

SUGGESTED ASSEMBLY TORQUE VALUES TO PRODUCE CORRESPONDING BOLT LOADS

Size	Tensile Stress Area A_s Square Inch	SA193 & ASTM 193 B7 Studs with A194 2H Heavy Hex Nuts		
		Clamp Load P. Lb.s	Tightening Torque	
			Dry K = .223 Ft. Lbs.	Lubed K = .167 Ft. Lbs.
1/2 - 13	0.138	10,350	96	72
9/16 - 12	0.177	13,275	139	104
5/8 - 11	0.220	16,500	192	143
3/4 - 10	0.327	24,525	342	256
7/8 - 9	0.452	33,900	551	413
1 - 8	0.594	44,550	828	620
1-1/8 - 8	0.776	58,200	1217	911
1-1/4 - 8	0.984	73,800	1714	1284
1-3/8 - 8	1.215	91,125	2328	1744
1-1/2 - 8	1.471	110,325	3076	2303
1-5/8 - 8	1.769	132,675	4006	3000
1-3/4 - 8	2.06	154,500	5024	3763
1-7/8 - 8	2.41	180,750	6298	4716
2 - 8	2.74	205,500	7638	5720
2-1/4 - 8	3.52	264,000	11,038	8266
2-1/2 - 8	4.40	330,000	15,331	11,481

Size	Clamp Load P. Lb.s	SA193 & ASTM 193 B7M Studs with A194 2HM Heavy Hex Nuts	
		Tightening Torque	
		Dry K = .223 Ft. Lbs.	Lubed K = .167 Ft. Lbs.
1/2 - 13	7,866	73	55
9/16 - 12	10,089	105	79
5/8 - 11	12,540	146	109
3/4 - 10	18,639	260	194
7/8 - 9	25,764	419	314
1 - 8	33,858	629	471
1-1/8 - 8	44,232	925	692
1-1/4 - 8	56,088	1303	976
1-3/8 - 8	69,255	1770	1325
1-1/2 - 8	83,847	2337	1750
1-5/8 - 8	100,833	3045	2280
1-3/4 - 8	177,420	3818	2860
1-7/8 - 8	137,370	4786	3584
2 - 8	156,180	5805	4347
2-1/4 - 8	200,640	8389	6282
2-1/2 - 8	250,800	11,652	8726

Size	Tensile Stress Area A_s Square Inch	SA320 & ASTM A320 L7 Studs with A194 Grade 4 or Grade L7 Heavy Hex Nuts		
		Clamp Load P. Lb.s	Tightening Torque	
			Dry K = .223 Ft. Lbs.	Lubed K = .167 Ft. Lbs.
1/2 - 13	0.138	10,350	96	72
9/16 - 12	0.177	13,275	139	104
5/8 - 11	0.220	16,500	192	143
3/4 - 10	0.327	24,525	342	256
7/8 - 9	0.452	33,900	551	413
1 - 8	0.594	44,550	828	620
1-1/8 - 8	0.776	58,200	1217	911
1-1/4 - 8	0.984	73,800	1714	1284
1-3/8 - 8	1.215	91,125	2328	1744
1-1/2 - 8	1.471	110,325	3076	2303
1-5/8 - 8	1.769	132,675	4006	3000
1-3/4 - 8	2.06	154,500	5024	3763
1-7/8 - 8	2.41	180,750	6298	4716
2 - 8	2.74	205,500	7638	5720
2-1/4 - 8	3.52	264,000	11,038	8266
2-1/2 - 8	4.40	330,000	15,331	11,481

Size	Clamp Load P. Lb.s	SA320 & ASTM A320 L7M Studs with A194 L7M Heavy Hex Nuts	
		Tightening Torque	
		Dry K = .223 Ft. Lbs.	Lubed K = .167 Ft. Lbs.
1/2 - 13	7,866	73	55
9/16 - 12	10,089	105	79
5/8 - 11	12,540	146	109
3/4 - 10	18,639	260	194
7/8 - 9	25,764	419	314
1 - 8	33,858	629	471
1-1/8 - 8	44,232	925	692
1-1/4 - 8	56,088	1303	976
1-3/8 - 8	69,255	1770	1325
1-1/2 - 8	83,847	2337	1750
1-5/8 - 8	100,833	3045	2280
1-3/4 - 8	177,420	3818	2860
1-7/8 - 8	137,370	4786	3584
2 - 8	156,180	5805	4347
2-1/4 - 8	200,640	8389	6282
2-1/2 - 8	250,800	11,652	8726

NOTES:

1. Tightening torque values from the formula $T=KDP$, where T = tightening torque, lb. ft. K - torque friction coefficient, D = nominal bolt diameter, in.; and P = bolt clamping load developed by tightening, lb.
2. Clamp load is also known as preload or initial load in tension on bolt. Clamp load (lb.) is calculated by arbitrarily assuming useable bolt strength is 75% of bolt proof load (PSI) times the stress area (sq. in.) of threaded section of each bolt size. Higher or lower values of clamp load can be used depending on the application requirements and the judgement of the designer.
3. No proof load has been established by ASTM. Value shown in table are assumed at 95% of yield strength.

*Grade 7M nuts at a hardness not exceeding 235HB (or equivalent) shall be used with Grade B7M studs.