

About the Author/WAYNE WALLACE

Wayne Wallace is the president of Applied Bolting Technology Products. The company provides bolting consulting services and manufactures direct tension indicating washers from its base in Ludlow, Vermont. Wallace is a member of the Research Council on Structural Connections, a director of the Bolting Technology Council, and author of numerous papers on the practical aspects of quality assurance in structural bolting. He can be reached by fax at 802-228-7204, or e-mail at wallace@appliedbolting.com.



Squirters Blind Tested at University of Idaho

In the first of an expected series of squirter DTI blind tests, Dr. Ed Schmeckpeper, University of Idaho Professor of Civil Engineering, reports impressive results.

“Squirters” — that’s right, “squirters.” Just type in “squirter washers” in any major web browser like Google, HotBot, Yahoo, and AltaVista, or find www.appliedbolting.com and type in “squirters.” Squirters are those new style DTIs with silicone embedded in them which squirts out when the DTI bumps are compressed by a bolt being tightened. The orange silicone tells the bolt installer when to stop tightening, regardless of the bolt’s torque resistance. Torque resistance measurement can be inaccurate due to the variance in the condition of the bolts being tightened. Now “squirters” have been independently

tested to check how well they actually work.

Dr. Schmeckpeper and his students tightened bolts with squirter DTIs on them and stopped tightening when they thought the bolts were tensioned correctly, just by looking at the silicone squirt appearance. With the Skidmore covered, they just stopped tightening when the silicone appeared, then looked at the tension measured in the bolt by the Skidmore. This method does not require a torque wrench to wrestle with or measurement of part turn as in turn-of-nut.

The following chart shows four histograms of bolt tensions measured in a laboratory environment. Remember, a histogram is a frequency plot of the data, or the density of test results at each of a number of values. Ideally, all test results

would be densely clustered at or near the mean, or average of all the results, but that is never the case in the real world. In the real world, test values vary from the mean, and the statistical measurement of the variability of the test data is called the “standard deviation.” The lower the standard deviation, the more accurate the test results.

From the histograms, it is apparent that the “squirter” tests constituted the most accurate bolt tensions of the four. They have a mean nicely close to the minimum value (10% over) and a standard deviation of just 7% of the values measured.

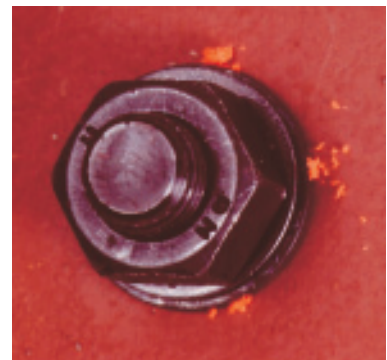
The real tests will come from the field under actual adverse conditions, not from the lab like these tests. Even so, it’s expected that




1. Loctite® silicone in DTI cavities



2. Before tightening, there is no red showing around the bolt.



3. After tightening, there is red showing around the bolt.

in the field, the visible silicone squirt will be a real advantage for bolt installers and help them do a superb job of tightening bolts under any conditions. This method works on any bolt, in any condition, any length — just stop tightening when it squirts. 

“The graphical representation of the squirter test data reported by the University of Idaho presented in this report was done at Applied Bolting Technology by Mr. Nate Deibler, who is going into third year mechanical engineering at Le-Tourneau University in Texas. For data on calibrated wrench and turn-of-nut, he used the data presented in Kulak’s “Guide to Design Criteria for Bolted and Riveted Joints”, 2nd edition, New York, John Wiley 1987. All the test data presented is from laboratory tests done under controlled conditions.”

DTI SQUIRTERS COMPARED TO CALIB. WRENCH AND TURN OF NUT

