



THE TORQUE WRENCH

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Let's take a look at a very important but often overlooked and underused tool. The Torque Wrench! According to the 'Ask' web description a Torque Wrench is a tool used to precisely apply a specific torque (or tightness) to a nut or bolt. It is usually in the form of a socket wrench with special internal mechanisms. Now here is a cool fact for us Water Operations Specialists: It was invented by Conrad Bahr in 1918 while working for the New York City Water Department. It was designed to prevent over tightening bolts on water mains and steam pipe repairs underground. Yep! Those resourceful water guys and gals!

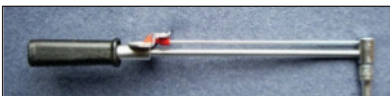
A Torque Wrench is used where the tightness of screws and bolts is crucial. It allows the operator to measure the torque applied to the fastener so that it can be matched to the specifications for a particular application.

TYPES OF TORQUE WRENCHES

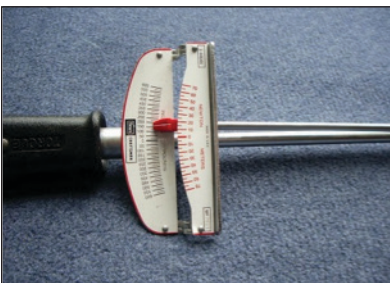
SLIPPER TYPE

Unlike most torque wrenches, a slipper torque wrench will not over tighten the fastener by continuing to apply pressure / rotation.

BEAM TYPE



Beam-type torque wrench. The indicator bar remains straight while the main shaft bends proportionally to the force applied at the handle.



Detailed view of the torque display scale on a beam type torque wrench. This shows a torque of about 160 in.lbf or 18 N·m.

The simplest form of torque wrench consists of a long lever arm between the handle and the wrench head, made of a material which bends elastically in response to applied torque. The deflection at the handle is proportional to the applied torque and material constants of the cantilever arm. A second, smaller bar with integral mechanical indicator is also connected to the head; this is never subjected to torque and thus maintains a constant

position with respect to the head. When no torque is applied to the lever arm the indicator rests parallel to the lever arm. A calibrated scale is fitted to the handle so that applied torque, and the associated deflection scaled as torque of the main lever, causes the scale to move under the indicator. When the desired torque is reached (as shown by the indicator), the operator stops applying force. This type of wrench is simple, inherently accurate, and inexpensive.

A more sophisticated variation of the beam type torque wrench has a dial gauge indicator on its body that can be configured to give a visual indication, or electrical indication, or both when a preset torque is reached.

DEFLECTING BEAM

The dual-signal deflecting beam torque wrench employs the principle of applying torque to a deflecting beam rather than a coil spring. This helps prolong wrench life, with a greater safety margin on maximum loading and provides more consistent and accurate readings throughout the range of each wrench. The operator can see and hear when a dual-signal wrench reaches the selected torque, since the signal can be seen and heard.

CLICK TYPE



Click-type torque wrench with socket attached, adjusted by turning the knurled handle. Click-type torque wrench with an open end and preset torque.

A more sophisticated method of presetting torque is with a calibrated clutch mechanism. At the point where the desired torque is reached, the clutch slips, signaling the desired torque and preventing additional tightening. The most common form uses a ball detent and spring, with the spring preloaded by an adjustable screw thread, calibrated in torque units. The ball detent transmits force until the preset torque is reached, at which point the force exerted by the spring is overcome and the ball "clicks" out of its socket. The advantage of this design is greater precision and a positive action at the set point. A number of variations of this design exist for different applications and different torque >>>

ranges.

“NO-HUB” WRENCH

This is a specialized torque wrench used by plumbers to tighten the clamping bands on “hubless” soil pipe couplings. It is a T-handled wrench with a one-way combination ratchet and clutch, factory calibrated to slip at a torque sufficient to seal the coupling, but insufficient to damage it. Since the ratchet is not reversible, the shaft of the wrench incorporates a folding auxiliary handle for loosening the clamps.

ELECTRONIC TORQUE WRENCHES



With electronic (indicating) torque wrenches, measurement is by means of a strain gauge attached to the torsion rod. The signal generated is converted by the transducer to the required unit of force (N·m, lbf·ft etc.) and shown on the digital display. A number of different joints (measurement details or limit values) can be stored. These programmed limit values are then permanently displayed during the tightening process by means of LEDs or the display. At the same time, this generation of torque wrenches can store all the measurements made in an internal readings memory. This readings memory can then be easily transferred to a PC via the interface (RS232) or printed straight to a printer. A popular application of this kind of torque wrench is for in-process documentation or quality assurance purposes. Typical accuracy level would be +/- 0.5% to 4%.

PROGRAMMABLE ELECTRONIC TORQUE / ANGLE WRENCHES

Torque measurement is conducted in the same way as with an electronic torque wrench but the tightening angle from the snug point or threshold is also measured. The angle is measured by an angle sensor or electronic gyroscope. The angle measurement process enables joints which have already been tightened to be recognized. The inbuilt readings memory enables measurements to be statistically evaluated. Tightening curves can be analyzed using the software via the integrated tightening-curve system (force/path graph). This type of torque wrench can also be used to determine breakaway torque, prevail torque, and the final torque of a tightening job. Thanks to a special measuring process, it is also possible to display the yield point (yield controlled tightening). This design of torque wrench is highly popular with automotive manufacturers for documenting tightening processes requiring both torque and angle control because, in these cases, a defined angle has to be applied to the fastener on top of the prescribed torque (e.g. 50 N·m or 37 lbf·ft + 90° - here the 50 N·m or 37 lbf·ft means the snug point/threshold and +90° indicates that an

additional angle has to be applied after the threshold).

MECHATRONIC TORQUE WRENCHES



Torque measurement is achieved in the same way as with a click-type torque wrench but, at the same time, the torque is measured as a digital reading (click and final torque) as with an electronic torque wrench. This is, therefore, a combination of electronic and mechanical measurements. All the measurements are transferred and documented via wireless data transmission. Users will know they have achieved the desired torque setting when the wrench “beeps.”

Wrenches are available in 1/4, 3/8, or 1/2 inch drives. They can be read in Inch pounds, foot pounds, and Newton Measure*. *Don't ask me, the only Newtons I understand are the figs.

Now, after all this we come to the crux of this article. Have you ever noticed when you pull that pipe repair product out of the box it comes in there is a piece of paper that blows away and is soon forgotten? Well, if you can catch it and read it, you will most likely discover the **Torque Specs** for the item you are applying to the pipe you are working on. Ladies and Gentlemen....there is a reason for these! Not just to test your agility catching the paper. Manufacturers conduct stringent tests on their products to establish these specs. If and when you return one of their products to them with a complaint, they can tell if was 'Bubba' or his wimpy little cousin who tightened the bolts! As with any instrument proper care of the tool is highly warranted.

Now I know, us guys don't like to be 'told' to do something so: regard this **Torque Wrench** as a 'gadget' and that will make it okay and fun for us to use!

Please note: Information in this article was gathered using the ask.com website.

'Till next time, Dan Tousley 💧💧