

A. PRELOADING BY VISUAL INDICATION

Tensioning DTI SmartBolts[®] by visual reference should be done carefully with the supplied **Verification Guide** for an accurate “tight” color match. There must be sufficient light illuminating the indicator to enable the operator to observe small color changes occurring as the bolt is tightened. For best results, a fluorescent full spectrum (~5000K) light source or natural light is recommended. If this is not available an LED light source with an output of 87 Lumens or less may be used. **The light source should be positioned a minimum of two feet away from the indicator.** Use of an incandescent light source is not recommended.

A box-end wrench is preferably used if driving the bolt head, while fitting sockets may be used to drive the nut. It is best to initially tighten the fastener slowly by applying a smooth even pull. After the indicator has begun to darken, the bolt should be tightened until the indicator color matches the **“TIGHT”** region on the included Verification Guide. This is the point where the **Design Tension** has been reached and where further tightening will cause little discernible color change. The in-service tension may then be monitored at any later time by observing the color of the DTI indicator and matching to the guide. **Be cautious** not to over tighten your DTI SmartBolts[®] significantly past this point, potentially exceeding the Proof Load, which may cause a loss of calibration or damage the DTI indicator.

B. PRELOADING BY TORQUE CONTROL

For the first installation using torque control, the torque-tension relationship should be established by carefully applying a known torque value in a steady even pull with a calibrated torque wrench. Then remove the torque wrench and measure the tension by matching the indicator color with the blocks on the included Verification Guide. The torque value should be increased until the “Tight” color block matches the indicator’s tension. This torque value can then be used as a starting point for assembly of the remaining fasteners assuming no significant changes to the bolted joint are made. The color of the SmartBolt[™] should always be checked after torquing to ensure the required amount of tension has been developed. If the indicator is not fully “Tight”, increase the installation torque until it is properly preloaded.

The in-service tension may then be monitored at any later time by observing the color of the DTI indicator and matching to the guide. **Be cautious** not to over tighten your DTI SmartBolts[®] significantly past this point, potentially exceeding the Proof Load, which may cause a loss of calibration or damage the DTI indicator. **Note:** If the required torque value is excessively high, inspect the bolted joint components for damage such as marred threads, excessive corrosion, or galling.

BOLT AND JOINT PREPARATION

Lubricating the bolt threads and all parts that experience relative motion during tightening with a suitable grease or thread lubricant will help to ease tightening torques required to set the Design Tension by means of the DTI visual indicator, as well as to prevent galling damage to the bolt threads. When tightening, it is preferable to drive the nut rather than the bolt head when possible. It is good practice to use a hardened washer under the driven element (head or nut) in any case to prevent galling and reduce embedment. The bolted joint should have parallel surfaces for an accurate indication. If surfaces are more than 5 degrees out of parallel, use tapered washers or spherical 2-part washers under the head or nut as required ensuring parallelism.

PROPER CARE AND HANDLING

Proper care should be taken to protect the indicator from direct impact during handling and use. The indicator is a precision measuring device that is calibrated at the factory and under proper use can remain accurate for the life of the SmartBolt[™]. A cloth dampened with water can be used to wipe away contaminants and light coat of oil is acceptable. Contact of the indicator with harsh solvents or cleaners should be avoided.

Additional information and frequently asked questions are available for download on our website at www.smartbolts.com/support. For other questions on proper use and application of SmartBolts[®], please contact the factory at (240) 631-7246 or email us at support@smartbolts.com

