

## BOLT CLAMP LOADS - SUGGESTED ASSEMBLY TORQUE VALUES

DIAM. & THDS. PER IN.	SAE GRADE 2 THRU 6" LONG							SAE GRADE 5					SAE GRADE 8					L9* FASTENING SYSTEM				
	STRESS AREA SQ. IN.	TENSILE Strength MIN. KSI.	PROOF LOAD LBS.	CLAMP LOAD LBS.	TORQUE		TENSILE Strength MIN. KSI.	PROOF LOAD LBS.	CLAMP LOAD LBS.	TORQUE		TENSILE Strength MIN. KSI.	PROOF LOAD LBS.	CLAMP LOAD LBS.	TORQUE		TENSILE Strength MIN. KSI.	PROOF LOAD LBS.	CLAMP LOAD LBS.	TORQUE BY		
					DRY FT. LB.	LUB. FT. LB.				DRY FT. LB.	LUB. FT. LB.				DRY FT. LB.	LUB. FT. LB.				HEAD FT. LB.	NUT FT. LB.	
1/4-20 28	0318	74	1750	1310	5.5	4.2	120	2700	2020	8	6.3	150	3800	2850	12	9	180	4610	3450	10	11	
	0364	74	2000	1500	6.3	4.7	120	3100	2320	10	7.2	150	4350	3250	14	10	180	5270	3950	12	13	
5/16-18 24	0524	74	2900	2160	11	8	120	4450	3340	17	13	150	6300	4700	24	18	180	7590	5700	19	21	
	0580	74	3200	2400	12	9	120	4900	3700	19	14	150	6950	5200	27	20	180	8410	6300	20	23	
3/8-16 24	0775	74	4250	3200	20	15	120	6600	4950	30	23	150	9300	6980	45	35	180	11230	8450	30	33	
	0878	74	4800	3620	23	17	120	7450	5600	35	25	150	10500	7900	50	35	180	12730	9550	35	38	
7/16-14 20	1063	74	5850	4380	32	24	120	9050	6780	50	35	150	12800	9550	70	50	180	15410	11550	55	60	
	1187	74	6550	4900	36	27	120	10100	7570	55	40	150	14200	10650	80	60	180	17210	12900	60	65	
1/2-13 20	1419	74	7800	5850	50	35	120	12100	9050	75	55	150	17000	12750	110	80	180	20570	15450	85	95	
	1599	74	8800	6600	55	40	120	13600	10200	85	65	150	19200	14400	120	90	180	23180	17400	95	105	
9/16-12 18	1820	74	10000	7500	70	55	120	15500	11600	110	80	150	21800	16350	150	110	180	26390	19800	120	140	
	2030	74	11200	8400	80	60	120	17300	12950	120	90	150	24400	18250	170	130	180	29430	22100	135	150	
5/8-11 18	226	74	12400	9320	100	75	120	19200	14400	150	110	150	27100	20350	210	160	180	32770	24550	170	185	
	256	74	14100	10560	110	85	120	21800	16350	170	130	150	30700	23000	240	180	180	37120	27800	190	205	
3/4-10 16	334	74	18400	13800	175	130	120	28400	21300	260	200	150	40100	30100	380	280	180	48430	36350	265	290	
	373	74	20500	15390	200	140	120	31700	23780	300	220	150	44800	33500	420	310	180	54080	40600	330	355	
7/8-9 14	462	60	15200	11430	170	125	120	39300	29450	430	320	150	55400	41600	600	450	180	66990	50300	475	505	
	509	60	16800	12600	180	140	120	43300	32450	470	350	150	61100	45800	670	500	180	73800	55400	520	585	
1-8 14	606	60	20000	15000	250	190	120	51500	38600	640	480	150	72700	54500	910	680	180	87870	65900	550	775	
	679	60	22400	16800	280	210	120	57700	43300	720	540	150	81500	61100	1020	760	180	98450	73800	700	900	
1 1/8-7 12	763	60	25200	18900	350	270	105	56500	42300	790	590	150	91600	68700	1290	970	180	110630	83000	1025	1150	
	856	60	28200	21200	400	300	105	63300	47500	890	670	150	102700	77000	1440	1080	180	124120	93100	1150	1325	
1 1/4-7 12	969	60	32000	24000	500	380	105	71700	53800	1120	840	150	116300	87200	1820	1360	180	140500	105400	1400	1600	
	1073	60	35400	26550	550	420	105	79400	59600	1240	930	150	128800	96600	2010	1510	180	155580	116700	1600	1750	
1 1/2-6 12	1405	60	46400	34800	870	650	105	104000	78000	1950	1460	150	168600	126500	3160	2370	180	203720	152800	2900	3250	
	1581	60	52200	39150	980	730	105	117000	87700	2200	1640	150	189700	142200	3560	2670	180	229240	171900	3300	3650	

### NOTES:

The above recommended assembly torques are offered as a guide only. Torque specifications, especially for critical joints, should be determined under actual assembly conditions due to the many variables involved which are difficult to predict and do affect the torque-tension relationship.

The above recommended clamp loads are based on 75% of the minimum specified proof loads for each grade and size.

Strength Grade	Applicable Sizes	Proof Load Stress (psi)	Yield Strength Min. Stress (psi)	Tensile Strength Min. Stress (psi)
SAE Gr. 2	1/4" thru 3/4" dia.	55,000	57,000	74,000
	over 3/4" thru 1-1/2" dia.	33,000	36,000	60,000
	over 6" long	33,000	36,000	60,000
SAE Gr. 5	1/4" thru 1" dia.	85,000	92,000	120,000
	over 1" thru 1-1/2" dia.	74,000	81,000	105,000
SAE Gr. 8	1/4" thru 1-1/2" dia.	120,000	130,000	150,000
L9*	1/4" thru 1-1/2" dia.	145,000	155,000	180,000

Torques for Grades 2, 5, and 8 were calculated based on the following relationship:

$$T = RDP$$

Where: T = -Torque (in.-lbs.)

D = Nominal Diameter (in.)

P = Clamp Load (lbs.)

R = Tightening Coefficient

The value of R is assumed to be equal to .20 for dry unplated conditions and equal to .15 for lubricated, including plated, conditions. Actual values of R can vary between .05 and .35 for commonly encountered conditions.

L9\* Fastening System torque values are for a nut, bolt, and two washer assembly, not for screws used in tapped holes; and were developed through laboratory testing of representative samples. As such, they are average values which when used under actual assembly conditions can be expected to produce clamploads within ±15% of the recommended values. When L9\* hex screws with L9\* tension control washers are used in tapped holes, assembly torque values should be determined experimentally under actual conditions.



**EQUIPMENT COMPANY**

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