Serrated Flange & Pan Head Fin Neck Locking Bolts Technical Data

Torque-Tension Relationships for SAE Grades 2, 5 / 5.2 / 8

Nominal Size and Threads/in		Stress Area (1)	Grade 2 Clamp Load	Grade 2 Torque Dry K = 0.2 in-lb	Grade 2 Torque Lub K = 0.15	Grade 5 Clamp Load	Grade 5 Torque Dry K = 0.2	Grade 5 Torque Lub K = 0.15	Grade 8 Clamp Load	Grade 8 Torque Dry K = 0.2	Grade 8 Torque Lub K = 0.15
		in²	lb	in-lb	in-lb	lb	in-lb	in-lb	lb	in-lb	in-lb
	0.250-28	0.03637	1500	75.0	56.0	2319	116.0	87.0	3273	164	123
1/4 (20)	0.250-20	0.03182	1313	66.0	49.0	2029	101.0	76.0	2864	143	107
	0.3125-24	0.05806	2395	150.0	112.0	3700	230.0	173.0	5225	327	245
5/16 (18)	0.3125-18	0.05243	2163	135.0	101.0	3342	209.0	157.0	4719	295	221
	0.375-24	0.08783	3623	272.0	204.0	5600	420.0	315.0	7905	593	445
3/8 (16)	0.375-16	0.07749	3196	240.0	180.0	4940	370.0	278.0	6974	523	392
	0.4375-20	0.11870	4896	428.0	321.0	7567	662.0	496.0	10683	935	700
7/16 (14)	0.4375-14	0.10630	4385	384.0	288.0	6777	593.0	445.0	9567	837	628
	0.500-20	0.15995	6598	660.0	495.0	10197	1020.0	764.0	14396	1440	1080
1/2 (13)	0.500-13	0.14190	5853	585.0	439.0	9046	904.0	678.0	12771	1277	958
		in²	lb	ft-lb	ft-lb	lb	ft-lb	ft-lb	lb	ft-lb	ft-lb
	0.5625-18	0.20298	8373	78	59	12940	121	91	18268	171	128
	0.5625-12	0.18195	7505	70	53	11600	109	82	16376	154	115
	0.625-18	0.25595	10558	110	82	16317	170	127	23036	240	180
5/8 (11)	0.625-11	0.22600	9322	97	73	14407	150	113	20340	212	159
	0.750-16	0.37296	15385	192	144	23776	297	223	33566	420	315
	0.750-10	0.33446	13796	172	129	21532	269	201	30101	376	282
	1.000-12	0.66304	–	–	–	42269	704	528	59674	995	746
	1.000-8	0.60574	–	–	–	38616	644	483	54517	909	681
Tensile Strength Proof Load Stress			74,000 psi 55,000 psi			120,000 psi 85,000 psi			150,000 psi 120,000 psi		

CAUTION – The previously listed torque and resulting tension are provided as an advisory guide. Individual application discretion is recommended. The content has been presented as accurately as possible, but responsibility for its application lies with the user.

EMPIRICAL EQUATION TO OBTAIN TORQUE GUIDE

$$T=KDW$$

where:
T = Torque (in-lb, in-oz)
D = Screw or bolt nominal size (in)
W = Screw or bolt tension (lb-oz)
K = Torque factor

The tension of the screw or bolt is calculated by multiplying the usable screw or bolt tension strength by the tensile-stress core area of the screw or bolt. The nominal clamp load stress is assumed as 75% of proof load.

The torque factor is the critical parameter in Equation 1 influenced primarily by the frictional conditions along the thread flank and at the bearing surfaces.

The other influence on "K" is the relative resiliency of the fastener and joint material.

a. Therefore:

$$K = K1 + K2 + K3$$

where:

K_1 represents the torque factor wasted by friction on the bearing surface of the nut or bolt, approximately 50% of the total torque factor.

K_2 factor represents the wasted friction on the contact flanks of the threads, about 40% of the total "K".

K_3 factor represents the useful torque producing the bolt tension, about 10% of the total "K".

b. K is 0.15/0.20 when bolts, nuts, and washers of the fastener joint are clean and coated with a thin film of protective oil. When dirt, rust, and other defects of field storage and environmental exposure are present, K can be 0.25/0.40. For torque K factors for other conditions refer to following table.

Torque Factors for Surface Conditions of Mating Fasteners

Mating Parts	K
Dry, clean with thin film of oil	0.15/0.20
Additional lubricating coatings of oil, wax, or dissimilar plating or hard washer	0.10/0.15
Thread and head bearing surfaces covered with high-performance lubricants or with anti-seize compounds	can be as low as 0.05
Combinations of certain materials such as Austenite stainless steel screws/bolts and parts not lubricated or coated	can be as high as 0.35
Stainless fasteners plated with Leland JS600	0.13 ± 0.02

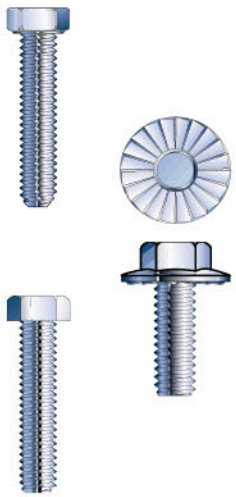
All test results and suggestions are based on laboratory tests. Specific job site conditions should be taken into consideration when specifying the proper fastener. Because applications vary, we assume no liability for use of this information

Bolt
Technical Data

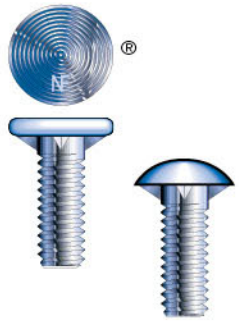
Allowable Dimensions

NOMINAL SIZE SCREW SIZE & THREADS PER INCH	SERIES DESIGNATION	ALLOWANCE	MAJOR DIAMETER MAXIMUM	MAJOR DIAMETER MINIMUM	PITCH DIAMETER MAXIMUM	PITCH DIAMETER MINIMUM	TOLERANCE
1/4-20	UNC	.0011	.2489	.2408	.2164	.2127	.0037
5/16-18	UNC	.0012	.3113	.3026	.2752	.2712	.0040
3/8-16	UNC	.0013	.3737	.3643	.3331	.3287	.0044
7/16-14	UNC	.0014	.4361	.4258	.3897	.3850	.0047
1/2-13	UNC	.0015	.4985	.4876	.4485	.4435	.0050
5/8-11	UNC	.0016	.6234	.6113	.5644	.5589	.0055

Mechanical Requirements & Identification Marking for Bolts



GRADE DESIGNATION	PRODUCTS	NOMINAL DIAMETER / INCHES	FULL SIZE BOLTS, SCREWS, STUDS, SEMS: PROOF LOAD (STRESS) PSI	FULL SIZE BOLTS, SCREWS, STUDS, SEMS: YIELD STRENGTH (STRESS) MIN. PSI	MACHINE TEST SPECIMENS OF BOLTS, SCREWS AND NUTS: TENSILE STRENGTH (STRESS) MIN. PSI	MACHINE TEST SPECIMENS OF BOLTS, SCREWS AND NUTS: ELONGATION MIN. %	MACHINE TEST SPECIMENS OF BOLTS, SCREWS AND NUTS: REDUCTION OF AREA MIN. %	SURFACE HARDNESS: ROCKWELL 30N MAXIMUM	CORE HARDNESS ROCKWELL: MINIMUM	CORE HARDNESS ROCKWELL: MAXIMUM	GRADE IDENTIFICATION MARKING	MANUFACTURERS IDENTIFICATION MARKING
2	Bolts	1/4 thru 3/4	55000	57000	74000	18	35	-	B80	B100		NF®
	Studs	1/2 to 3/4	33000	36000	60000	18	35	-	B70	B100		
8	Bolts	1/4 thru 1	120000	130000	150000	10	35	58.6	C33	C39		NF®



Proof Load and Tensile Strength Requirements
Coarse Thread Series - UNC

NOMINAL DIAMETER OF PRODUCT & THREADS PER INCH	GRADE 2: PROOF LOAD, LBS	GRADE 2: TENSILE STRENGTH MIN. LBS	GRADE 8: PROOF LOAD, LBS	GRADE 8: TENSILE STRENGTH MIN. LBS	MECHANICAL PROPERTIES - ASTM 593-02 304 AND 316 STAINLESS STEEL: YIELD STRENGTH MIN. LBS	MECHANICAL PROPERTIES - ASTM 593-02 304 AND 316 STAINLESS STEEL: TENSILE STRENGTH MIN. LBS
1/4-20	1750	2350	3800	4750	2070	3180
5/16-18	2900	3900	6300	7850	3410	5240
3/8-16	4250	5750	9300	11600	5040	7750
7/16-14	5850	7850	12800	15900	6910	10630
1/2-13	7800	10500	17000	21300	9230	14190
5/8-11	12400	16700	27100	33900	14690	22600

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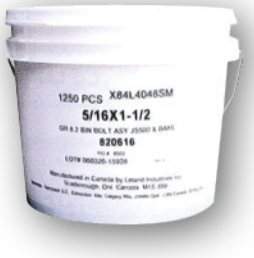
Packaging Programs Recylable Plastic Packaging

SQUARE PLASTIC PAILS

- Product is bulk packed
- Waterproof - tamper proof & resealable
- Features security strip to indicate pail has been opened

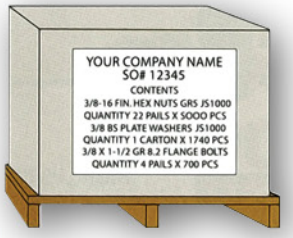
1/4 KEG CARTONS

- Bulk packed



ROUND PLASTIC PAILS

- Bulk packed
- Waterproof & resealable



CUSTOM JOB PACKS

All fasteners and accessories individually packed in quantities to suit bill of material requirement and labeled with job number. Our pallets are compliant to United Nations Food and Agricultural Organization standard ISPM 15 to prevent the spread of wood pests.

EMSEAL AST Hi-Acrylic

AST is a self-adhering tape seal made from resilient, open-cell polyurethane foam impregnated with a water-based acrylic-modified asphalt emulsion and then compressed to a sealing density level appropriate to the application.

Typically, higher compression levels are required for watertightness in water run-off applications. Lower compression can be used, for example, for snow seals at roof ridges.

EMSEAL MST

EMSEAL MST Multi-Use Sealant Tape is a preformed expanding tape seal. MST is made of a resilient cellular foam infused with a hydrophobic, modified-acrylic, liquid adhesive sealant which is then compressed to a sealing density level appropriate to the application. The result is a hybrid sealant that features the best characteristics of foam and liquid sealants while eliminating their respective weaknesses. MST compresses uniformly without overspill to provide a lasting seal.