

**Standard Method of Test for
Rotational Capacity of High Strength Long Steel Bolt
Assemblies**

SCDOT Designation: SC-T-150 (9/08)

1. SCOPE

- 1.1. This method covers the procedure for determining the rotational capacity of long ASTM A 325 structural steel bolts.

2. REFERENCED DOCUMENT

- 2.1. ASTM A 325

3. SIGNIFICANCE AND USE

- 3.1. The purpose of this procedure is to verify the rotational capacity of structural steel bolts and to evaluate the compatibility of assemblies selected for testing.

4. APPARATUS

- 4.1. Calibrated Tension Measuring Device (TMD) of size required for bolts to be tested.
- 4.2. Calibrated torque wrench that has the capability to measure the torque produced by the particular bolt assembly being tested.
- 4.3. Spacers and/or washers with hole size no larger than 1/16 inch greater than bolt being tested.
- 4.4. Steel section to mount TMD. The flange of the girder or the cross frame accessible from the ground is satisfactory.

5. PROCEDURE

- 5.1. Install the nut on the bolt and measure the stick out of the bolt when 3 to 5 threads of the bolt are located between the bearing face of the nut and the bolt head. Measure the bolt length, the distance from the end of the threaded shank to the underside of the bolt head.
- 5.2. Install the bolt into the TMD and install the required number of shim plates and/or washer (minimally, one washer under the nut must always be used) to produce the thread stick-out.
- 5.3. As a minimum, tighten the bolt using a hand wrench to the snug tensions listed in the table below:

* Initial Tension Load									
Bolt Diameter (inches)	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
Initial Tension Min., (kips)	1	2	3	4	5	6	7	9	10
* Approximately 10% of Minimum Installation Tension.									

- 5.4. Match mark the nut, bolt, and the faceplate of the TMD.
- 5.5. Using the calibrated manual torque wrench, tighten the bolt to at least the tension listed in the table below. Record the torque required to reach the tension and the value of the bolt tension. Measure torque with the nut in the motion.

* Minimum Installation Tension									
Bolt Diameter (inches)	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
Tension Min., (kips)	12	19	28	39	51	56	71	85	103
* Installation Tension equals 70% x Min. Tensile Strength.									

- 5.6. Further tighten the bolt to the rotation listed in the table below. Measure the rotation from the initial marking. Record the bolt tension.

*Rotation			
Bolt Length	4 x bolt diam. or less	Greater than 4 x bolt diam., but not more than 8 x bolt diam.	Greater than 8 x bolt diam.
Required Rotation	2/3	1	1 1/3
*Turn Test Tension equals 1.15 x 70% x Min. tensile Strength.			

- 5.7. Remove the fastener assembly from the TMD. Ensure that there are no signs of thread shear failure, stripping, or torsion failure of the bolt. Check for stripping by running the nut on the bolt threads to where it was during the test. Accomplish this without the use of tools.
- 5.8. Note the proof load, the tensions and torques at the required turns, the appearance quality, the lubricant quality, the final bolt tension and torque at the required turn.

6. REPORT

- 6.1. None.