

Lever Length

Lever length is the distance from the center of the drive square or point of torque load to the handle pivot point where the applied load is concentrated.

If the length is measured in inches and the force in pounds, the torque developed will be in the unit of measure called inch pounds. If the lever length is measured in feet and the force is measured in pounds, the torque developed will be in the unit of measure called foot pounds.

Regardless of the units of measure used for the lever length and the force applied, the amount of torque developed is always the result of multiplying the force times the distance. Common units of measure include the kilogram meter (kgf*m), kilogram centimeter (kgf*cm), the Newton meter (Nm), inch pound (in.Lb.) and the foot pound (Ft.Lb.).

The basic formula is as given below.

$$T_w = L \times F$$

Where:

$$T_w = \text{Torque}$$

$$L = \text{Lever Length}$$

$$F = \text{Force}$$



The applied torque with an adapter or extension that changes the effective length of the tool is the sum of the length of the change plus the lever length of the wrench. This is shown in the formula below.

$$T_a = T_w \times (L + A) / L$$

where

T_a = Torque applied to fastener with extension on wrench

T_w = Wrench reading on scale

L = Lever Length of wrench

A = Length of Adapter

Example:

You have a wrench with a 10" lever length and are using an extension that adds 6" to the length of the wrench. What will be the actual torque output when the wrench reads 30 inch pounds?

$$T_w = 30 \text{ inch pounds}$$

$$L = 10 \text{ inches}$$

$$A = 6 \text{ inches}$$

$$T_a = T_w \times (L + A) / L$$

$$T_a = 30 \times ((10 + 6) / 10)$$

$$T_a = 30 \times (16 / 10)$$

$$T_a = 30 \times 1.6$$

$$T_a = 48 \text{ inch pounds}$$

This formula can also be worked backwards to find the necessary scale reading for the desired actual torque. To do so use the formula:

$$T_a \times (L / (L + A)) = T_w$$

As applied to the first example this would be:

$$48 \times (10 / 16) = T_w$$

$$48 \times (0.625) = T_w$$

$$30 \text{ inch pounds} = T_w$$

Adapters and Extensions

Sometimes it is necessary to use an adapter or extension with the wrench in order to reach and properly tighten the fastener. When so doing it is imperative that attention is paid to the effect of the adapter on the lever length. If the adapter or extension does not change the lever length of the tool (such as a socket extension), no special steps need be taken. If the adapter or extension does change the lever length of the tool the torque output will not match the scale.

If the adapter or extension changes the effective length of the tool, such as is shown below, it is necessary to calculate the effect this will have on the actual torque output and the torque shown on the scale.



Tips on Torque

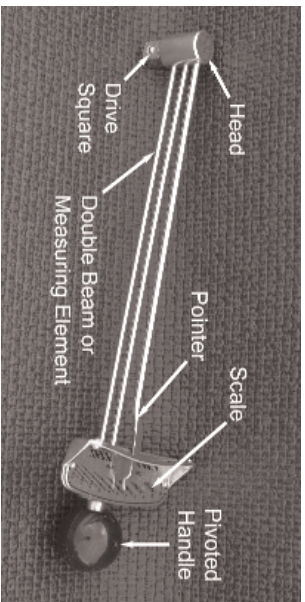
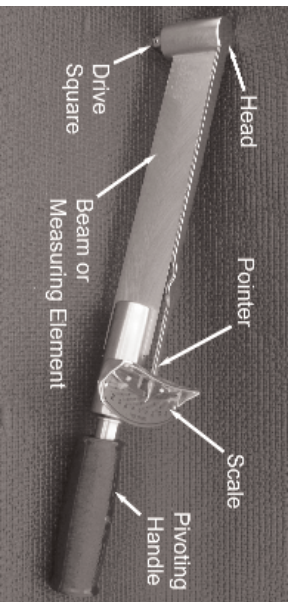
How to Use
and Care for
Your Beam-Type
Torque Wrench

What is Torque?

Torque is the amount of force required to rotate a body around an axis. Simplified, it is a turning or twisting force. The most common example of this is the tightening of a nut or bolt. Determination of the force being applied is based on the fundamental law of the lever. Distance times Force equals the torque about a point. If this law is understood, all questions dealing with torque relative to wrenches, adapters and extensions can be answered.

What is a Torque Wrench?

A torque wrench is a measuring tool, designed, manufactured and calibrated to make possible the measurement of resistance to turning, called torque. As a measuring tool, it is comparable to a micrometer, caliper, or other precision measuring instrument. There are many different types of torque wrenches, and they come in a variety of shapes and forms. Shown below are two "deflecting beam" type torque wrenches.



Cautions

- Safety glasses should be worn when using any hand tool.
- Be sure attachment end is properly engaged to fastener.
- Do Not use cheater bars to increase leverage.
- Do Not exceed the rated capacity of the wrench.
- Do Not use the wrench for other than its intended purpose.
- Calibrate the wrench periodically to maintain its accuracy.

Accuracy

Our flat beam torque wrenches have been tested and calibrated to an accuracy of +/- 2% of the indicated value. The tool has been calibrated with standards traceable to NIST.

Our round beam torque wrenches have been tested and calibrated to an accuracy of +/- 4% of the indicated value. The tool has been calibrated with standards traceable to NIST.

All torque wrenches should be calibrated periodically.

How to Use Your Torque Wrench

These torque wrenches are equipped with a "floating" handle. A floating handle is one that has a pivot in the center. The purpose of the pivot is to concentrate the load at a fixed location so it maintains an exact distance from the drive square.

When using the wrench it is important to grasp the handle so that the pivot is the only part of the handle that contacts the beam. If another part of the handle contacts the beam during use, the load point will change, adversely affecting accuracy.

The images below demonstrate the correct and incorrect means of holding the tool in use.

Correct Grip



Incorrect Grip



NEVER use a "Cheater Bar".

Cleaning Beam Torque Wrenches

The torque wrench should be cleaned periodically with a clean, damp cloth. The torque wrench should not be cleaned with abrasive or acidic cleaners. Do not use any cleaning solvent that can etch the tool or reduce the legibility of the scale.

Inspecting Beam Torque Wrenches

Check the pointer to make sure it does not contact the tool at any location other than its anchor at the drive end. If it does contact the tool at any other location the accuracy may be affected. If there is contact at any other location, remove the tool from service and have it repaired and calibrated.



Check the handle to make sure it pivots properly and is not chipped, cracked or otherwise damaged.



Check the scale to make sure it does not move. If the scale can move it will cause inaccurate in torque measurement. If this condition exists, remove the tool from service and have it repaired and calibrated.



Hold the torque wrench vertically by the drive square with no load on the wrench. Check to make sure the pointer is directly over the zero mark on the scale. If the pointer is not directly over the zero when there is no load on the tool and it is vertically oriented, the tool will be inaccurate. Remove the tool from service and have it repaired and calibrated.

