

L J Star Clamp Nut Torque Guide

Introduction

The torque figures for L J Star Clamps are based on the following assumptions:

- The torque values given are for the common sanitary union design.
- Torque figures are based on maintaining ASME-BPE SG-4.2 CAT II Intrusion.
- The figures are based on the maximum working pressure (MAWP).
- Ferrules and gaskets must conform to recognised industry standards and enable the correct assembly of the union with minimal gasket crevices.
- Polymeric gasket unions should be re-torqued after allowing some time for the gasket to creep.
- The torque figure can be reduced if the MAWP is reduced and ASME BPE categories of intrusion are adhered to. However, a minimum of 2Nm should be considered.
- Torque is applied in a slow and steady manner up to the required figure.
- A suitable sanitary lubricant must be used for threads on unions where PTFE is the seal material.

L J Star Clamps use a variety of thread sizes which have been selected for the clamping force requirement of each size and style of clamp.

Table 1. L J Star Clamp Bolt Sizes by Size and Type

Nominal Size (inches)	SH	SSH	ASME VIII	S-Type
0.5	5/16" UNC - 18	M8 x 1.25	-	5/16" UNC - 18
DN10	5/16" UNC - 18	M8 x 1.25	-	5/16" UNC - 18
1.5	5/16" UNC - 18	M10 x 1.5	1/2" UNC - 13	5/16" UNC - 18
2	5/16" UNC - 18	M10 x 1.5	1/2" UNC - 13	5/16" UNC - 18
2.5	5/16" UNC - 18	M10 x 1.5	-	5/16" UNC - 18
3	5/16" UNC - 18	M10 x 1.5	1/2" UNC - 13	5/16" UNC - 18
3.5	5/16" UNC - 18	M10 x 1.5	-	5/16" UNC - 18
4	5/16" UNC - 18	M10 x 1.5	1/2" UNC - 13	5/16" UNC - 18
4.5	5/16" UNC - 18	M10 x 1.5	-	5/16" UNC - 18
5	5/16" UNC - 18	M12 x 1.75	-	-
5.5	M10 x 1.5	M12 x 1.75	-	-
6	M10 x 1.5	M12 x 1.75	1/2" UNC - 13	5/16" UNC - 18
6.625	M10 x 1.5	M12 x 1.75	-	-
8	M10 x 1.5	M12 x 1.75	1/2" UNC - 13	-
8.625	M10 x 1.5	M12 x 1.75	1/2" UNC - 13	-
10	M10 x 1.5	-	1/2" UNC - 13	-
10.625	M10 x 1.5	-	-	-
12	M10 x 1.5	-	1/2" UNC - 13	-
12.625	M10 x 1.5	-	-	-

Table 2. Maximum Torque Figures for Standard L J Star Clamp Threaded Fasteners

Maximum Torque Values		Nm (Lubricated)
Bolt Size	Nm (Dry)	
5/16" UNC - 18	11.2	10.05
M8 x 1.25	21.57	19.09
M10 x 1.5	42.17	37.85
M12 x 1.75	73.55	65.08
1/2" UNC	92.7	83.15

Table 3. Torque Conversion Factors

Units to be converted	SI Units		Imperial Units			Metric Units	
	cN.m	N.m	ozf.in	lbf.in	lbf.ft	kgf.cm	kgf.m
1cN.m =	1	0.01	1.416	0.088	0.007	0.102	0.001
1 N.m =	100	1	1.416	8.851	0.738	10.20	0.102
1ozf.in =	0.706	0.007	1	0.0625	0.005	0.072	0.0007
1lbf.in =	11.3	0.113	16	1	0.083	1.152	0.0115
1lbf.ft =	135.6	1.356	192	12	1	13.83	0.138
1kgf.cm =	9.807	0.098	13.89	0.868	0.072	1	0.01
1kgf.m =	980.7	9.807	1389	86.8	7.233	100	1

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Seals and Lubrication

Sanitary elastomeric seals have very good sealing capabilities and seal at a low clamping force. PTFE does not have these characteristics and the material creep even at low temperatures results in a decreased clamping force on the gasket which can produce a leak at a low pressure.

Lubrication has a noticeable effect on the pressure holding capability of the clamp unions, specifically when polymeric gaskets are used. Also, when the bolts are un-lubricated there is an increased possibility that the threads will gall.

Lubricated clamp loads are 46% higher than dry loads. This will allow for a higher force to be imparted onto the polymeric gasket, thus resulting in a more reliable seal.

For instance:

- A ½" UNC bolt lubricated and tightened to 83.15Nm will apply a clamping load of 1448 Kg. This load will utilise 90% of the bolt yield strength.
- A ½" UNC bolt un-lubricated and tightened to 92.7Nm will apply a clamping load of 772 Kg. This load will utilise 40% of the bolt yield strength.

In addition to this; as the torque figure is increased, the chances of galling and failure of the eyebolt at the thread root increase. In order to ensure a better lifetime for your clamp, torque should be minimised to the correct level.

In the event that lubrication cannot be applied to the threads, a suitable bolt /nut material combination should be employed. The standard material for this application would normally be Nitronic 60 (Ref. L J Star Anti-Gall).

Table 4. L J Star Clamp Torque Values – Elastomeric (Dry)

Nominal Size (inches)	Flange Size	SH		SSH		ASME VIII		S-Type	
		MAWP	Torque (Nm)	MAWP	Torque (Nm)	MAWP	Torque (Nm)	MAWP	Torque (Nm)
0.5	25	50	2	75	2			25	2
DN10	34	50	2	75	2			25	2
1.5	50.5	50	2	75	2	167	2	25	2
2	64	50	2	75	2	90	2	25	2
2.5	77.5	50	2	75	2			25	2
3	91	40	3	60	3	90	3	20	3
3.5	106	40	3	60	3			20	3
4	119	35	3	53	3	57	3	17	3
4.5	130	30	4	45	4			15	4
5	144.4	30	4	45	4	28	4		
5.5	155	30	4	45	4				
6	167	30	5	45	4	22	4	15	4
6.625	183	25	5	38	5	22	5		
8	217.4	20	5	30	6	15	6		
8.625	233.5	20	6	30	6	12	6		
10	268	16	8			10	8		
10.625	286.1	16	8						
12	319	10	10			7	10		
12.625	338	10	10						

Note: Torque values for elastomeric union seals are given as a dry value. The torque value can be kept to a minimum as elastomeric seals are self-energising. In the event that a seal is not achieved, lubrication should be applied to the bolt or a higher torque should be used (do not exceed maximum torque values shown in Table 2).

Table 5. L J Star Clamp Torque Values – Polymeric (Lubricated)

Nominal Size (inches)	Flange Size	SH		SSH		ASME VIII		S-Type	
		MAWP	Torque (Nm)	MAWP	Torque (Nm)	MAWP	Torque (Nm)	MAWP	Torque (Nm)
0.5	25	50	6	75	6			25	6
DN10	34	50	6	75	6			25	6
1.5	50.5	50	6	75	6	167	10	25	6
2	64	50	6	75	6	90	10	25	6
2.5	77.5	50	6	75	6			25	6
3	91	40	9	60	9	90	15	20	9
3.5	106	40	9	60	9			20	9
4	119	35	9	53	9	57	15	17	9
4.5	130	30	10	45	12			10	10
5	144.4	30	10	45	20	28	20		
5.5	155	30	16	45	20				
6	167	30	20	45	20	22	20	7	10
6.625	183	25	20	38	25	22	25		
8	217.4	20	20	30	30	15	24		
8.625	233.5	20	24	30	30	12	24		
10	268	16	32			10	32		
10.625	286.1	16	32						
12	319	10	37.5			7	40		
12.625	338	10	37.5						

Note: Torque values for polymeric union seals are given as a lubricated value. In the event that a seal is not achieved, lubrication should be re-applied to the bolt or a higher torque should be used (do not exceed maximum torque values shown in Table 2).

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