
****GENERAL REWRITE – PLEASE READ CAREFULLY.****

TENSIONING OF HIGH STRENGTH BOLTS

SNUG TIGHTENED CONDITION

The snug tightened condition is the tightness that is attained with a few impacts of an impact wrench or the full effort of an ordinary hand wrench to bring the plies into firm contact. In any case, the snug tightened condition cannot exceed 20% of the specified minimum tensile strength. Systematically progress with snug tightening starting at the center of the connection and working out to the edges.

INSTALLATION

High strength bolts must be tightened to a tension equal to or greater than 80% of the specified minimum tensile strength. This tension produces the high clamping force that enables the faying surfaces to carry the loads entirely by friction.

High strength bolts may be tightened with calibrated torque wrenches or by the turn of the nut methods. Suitable hand wrenches or powered impact wrenches can be used with either of these methods.

The turn-of-nut method is basically a strain control as contrasted with the torque control of the calibrated torque wrench.

When all fasteners in the connection are snug-tightened, the face of the connecting part (the nut and the bolt point) shall be matched marked using paint or crayon to provide reference for determining the relative rotation of the parts during final tightening. Tightening shall progress systematically from the center of the joint to the free edge. Also refer to the requirements of [Article 2408.03R5](#)

TORQUE WRENCHES

Torque wrenches shall be calibrated every six months.

REUSE OF BOLTS

Bolts which have been tightened previously cannot be reused. Used high strength bolts, nuts, and washers cannot be allowed to be installed nor can be allowed to be incorporated in the final construction joint connections.

STORAGE OF FASTENERS (Bolts, Nuts, and Washers)

Fasteners should be protected from dirt and moisture in closed and sealed containers and in a protected shelter at the site of installation. Only as many fasteners components as are anticipated to be installed during the work shift shall be taken from the protected storage. Fastener components that are not being incorporated into the structure shall be returned to protected storage. Fasteners cannot be cleaned, re-oiled, and / or modified from as-delivered condition without prior approval of the engineer.