

# Industry Approved.

No other fastening system or method can match our patented TNA<sup>®</sup> Torque+Angle Fastening System for producing the highest level of accuracy, reliability and efficiency. Quickly snug bolts in bearing connections and safely tension bolts in pretensioned and slip-critical connections. Specify TNA with confidence on your next project!

## BENEFITS

- 144 ksi Tensile Strength Fixed-Spline Bolts
- Control built into the tool
- Easily removable with installation tool
- Single-sided installation
- No pinch point tools
- No uncontrolled tips
- No manual gauging

## APPROVALS

- RCSC 2020 Combined Method of Installation
- ASTM F3148-17A Specification
- ANSI/AISC 358 Specification for Seismic Applications
- AISC 360-22 Specification for Structural Steel Buildings
- AASHTO LRFD Bridge Design Specification
- AASHTO Steel Bridge Fabrication Specification
- AREMA Manual for Railway Engineering



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**TNA** TORQUE+ANGLE  
FASTENING SYSTEM  
GET YOUR **TIGHTRIGHT**

# How it works.

**TAE** TORQUE-**+**ANGLE FASTENING SYSTEM

**LEJEUNE** BOLT COMPANY

## Initial Tightening (SNUG)

- 1: Set the TAE-Series Torque/Angle wrench to the **SNUG** mode (as shown).
- 2: Starting with the most rigid point of the connection, place the TAE-Series tool firmly over the nut and spline end, ensuring full engagement. Pull and hold the trigger to perform initial tightening. The tool will shut off when the set torque value is reached that is sufficient to achieve the minimum initial tension in Table 1.

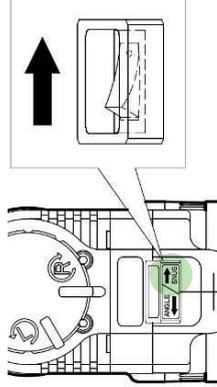


TABLE 1 – Assembly Installation Tension Test Minimum Tension, lbf.

Bolt Diameter (in.)	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
Initial Minimum	7000	11000	16000	22000	29000	36000	46000
Final Minimum	16000	25000	37000	51000	67000	84000	107000

### After Initial Tightening

- Perform routine observation of the snug tightening process to verify proper techniques are followed.
- Verify that the plies in the connection are in firm contact. If gaps in the steel remain during initial tightening, perform the initial tightening

procedure again using the same pattern until the plies are in firm contact.

- Verify that the proper bolt length was used. The face of the nut shall be at least flush with the first thread of the bolt and no more than 3 threads should extend beyond the face of the nut to prevent thread runout.

## Final Tensioning (ANGLE)

- 1: Set the TAE-Series Torque/Angle wrench to the **ANGLE** mode (as shown).



- 2: Set the **Angle Setting Dial** to the degree of rotation specified for your bolt length in Table 2 (either 90° or 120°, +10° to account for tool tolerance).

- 3: Engage the first bolt in the pattern that you established during the snug mode. Pull and hold the trigger until the tool shuts off.
- 4: The Cycle Indicator Light will show solid green if the cycle was completed successfully.

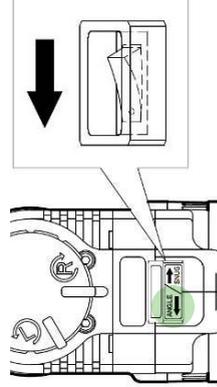


TABLE 2 – Angle Tightening Rotation, Degrees

Bolt Length	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
* Required Rotation	Up to 2	Up to 2 1/2	Up to 3	Up to 3 1/2	Up to 4	Up to 4 1/2	Up to 5
Up to 4D	90°	2 1/4 to 4	2 1/4 to 5	3 1/4 to 6	3 1/4 to 7	4 1/4 to 8	4 1/4 to 10
>4D to 8D	120°	2 1/4 to 4	2 1/4 to 5	3 1/4 to 6	3 1/4 to 7	4 1/4 to 8	4 1/4 to 10

- 5: Repeat the process for each bolt in the connection. Your bolts are now installed to a consistently reliable tension well above the specified minimum.

### After Final Tensioning

- Perform routine observation of the final angle tightening process to verify proper techniques are followed as described in Step 2: Angle Tightening
- NOTE: If routine observation is not possible, match marking for final installation may be used during the angle tightening process. This step of visual inspection should be included in the scope of work or contract documents to avoid disputes.

GET YOUR **TIGHT RIGHT**

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Certified Installer  
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