

TC, Tension Control, or Twist-Off style structural bolts

“TC” refers to abbreviation for “Tension Control” in pre-2015 ASTM standards governing TC bolts. Specifically, ASTM F1852, equivalent to hex head ASTM A325 bolts and ASTM F2280 equivalent, ASTM A490. In any case, adjective “Tension Control” is inaccurate since the fasteners rely on ***Torque*** and not ***Tension*** to work properly. While individual standards for TC bolts no longer exist, the term “Tension Control bolt” still permeates the current ASTM F3125 structural bolt standard.

Things to know about TC Bolts:

1. ***As required by ASTM F3125 section 11, manufacturers test TC bolt assemblies to the minimum required preinstallation verification value listed in the Research Council on Structural Connections (RCSC) Specification for Structural Joints Using High-Strength Bolts (RCSC 7.1 & ASTM F3125 11.1.4).***

Therefore, ***any*** degradation to the lubricant applied by the manufacturer, however minute, may cause the bolt to fail RCSC field preinstallation verification testing. Also, while pre-2015 ASTM standards mandated all samples to meet or exceed minimum RCSC loads, the current ASTM standard only requires the average value of tests to pass. In other words, not all samples need to pass ASTM/RCSC requirements if some results are higher than necessary.

2. ***A TC bolt must be sampled, tested, and sold as a complete fastener assembly, consisting of a bolt, a nut, and a washer.***

Each assembly may only be used with the exact components that were tested in accordance with ASTM F3125. It is not permissible to buy, sell, or swap out individual TC components without reverifying the assembly in accordance with ASTM F3125 section 11.

3. ***TC Bolts must be tested in their final manufactured state.***

Only the manufacturer may coat any, or all, of the assembly components (ASTM F3125 11.3). If a TC bolt’s lubrication has been compromised, they may only be re-lubricated by the manufacturer (ASTM F3125 11.3 & RCSC 2.2).

4. ***RCSC Preinstallation Verification samples must be representative of bolts being pretensioned.***

Un-sheared bolts, snug tightened and left in the work for any length of time (hours or days depending on environmental conditions), will need to undergo additional RCSC Preinstallation Verification Testing, regardless if testing has already been completed with as-delivered samples. Such retests must be performed with bolts removed from the work, unless samples have been left nearby, in anticipation of delays between snugging and pretensioning.

While North American manufacturers and distributors will likely adhere to all items, foreign distributors will routinely violate item 3. Such distributors will purchase plain TC assemblies and apply coatings, without retesting the coated assembly. With luck, such misrepresentation will be obvious on the fastener material test reports (MTRs) or certifications. If an MTR describes a plain TC assembly, or the paperwork includes coating certification page by company, other than the bolt manufacturer, it is likely secondary testing has not occurred. If accompanying documentation appears correct, RCSC preinstallation verification testing will expose such misrepresentation because an added coating will ruin the device’s ability to be pretensioned adequately. Simply put, the coated assemblies will fail hydraulic testing, due to an increase in friction caused by the coating.