

TORQUE WRENCH CALIBRATION: INSTRUMENTATION



Norbar Calibration Beam

Philip Brodey, Torque Specialist and Director at Norbar Torque Tools, comments:

When it comes to torque wrench calibration, I often get asked “When should I re-calibrate my torque wrench? And should I wind it back to zero after use?” In fact, these two questions might well be the most frequently asked of all frequently asked questions and are rightly a subject of genuine concern for production and quality managers. To misuse the old wartime propaganda slogan a little, “Careless torque can cost lives.”

When it comes to matters of recalibration, I always refer back to the standard BS EN ISO6789 – “Assembly tools for screws and nuts – Hand Torque Tools – Requirements and test methods for design conformance testing, quality conformance testing and recalibration procedure”. Unsurprisingly, most of us refer to it as “the torque wrench standard”!

In 1992, ISO 6789 was very much a document covering the design and manufacture of torque tools and the requirement was that the tool should be tested at maximum capacity for 5000 cycles in each direction. No guidance was given on recalibration intervals.

However, when the standard was revised to the 2003 edition, the scope was broadened to include “quality conformance testing and recalibration” and so became of relevance to people using torque wrenches rather than just those designing and manufacturing them. This is the first time that the standard discussed the interval for recalibration.



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For those looking for a simple answer to the question posed, the default period of use between recalibrations is 5000 cycles or 12 months. However, the standard recognises that many businesses will have their own procedures for the control of test devices and, as a torque wrench can be considered a test device, a company's own procedures must take precedence over the default 5000 cycles/12 months.

The reason that there is really no simple answer to the recalibration interval question is that circumstances of use will vary widely and this will have a direct bearing on how long the torque wrench is likely to stay in calibration. Factors such as the frequency of use, setting of the wrench as a percentage of full scale (which leads us onto the second question) and general care taken in use and storage will all have their effect. For example, a helicopter assembly company that I have visited tests their wrenches before every single use due to the degree of safety criticality of the bolted assembly. A typical automotive garage might find this degree of control onerous and unnecessary!

The other important statement made by the standard is that if a torque wrench is subjected to an overload of 25% or more above the nominal maximum, it should then be recalibrated. For many, this might be the ultimate decider on how often your wrenches should be recalibrated. For some, it will be almost every time the wrench is used!

Should I Wind My Torque Wrench Back To Zero?

One very important consideration for recalibration is how you set your torque wrench after use. Anyone working in torque will have been taught to wind their torque wrench back to zero after every use. However, this is wrong. Certainly if the wrench is wound back at all it should not be adjusted below the minimum scale marking (usually 20% of maximum) – never to zero as this can adversely affect the calibration of the wrench.

We have thousands of Production Type wrenches in service that are left at their setting for months on end without a problem. Other factors in the way that torque wrenches are used and sometimes abused will have a far greater influence on calibration and the final torque delivered to the fastener than whether the wrench is left 'wound up'.



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Establishing Traceability

Establishing traceability for torque wrenches is vital and involves a hierarchy of equipment, with transducers used to calibrate torque wrenches and transducers in turn being calibrated by calibration beams. The process starts in calibration laboratories, which are accredited under ISO/IEC 17025:2005 international testing and calibration standard.

There is mutual recognition by accreditation bodies worldwide. This means that Norbar's UKAS accreditation for performing calibrations up to 108,500 N.m of torque under BS7882:2008 is also recognised by NVLAP (USA), NATA (Australia) and similar organisations in other countries. This level of agreement on competence is another element in the common language of torque. From huge scale operations on oil & gas industry pipelines to precision applications on delicate scientific instrumentation, torque is an ever present element requiring constant attention and input from an ever increasing range of stakeholders.



