QX ETS
Calibration & Validation Overview

This document provides an overview of the recommended calibration and validation processes when using an Ingersoll Rand QX ETS tool, along with Ingersoll Rand's general guidelines to ensure acceptable results and performance.

Calibration of QX ETS Tools

CALIBRATION of a torque tool is the process of testing the measurement accuracy of the integrated torque transducer of the QX ETS tool against a 'master' external torque transducer in a controlled test environment for the purposes of ensuring alignment of the tool's torque measurement results to those of the external torque transducer.

If the measurement results differ between the QX ETS tool and the external torque transducer, adjustments should be made to the TR (calibration value) of the QX ETS tool using the prescribed calibration method *(see below)* in order to re-gain alignment between the QX ETS tool and the external torque transducer.

Reference the *"IR Calibration Procedures"* document for a detailed explanation of the recommended calibration procedure of the QX Series tools, including QX ETS.

Note: Calibration of all QX ETS tools should be performed with the tool in direct drive mode in order to be in compliance with ISO 5393 testing standards.

Above shows a typical calibration procedure setup using an Ingersoll Rand EXTT torque analyzer

Above shows an Ingersoll Rand stationary torque transducer that is typically used for calibration procedures in conjunction with the Ingersoll Rand EXTA torque analyzer

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Validation of QX ETS Tools

VALIDATION of a torque tool is the process of validating or verifying that a previously calibrated tool that has been programmed with the required torque control settings for a specific production application - actually delivers the required level of torque to the actual target fastener.

There are two common, recommended methods for validating the torque when using a QX ETS tool in a production environment:

Method #1 : Digital Audit Wrench

- This method typically produces most accurate results and if available - is Ingersoll Rand's primary recommendation for the validation of applied torque when using QX ETS tools
- This method involves using a digital audit wrench to validate the applied torque after the tightening of the target fastener is completed by the QX ETS tool
- Ingersoll Rand recommends using either a residual 'break forward' strategy or 'torque back to mark' measurement strategy when validating using a digital audit wrench

Above shows a typical digital audit wrench that can be used for validation. This one is available from Crane Electronics – IQWrench2
https://crane-electronics.com/

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Method #2 : Rotary Inline Transducer

- With the correct settings, this method can produce repeatable and reliable results, and using equipment more readily available to the common assembly production environment.

- This method involves using a torque analyzer and rotary inline transducer (pictured) in between the QX ETS tool's output spindle and the socket being used to engage the fastener. This transducer takes a torque measurement using the target tool, target hardware, on the target application that can be compared to the torque measurement result provided by the QX ETS tool. As such, it can enable the user to confidently validate the torque performance of the QX ETS tool and/or make necessary adjustments to achieve acceptable performance on the actual joint to be fastened.

Above shows a typical validation procedure setup using an Ingersoll Rand EXTA torque analyzer and a rotary inline transducer

Important Note on Torque Filter Frequency:

- When using this method with QX ETS tools, it is imperative to use a torque transducer and analyzer system that allows the adjustment of the torque measurement filter frequency.
- Ingersoll Rand recommends using either a 75 Hz or 150 Hz filter.
- The QX ETS tool's internal settings are set to 150 Hz, low-pass filter, which provides better results for measuring and auditing the tool's performance.
- Adjusting your torque analyzer to either 75 Hz or 150 Hz ensures alignment between readings during the validation process.
- The reason for this recommendation is that depending on the specific joint characteristics, the impulse created by the ETS algorithm can have a leading edge (overshoot) that is measureable by the inline rotary transducer, but has little influence on the actual delivered torque to the fastener. The lower filter setting takes out most of this overshoot and leaves the main profile intact – which is much more representative of the actual torque that was delivered into the joint for that impulse.