

## FASTENERS / HARDWARE

Morrill Industries, Inc. stocks a wide selection of fasteners for various applications. Our stock consists of Grade 5 Zinc plated, and 18-8 Grade Stainless Steel coarse threaded fasteners. We also have on hand a wide selection of all-thread for specialty applications.

- When ordering Grade 5 hardware our part number will start with BLT Example: BLT-0250
- When ordering 18-8 Grade hardware use “-S4” designation Example: BLT-S4-0250
- When ordering 316 Grade hardware use “-S6” designation Example: BLT-S6-0250

*All Fasteners & Hardware sales are final with no cancellations or returns without written authorization.*

### FLANGE BOLT-UP SEQUENCE - Flange Bolt-Up Preparation

- Clean the flange faces and check for scarring; the faces must be clean and free of defects (burrs, pits, dents, etc.)
- Visually inspect all bolts and nuts for damages or corroded threads. Replace or repair bolts or nuts as needed
- Lubricate the threads of the bolt or stud, and the surface of the nut face adjacent to the flange or washer
- Install the new gasket and be sure the gasket is properly centered. DO NOT REUSE the old gasket, or use MULTIPLE gaskets
- Check flange alignment. Ref: ASME B31.3 process piping
- Adjust the position of the nuts to ensure the 2-3 threads is viable above the top of the nut

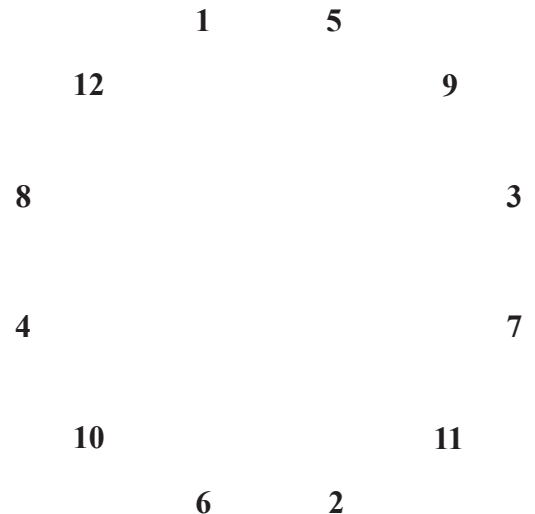
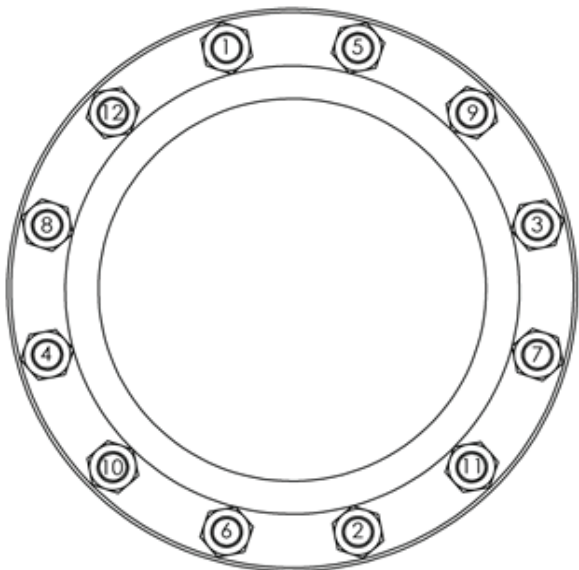
### LUBRICATION

Lubrication reduces the friction during tightening, decreases bolt failure during installation and increases bolt life. Variation in friction coefficients affect the amount of preload achieved at a specific torque. Higher friction results in less conversion of torque to preload. The value for the friction coefficient provided by the lubricant manufacturer must be known to accurately establish the required torque value.

Lubricate or anti-seizure compounds should be applied to both the nut bearing surface and the male threads.

### TIGHTENING SEQUENCE

With the first pass, lightly tighten the first bolt then move directly across or 180 degrees for the second bolt, then move 1/4 turn around the circle or 90 degrees for the third bolt and directly across the fourth. Continue this sequence until all bolts are tightened. When tightening a four-bolt flange, use a crisscross pattern.



## GRADE 5 BOLTS, NUTS, & WASHERS



BOLT LENGTH	1/4" PART NO.	3/8" PART NO.	1/2" PART NO.	5/8" PART NO.	3/4" PART NO.	7/8" PART NO.	1" PART NO.	1-1/8" PART NO.	1-1/4" PART NO.
1-1/2"	BLT-0215	BLT-0315	BLT-0515	BLT-0615	BLT-0715	BLT-0815	BLT-1015	BLT-1115	BLT-1215
2"	BLT-0220	BLT-0320	BLT-0520	BLT-0620	BLT-0720	BLT-0820	BLT-1020	BLT-1120	BLT-1220
2-1/2"	BLT-0225	BLT-0325	BLT-0525	BLT-0625	BLT-0725	BLT-0825	BLT-1025	BLT-1125	BLT-1225
3"	BLT-0230	BLT-0330	BLT-0530	BLT-0630	BLT-0730	BLT-0830	BLT-1030	BLT-1130	BLT-1230
3-1/2"	BLT-0235	BLT-0335	BLT-0535	BLT-0635	BLT-0735	BLT-0835	BLT-1035	BLT-1135	BLT-1235
4"	BLT-0240	BLT-0340	BLT-0540	BLT-0640	BLT-0740	BLT-0840	BLT-1040	BLT-1140	BLT-1240
4-1/2"	BLT-0245	BLT-0345	BLT-0545	BLT-0645	BLT-0745	BLT-0845	BLT-1045	BLT-1145	BLT-1245
5"	BLT-0250	BLT-0350	BLT-0550	BLT-0650	BLT-0750	BLT-0850	BLT-1050	BLT-1150	BLT-1250
5-1/2"	BLT-0255	BLT-0355	BLT-0555	BLT-0655	BLT-0755	BLT-0855	BLT-1055	BLT-1155	BLT-1255
6"	BLT-0260	BLT-0360	BLT-0560	BLT-0660	BLT-0760	BLT-0860	BLT-1060	BLT-1160	BLT-1260
6-1/2"	BLT-0265	BLT-0365	BLT-0565	BLT-0665	BLT-0765	BLT-0865	BLT-1065	BLT-1165	BLT-1265
7"	BLT-0270	BLT-0370	BLT-0570	BLT-0670	BLT-0770	BLT-0870	BLT-1070	BLT-1170	BLT-1270
7-1/2"	BLT-0275	BLT-0375	BLT-0575	BLT-0675	BLT-0775	BLT-0875	BLT-1075	BLT-1175	BLT-1275
8"	BLT-0280	BLT-0380	BLT-0580	BLT-0680	BLT-0780	BLT-0880	BLT-1080	BLT-1180	BLT-1280
8-1/2"	BLT-0285	BLT-0385	BLT-0585	BLT-0685	BLT-0785	BLT-0885	BLT-1085	BLT-1185	BLT-1285
9"	BLT-0290	BLT-0390	BLT-0590	BLT-0690	BLT-0790	BLT-0890	BLT-1090	BLT-1190	BLT-1290
HEX NUT	BLT-02N	BLT-03N	BLT-05N	BLT-06N	BLT-07N	BLT-08N	BLT-10N	BLT-11N	BLT-12N
FLAT WASHERS	BLT-02F	BLT-03F	BLT-05F	BLT-06F	BLT-07F	BLT-08F	BLT-10F	BLT-11F	BLT-12F
LOCK WASHERS	BLT-02L	BLT-03L	BLT-05L	BLT-06L	BLT-07L	BLT-08L	BLT-10L	BLT-11L	BLT-12L

COARSE THREAD ZINC PLATED, NO RETURNS ON BOLTS, NUTS, OR WASHERS

\*S4: 18-18

\*S6: 316 S/S

## TORQUE CHART

### Torque ratings for NA (Non-Asbestos).

NOMINAL PIPE SIZE (CLASS 150)	TORQUE FT. LBS.
0.50	28
0.75	43
1.00	50
1.25	27
1.50	27
2.00	122
2.50	122
3.00	122
3.50	122
4.00	122
5.00	202
6.00	202
8.00	202
10.00	325
12.00	325
14.00	506
16.00	506
18.00	723
20.00	723
24.00	1012

NOMINAL PIPE SIZE (CLASS 300)	TORQUE FT. LBS.
0.50	28
0.75	43
1.00	72
1.25	101
1.50	151
2.00	108
2.50	144
3.00	173
3.50	202
4.00	202
5.00	202
6.00	202
8.00	325
10.00	506
12.00	723
14.00	614
16.00	867
18.00	1012
20.00	853
24.00	1410

### TORQUE FOOTPOUNDS

SAE J429 / GRADE 5 BOLTS						
DIA.	UNC			UNF		
	*K=.20	*K=.15	*K=.10	*K=.20	*K=.15	*K=.10
	PLAIN DRY	LIGHT LUBED	WELL LUBED	PLAIN DRY	LIGHT LUBED	WELL LUBED
1/4"	8	6	4	10	7	5
5/16"	17	13	9	19	14	10
3/8"	31	23	15	35	26	17
7/16"	49	35	25	55	41	28
1/2"	75	55	38	85	64	43
9/16"	109	80	54	122	91	61
5/8"	150	110	75	170	128	85
3/4"	266	200	133	297	223	149
7/8"	429	320	215	474	355	237
1" **	644	480	322	721	541	361
1 1/8"	794	600	397	890	668	455
1 1/4"	1120	840	560	1241	930	620
1 3/8"	1469	1100	734	1672	1254	836
1 1/2"	1950	1460	975	2194	1645	1097

\*\*1-1/4" UNS Fine Thread

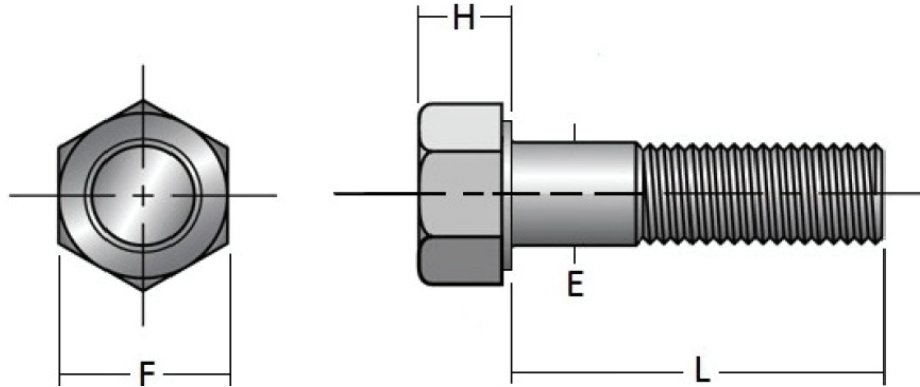
\*K = Coefficient of friction



PRICES, PRODUCTS, AND DESIGNS ARE SUBJECT TO CHANGE WITHOUT NOTICE



## HEX CAP SCREW GRADE 5 ZINC PLATED



SIZE	TPI NC	E		F		H		WRENCH SIZE
		FULL SIZE BODY DIAMETER		WIDTH ACROSS FLATS		HEAD HEIGHT		
		MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	
1/4"	20	0.25	0.245	0.438	0.428	0.163	0.15	7/16"
5/16"	18	0.3125	0.3065	0.5	0.489	0.211	0.195	1/2"
3/8"	16	0.0375	0.369	0.562	0.551	0.243	0.226	9/16"
7/16"	14	0.4375	0.4305	0.625	0.612	0.291	0.272	5/8"
1/2"	13	0.5	0.493	0.75	0.736	0.323	0.302	3/4"
9/16"	12	0.525	0.5545	0.812	0.798	0.371	0.348	13/16"
5/8"	11	0.625	0.617	0.938	0.922	0.403	0.378	15/16"
3/4"	10	0.741	0.741	1.125	1.1	0.483	0.455	1-1/8"
7/8"	9	0.875	0.866	1.312	1.285	0.563	0.531	1-5/16"
1"	8	1	0.99	1.5	1.469	0.627	0.591	1-1/2"
1 1/8"	7	1.125	1.114	1.688	1.631	0.718	0.658	1-11/16"
1 1/4"	7	1.25	1.239	1.875	1.812	0.813	0.749	1-7/8"
1 1/2"	6	1.5	1.488	2.25	2.175	0.974	0.902	2-1/4"

Length and thread length per ASME B18.2.1

### Specification Requirements:

- Dimensions
- Material and Mechanical Properties:
- Thread Requirements:
- Head Marking:
- Finish:

ASME B18.2.1  
 Grade 5 per SAE J429  
 ASME B1.1 UNC & UNF, Class 2A  
 Manufacturer ID and 3 radial lines 120 degrees apart  
 Fe/Zn 3AN per ASTM F1941/F1941M

## MATERIAL THICKNESS CHART

SIZE	BOLT DIA.	1/2 PLATE FLANGE	1028B AWWA CLASS B #150	1028D AWWA CLASS D #150	1028E AWWA CLASS E #150	1028F AWWA CLASS F#300	ANSI B16.5 #150	PLASTIC FLANGES #150	BRAY SERIES 30-32 VALVES	GAS KET 1/16" 1/8"	HEX NUT	FLAT WASHER	LOCK WASHER MEAN
2"	0.625	0.5					0.75	1	1.62	0.06	0.56	0.16	0.16
2 1/2"		0.5					0.88	1	1.75	0.06	0.56	0.16	0.16
3"		0.5					0.94	1.19	1.75	0.06	0.56	0.16	0.16
4"	0.755	0.5	0.63	0.63	1.13	1.13	0.94	1.25	2	0.06	0.56	0.16	0.16
5"		0.5	0.63	0.63	1.19	1.21	0.94	1.43	2.12	0.06	0.67	0.18	0.19
6"		0.5	0.69	0.69	1.31	1.31	1	1.43	2.12	0.06	0.67	0.18	0.19
8"	0.875	0.5	0.69	0.69	1.5	1.31	1.12	1.43	2.5	0.06	0.67	0.18	0.19
10"		0.5	0.69	0.69	1.56	1.5	1.19	1.75	2.5	0.06	0.78	0.19	0.22
12"		0.5	0.69	0.81	1.75	1.63	1.25	1.75	3	0.06	0.78	0.19	0.22
14"	1.005	0.5	0.69	0.94	1.88	1.94	1.38		3	0.06	0.89	0.19	0.25
16"		0.5	0.69	1	2	2.14	1.44		4	0.06	0.89	0.19	0.25
18"	1.125	0.5	0.69	1.06	2.13	2.25	1.56		4.25	0.06	1	0.19	0.28
20"		0.5	0.69	1.13	2.38	2.33	1.69		5	0.06	1	0.19	0.28
22"	1.255	0.5	0.75	1.19	2.5	2.5	1.84		6.06	0.13	1.09	0.19	0.31
24"		0.5	0.75	1.25	2.63	2.69	1.88		5.94	0.13	1.09	0.19	0.31
26"		0.5	0.81	1.31	2.75	3			6.5	0.13	1.09	0.19	0.31
28"		0.5	0.88	1.31	2.75	3.13			6.5	0.13	1.09	0.19	0.31
30"		0.5	0.88	1.38	3	3.16			6.56	0.13	1.09	0.19	0.31
32"	1.505	0.5	0.94	1.5	3	3.32			7.48	0.13	1.31	0.19	0.38
34"		0.5	0.94	1.5	3.13	3.48			7.88	0.13	1.31	0.19	0.38
36"		0.5	1	1.63	3.13	3.67			7.88	0.13	1.31	0.19	0.38
38"		0.5	1	1.63	3.13	3.82				0.13	1.31	0.19	0.38
40"		0.5	1	1.63	3.25	3.63				0.13	1.31	0.19	0.38
42"		0.5	1.13	1.75	3.38	3.81				0.13	1.31	0.19	0.38
44"		0.5	1.01	1.75	3.38	4				0.13	1.31	0.19	0.38
46"		0.5	1.13	1.75	3.44	4.13				0.13	1.31	0.19	0.38
48"		0.5	1.25	1.88	3.5	4.5				0.13	1.31	0.19	0.38
50"		1.755	0.5	1.25	2	3.5				0.13	1.5	0.19	0.4
52"	0.5		1.25	2	3.63				0.13	1.5	0.19	0.4	
54"	0.5		1.38	2.13	3.75				0.13	1.5	0.19	0.4	
60"	0.5		1.5	2.25	3.88				0.13	1.5	0.19	0.4	