/4	1.2500	1.812	1.875	2.066	2.165	1.030	1.094	0.687	0.751	0.033	0.028	0.033
1-3/8	1.3750	1.994	2.062	2.273	2.382	1.138	1.206	0.747	0.815	0.036	0.031	0.036
1-1/2	1.5000	2.175	2.250	2.480	2.598	1.245	1.317	0.808	0.880	0.039	0.034	0.039
1-5/8	1.6250	2.350	2.430	2.679	2.805	1.364	1.416	0.868	0.944	0.044	0.038	0.044
1-3/4	1.7500	2.538	2.625	2.893	3.031	1.460	1.540	0.929	1.009	0.048	0.041	0.048
1-7/8	1.8750	2.722	2.813	3.103	3.247	1.567	1.651	0.989	1.073	0.051	0.044	0.051
2	2.0000	2.900	3.000	3.306	3.464	1.675	1.763	1.050	1.138	0.055	0.047	0.055
2-1/4	2.2500	3.263	3.375	3.719	3.897	1.890	1.986	1.155	1.267	0.061	0.052	0.061
2-1/2	2.5000	3.625	3.750	4.133	4.330	2.105	2.209	1.401	1.427	0.068	0.058	0.068
2-3/4	2.7500	3.998	4.125	4.546	4.763	2.319	2.431	1.522	1.556	0.074	0.064	0.074
3	3.0000	4.350	4.500	4.959	5.196	2.534	2.654	1.643	1.685	0.081	0.070	0.081

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



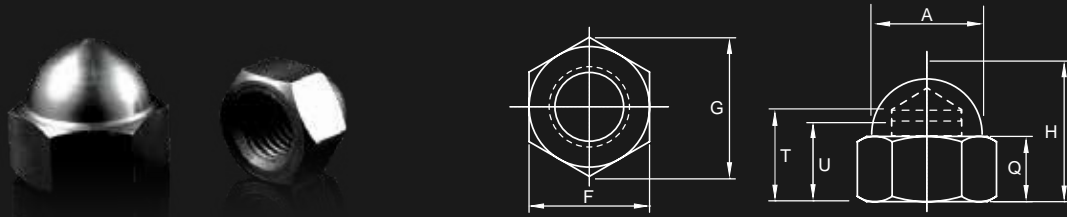


## Dimensions of Heavy Hex Nuts and Heavy Hex Jam Nuts

ANSI B 18.2.2-2010

Nominal Size	Basic Major Diameter of Thread	F			G		H			H1			Maximum Runout of Bearing Surface to Thread Axis, FIM		
		Width Across Flats			Width Across Corners		Thickness Heavy Hex Nuts			Thickness Heavy Hex Jam Nuts			Heavy Hex Nuts		Heavy Hex Jam Nuts
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	Basic	Min.	Max.	Up to 150,000 psi	150,000 psi and Greater	
1/4	0.2500	1/2	0.488	0.500	0.556	0.577	15/64	0.218	0.250	11/64	0.156	0.188	0.017	0.011	0.017
5/16	0.3125	9/16	0.546	0.562	0.622	0.650	19/64	0.280	0.314	13/64	0.186	0.220	0.020	0.012	0.020
3/8	0.3750	11/16	0.669	0.688	0.763	0.794	23/64	0.341	0.377	15/64	0.216	0.252	0.021	0.014	0.021
7/16	0.4375	3/4	0.728	0.750	0.830	0.866	27/64	0.403	0.441	17/64	0.247	0.285	0.022	0.015	0.022
1/2	0.5000	7/8	0.850	0.875	0.969	1.010	31/64	0.464	0.504	19/64	0.277	0.317	0.023	0.016	0.023
9/16	0.5625	15/16	0.909	0.938	1.037	1.083	35/64	0.526	0.568	21/64	0.307	0.349	0.024	0.017	0.024
5/8	0.6250	1-1/16	1.031	1.062	1.175	1.227	39/64	0.587	0.631	23/64	0.337	0.381	0.025	0.018	0.025
3/4	0.7500	1-1/4	1.212	1.250	1.382	1.443	47/64	0.710	0.758	27/64	0.398	0.446	0.027	0.020	0.027
7/8	0.8750	1-7/16	1.394	1.438	1.589	1.660	55/64	0.833	0.885	31/64	0.458	0.510	0.029	0.022	0.029
1	1.0000	1-5/8	1.575	1.625	1.796	1.876	63/64	0.956	1.012	35/64	0.519	0.575	0.031	0.024	0.031
1-1/8	1.1250	1-13/16	1.756	1.812	2.002	2.093	1-7/64	1.079	1.139	39/64	0.579	0.639	0.033	0.027	0.033
1-1/4	1.2500	2	1.938	2.000	2.209	2.309	1-7/32	1.187	1.251	23/32	0.687	0.751	0.035	0.030	0.035
1-3/8	1.3750	2-3/16	2.119	2.188	2.416	2.526	1-11/32	1.310	1.378	25/32	0.747	0.815	0.038	0.033	0.038
1-1/2	1.5000	2-3/8	2.300	2.375	2.622	2.742	1-15/32	1.433	1.505	27/32	0.808	0.880	0.041	0.036	0.041
1-5/8	1.6250	2-9/16	2.481	2.562	2.828	2.959	1-19/32	1.556	1.632	29/32	0.868	0.944	0.044	0.038	0.044
1-3/4	1.7500	2-3/4	2.662	2.750	3.035	3.175	1-23/32	1.679	1.759	31/32	0.929	1.009	0.048	0.041	0.048
1-7/8	1.8750	2-15/16	2.844	2.938	3.242	3.392	1-27/32	1.802	1.886	1-1/32	0.989	1.073	0.051	0.044	0.051
2	2.0000	3-1/8	3.025	3.125	3.449	3.608	1-31/32	1.925	2.013	1-3/32	1.050	1.138	0.055	0.047	0.055
2-1/4	2.2500	3-1/2	3.388	3.500	3.862	4.041	2-13/64	2.155	2.251	1-13/64	1.155	1.251	0.061	0.052	0.061
2-1/2	2.5000	3-7/8	3.750	3.875	4.275	4.474	2-29/64	2.401	2.505	1-29/64	1.401	1.505	0.068	0.058	0.068
2-3/4	2.7500	4-1/4	4.112	4.250	4.688	4.907	2-45/64	2.647	2.759	1-37/64	1.522	1.634	0.074	0.064	0.074
3	3.0000	4-5/8	4.475	4.625	5.102	5.340	2-61/64	2.893	3.013	1-45/64	1.643	1.763	0.081	0.070	0.081

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



## Dimensions of One-Piece Hex Cap Nuts, Low Crown

SAE J483-2013

Nominal Size or Basic Major Diameter of Thread		F		G		A	H	Q	T	U
		Width Across Flats		Width Across Corners		Body Diameter	Overall Height	Hexagon Height	Drill Depth	Full Thread
		Max.	Min.	Max.	Min.					
6	0.1380	0.3125	0.302	0.361	0.344	0.30	0.34	0.16	0.25	0.16
8	0.1640	0.3125	0.302	0.361	0.344	0.30	0.34	0.16	0.25	0.16
10	0.1900	0.3750	0.362	0.433	0.413	0.36	0.41	0.19	0.28	0.19
1/4	0.2500	0.4375	0.428	0.505	0.488	0.41	0.47	0.22	0.34	0.25
5/16	0.3125	0.5000	0.489	0.577	0.557	0.47	0.53	0.25	0.41	0.31
3/8	0.3750	0.5625	0.551	0.650	0.628	0.53	0.62	0.28	0.45	0.38
1/2	0.5000	0.7500	0.736	0.866	0.840	0.72	0.81	0.38	0.59	0.50
5/8	0.6250	0.9375	0.922	1.083	1.051	0.91	1.00	0.47	0.75	0.53
3/4	0.7500	1.0625	1.045	1.227	1.191	1.03	1.16	0.53	0.88	0.75

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



## Dimensions of Style NE Nylon Insert Locknuts

ASME B18.16.6-2017

Designation		A		B	C		D	Maximum Runout of Bearing Surface With Thread P.D FIM
		Width Across Flats		Minimum Width Across Corners	Thickness		Minimum Hex Height	
Size	Nominal Diameter	Max.	Min.			Max.		Min.
1/4	0.2500	0.439	0.430	0.482	0.328	0.298	0.225	0.010
5/16	0.3125	0.502	0.489	0.552	0.359	0.329	0.250	0.011
3/8	0.3750	0.564	0.551	0.622	0.468	0.438	0.335	0.012
7/16	0.4375	0.627	0.616	0.698	0.468	0.438	0.324	0.013
1/2	0.5000	0.752	0.736	0.837	0.609	0.579	0.464	0.014
9/16	0.5625	0.877	0.861	0.978	0.656	0.626	0.469	0.015
5/8	0.6250	0.940	0.922	1.051	0.765	0.735	0.593	0.016
3/4	0.7500	1.064	1.052	1.191	0.890	0.860	0.742	0.018
7/8	0.8750	1.252	1.239	1.403	0.999	0.969	0.790	0.020
1	1.0000	1.440	1.427	1.615	1.078	1.016	0.825	0.022
1-1/8	1.1250	1.627	1.614	1.826	1.203	1.141	0.930	0.025
1-1/4	1.2500	1.815	1.801	2.038	1.422	1.360	1.125	0.028
1-3/8	1.3750	2.008	1.973	2.232	1.609	1.547	1.282	0.031
1-1/2	1.5000	2.197	2.159	2.444	1.640	1.578	1.313	0.034

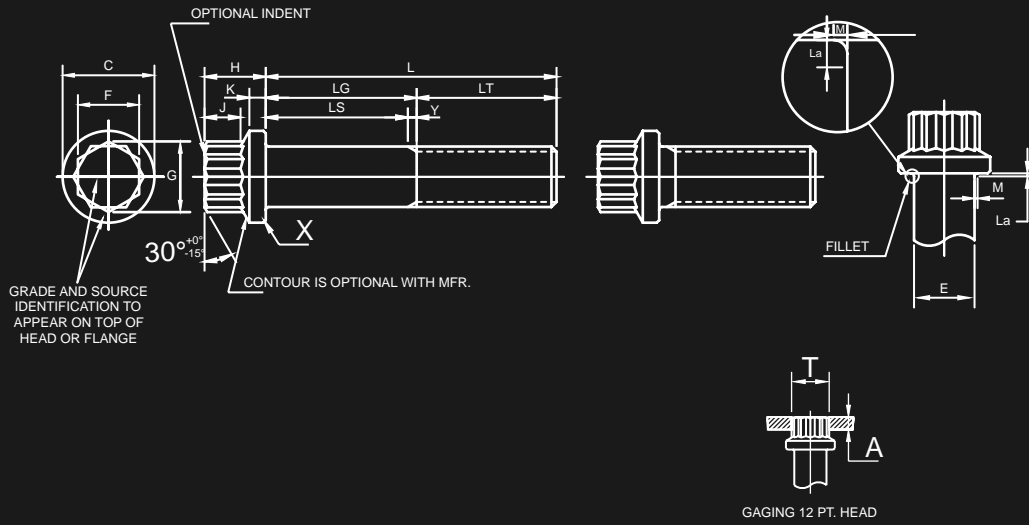
NOTE: ALL DIMENSIONS ARE IN INCHES. OTHER DIMENSIONS AND METRIC SIZES AVAILABLE.



## Dimensions of 12-Point Flange Screws

Nominal Size or Basic Major Diameter of Thread		E	C		F		G	H	J	K
		Body Diameter Min. (Max. Equal to Nominal Size)	Flange Diameter		Width Across Flats		Width Across Corners	Head Height	Wrenching Height	Flange Thickness
			Max.	Min.	Max.	Min.	Min.	Max.	Min.	Min.
1/4	0.2500	0.2435	0.375	0.365	0.252	0.244	0.278	0.260	0.15	0.058
5/16	0.3125	0.3053	0.469	0.457	0.315	0.306	0.348	0.312	0.18	0.074
3/8	0.3750	0.3678	0.562	0.550	0.377	0.368	0.420	0.375	0.21	0.095
7/16	0.4375	0.4294	0.656	0.642	0.438	0.429	0.489	0.438	0.25	0.109
1/2	0.5000	0.4919	0.750	0.735	0.502	0.493	0.562	0.500	0.29	0.129
9/16	0.5625	0.5538	0.844	0.828	0.564	0.555	0.633	0.563	0.33	0.145
5/8	0.6250	0.6163	0.938	0.921	0.627	0.618	0.705	0.625	0.36	0.166
3/4	0.7500	0.7406	1.125	1.107	0.752	0.743	0.847	0.750	0.44	0.200
7/8	0.8750	0.8647	1.312	1.293	0.877	0.866	0.987	0.875	0.51	0.234
1	1.0000	0.9886	1.500	1.479	1.003	0.991	1.130	1.000	0.60	0.268
1-1/8	1.1250	1.1086	1.688	1.665	1.128	1.115	1.271	1.125	0.66	0.310
1-1/4	1.2500	1.2336	1.875	1.852	1.253	1.240	1.414	1.250	0.73	0.350
1-3/8	1.3750	1.3568	2.062	2.038	1.378	1.365	1.556	1.375	0.80	0.392
1-1/2	1.5000	1.4818	2.250	2.224	1.503	1.489	1.697	1.500	0.87	0.433

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



IFI-115-2002

Runout of Bearing Surface FIM	M		La	Bearing Surface Junctionure Radius	X	A		T		LT	Y
	Fillet Extension		Fillet Length		Chamfer or Radius	Gaging Ring Thickness		Gaging Ring Diameter		Thread Length	Transition Thread Length
Max.	Max.	Min.	Max.		Max.	Max.	Min.	Max.	Min.	Basic	Max.
0.007	0.014	0.009	0.087	0.007	0.020	0.053	0.052	0.278	0.278	1.000	0.25
0.008	0.017	0.012	0.087	0.009	0.020	0.060	0.060	0.348	0.348	1.125	0.28
0.010	0.020	0.015	0.087	0.012	0.020	0.071	0.071	0.420	0.420	1.250	0.31
0.011	0.023	0.018	0.087	0.014	0.030	0.084	0.084	0.489	0.489	1.375	0.36
0.013	0.026	0.020	0.087	0.016	0.030	0.095	0.095	0.562	0.562	1.500	0.38
0.015	0.029	0.022	0.157	0.018	0.030	0.107	0.107	0.633	0.633	1.625	0.42
0.016	0.032	0.024	0.157	0.021	0.040	0.118	0.118	0.705	0.705	1.750	0.46
0.020	0.039	0.030	0.157	0.025	0.040	0.142	0.141	0.847	0.847	2.000	0.50
0.023	0.044	0.034	0.227	0.031	0.040	0.166	0.165	0.987	0.987	2.250	0.56
0.026	0.050	0.040	0.332	0.034	0.040	0.189	0.189	1.130	1.130	2.500	0.62
0.029	0.055	0.045	0.332	0.039	0.050	0.211	0.211	1.271	1.271	2.750	0.71
0.033	0.060	0.050	0.332	0.044	0.050	0.233	0.233	1.414	1.414	3.000	0.71
0.036	0.065	0.055	0.332	0.048	0.050	0.254	0.254	1.556	1.556	3.250	0.83
0.039	0.070	0.060	0.332	0.052	0.050	0.276	0.276	1.697	1.697	3.500	0.83

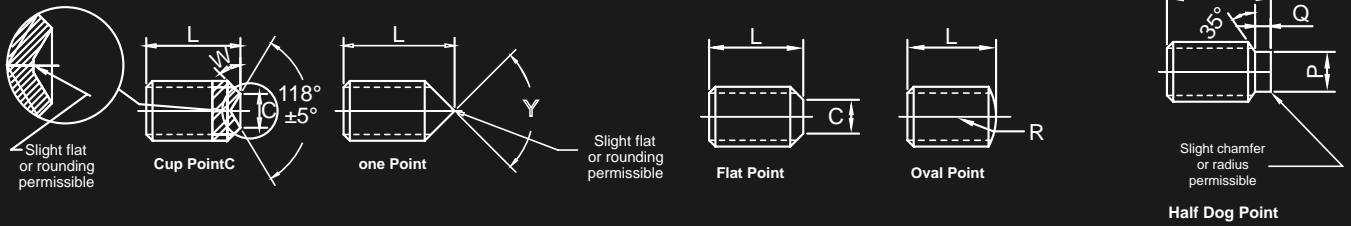




## Dimensions of Hexagon Socket Set Screws

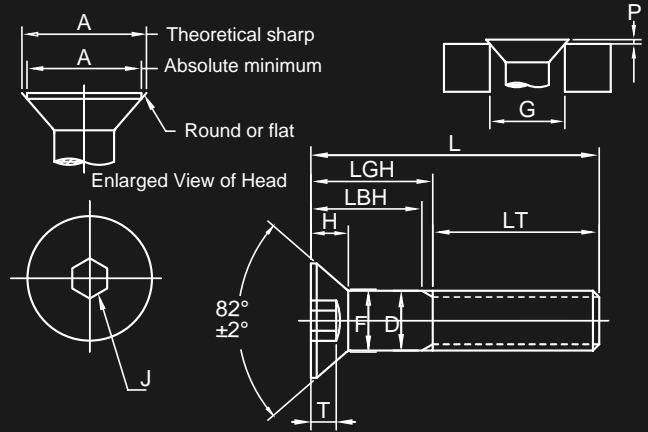
Nominal Size (Basic Screw Diameter)		J		T	C		R	Y  Cone Point Angle 90 deg ± 2 deg for These Nominal Lengths or Longer:  118 deg ± 2 deg for Shorter Nominal Lengths
		Nominal Hexagon Socket Size		Minimum Key Engagement to Develop Functional Capability of Key	Max.	Min.	Basic Oval Point Radius	
				Hex Socket, TH				
5	(0.1250)	1/16	0.062	0.080	0.067	0.057	0.094	0.19
6	(0.1380)	1/16	0.062	0.080	0.074	0.064	0.104	0.19
8	(0.1640)	5/64	0.078	0.090	0.087	0.076	0.123	0.25
10	(0.1900)	3/32	0.094	0.100	0.102	0.088	0.142	0.25
1/4	(0.2500)	1/8	0.125	0.125	0.132	0.118	0.188	0.31
5/16	(0.3125)	5/32	0.156	0.156	0.172	0.156	0.234	0.38
3/8	(0.3750)	3/16	0.188	0.188	0.212	0.194	0.281	0.44
7/16	(0.4375)	7/32	0.219	0.219	0.252	0.232	0.328	0.50
1/2	(0.5000)	1/4	0.250	0.250	0.291	0.270	0.375	0.57
5/8	(0.6250)	5/16	0.312	0.312	0.371	0.347	0.469	0.75
3/4	(0.7500)	3/8	0.375	0.375	0.450	0.425	0.562	0.88
7/8	(0.8750)	1/2	0.500	0.500	0.530	0.502	0.656	1.00
1	(1.0000)	9/16	0.562	0.562	0.609	0.579	0.750	1.13
1-1/8	(1.1250)	9/16	0.562	0.562	0.689	0.655	0.844	1.25
1-1/4	(1.2500)	5/8	0.625	0.625	0.767	0.733	0.938	1.50
1-3/8	(1.3750)	5/8	0.625	0.625	0.848	0.808	1.031	1.63
1-1/2	(1.5000)	3/4	0.750	0.750	0.926	0.886	1.125	1.75
1-3/4	(1.7500)	1	1.000	1.000	1.086	1.039	1.312	2.00
2	(2.0000)	1	1.000	1.000	1.244	1.193	1.500	2.25

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



ASME B18.3-2012

P		Q		B			B1		
Half Dog Point				Shortest Optimum Nominal Length to Which TH Applies			Nominal Length to Which TS Applies		
Diameter		Length		Cup and Flat Points	90 deg Cone and Oval Points	Half Dog Point	Cup and Flat Points	90 deg Cone and Oval Points	Half Dog Point
Max.	Min.	Max.	Min.						
0.083	0.078	0.033	0.027	0.19	0.19	0.19	0.13	0.19	0.19
0.092	0.087	0.038	0.032	0.19	0.25	0.19	0.13	0.25	0.19
0.109	0.103	0.043	0.037	0.19	0.25	0.25	0.19	0.25	0.25
0.127	0.120	0.049	0.041	0.19	0.25	0.25	0.19	0.25	0.25
0.156	0.149	0.067	0.059	0.25	0.31	0.31	0.25	0.31	0.31
0.203	0.195	0.082	0.074	0.31	0.44	0.38	0.31	0.44	0.38
0.250	0.241	0.099	0.089	0.38	0.44	0.44	0.38	0.44	0.44
0.297	0.287	0.114	0.104	0.44	0.63	0.50	0.44	0.63	0.50
0.344	0.334	0.130	0.120	0.50	0.63	0.63	0.50	0.63	0.63
0.469	0.456	0.164	0.148	0.63	0.88	0.88	0.63	0.88	0.88
0.562	0.549	0.196	0.180	0.75	1.00	1.00	0.75	1.00	1.00
0.656	0.642	0.227	0.211	0.88	1.00	1.00	0.88	1.25	1.00
0.750	0.734	0.260	0.240	1.00	1.25	1.25	...	...	...
0.844	0.826	0.291	0.271	1.25	1.50	1.25	...	...	...
0.938	0.920	0.323	0.303	1.25	1.50	1.50	...	...	...
1.031	1.011	0.354	0.334	1.50	1.75	1.50	...	...	...
1.125	1.105	0.385	0.365	1.50	2.00	1.75	...	...	...
1.312	1.289	0.448	0.428	1.75	2.25	2.00	...	...	...
1.500	1.474	0.510	0.490	2.00	2.50	2.50	...	...	...

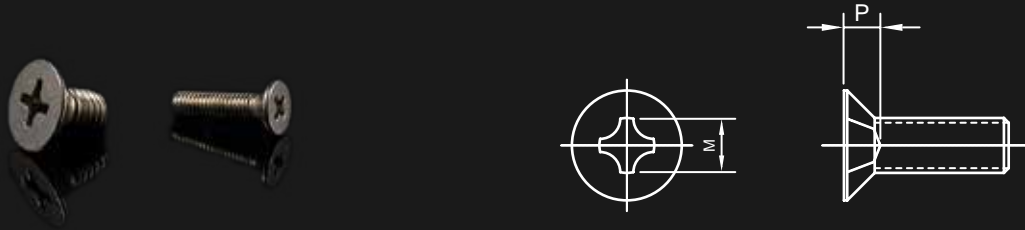


## Dimensions of Hexagon Socket Flat Countersunk Head Cap Screws

ASME B18.3-2002

Nominal Size (Basic Screw Diameter)	D		A		H Reference Head Height	G		P		J		T Minimum Key Engagement	F Maximum Fillet Transition Diameter	
	Body Diameter		Head Diameter			Protrusion Gage Diameter		Protrusion		Nominal Hexagon Socket Size				
	Max.	Min.	Max.	Min.		Max.	Min.	Max.	Min.					
5	(0.1250)	0.1250	0.1202	0.281	0.240	0.090	0.196	0.195	0.059	0.037	5/64	0.078	0.061	0.153
6	(0.1380)	0.1380	0.1329	0.307	0.263	0.097	0.220	0.219	0.060	0.037	5/64	0.078	0.066	0.168
8	(0.1640)	0.1640	0.1585	0.359	0.311	0.112	0.267	0.266	0.063	0.039	3/32	0.094	0.076	0.194
10	(0.1900)	0.1900	0.1840	0.411	0.359	0.127	0.313	0.312	0.066	0.041	1/8	0.125	0.087	0.220
12	(0.2158)	0.2158	0.2102	0.450	0.410	0.135	0.360	0.359	0.069	0.042	1/8	0.125	0.094	0.246
1/4	(0.2500)	0.2500	0.2435	0.531	0.480	0.161	0.424	0.423	0.072	0.043	5/32	0.156	0.111	0.280
5/16	(0.3125)	0.3125	0.3053	0.656	0.600	0.198	0.539	0.538	0.078	0.047	3/16	0.188	0.135	0.343
3/8	(0.3750)	0.3750	0.3678	0.781	0.720	0.234	0.653	0.652	0.088	0.050	7/32	0.219	0.159	0.405
7/16	(0.4375)	0.4375	0.4294	0.844	0.781	0.234	0.690	0.689	0.104	0.063	1/4	0.250	0.159	0.468
1/2	(0.5000)	0.5000	0.4919	0.938	0.872	0.251	0.739	0.738	0.131	0.087	5/16	0.312	0.172	0.530
5/8	(0.6250)	0.6250	0.6163	1.188	1.112	0.324	0.962	0.961	0.146	0.096	3/8	0.375	0.220	0.655
3/4	(0.7500)	0.7500	0.7406	1.438	1.355	0.396	1.186	1.185	0.170	0.105	1/2	0.500	0.220	0.780
7/8	(0.8750)	0.8750	0.8647	1.688	1.604	0.468	1.411	1.410	0.165	0.118	9/16	0.562	0.248	0.905
1	(1.0000)	1.0000	0.9886	1.938	1.841	0.540	1.635	1.634	0.181	0.130	5/8	0.625	0.297	1.030
1-1/8	(1.1250)	1.1250	1.1086	2.188	2.079	0.611	1.859	1.858	0.196	0.140	3/4	0.750	0.325	1.187
1-1/4	(1.2500)	1.2500	1.2336	2.438	2.316	0.683	2.083	2.082	0.212	0.150	7/8	0.875	0.358	1.312
1-3/8	(1.3750)	1.3750	1.3568	2.688	2.553	0.755	2.306	2.305	0.228	0.162	7/8	0.875	0.402	1.437
1-1/2	(1.5000)	1.5000	1.4818	2.938	2.791	0.827	2.530	2.529	0.243	0.173	1	1.000	0.435	1.562

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

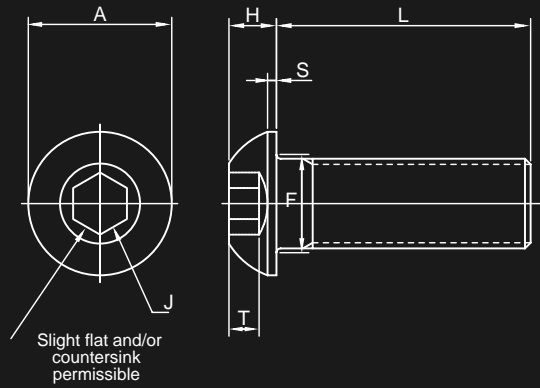
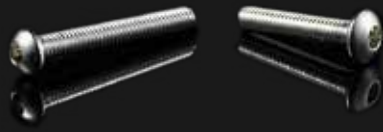


## Recess Dimensions for Flat Countersunk Trim Head Screws

ASME B18.6.3-2013

Nominal Size or Basic Screw Diameter		Type I				
		Head Size	M	Driver Size	P	
			Recess Diameter		Recess Penetration Gaging Depth	
					Max.	Min.
5	0.1250	4	0.122	1	0.082	0.066
6	0.1380	4	0.122	1	0.082	0.066
6	0.1380	5	0.148	2	0.075	0.052
8	0.1640	5	0.158	2	0.085	0.062
8	0.1640	6	0.176	2	0.103	0.080
10	0.1900	8	0.182	2	0.110	0.087
12	0.2160	8	0.192	2	0.120	0.097
12	0.2160	10	0.198	2	0.125	0.102
14	0.2420	10	0.198	2	0.125	0.102
14	0.2420	12	0.262	3	0.139	0.116
1/4	0.2500	10	0.198	2	0.125	0.102
1/4	0.2500	12	0.262	3	0.139	0.116
5/16	0.3125	12	0.262	3	0.139	0.116
5/16	0.3125	1/4	0.276	3	0.154	0.131
3/8	0.3750	5/16	0.358	4	0.196	0.174

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



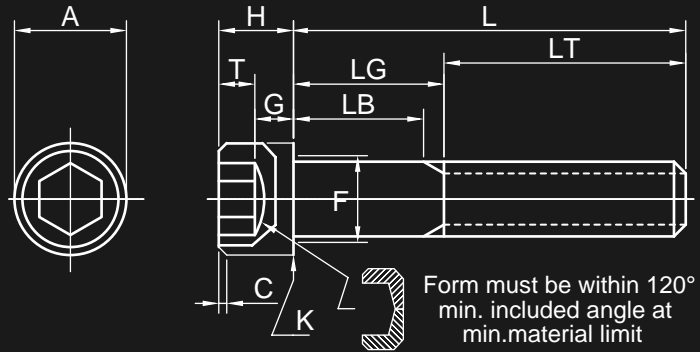
## Dimensions of Hexagon Socket Button Head Cap Screws

ASME B18.3 - 2012

Nominal Size (Basic Screw Diameter)		A		H		S	J		T	F		L
		Head Diameter		Head Height			Nominal Hexagon Socket Size	Minimum Key Engagement		Fillet Extension		
		Max.	Min.	Max.	Min.	Head Side Height			Max.	Min.	Nominal Maximum Standard Length	
5	(0.1250)	0.238	0.226	0.066	0.058	0.015	5/64	0.078	0.044	0.145	0.135	0.50
6	(0.1380)	0.262	0.250	0.073	0.063	0.015	5/64	0.078	0.044	0.158	0.148	0.63
8	(0.1640)	0.312	0.298	0.087	0.077	0.015	3/32	0.094	0.052	0.194	0.184	0.75
10	(0.1900)	0.361	0.347	0.101	0.091	0.020	1/8	0.125	0.070	0.220	0.210	1.00
1/4	(0.2500)	0.437	0.419	0.132	0.122	0.031	5/32	0.156	0.087	0.290	0.280	1.00
5/16	(0.3125)	0.547	0.527	0.166	0.152	0.031	3/16	0.188	0.105	0.353	0.343	1.00
3/8	(0.3750)	0.656	0.636	0.199	0.185	0.031	7/32	0.219	0.122	0.415	0.405	1.25
7/16	(0.4375)	0.765	0.746	0.231	0.218	0.031	1/4	0.250	0.140	0.478	0.468	1.50
1/2	(0.5000)	0.875	0.851	0.265	0.245	0.046	5/16	0.312	0.175	0.560	0.540	2.00
5/8	(0.6250)	1.000	0.970	0.331	0.311	0.062	3/8	0.375	0.210	0.685	0.665	2.00
3/4	(0.7500)	1.125	1.105	0.375	0.355	0.062	7/16	0.437	0.245	0.740	0.720	2.50

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



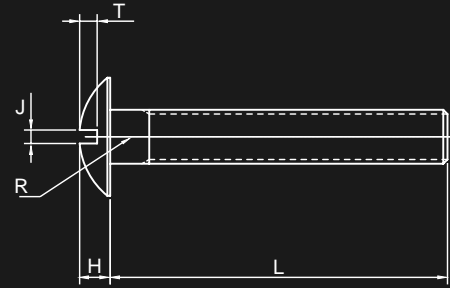


## Dimensions of Hexagon Socket Head Cap Screws

ASME B 18.3-2012

Nominal Size (Basic Product Diameter)		D		A		H		C	J		T	G	K
		Body Diameter		Head Diameter		Head Height			Maximum Chamfer or Radius	Nominal Hexagon Socket Size			
		Max.	Min.	Max.	Min.	Max.	Min.						
5	(0.1250)	0.1250	0.1202	0.205	0.198	0.125	0.121	0.012	3/32	0.094	0.057	0.043	0.008
6	(0.1380)	0.1380	0.1329	0.226	0.216	0.138	0.134	0.013	7/64	0.109	0.064	0.047	0.008
8	(0.1640)	0.1640	0.1585	0.270	0.257	0.164	0.159	0.014	9/64	0.141	0.077	0.056	0.008
10	(0.1900)	0.1900	0.1840	0.312	0.298	0.190	0.185	0.018	5/32	0.156	0.090	0.065	0.008
12	(0.2160)	0.2160	0.2095	0.324	0.314	0.216	0.210	0.022	5/32	0.156	0.103	0.082	0.010
1/4	(0.2500)	0.2500	0.2435	0.375	0.354	0.250	0.244	0.025	3/16	0.188	0.120	0.095	0.010
5/16	(0.3125)	0.3125	0.3053	0.469	0.446	0.312	0.306	0.033	1/4	0.250	0.151	0.119	0.010
3/8	(0.3750)	0.3750	0.3678	0.562	0.540	0.375	0.368	0.040	5/16	0.312	0.182	0.143	0.010
7/16	(0.4375)	0.4375	0.4294	0.656	0.631	0.438	0.430	0.047	3/8	0.375	0.213	0.166	0.015
1/2	(0.5000)	0.5000	0.4919	0.750	0.725	0.500	0.492	0.055	3/8	0.375	0.245	0.190	0.015
9/16	(0.5625)	0.5625	0.5538	0.843	0.827	0.562	0.554	0.062	7/16	0.437	0.276	0.214	0.015
5/8	(0.6250)	0.6250	0.6163	0.938	0.914	0.625	0.616	0.070	1/2	0.500	0.307	0.238	0.015
3/4	(0.7500)	0.7500	0.7406	1.125	1.094	0.750	0.740	0.085	5/8	0.625	0.370	0.285	0.015
7/8	(0.8750)	0.8750	0.8647	1.312	1.291	0.875	0.864	0.100	3/4	0.750	0.432	0.333	0.020
1	(1.0000)	1.0000	0.9886	1.500	1.476	1.000	0.988	0.114	3/4	0.750	0.495	0.380	0.020
1-1/8	(1.1250)	1.1250	1.1086	1.688	1.665	1.125	1.111	0.129	7/8	0.875	0.557	0.428	0.020
1-1/4	(1.2500)	1.2500	1.2336	1.875	1.852	1.250	1.236	0.144	7/8	0.875	0.620	0.475	0.020
1-3/8	(1.3750)	1.3750	1.3568	2.062	2.038	1.375	1.360	0.160	1	1.000	0.682	0.523	0.020
1-1/2	(1.5000)	1.5000	1.4818	2.250	2.224	1.500	1.485	0.176	1	1.000	0.745	0.570	0.020
1-3/4	(1.7500)	1.7500	1.7295	2.625	2.597	1.750	1.734	0.207	1-1/4	1.250	0.870	0.665	0.020
2	(2.0000)	2.0000	1.9780	3.000	2.970	2.000	1.983	0.238	1-1/2	1.500	0.995	0.760	0.020
2-1/4	(2.2500)	2.2500	2.2280	3.375	3.344	2.250	2.232	0.269	1-3/4	1.750	1.120	0.855	0.036
2-1/2	(2.5000)	2.5000	2.4762	3.750	3.717	2.500	2.481	0.300	1-3/4	1.750	1.245	0.950	0.036
2-3/4	(2.7500)	2.7500	2.7262	4.125	4.090	2.750	2.730	0.332	2	2.000	1.370	1.045	0.036
3	(3.0000)	3.0000	2.9762	4.500	4.464	3.000	2.979	0.363	2-1/4	2.250	1.495	1.140	0.036

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

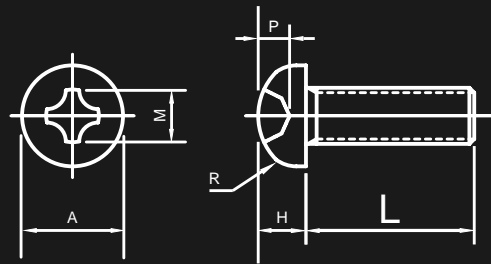


## Dimensions of Slotted Truss Head Machine Screws

ASME B 18.6.3-2003

Nominal Size or Basic Screw Diameter		A		H		R	J		T	
		Head Diameter		Head Height		Head Radius	Slot Width		Slot Depth	
		Max.	Min.	Max.	Min.	Max.	Max.	Min.	Max.	Min.
5	0.1250	0.289	0.272	0.078	0.066	0.191	0.043	0.035	0.045	0.034
6	0.1380	0.321	0.303	0.086	0.074	0.211	0.048	0.039	0.050	0.037
8	0.1640	0.384	0.364	0.102	0.088	0.254	0.054	0.045	0.058	0.045
10	0.1900	0.448	0.425	0.118	0.103	0.283	0.060	0.050	0.068	0.053
12	0.2160	0.511	0.487	0.134	0.118	0.336	0.067	0.056	0.077	0.061
1/4	0.2500	0.573	0.546	0.150	0.133	0.375	0.075	0.064	0.087	0.070
5/16	0.3125	0.698	0.666	0.183	0.162	0.457	0.084	0.072	0.106	0.085
3/8	0.3750	0.823	0.787	0.215	0.191	0.538	0.094	0.081	0.124	0.100
7/16	0.4375	0.948	0.907	0.248	0.221	0.619	0.094	0.081	0.142	0.116
1/2	0.5000	1.073	1.028	0.280	0.250	0.701	0.106	0.091	0.161	0.131
9/16	0.5625	1.198	1.149	0.312	0.279	0.783	0.118	0.102	0.179	0.146
5/8	0.6250	1.323	1.269	0.345	0.309	0.863	0.133	0.116	0.196	0.162
3/4	0.7500	1.573	1.511	0.410	0.368	1.024	0.149	0.131	0.234	0.182

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

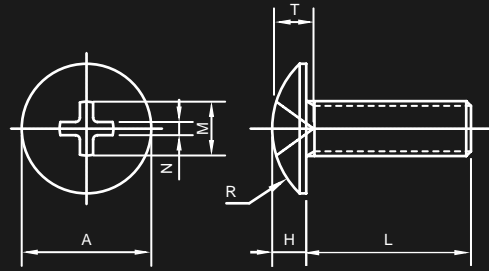


## Dimensions of Type I Cross Recessed Pan Head Screws

ASME B 18.6.3-2013

Nominal Size or Basic Screw Diameter		A		H		R	M	Driver Size	P	
		Head Diameter		Head Height					Head Radius	Recess Diameter
		Max.	Min.	Max.	Min.	Max.	Min.			
5	0.1250	0.245	0.231	0.089	0.079	0.015	0.152	2	0.072	0.046
6	0.1380	0.270	0.256	0.097	0.087	0.015	0.159	2	0.080	0.055
7	0.1510	0.296	0.281	0.106	0.096	0.015	0.170	2	0.089	0.064
8	0.1640	0.322	0.306	0.115	0.105	0.015	0.175	2	0.097	0.071
10	0.1900	0.373	0.357	0.133	0.122	0.020	0.192	2	0.113	0.089
12	0.2160	0.425	0.407	0.151	0.139	0.025	0.252	3	0.124	0.098
14	0.2420	0.476	0.457	0.169	0.156	0.035	0.274	3	0.144	0.118
14	0.2500	0.492	0.473	0.175	0.162	0.035	0.274	3	0.144	0.118
16	0.2680	0.528	0.508	0.187	0.173	0.035	0.286	3	0.158	0.132
18	0.2940	0.579	0.558	0.205	0.191	0.035	0.328	4	0.158	0.134
5/16	0.3125	0.615	0.594	0.218	0.203	0.040	0.343	4	0.173	0.149
20	0.3200	0.631	0.608	0.223	0.208	0.040	0.344	4	0.173	0.149
24	0.3720	0.734	0.709	0.259	0.242	0.040	0.382	4	0.213	0.190
3/8	0.3750	0.740	0.716	0.261	0.244	0.040	0.382	4	0.213	0.190
7/16	0.4375	0.863	0.837	0.305	0.284	0.050	0.406	4	0.239	0.214
1/2	0.5000	0.987	0.958	0.348	0.325	0.055	0.428	4	0.260	0.235
9/16	0.5625	1.041	1.000	0.391	0.366	0.065	0.458	4	0.292	0.268
5/8	0.6250	1.172	1.125	0.434	0.406	0.075	0.575	5	0.310	0.281
3/4	0.7500	1.435	1.375	0.521	0.488	0.085	0.621	5	0.349	0.322

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



## Dimensions of Type II Cross Recessed Truss Head Machine Screws

ASME B 18.6.3-2003

Nominal Size or Basic Screw Diameter		A		H		R	M	T	N	Recess Penetration Gaging Depth					
		Head Diameter		Head Height						Head Radius	Recess Diameter	Recess Depth	Recess Width	Max.	Min.
		Max.	Min.	Max.	Min.										
5	0.1250	0.289	0.272	0.078	0.066	0.191	0.157	0.086	0.033	0.068	0.057				
6	0.1380	0.321	0.303	0.086	0.074	0.211	0.175	0.097	0.035	0.079	0.068				
8	0.1640	0.384	0.364	0.102	0.088	0.254	0.209	0.115	0.041	0.102	0.091				
10	0.1900	0.448	0.425	0.118	0.103	0.283	0.244	0.138	0.046	0.126	0.113				
12	0.2160	0.511	0.487	0.134	0.118	0.336	0.279	0.160	0.051	0.148	0.136				
1/4	0.2500	0.573	0.546	0.150	0.133	0.375	0.313	0.174	0.057	0.171	0.157				
5/16	0.3125	0.698	0.666	0.183	0.162	0.457	0.382	0.219	0.067	0.217	0.201				
3/8	0.3750	0.823	0.787	0.215	0.191	0.538	0.446	0.261	0.076	0.259	0.242				
7/16	0.4375	0.948	0.907	0.248	0.221	0.619	0.511	0.304	0.086	0.303	0.284				
1/2	0.5000	1.073	1.028	0.280	0.250	0.701	0.588	0.354	0.097	0.354	0.333				
9/16	0.5625	1.198	1.149	0.312	0.279	0.783	0.588	0.354	0.097	0.354	0.333				
5/8	0.6250	1.323	1.269	0.345	0.309	0.863	0.588	0.354	0.097	0.354	0.333				
3/4	0.7500	1.573	1.511	0.410	0.368	1.024	0.588	0.354	0.097	0.354	0.333				

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.



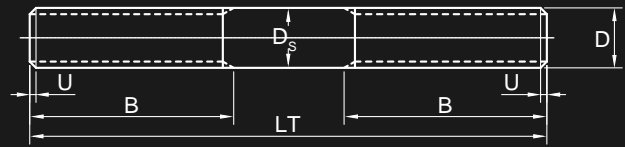
## Dimensions For Continuous Thread Studs

ASME B18.31.2-2014

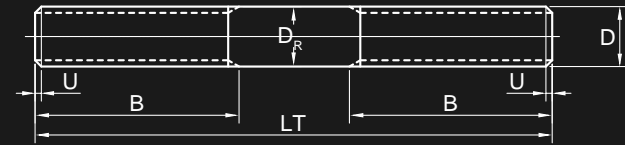
Nominal Size	D	Threads Per Inch			U					
	Diameter				Chamfered Thread Distance					
		UNC	UNF	8UN	UNC Threads		UNF Threads		8UN Threads	
					Min.	Max.	Min.	Max.	Min.	Max.
1/4	0.2500	20	28	...	0.050	0.100	0.036	0.071	...	...
5/16	0.3125	18	24	...	0.056	0.111	0.042	0.083	...	...
3/8	0.3750	16	24	...	0.063	0.125	0.042	0.083	...	...
7/16	0.4375	14	20	...	0.072	0.143	0.050	0.100	...	...
1/2	0.5000	13	20	...	0.077	0.154	0.050	0.100	...	...
9/16	0.5625	12	18	...	0.084	0.167	0.056	0.111	...	...
5/8	0.6250	11	18	...	0.091	0.182	0.056	0.111	...	...
3/4	0.7500	10	16	...	0.100	0.200	0.063	0.125	...	...
7/8	0.8750	9	14	...	0.111	0.222	0.072	0.143	...	...
1	1.0000	8	12	...	0.125	0.250	0.084	0.167	...	...
1-1/8	1.1250	7	12	8	0.143	0.286	0.084	0.167	0.125	0.250
1-1/4	1.2500	7	12	8	0.143	0.286	0.084	0.167	0.125	0.250
1-3/8	1.3750	6	12	8	0.167	0.333	0.084	0.167	0.125	0.250
1-1/2	1.5000	6	12	8	0.167	0.333	0.084	0.167	0.125	0.250
1-5/8	1.6250	...	...	8	...	...	...	...	0.125	0.250
1-3/4	1.7500	5	...	8	0.200	0.400	...	...	0.125	0.250
1-7/8	1.8750	...	...	8	...	...	...	...	0.125	0.250
2	2.0000	4-1/2	...	8	0.222	0.444	...	...	0.125	0.250
2-1/4	2.2500	4-1/2	...	8	0.222	0.444	...	...	0.125	0.250
2-1/2	2.5000	4	...	8	0.250	0.500	...	...	0.125	0.250
2-3/4	2.7500	4	...	8	0.250	0.500	...	...	0.125	0.250
3	3.0000	4	...	8	0.250	0.500	...	...	0.125	0.250

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.





Full Body



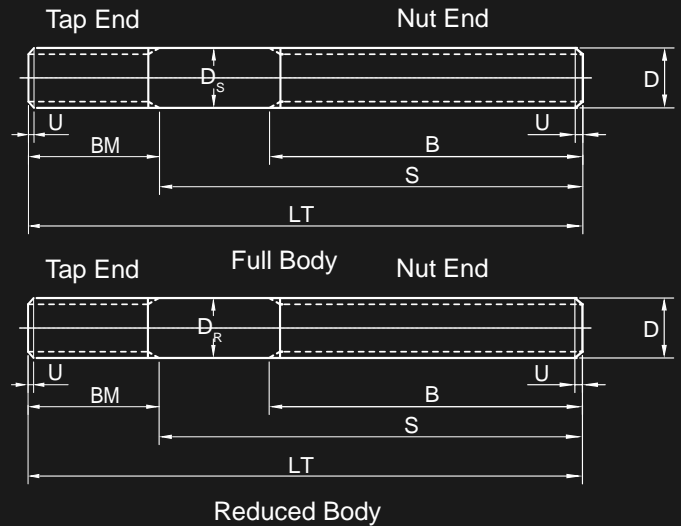
Reduced Body

## Dimensions For Clamping Type Studs

ASME B18.31.2-2014

Nominal Size	D	Bmin			Umax = 2 Thread Pitches		
	Diameter	Nut End Minimum Full Thread Length			UNC Threads	UNF Threads	8UN Threads
		L ≤ 10	10 < L ≤ 16	L > 16			
1/4	0.2500	0.750	1.000	1.500	0.100	0.071	...
5/16	0.3125	0.875	1.125	1.625	0.111	0.083	...
3/8	0.3750	1.000	1.250	1.750	0.125	0.083	...
7/16	0.4375	1.125	1.375	1.875	0.143	0.100	...
1/2	0.5000	1.250	1.500	2.000	0.154	0.100	...
9/16	0.5625	1.375	1.625	2.125	0.167	0.111	...
5/8	0.6250	1.500	1.750	2.250	0.182	0.111	...
3/4	0.7500	1.750	2.000	2.500	0.200	0.125	...
7/8	0.8750	2.000	2.250	2.750	0.222	0.143	...
1	1.0000	2.250	2.500	3.000	0.250	0.167	...
1-1/8	1.1250	2.500	2.750	3.250	0.286	0.167	0.250
1-1/4	1.2500	2.750	3.000	3.500	0.286	0.167	0.250
1-3/8	1.3750	3.000	3.250	3.750	0.333	0.167	0.250
1-1/2	1.5000	3.250	3.500	4.000	0.333	0.167	0.250
1-5/8	1.6250	3.500	3.750	4.250	...	...	0.250
1-3/4	1.7500	3.750	4.000	4.500	0.400	...	0.250
1-7/8	1.8750	4.000	4.250	4.750	...	...	0.250
2	2.0000	4.250	4.500	5.000	0.444	...	0.250
2-1/4	2.2500	4.750	5.000	5.500	0.444	...	0.250
2-1/2	2.5000	5.250	5.500	6.000	0.500	...	0.250
2-3/4	2.7500	5.750	6.000	6.500	0.500	...	0.250
3	3.0000	...	6.500	7.000	0.500	...	0.250

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

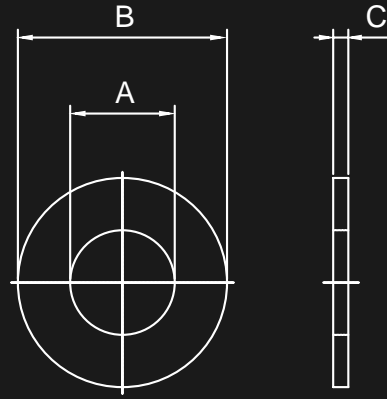


## Dimensions For Tap-End Studs (1.5D Engagement)

ASME B18.31.2-2014

D  Nominal Size Diameter	BM			U <sub>max</sub> = 2P			Bmin		
	Tap-End Full Thread Length						Nut End Minimum Full Thread Length		
	Nominal	Min.	Max.	"UNC and NC-5 Threads"	UNF Threads	8UN Threads	L ≤ 10	10 < L ≤ 16	L > 16
1/4	0.375	0.350	0.400	0.100	0.071	...	0.750	1.000	1.500
5/16	0.469	0.440	0.498	0.111	0.083	...	0.875	1.125	1.625
3/8	0.563	0.532	0.594	0.125	0.083	...	1.000	1.250	1.750
7/16	0.656	0.620	0.692	0.143	0.100	...	1.125	1.375	1.875
1/2	0.750	0.708	0.792	0.154	0.100	...	1.250	1.500	2.000
9/16	0.844	0.802	0.896	0.167	0.111	...	1.375	1.625	2.125
5/8	0.938	0.892	0.983	0.182	0.111	...	1.500	1.750	2.250
3/4	1.125	1.075	1.175	0.200	0.125	...	1.750	2.000	2.500
7/8	1.313	1.258	1.368	0.222	0.143	...	2.000	2.250	2.750
1	1.500	1.438	1.562	0.250	0.167	...	2.250	2.500	3.000
1-1/8	1.688	1.625	1.750	0.286	0.167	0.250	2.500	2.750	3.250
1-1/4	1.875	1.813	1.938	0.286	0.167	0.250	2.750	3.000	3.500
1-3/8	2.063	2.000	2.125	0.333	0.167	0.250	3.000	3.250	3.750
1-1/2	2.250	2.188	2.313	0.333	0.167	0.250	3.250	3.500	4.000
1-5/8	2.438	2.375	2.500	...	...	0.250	3.500	3.750	4.250
1-3/4	2.625	2.563	2.688	0.400	...	0.250	3.750	4.000	4.500
1-7/8	2.813	2.750	2.875	...	...	0.250	4.000	4.250	4.750
2	3.000	2.925	3.075	0.444	...	0.250	4.250	4.500	5.000
2-1/4	3.375	3.300	3.450	0.444	...	0.250	4.750	5.000	5.500
2-1/2	3.750	3.675	3.825	0.500	...	0.250	5.250	5.500	6.000
2-3/4	4.125	4.050	4.200	0.500	...	0.250	5.750	6.000	6.500
3	4.500	4.425	4.575	0.500	...	0.250	...	6.500	7.000

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

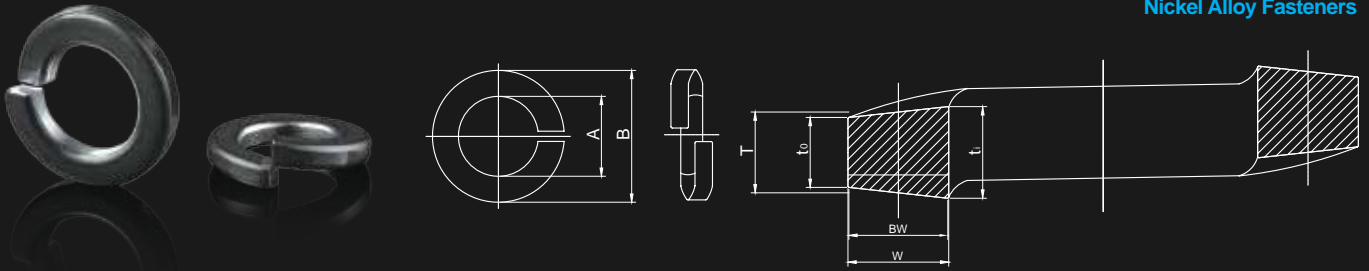


## Dimensions of Preferred Sizes of Type A Plain Washers

ASME B 18.21.1-2009

Nominal Washer Size		Series	A			B			C		
			Inside Diameter			Outside Diameter			Thickness		
			Basic	Tolerance		Basic	Tolerance		Basic	Max.	Min.
				Plus	Minus		Plus	Minus			
No. 0	...	...	0.078	0.000	0.005	0.188	0.000	0.005	0.020	0.025	0.016
No. 2	...	...	0.094	0.000	0.005	0.250	0.000	0.005	0.020	0.025	0.016
No. 4	...	...	0.125	0.008	0.005	0.312	0.008	0.005	0.032	0.040	0.025
No. 6	0.138	...	0.156	0.008	0.005	0.375	0.015	0.005	0.049	0.065	0.036
No. 8	0.164	...	0.188	0.008	0.005	0.438	0.015	0.005	0.049	0.065	0.036
No. 10	0.190	...	0.219	0.008	0.005	0.500	0.015	0.005	0.049	0.065	0.036
3/16	0.188	...	0.250	0.015	0.005	0.562	0.015	0.005	0.049	0.065	0.036
No. 12	0.216	...	0.250	0.015	0.005	0.562	0.015	0.005	0.065	0.080	0.051
1/4	0.250	N	0.281	0.015	0.005	0.625	0.015	0.005	0.065	0.080	0.051
1/4	0.250	W	0.312	0.015	0.005	0.734	0.015	0.007	0.065	0.080	0.051
5/16	0.312	N	0.344	0.015	0.005	0.688	0.015	0.007	0.065	0.080	0.051
5/16	0.312	W	0.375	0.015	0.005	0.875	0.030	0.007	0.083	0.104	0.064
3/8	0.375	N	0.406	0.015	0.005	0.812	0.015	0.007	0.065	0.080	0.051
3/8	0.375	W	0.438	0.015	0.005	1.000	0.030	0.007	0.083	0.104	0.064
7/16	0.438	N	0.469	0.015	0.005	0.922	0.015	0.007	0.065	0.080	0.051
7/16	0.438	W	0.500	0.015	0.005	1.250	0.030	0.007	0.083	0.104	0.064
1/2	0.500	N	0.531	0.015	0.005	1.062	0.030	0.007	0.095	0.121	0.074
1/2	0.500	W	0.562	0.015	0.005	1.375	0.030	0.007	0.109	0.132	0.086
9/16	0.562	N	0.594	0.015	0.005	1.156	0.030	0.007	0.095	0.121	0.074
9/16	0.562	W	0.625	0.015	0.005	1.469	0.030	0.007	0.109	0.132	0.086
5/8	0.625	N	0.656	0.030	0.007	1.312	0.030	0.007	0.095	0.121	0.074
5/8	0.625	W	0.688	0.030	0.007	1.750	0.030	0.007	0.134	0.160	0.108
3/4	0.750	N	0.812	0.030	0.007	1.469	0.030	0.007	0.134	0.160	0.108
3/4	0.750	W	0.812	0.030	0.007	2.000	0.030	0.007	0.148	0.177	0.122
7/8	0.875	N	0.938	0.030	0.007	1.750	0.030	0.007	0.134	0.160	0.108
7/8	0.875	W	0.938	0.030	0.007	2.250	0.030	0.007	0.165	0.192	0.136
1	1.000	N	1.062	0.030	0.007	2.000	0.030	0.007	0.134	0.160	0.108
1	1.000	W	1.062	0.030	0.007	2.500	0.030	0.007	0.165	0.192	0.136
1-1/8	1.125	N	1.250	0.030	0.007	2.250	0.030	0.007	0.134	0.160	0.108
1-1/8	1.125	W	1.250	0.030	0.007	2.750	0.030	0.007	0.165	0.192	0.136

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

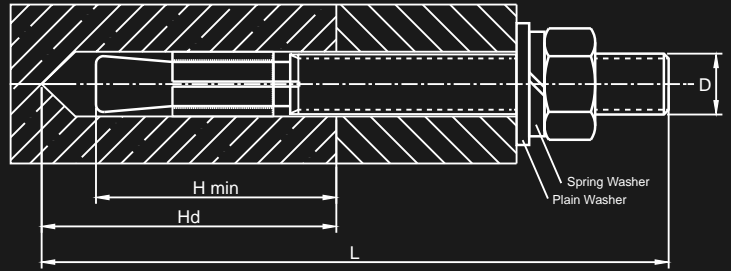


## Dimensions of Regular Helical Spring-Lock Washers

ASME B 18.21.1-2009

Nominal Size or Basic Screw Diameter	A		B	T	W	BW
	Inside Diameter		Maximum Outside Diameter	Minimum Mean Section Thickness ( $t_i + t_o$ )/2	Minimum Section Width	Minimum Bearing Width
	Max.	Min.				
No. 5 (0.125)	0.133	0.127	0.236	0.031	0.047	0.033
No. 6 (0.138)	0.148	0.141	0.250	0.031	0.047	0.033
No. 8 (0.164)	0.174	0.167	0.293	0.040	0.055	0.038
No. 10 (0.190)	0.200	0.193	0.334	0.047	0.062	0.043
No. 12 (0.216)	0.227	0.220	0.377	0.056	0.070	0.049
1/4 (0.250)	0.260	0.252	0.487	0.062	0.109	0.076
5/16 (0.3125)	0.322	0.314	0.583	0.078	0.125	0.087
3/8 (0.375)	0.385	0.377	0.680	0.094	0.141	0.099
7/16 (0.4375)	0.450	0.440	0.776	0.109	0.156	0.109
1/2 (0.500)	0.512	0.502	0.869	0.125	0.171	0.120
9/16 (0.5625)	0.574	0.564	0.965	0.141	0.188	0.132
5/8 (0.625)	0.641	0.628	1.073	0.156	0.203	0.142
11/16 (0.6875)	0.704	0.691	1.170	0.172	0.219	0.153
3/4 (0.750)	0.766	0.753	1.265	0.188	0.234	0.164
13/16 (0.8125)	0.832	0.816	1.363	0.203	0.250	0.175
7/8 (0.875)	0.894	0.878	1.459	0.219	0.266	0.186
15/16 (0.9375)	0.958	0.941	1.556	0.234	0.281	0.197
1 (1.000)	1.024	1.003	1.656	0.250	0.297	0.208
1-1/16 (1.0625)	1.087	1.066	1.751	0.266	0.312	0.218
1-1/8 (1.125)	1.153	1.129	1.847	0.281	0.328	0.230
1-3/16 (1.1875)	1.217	1.192	1.943	0.297	0.344	0.241
1-1/4 (1.250)	1.280	1.254	2.036	0.312	0.359	0.251
1-5/16 (1.3125)	1.344	1.317	2.133	0.328	0.375	0.262
1-3/8 (1.375)	1.408	1.379	2.219	0.344	0.391	0.274
1-7/16 (1.4375)	1.472	1.442	2.324	0.359	0.406	0.284
1-1/2 (1.500)	1.534	1.504	2.419	0.375	0.422	0.295
1-5/8 (1.625)	1.663	1.633	2.553	0.389	0.424	0.297
1-3/4 (1.750)	1.789	1.758	2.679	0.389	0.424	0.297
1-7/8 (1.875)	1.914	1.883	2.811	0.422	0.427	0.299
2 (2.000)	2.039	2.008	2.936	0.422	0.427	0.299
2-1/4 (2.250)	2.293	2.262	3.221	0.440	0.442	0.309
2-1/2 (2.500)	2.543	2.512	3.471	0.440	0.442	0.309
2-3/4 (2.750)	2.793	2.762	3.824	0.458	0.491	0.344
3 (3.000)	3.043	3.012	4.074	0.458	0.491	0.344

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

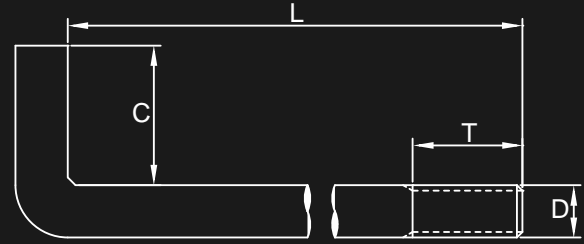


## Dimensions of Wedge Anchors

D	H <sub>min</sub>	H <sub>d</sub>	L
Nominal Size Diameter	Minimum Embedment Length	Drill Depth	Overall Length
1/4	1-1/8	1-1/4	2
5/16	1-3/8	1-1/2	2-3/8
5/16	1-3/8	1-1/2	2-3/4
3/8	1-5/8	1-3/4	2-3/4
3/8	1-5/8	1-3/4	3
3/8	1-5/8	1-3/4	3-1/2
3/8	1-5/8	1-3/4	4
1/2	2	2-3/16	4
1/2	2	2-3/16	5
1/2	2	2-3/16	6
5/8	2-3/8	2-5/8	4
5/8	2-3/8	2-5/8	5
5/8	2-3/8	2-5/8	6
3/4	3-1/8	3-3/8	6
3/4	3-1/8	3-3/8	8
3/4	3-1/8	3-3/8	10
7/8	4	4-3/8	8
7/8	4	4-3/8	10
7/8	4	4-3/8	12
1	4-3/4	5-1/8	8
1	4-3/4	5-1/8	10
1	4-3/4	5-1/8	12

NOTE: OTHER DIMENSIONS AND METRIC SIZES AVAILABLE.





D x L x C x T

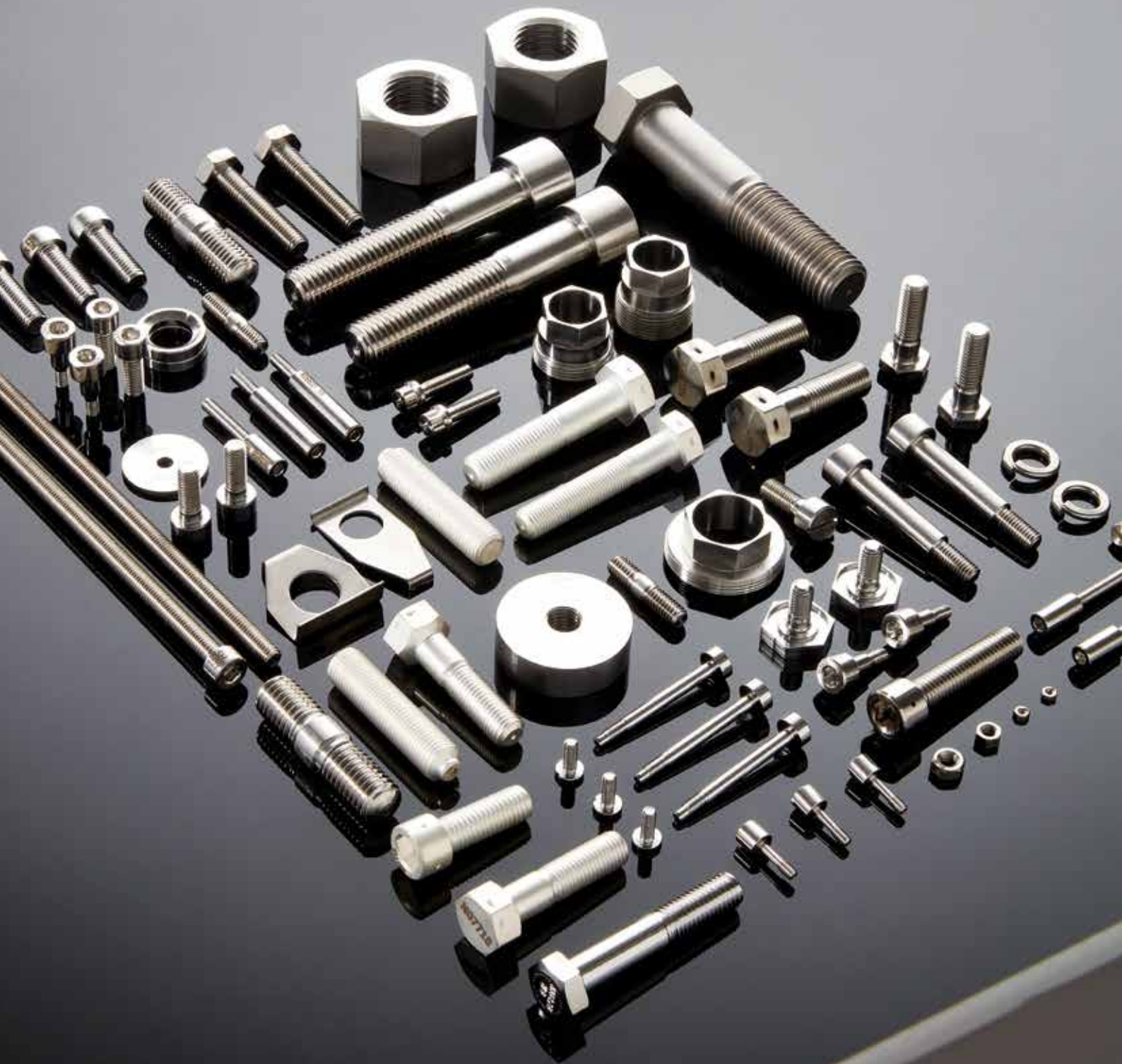
## Dimensions of L-Anchor, Right Angle Bend

ASME B 18.31.5-2011

PIN Fields		D Diameter and UNC Thread	L Inside Length			C Inside Width			T Thread Length	
3, D	5, LCT		Basic	Max.	Min.	Basic	Max.	Min.	Max.	Min.
06	060	3/8-16	6.000	6.125	5.875	1.000	1.125	0.875	1.625	1.375
06	080	3/8-16	8.000	8.125	7.875	1.000	1.125	0.875	1.625	1.375
06	100	3/8-16	10.000	10.125	9.875	1.000	1.125	0.875	1.625	1.375
06	120	3/8-16	12.000	12.125	11.875	1.000	1.125	0.875	1.625	1.375
06	140	3/8-16	14.000	14.125	13.875	1.000	1.125	0.875	1.625	1.375
06	160	3/8-16	16.000	16.125	15.875	1.000	1.125	0.875	1.625	1.375
08	060	1/2-13	6.000	6.125	5.875	1.000	1.125	0.875	2.125	1.875
08	080	1/2-13	8.000	8.125	7.875	1.000	1.125	0.875	2.125	1.875
08	100	1/2-13	10.000	10.125	9.875	1.000	1.125	0.875	2.125	1.875
08	120	1/2-13	12.000	12.125	11.875	1.000	1.125	0.875	2.125	1.875
08	140	1/2-13	14.000	14.125	13.875	1.000	1.125	0.875	2.125	1.875
08	160	1/2-13	16.000	16.125	15.875	1.000	1.125	0.875	2.125	1.875
08	180	1/2-13	18.000	18.125	17.875	1.000	1.125	0.875	2.125	1.875
10	060	5/8-11	6.000	6.125	5.875	2.000	2.125	1.875	4.188	3.812
10	080	5/8-11	8.000	8.125	7.875	2.000	2.125	1.875	4.188	3.812
10	100	5/8-11	10.000	10.125	9.875	2.000	2.125	1.875	4.188	3.812
10	120	5/8-11	12.000	12.125	11.875	2.000	2.125	1.875	4.188	3.812
10	140	5/8-11	14.000	14.125	13.875	2.000	2.125	1.875	4.188	3.812
10	160	5/8-11	16.000	16.125	15.875	2.000	2.125	1.875	4.188	3.812
10	180	5/8-11	18.000	18.125	17.875	2.000	2.125	1.875	4.188	3.812
12	080	3/4-10	8.000	8.188	7.812	3.000	3.188	2.812	4.250	3.750
12	100	3/4-10	10.000	10.188	9.812	3.000	3.188	2.812	4.250	3.750
12	120	3/4-10	12.000	12.188	11.812	3.000	3.188	2.812	4.250	3.750
12	140	3/4-10	14.000	14.188	13.812	3.000	3.188	2.812	4.250	3.750
12	160	3/4-10	16.000	16.188	15.812	3.000	3.188	2.812	4.250	3.750
12	180	3/4-10	18.000	18.188	17.812	3.000	3.188	2.812	4.250	3.750
12	240	3/4-10	24.000	24.250	23.750	3.000	3.188	2.812	4.250	3.750
16	100	1-8	10.000	10.188	9.812	3.500	3.688	3.312	6.250	5.750
16	120	1-8	12.000	12.188	11.812	3.500	3.688	3.312	6.250	5.750
16	140	1-8	14.000	14.188	13.812	3.500	3.688	3.312	6.250	5.750
16	160	1-8	16.000	16.188	15.812	3.500	3.688	3.312	6.250	5.750
16	180	1-8	18.000	18.188	17.812	3.500	3.688	3.312	6.250	5.750
16	240	1-8	24.000	24.250	23.750	3.500	3.688	3.312	6.250	5.750

NOTE: ALL DIMENSIONS ARE IN INCHES. METRIC SIZES AVAILABLE.

# Custom Products



## Fastener Materials

**Inconel®**  
**Hastelloy®**  
**Incoloy®**  
**A-286**  
**Titanium**  
**Nickel**  
**Monel**  
**AL-6XN®**  
**Duplex**  
**Super Duplex**  
**6% Moly**  
**Stainless Steel**



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