

How to Torque a Fastener?

“TOOL BOX TALK”



General Rules which must be followed:

1. Never over torque a Fastener. To over-torque a Fastener can cause it to stretch beyond normal limits causing Fastener breakage, or loosening of Fastener
2. Never under torque Fasteners because it can cause the Fastener to loosen to break
3. Ensure you know the torque specification
4. Ensure you know the torque specification if you are using a Fastener with lubricant on it or dry
5. As a general rule Fasteners should be lubricated unless manufacturer states otherwise
6. Know how to use a torque wrench. When all else fails read the instructions.
7. When unsure whether a Fastener should be torque to a specification, torque it
8. Do not re-use a Fastener if:
 - If it was installed with an impact wrench
 - If it could result in a safety risk

- A torque wrench is used where the tightness of screws and Fasteners is crucial.
- It allows the operator to measure the torque applied to the fastener so it can be matched to the specifications for a particular application. This permits proper tension and loading of all parts.

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Using the most common torque wrench which is a “click type” follow these steps;

Step 1: Preset torque value on torque wrench as determined by the equipment manufacturer; or if not available a common torque specification chart. (see below)

Fastener Failure Modes:

- **Overloading** – Force exceeds Fastener strength, Fastener loosens or shears
- **Over-Torque** - damaging the threads and deforming the hardware
- **Under-Torque** - allowing a joint to come loose. It may also allow the joint to flex and thus fail under fatigue.
- **Brinelling** – caused by poor quality washers, leading to a loss of clamp load and failure of the joint
- **Corrosion** – caused by the disintegration of an engineered material due to electrochemical oxidation of metals in reaction with an oxidant such as oxygen, this is why Fasteners must be lubricated unless stated by the equipment manufacturer.

Definitions:

Torque Wrench:

- A torque wrench is a tool used to precisely apply a specific torque to a fastener such as a nut or Fastener.

FASTENER TORQUE CHARTS

		BOLT CLAMP LOADS Suggested Assembly Torque Values									
		USS/SAE GRADE 5					USS/SAE GRADE 8				
DIAMETER & THREADS PER INCH	TENSILE STRENGTH Min. PSI	PROOF LOAD LB	CLAMP LOAD LB	TORQUE Dry FT LB	LUBRICATED FT LB	TENSILE STRENGTH Min. PSI	PROOF LOAD LB	CLAMP LOAD LB	TORQUE Dry FT LB	LUBRICATED FT LB	
1/4-20	120,000	2,700	2,020	8	6.3	150,000	3,800	2,950	12	9	
20	120,000	3,300	2,320	10	7.7	150,000	4,350	3,250	14	10	
5/16-18	120,000	4,450	3,340	17	13	150,000	6,300	4,700	24	18	
24	120,000	4,900	3,700	19	14	150,000	6,950	5,200	27	20	
3/8-16	120,000	6,600	4,950	30	23	150,000	9,300	6,980	45	35	
24	120,000	7,450	5,600	35	28	150,000	10,500	7,900	50	38	
7/16-14	120,000	9,950	6,780	50	35	150,000	12,800	9,550	70	50	
20	120,000	10,100	7,570	55	40	150,000	14,200	10,650	80	60	
1/2-13	120,000	12,100	8,890	75	55	150,000	17,000	12,750	110	80	
20	120,000	13,500	10,200	85	65	150,000	19,200	14,400	125	90	
9/16-12	120,000	15,500	11,600	110	80	150,000	21,800	16,350	150	110	
18	120,000	17,300	12,950	120	90	150,000	24,400	18,250	170	130	
5/8-11	120,000	19,200	14,400	150	110	150,000	27,100	20,350	210	160	
18	120,000	21,800	16,350	170	130	150,000	30,700	23,000	240	180	
3/4-10	120,000	28,400	21,300	260	200	150,000	40,100	30,100	340	260	
16	120,000	31,700	23,780	300	220	150,000	44,800	33,500	420	310	
7/8-9	120,000	39,300	29,450	430	320	150,000	55,400	41,600	600	450	
14	120,000	43,300	32,450	470	350	150,000	61,100	45,800	670	500	
1-8	120,000	51,500	38,600	640	480	150,000	72,700	54,500	910	680	
14	120,000	57,700	43,300	720	540	150,000	81,500	61,100	1,020	760	

Note: When using anti-seize reduce lube torque value by 20%

Step 2: Torque the Fastener to the point where the desired torque is reached, signaling the desired torque by causing a click sound (some torque wrenches will not allow a Fastener to be torque above the setting however some will, be sure and purchase the best torque wrench possible)