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orange

is good!

Now you can
see that the
bolt is tight!



Squirter®DTIs are DTIs with a flexible silicone embedded in the depressions under the bumps. **To use them, simply ...** Tighten the bolt until the calibrated amount* of orange silicone appears from under the DTI's squirt locations, then stop tightening. **That's all there is to it.**

Squirter® DTIs making bolting easy!

Easier and Better than Turn-of-Nut

You don't have to remember to stop turning at 1/3rd, 1/2, or 2/3rds turn. No match-marking or special gun necessary.

Easier and Better than Calibrated Wrench

You don't have to establish and then check the torque resistance of bolts daily and for each lot and when your wrench condition changes.

Better than a Twist-Off Bolt

Tension control rather than torque control.
No splined end to twist off and become a safety hazard.
No problems caused by the splined end shearing off in torsion before the plies are together.

Works with All Bolt Lengths

Even when the bolts are extremely short or long, Squirter®DTIs show you when the correct tension has been achieved.

Saves Erector Time

Enables correct tensioning as fast as the wrench can be moved to the next bolt, because the operator can see when to stop.

Establishes A Good Snug Point

With Squirter®DTIs, snug (tight iron) is partial bump compression. The snug criteria becomes no squirt. The tight criteria becomes squirt.

*See calibration instructions on reverse.

Visual Low Tech Tension Indicator

The orange silicone is easy for erectors to see. No feeler gage except during calibration.

Safe for Inspectors

Once calibrated (see reverse side of this sheet), inspectors can verify which connections have been completed by squirt alone before they have to climb the steel. Compared to routine feeler gage inspection, Squirters® allow virtually 100% inspection. As always, no cumbersome torque wrench to lug around.

Squirter® DTIs Approved

Squirter® DTIs are made and certified to ASTM F959 and recognized by ASME B.182.6. FHWA, Research Council and state DOT procedures for installation and inspection are unaffected.

Extremely High Bolt Tension Avoided

Erectors know when to stop tightening. Some applications prefer bolts tightened over a minimum, but not too far over. Squirter®DTIs enable previously unavailable control.

"Squirters® are light years ahead of any other tightening method."

Richard Oliver
Babcock & Wilcox



Squirter® DTIs

How much
squirt is tight?



Video training tips
Scan with
smartphone
or go to
appliedbolting.com



SQUIRTER® CALIBRATION AND INSTALLATION INSTRUCTIONS

3 Easy Steps: 1. Calibrate in a Skidmore 2. Snug the array of bolts 3. Drive it Till it Squirts

1. Calibrate Squirters® as follows:

Before starting installation, Squirter® DTIs MUST be calibrated in a Skidmore or in solid steel by checking the DTI gap with a feeler gage.

In a Skidmore -- Insert a bolt, nut, flat washer, and Squirter® DTI. Tighten the assembly to about 10% to 20% over the minimum required tension, just as the bolt would be tightened in the steel work (see Note 1 below). For example, tighten a 7/8" A325 bolt to about 45,000 lb. Make sure your wrench can tighten the assembly in less than 10 seconds. Once tightened, note the appearance, flow volume, and number of squirts emanating from under the DTI at that tension. The number of squirts should be AT LEAST equal to the number of bumps on the DTI less one: for instance, a five bump DTI should squirt in at least four places. Repeat this test a few times and get a visual impression of how much squirt is necessary. To be a Squirter "Pro", cover the dial of the Skidmore and see how close you can get to the calibration tension.

In solid steel -- Duplicate the above test in a solid connection, tightening the bolt assembly until the DTI has been sufficiently compressed so that a feeler gage of the correct thickness (.005" if the DTI is on the nut end or coated assy., or .015" if the DTI is under the head) WILL NOT enter HALF of the available places right into the bolt shank. If it does, tighten the bolt a little more and note the silicone squirt volume and appearance. Repeat this test a few times and get a visual impression of how much squirt is necessary.

Note 1: For ASTM A325 and A490 bolts, as determined by the RCSC, minimum tension is 70% of minimum tensile strength. See <http://www.appliedbolting.com/faq/3.html#1>. Other bolt grades may require different minimum tension.

2. Snug the Array

Always snug an array of bolts to bring the plies into firm contact before final tightening. Make sure you don't fully compress the DTI on the snug (first) pass. On the final pass, compress the DTIs from the most rigid point outward.

3. Drive it Till it Squirts

TIGHTEN THE BOLT UNTIL AFTER THE ORANGE SILICONE APPEARS IN VOLUME FROM MOST OF THE DTI'S SQUIRT LOCATIONS.* DON'T STOP TIGHTENING UNTIL THE SQUIRT VOLUME AND APPEARANCE IS JUST LIKE IT WAS IN THE CALIBRATION EXERCISE. THEN STOP TIGHTENING.

Caution: For installation of **Squirter® DTIs** in old or reconditioned steelwork, it may be necessary to place a hardened flat washer against the steel surface and under the **Squirter® DTIs** so that its squirt feature works reliably.

Squirter® DTIs are normally used over standard sized holes; If **Squirter® DTIs** must be used with oversized holes, the best solution is to put the **oversized hole** in the steelwork ONLY in the inner ply or plies, leaving a standard sized hole under the **Squirter® DTIs** so the squirt feature works correctly.

Squirter® DTIs can be used directly over oversized holes by using a special large OD flat washer under the Squirter® DTI. These special flat washers are available from Applied Bolting.

* Each DTI has one squirt location for every bump. The number of squirts should be AT LEAST equal to the number of bumps on the DTI less one. For instance, a five bump DTI should squirt out in at least four places.

Applied Bolting has patented the product (US Patent No.5,931,618)
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Pre-Installation Verification Test Report using Direct Tension Indicators

Date: _____

Wrench Model: _____

Skidmore No.: _____ Skidmore Calibration Date: _____

Bolt Grade: ASTM A325 ASTM A490

Bolt Size: _____ BLACK GALVANIZED DACROMET

Lot No.: _____

DTI Lot & config.: _____ DTI ON NUT SIDE DTI ON HEAD SIDE

Nut lot number: _____

F436 FW: _____

F436 Wide FW: _____

Required Tension: _____

(5% over minimum tension)

(7/8" Minimum = 39 kips, 5% over = 41 kips)

Sample #1
Bolt Tension _____

.005"
 .015"

**ASSEMBLY
ACCEPTABLE**

Refusals	Yes	No

Sample #2
Bolt Tension _____

**ASSEMBLY
ACCEPTABLE**

Refusals	Yes	No

Sample #3
Bolt Tension _____

**ASSEMBLY
ACCEPTABLE**

Refusals	Yes	No

Inspector: _____

Date: _____