

**Turn-of-Nut Installation** is one of four installation methods recognized by the Research Council on Structural Connections, RCSC, for installing Structural Bolts. When installations require pretensioned or slip-critical joints and hex head structural bolts are being utilized, this installation method results in more uniform bolt pretensions than is generally obtained with other torque-control methods. Combined with the Pre-installation Verification Procedure listed below, the "Turn-of-Nut" installation method will give your installation a proven method to achieve all of your installation requirements without torque wrenches and calibration concerns. Installation is as easy as 1-2-3 after Pre-installation Verification Testing; 1. Snug-tighten the bolts in the joint; 2. Match-mark the nut and protruding end of the bolt; and 3. Rotate the nut by the proper amount listed in the table below.

## TURN-OF-NUT METHOD REQUIRED TURNS FOR PRETENSIONING FROM SNUG-TIGHT

### Flat Surfaces under Bolt Head and Nut

| BOLT DIAMETER (INCHES) | BOLT LENGTH TO 4D | REQUIRED TURNS | BOLT LENGTH OVER 4D TO 8D | REQUIRED TURNS | BOLT LENGTH OVER 8D TO 12D | REQUIRED TURNS |
|------------------------|-------------------|----------------|---------------------------|----------------|----------------------------|----------------|
| 1/2"                   | 2"                | 1/3 turn       | >2 to 4"                  | 1/2 turn       | >4 to 6"                   | 2/3 turn       |
| 5/8"                   | 2.5"              | 1/3 turn       | >2.5 to 5"                | 1/2 turn       | >5 to 7.5"                 | 2/3 turn       |
| 3/4"                   | 3"                | 1/3 turn       | >3 to 6"                  | 1/2 turn       | >6 to 9"                   | 2/3 turn       |
| 7/8"                   | 3.5"              | 1/3 turn       | >3.5 to 7"                | 1/2 turn       | >7 to 10.5"                | 2/3 turn       |
| 1"                     | 4"                | 1/3 turn       | >4 to 8"                  | 1/2 turn       | >9 to 13.5"                | 2/3 turn       |
| 1 1/8"                 | 4.5"              | 1/3 turn       | >4.5 to 9"                | 1/2 turn       | >10 to 15"                 | 2/3 turn       |
| 1 1/4"                 | 5"                | 1/3 turn       | >5 to 10"                 | 1/2 turn       | >11 to 16.5"               | 2/3 turn       |

(Information from RCSC Table 8.2)

### Rotations Tolerance:

For 1/3 Turn (120 degrees)  $\pm$  30 degrees

For 1/2 Turn (180 degrees)  $\pm$  30 degrees

For 2/3 Turn (240 degrees)  $\pm$  45 degrees

Snug Tight = The tightness that is required to bring the plies into firm contact (Typically obtained with a few impacts of an impact wrench or the full effort of an Iron-worker using an ordinary spud wrench).

Bolts used in the Snug-Tightened Condition do not require Pre-Installation Verification Testing.

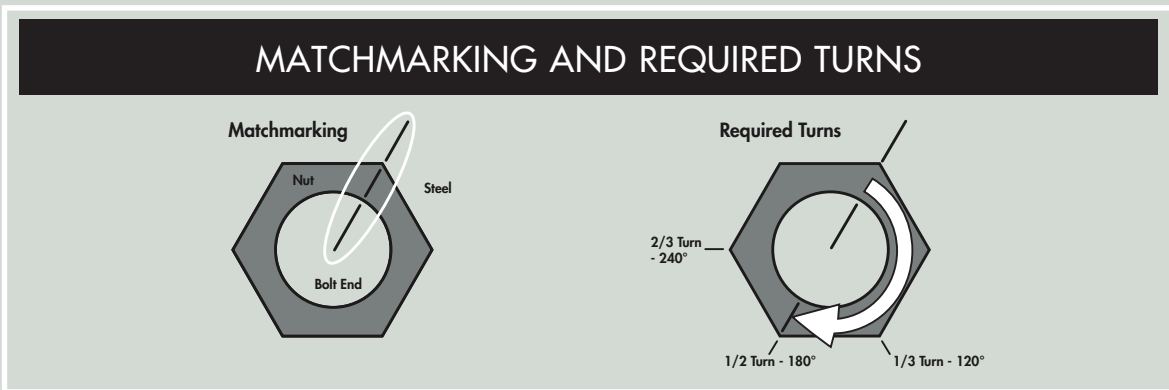
Always turn the nut during installation if you have the choice.

Always turn the same element during testing as you plan to turn during installation.

## Pre-Installation Verification Procedure for Turn-of-Nut Installation Method

1. Take 3 bolts of each diameter, length, grade and production lot; 3 washers of each diameter and production lot; and 3 nuts of each diameter, grade and production lot as they will be assembled.
2. Assemble the first set of bolt-washer-nut combination into the Skidmore-Wilhelm.
3. Snug the assembly using the same technique to be used in the structure.
4. Match mark the nut, bolt and Skidmore faceplate.
5. Apply the required rotation as listed in the above table for the assembly being tested.
6. Verify that the tension on the Skidmore dial gage is at least 5% more than the min. bolt pretension as listed in the table below.
7. Record the tension achieved in a log book.
8. Remove the assembly and repeat steps 2 through 7 until three assemblies have been tested.

Information from the RCSC "Specification for Structural Joints Using ASTM A325 or A490 Bolts"



## Minimum Bolt Pretension for Pretensioned and Slip-Critical Joints

| BOLT DIAMETER<br>(inches) | ASTM A325 BOLTS AND F1852 ASSEMBLIES |             | ASTM A490 BOLTS AND F2280 ASSEMBLIES |             |
|---------------------------|--------------------------------------|-------------|--------------------------------------|-------------|
|                           | (kips) <sup>a</sup>                  | + 5% (kips) | (kips) <sup>a</sup>                  | + 5% (kips) |
| 1/2                       | 12                                   | 12.6        | 15                                   | 15.8        |
| 5/8                       | 19                                   | 20.0        | 24                                   | 25.2        |
| 3/4                       | 28                                   | 29.4        | 35                                   | 36.8        |
| 7/8                       | 39                                   | 41.0        | 49                                   | 51.5        |
| 1                         | 51                                   | 53.6        | 64                                   | 67.2        |
| 1 1/8                     | 56                                   | 58.8        | 80                                   | 84.0        |
| 1 1/4                     | 71                                   | 74.6        | 102                                  | 107.1       |
| 1 3/8                     | 85                                   | 89.3        | 121                                  | 127.1       |
| 1 1/2                     | 103                                  | 108.2       | 148                                  | 155.4       |

<sup>a</sup> Values from RCSC Table 8.1

1 kip = 1,000 pounds

**TODAY, THAT LITTLE "n" MEANS BIG THINGS!**

This Technical Data Sheet is subject to change without prior notification.

