Key Inspection Points for Bolt Tightening Checklist

Below is a checklist of the key inspection points for four different bolt tightening methods: turn-of-nut, calibrated wrench, direct tension indicator (DTI), and twist-off bolts.

Note that some specifications described in the following content may not be the same as the specifications followed by your agency. Always check with your State agency's standards and specifications when using these guidelines.

Sections

- **Turn-of-nut**
- **Calibrated Wrench**
- **Direct Tension Indicator (DTI)**
- **Twist-off Bolts**

Turn-of-nut

- ❑ **Ensure that snug-tight closes all gaps and that uniform hand torque is being applied (turn-of-nut depends upon on all bolts being equally tight at the start)**
- ❑ **Make sure that installers are holding the bolt head from turning (turn angle on the nut means nothing if the bolt turns)**
- ❑ **Ensure that installers can explain the required turn angle and whether or not it changes when the bolt grade and length change**
- ❑ **Both the beginning and ending angle marks should be visible on the joint and also be on the nuts**

Calibrated Wrench

- ❑ **Ensure that all tools have calibration stickers and that the torque-to-tension test ratio is known for that specific tool on the R-C lot number of bolt assemblies being tightened**

- ❑ Make sure that the bolt is not allowed to turn during tightening as false results can happen
- ❑ Do not allow any pre-published torque charts to be used
- ❑ Ensure the same lubrication and bolt conditions as were used during the torque-tension test
- ❑ Ensure that hardened flat washers, or beveled washers where required, are used under the nut and bolt, especially in non-standard holes as frictions will change

Direct Tension Indicator (DTI)

- ❑ Ensure that DTIs are properly placed with the bumps away from the joint and usually not under the turning member (another washer should be on top of the DTI if the nut is turning on it)
- ❑ If squirt washers are used, conduct a test in the tension calibrator to verify the amount of squirt that approximates the desired tension value, and make sure that the operators are consistent
- ❑ Have the operators explain the use of the feeler gauge on DTIs
- ❑ Double check the parallelism of the plies (if the assembly is not square, it can lead to false results)

Twist-off Bolts

- ❑ Ensure that lubrication and condition of the bolts is the same as when the rotational capacity (ROCAP) testing was done—this method measures torque, not bolt tension directly
- ❑ Be sensitive to crosstalk issues as bolts may loosen as adjacent bolts are tightened—re-tightening with a calibrated torque wrench may be necessary but if the bolt has a button-head that may be impossible
- ❑ Make sure operators collect the broken bolt ends as they can be a slip hazard and can fall from height

- ❑ **Ensure that hardened flat washers, beveled washers, or finger shims are used with these bolts when needed**