

Maintenance Group Chairman Factual Report

Attachment 2 - Hardware Reuse

WPR10FA371

TASK 70-41-00-940-801-A01

**TIGHTENING TORQUES
GENERAL**

1. PURPOSE

The purpose of this chapter is to give the operator the procedure to torque to the applicable standard values, and to use a click-type torque wrench.

2. LOCKING AND TIGHTENING TORQUES

A. Definitions

- (1) Locking torque for the bolts, the screws and the nuts with a self-locking device
This is the torque value that you apply to a locked component so that it cannot turn, without an axial load in the screw.
- (2) Effective tightening torque
This is the necessary torque to have a given axial load in a screw. You must set the torque value on the torque wrench to the effective tightening torque, to tighten the nut and the screw (if there is no locking device).
- (3) Apparent tightening torque
This is the sum of the locking torque and the effective tightening torque. You must set the torque value on the torque wrench to the apparent tightening torque, to tighten the nuts and the screws that have a locking device.

WARNING

DO NOT BREATHE THE OIL VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE OIL ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE OIL CAN BE POISONOUS.

B. Conditions for the assembly of the normal attachments

Attach the components with the screws at the ambient temperature.

Apply some clean engine oil (unless differently specified) on the threads and the mating faces of the screws and the nuts.

Examine systematically the minimum locking torque of all the self-locking devices during the disassembly of a part or of an assembly. Refer to the table below.

Table 1 : Locking torque of the self-locking devices

<i>Nominal dia. in mm</i>	3	4	5	6	7	8	10	12	14	16
Locking torque in daN.m	0.075	0.160	0.200	0.320	0.460	0.600	0.950	1.500	2.200	3.300
	0.010	0.015	0.025	0.035	0.050	0.065	0.120	0.180	0.260	0.370
Locking torque in lb.in	6.63	14.16	17.70	28.32	42.48	53.10	84.07	132.75	194.7	292.05
	0.885	1.33	2.21	3.1	4.42	5.75	10.62	15.93	23.01	32.74

Effectivity: B1

NOTE: *Examine the min. locking torque when you loosen the screws. The mating face of the screw or the nut does not bear on the locking surface.*

NOTE: *Usually, for a screw or a nut with a diameter < 6 mm, the locking torque is correct if you cannot loosen the screw or the nut manually.*

- (1) Assembly of the attachments without a self-locking device
 - (a) You must show the value of the effective tightening torque on the torque wrench according to the diameter of the screw or the nut.
 - (b) Tighten the nut.

Table 2 : Effective tightening torques

Nominal dia. in mm	3	4	5	6	7	8	10	12	14	16
Locking torque in daN.m	0.065	0.18	0.37	0.62	1.10	1.70	3.10	5.60	9.20	13.5
Locking torque in lb.in	5.75	15.93	32.74	54.87	97.35	150.45	274.35	495.6	814.2	1194.7

NOTE: *These torques are correct if you use a clean engine oil as a lubricant.*

CAUTION: **MAKE SURE THAT THE SCREW COMES OUT OF THE NUT OR THE THREAD INSERT OF 1.5 TO 2 PITCHES, THE CHAMFER INCLUDED.**

CAUTION: **DO NOT TIGHTEN TO A VALUE GREATER THAN THE APPARENT TIGHTENING TORQUE VALUE TO MAKE THE SCREW COME OUT.**

CAUTION: **DO NOT CHANGE THE LOCKING TORQUE WITH SOME THREAD LOCK GLUE OR WITH A TAPPING CHANGE.**

- (2) Assembly of the attachments with a self-locking device
 - (a) You must show the value of the apparent tightening torque on the torque wrench according to the diameter of the screw or the nut.
 - (b) Tighten the nut.

Table 3 : Apparent tightening torques

Nominal dia. in mm	3	4	5	6	7	8	10	12	14	16
Locking torque in daN.m	0.100	0.27	0.48	0.8	1.35	2.03	3.63	6.44	10.43	15.33
Locking torque in lb.in	8.85	23.89	42.48	70.80	119.47	179.65	321.25	570.2	923.05	1356.7

NOTE: *These tightening torques are correct if you use a clean engine oil as a lubricant.*

3. INSTRUCTIONS ABOUT THE TIGHTENING TORQUES

WARNING

DO NOT BREATHE THE OIL VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE OIL ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE OIL CAN BE POISONOUS.

A. Lubrication

The performance of the thread depends on the type of the lubricant.
The lubricants to be used are given in the table below.

<i>Item</i>	<i>Materials</i>	<i>Lubricant</i> <i>Refer to 71-00-02-940-801.</i>
Lock nut for the bearings		Pure mineral vaseline
Studs and sleeves with threads	Cast iron Steel Light alloys	Anti-seize vaseline
Screw, bolts and nuts		Clean engine oil
Screws, bolts and nuts for the hot parts	Silver-plated	Clean engine oil
	Non silver-plated	Anti-seize vaseline

B. Tightening torque of 3.5 daN.m and more

Tighten first to make sure that the threads do not catch, and to have the mating surfaces against one another.

- (1) Lubricate the thread, the mating faces and the washers.
- (2) Tighten until you torque to half the value of the specified torque.
- (3) Loosen then tighten again to the value of the specified torque.

C. Tightening sequence

Refer to Figure 1

Do not tighten the nuts or the sets of the adjacent screws one after the other when the tightening force is important. Tighten them according to the specified sequence.

- (1) Lightly tighten a pair of nuts or of screws which have the opposite positions on the diameter.
- (2) Put the mating faces against one another.
- (3) Tighten to the specified torques, according to the same sequence.

NOTE: *On the flange that attaches the casings, first tighten the screw or the nut located in the center. Then, progressively, tighten the screws or the nuts one after the other, from the center to the ends.*

4. TIGHTENING OF THE ASSEMBLY COMPONENTS WITH A CLICK-TYPE TORQUE WRENCH

Effectivity: B1

A. Purpose

The function of a click-type torque wrench is to torque the components to the same value.

B. Equipment and materials

- (1) Standard tooling
A click-type torque wrench approved for the tightening torque you want to apply.
- (2) Materials
Some clean engine oil or some mineral vaseline grease.
- (3) Special tools
None.

C. How to use a click-type torque wrench

Refer to Figure 2

- (1) Set the pointer of the torque wrench to the value of the specified torque.
- (2) Install the special end-fitting for the nut on the torque wrench.
- (3) Hold with the hands the handle of the click-type torque wrench.
- (4) Lightly and smoothly tighten the nut until the torque wrench disengages.

5. REMOVAL OF THE SCREWS, THE BOLTS AND THE NUTS FROM THE HOT SECTIONS

Apply an anti-seize liquid on all the nuts and the screws installed on the hot sections to permit an easier removal.

A. Procedure

- (1) Soak all the screws, all the nuts or all the assembly bolts on the hot sections with an anti-seize liquid. Use a paint brush or a syringe.
- (2) Let the product soak for 15 to 20 minutes.

NOTE: *Do this procedure again if you cannot remove the screws, the bolts and the nuts.*

6. INSTRUCTIONS FOR REUSE OF SCREWS AND NUTS

Examine the threads and the calibrated parts of the bolts after each disassembly procedure.

Discard all the defective nuts or screws, examine particularly for:

- A distortion by striction, a deflection or a torsion
- A thread stripping
- Some scores on the smooth and the calibrated part
- A distorted or a flat head
- Some wear which causes some out-of-tolerance dimensions
- A damaged protection
- Some corrosion pittings