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BLIND BOLT TENSION AND SHEAR TESTING

TORQNUT™

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INTRODUCTION

This report presents the results of Tension and Shear Testing of Blind Bolts. TorqNut submitted the samples for testing on April 16, 2020.

OBJECTIVE

The scope of work was limited to performing tension and shear testing on **four (4)** Blind Bolts and providing a report of the results. The testing was completed on May 27, 2020.

SAMPLE IDENTIFICATION

The following items were submitted for testing:

- **Qty four (4)** M20 Blind Bolt, Part No: SE2070TN

RESULTS

Tension Test 1: installation torque: 120 ft lbs, maximum load: 39172 lbf, failure mode: pull through, minimum factored tension: 33296 lbf

Tension Test 2: installation torque: 180 ft lbs, maximum load: 54342 lbf, failure mode: pull through and shear of wing tabs, minimum factored tension: 46191 lbf

Shear Test: installation torques: 180 ft lbs, maximum load: 122896 lbf, failure mode: shear fracture of one bolt, minimum factored shear: 46086 lbf

TEST METHOD

Tension Test

A fixture was created to allow a blind bolt to be installed into two 1 inch thick plates through two 1.1875 inch diameter holes. The blind bolt was tightened to a given torque value as instructed by TorqNut. The fixture allowed the two 1 inch plates to be pulled apart until the bolt either failed or slipped through the plates. The plates were installed into a tension/compression load frame and pulled in opposite directions normal to the plates' largest surface creating a tensile load along the bolts longest axis. Loading was conducted at a rate of 0.25 inches per minute. Load data was recorded and the maximum load achieved was reported.

Shear Test

A fixture was created to apply a shear load to two blind bolts simultaneously in order to balance bending forces on the uniaxial load frame used for testing. Each anchor was installed into two 1 inch plates through 1.1875 diameter holes. The blind bolts were tightened to 180 foot pounds as instructed by TorqNut. Each set of plates was installed into tension/compression load frame so that the shear forces were evenly distributed between the two blind bolts. The plates were pulled in opposite directions along the plates' largest surface creating a shear load on each blind bolt. Testing was stopped when one of the two blind bolts failed.

CALIBRATED TEST EQUIPMENT

Tinius Olsen, Model Super ”L”, Universal Testing Machine, Asset# MTA-040.1, Calibrated: 11/7/2019, Calibration Due: 11/7/2020

Digital Caliper, Asset# PT-167-156, Calibrated: 7/18/2019, Calibration Due: 7/18/2020

PHOTOGRAPHS

Figure 1: Tension Test Specimen before testing

PHOTOGRAPHS (continued)

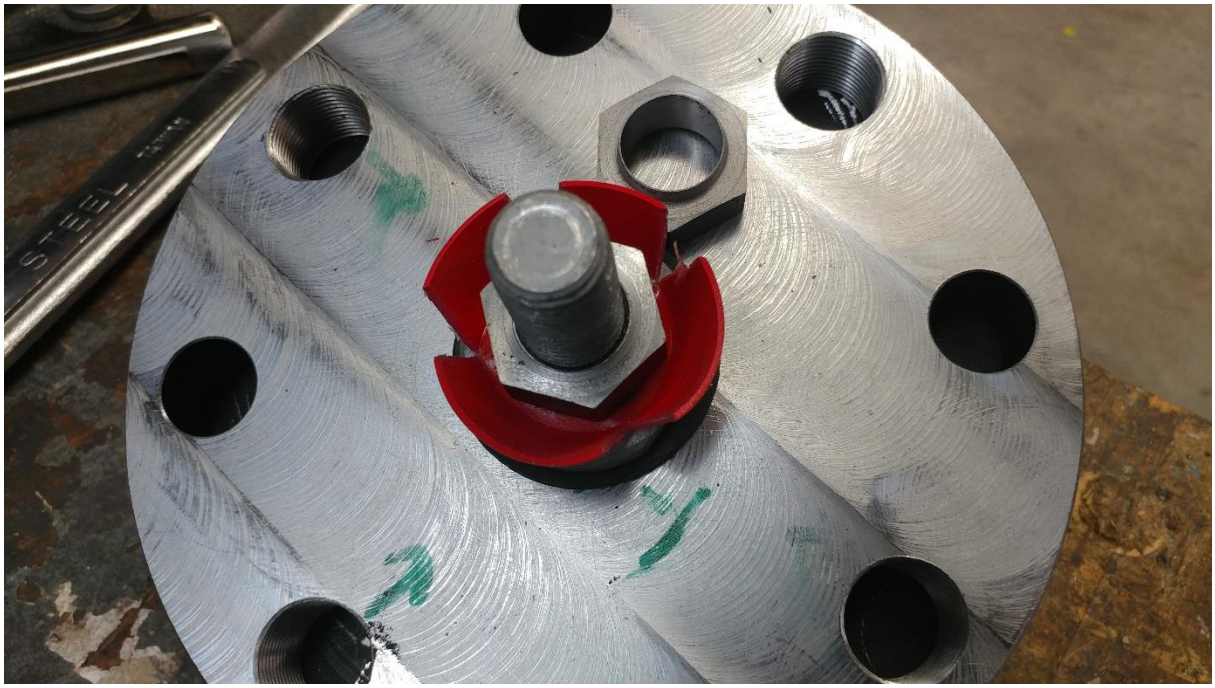

Figure 2: Tension Test Specimen after installation (nut shown sheared at 120 ft lbs)

Figure 3: Tension Test 1 (120 ft lb installation) after testing

PHOTOGRAPHS (continued)

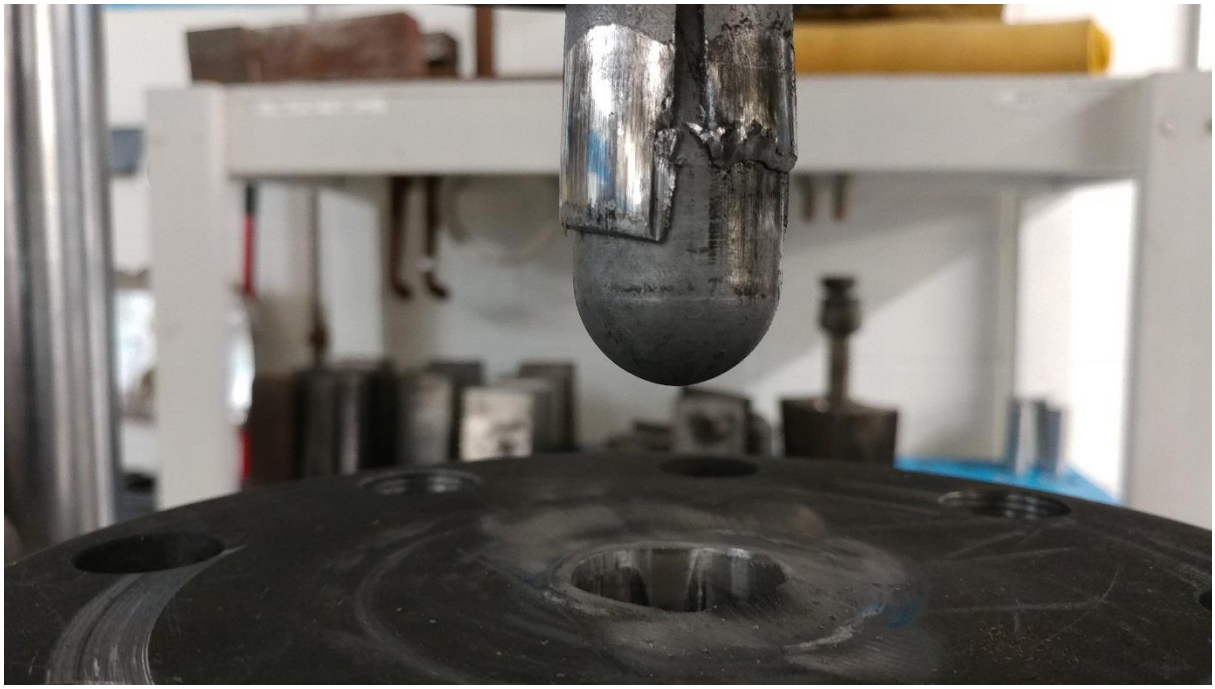

Figure 4: Tension Test 2 (180 ft lb installation) after testing

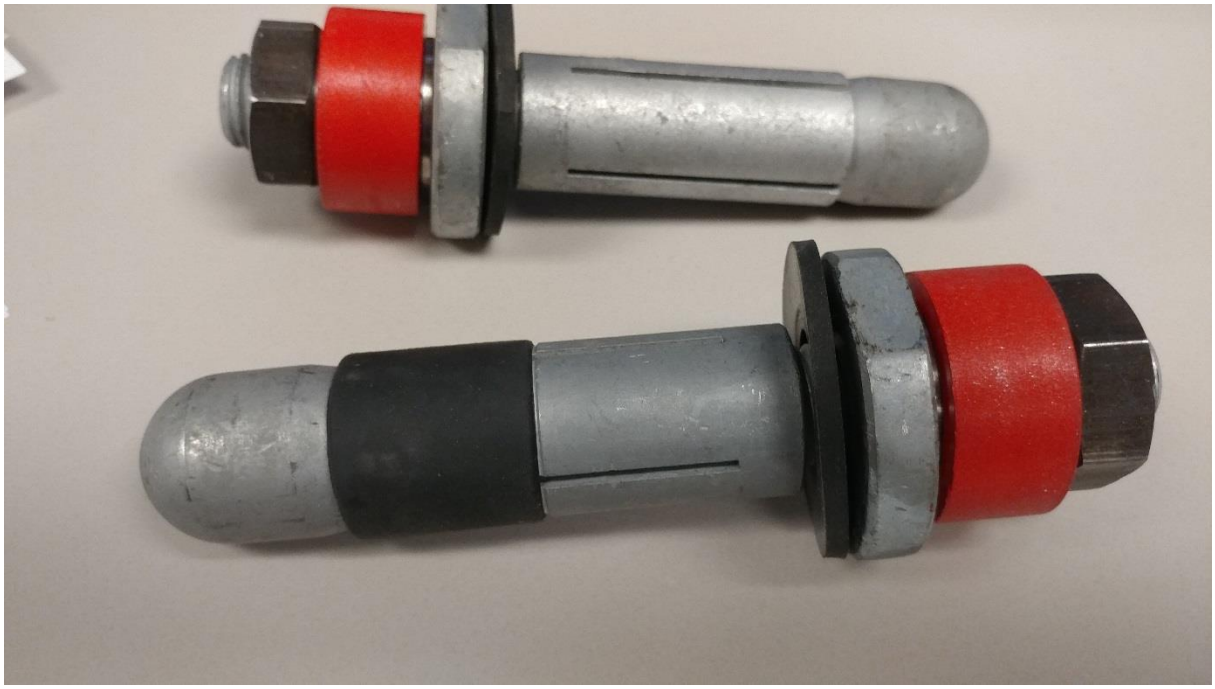

Figure 5: Shear Test Specimens before testing

PHOTOGRAPHS (continued)

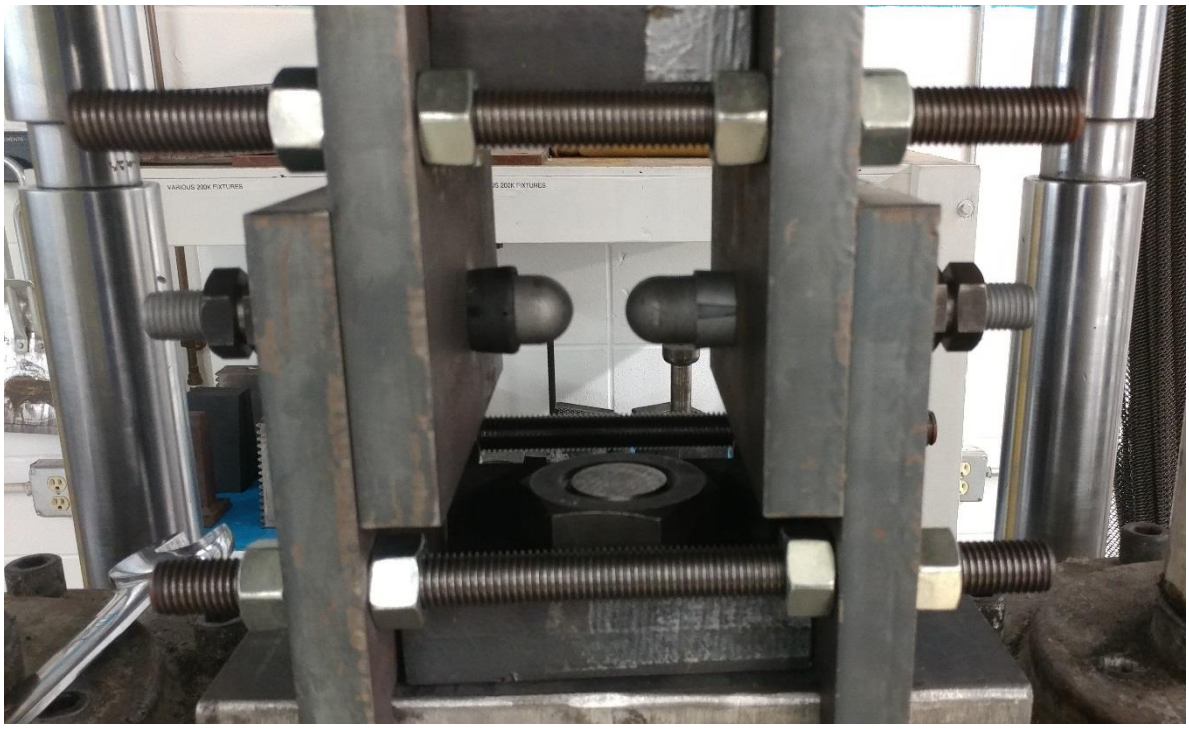

Figure 6: Shear Test Specimens installed before testing

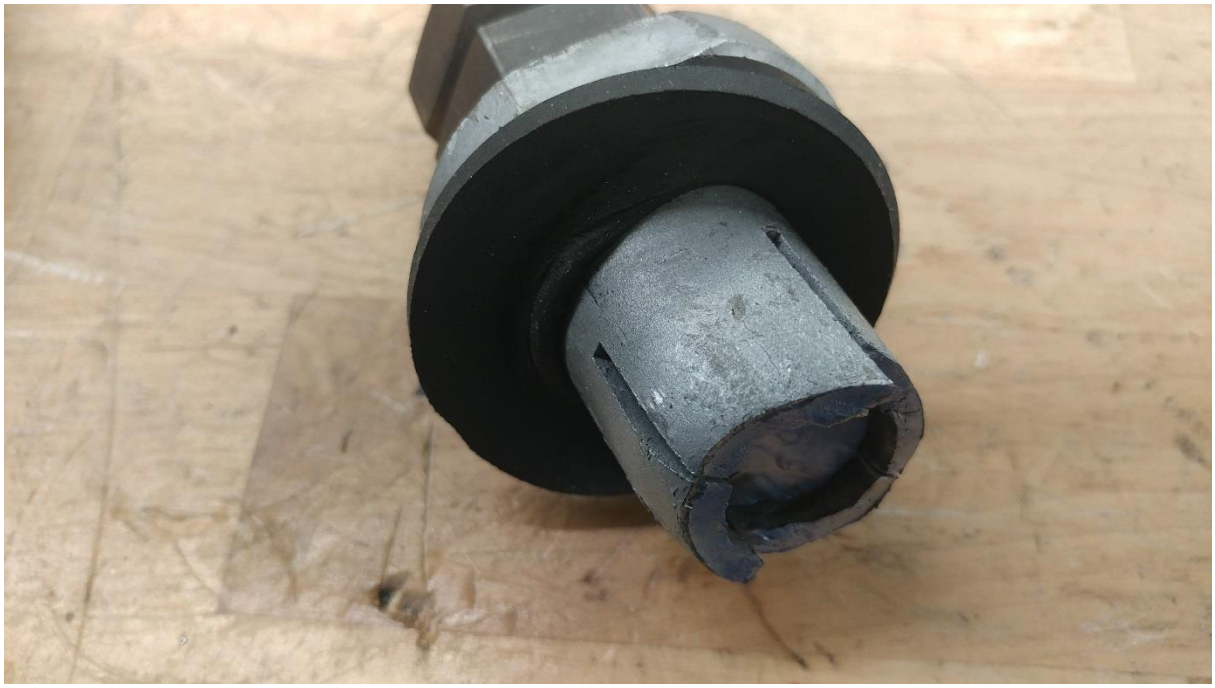

Figure 7: Shear Test Specimen after testing

PHOTOGRAPHS (continued)

Figure 8: Shear Test Specimen after testing