



Nickel Systems Torque Tables

Waspaloy

Min Yield Strength (σ_y)	160.0	KSI	160,000	PSI	UNS N07001 Fastener Torque	
Bolt Nominal Diameter (D)	Threads	Stress Area (A)	Proof Load	Clamping Load	K value	
					Dry	0.22
					Lubricated	0.13
					Dry	Lubricated
in	#/in	in ²	lbf	lbf	ft-lbf	ft-lbf
1/4	20	0.0318	4,579.2	3,434.4	15.7	9.3
1/4	28	0.0364	5,241.6	3,931.2	18.0	10.6
5/16	18	0.0524	7,713.3	5,785.0	33.1	19.6
5/16	24	0.0580	8,537.6	6,403.2	36.7	21.7
3/8	16	0.0775	11,408.0	8,556.0	58.8	34.8
3/8	24	0.0878	12,924.2	9,693.1	66.6	39.4
7/16	14	0.1063	15,647.4	11,735.5	94.1	55.6
7/16	20	0.1187	17,472.6	13,104.5	105.1	62.1
1/2	13	0.1419	20,887.7	15,665.8	143.6	84.9
1/2	20	0.1599	23,537.3	17,653.0	161.8	95.6
9/16	12	0.1820	26,790.4	20,092.8	207.2	122.4
9/16	18	0.2030	29,881.6	22,411.2	231.1	136.6
5/8	11	0.2260	33,267.2	24,950.4	285.9	168.9
5/8	18	0.2560	37,683.2	28,262.4	323.8	191.4
3/4	10	0.3340	49,164.8	36,873.6	507.0	299.6
3/4	16	0.3730	54,905.6	41,179.2	566.2	334.6
7/8	9	0.4620	68,006.4	51,004.8	818.2	483.5
7/8	14	0.5090	74,924.8	56,193.6	901.4	532.7
1	8	0.6060	89,203.2	66,902.4	1,226.5	724.8
1	12	0.6630	97,593.6	73,195.2	1,341.9	792.9
1 1/4	7	0.9690	142,636.8	106,977.6	2,451.6	1,448.7
1 1/4	12	1.0730	157,945.6	118,459.2	2,714.7	1,604.1
1 1/2	6	1.4050	206,816.0	155,112.0	4,265.6	2,520.6
1 1/2	12	1.5800	232,576.0	174,432.0	4,796.9	2,834.5

Equations

$$= \pi / 4 * (D - 0.9743 / n)^2$$

$$= \sigma_y * A * 90\%$$

$$= \text{Proof Load} * 75\%$$

$$= k * D * \text{Clamp Load} * (1\text{ft}/12\text{in})$$

Assumptions: (1) Yield Strength is chosen based on ASTM B 637 minimum standard for N07001 at 0.2% offset at room temperature. (2) This is for standard bolt, washer and nut connection. (3) This is for uniform materials for the bolt, washer & the nut. (4) This is for full thread engagement. (5) This is for new bolts and nuts without corrosion. (6) Our k values are typical. Molybdenum disulfide-based and nickel-based anti-seize lubricants were considered for lubrication. These values can fluctuate depending upon the source, type of oil and a variety of other factors. (7) This is considered under static load. Other factors such as vibration or dynamic applications were not considered. (8) These values are only appropriate for bolts under 6 inches. *This table was reviewed by an engineer & is believed by Nickel Systems to be accurate. However, it is not to be used as a substitute for professional engineering bolt design. Please consult a professional engineer. Nickel Systems assumes no liability for any use of this table beyond its intended purpose.*