

## UNBRAKO DIRECT TENSION INDICATOR (DTI)



### PRODUCT RANGE

- M16 - M36
- AVAILABLE IN GRADE 8.8 AND 10.9

### INTRODUCTION

UNBRAKO DIRECT TENSION INDICATORS (DTI) are more accurate and are very simple devices for ensuring that bolts have been installed above the specified minimum tension values. They help indicate that the defined preload has been achieved in the bolt.

The UNBRAKO DTI is washer-shaped with protrusions "bumps," pressed out on one face. These protrusions compress under load and thus **Indicate The Magnitude Of The Preload** in the assembly. The fact that it resembles a washer is incidental. It is in fact a **Precision Made Mechanical Load Cell; A Device For Tensioning Hsfq Bolts**, which is covered by the British Standard BS EN 14399-9.

The UNBRAKO DTI is installed on a bolt with the "bumps" placed against the underside of the bolt head. When noticeable gaps are reduced to the required dimension, the bolt is properly tensioned and required clamping force achieved. A DTI does not make it more difficult to tension a bolt it merely shows that the bolt has been properly tensioned.

UNBRAKO DTI is usually installed under the bolt head and the nut turned. When the bolt is properly tensioned the gap will be less than 0.40mm in more than half of the spaces. Grade Table lists the number of "bumps" for each size and grade of DTI and the required number of gage refusals in the gags.

**GRADE AND COMPRESSION TABLES OF UNBRAKO DTI**

<b>GRADE TABLE</b>				
<b>BOLT SIZE</b>	<b>Grade 8.8 (H8)</b>		<b>Grade 10.9 (H10)</b>	
	<b>Bumps</b>	<b>Refusals</b>	<b>Bumps</b>	<b>Refusals</b>
M12	4	3	-	-
M16	4	3	4	3
M20	5	3	6	4
M22	5	3	6	4
M24	6	4	6	4
M27	7	4	7	4
M30	8	5	8	5
M36	9	5	9	5

<b>Compression Load Table</b>			
<b>Grade 8.8 (H8)</b>			
<b>Bolt Size</b>	<b>Minimum (KN)</b>	<b>Maximum (KN)</b>	<b>Minimum No. Of Feeler-gauge Refusals</b>
M12	47	56	3
M16	88	106	3
M20	137	164	3
M22	170	204	3
M24	198	238	4
M27	257	308	4
M30	314	377	5
M36	458	550	5

<b>Grade 10.9 (H10)</b>			
<b>Bolt Size</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Minimum No. Of Feeler-gauge Refusals</b>
M16	110	132	3
M20	172	206	4
M22	212	254	4
M24	247	296	4
M27	321	385	4
M30	393	472	5
M36	572	688	5



# Unbrako Direct Tension Indicator

## UNBRAKO DTI UNDER THE BOLT HEAD-TURN THE NUT TO TENSION

This method should be used whenever possible as it ensures that the bolt has not been trapped by movement of the steel plies before tightening. Other methods are suggested but should only be used when this one cannot be applied.

### ASSEMBLY

Put the DTI under the bolt head with the bumps facing the underside of the bolt head. Put a hardened washer under the nut. (figure 2a).

With a short-slotted or oversized hole under the bolt head add a hardened flat washer between the DTI and the hole. (For a long slotted) hole, an external cover plate of sufficient size to completely cover the slot should be provided at a minimum of 8mm thick). (figure 2b).

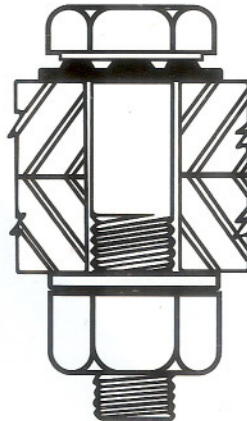


figure 2a

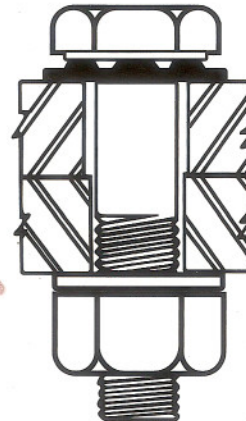


figure 2b

### TENSIONING:-

For grade 8.8 bolts turn the nut until the gap between the bolt head and the DTI face is reduced to less than 0.40mm in more than half of the entry spaces. For grade 10.9 reduce gaps to less than 0.50 mm and if desired not less than 0.40mm. When turning the nut, prevent the bolt head from spinning with a podger spanner. Spinning can cause unnecessary wear.

### APPLICATIONS OF UNBRAKO DTI



BRIDGES



STRUCTURAL  
STEEL BUILDINGS



PETRO-CHEMICAL  
INDUSTRY



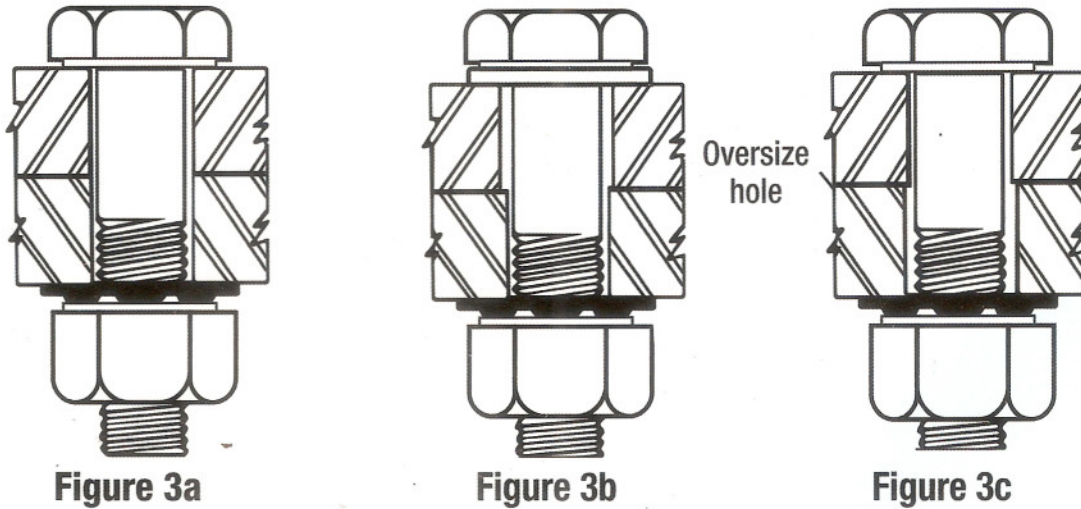
AUTOMOTIVE INDUSTRY



HIGH STRENGTH  
STRUCTURAL BOLT/  
ANCHOR BOLT

**INSTALLATION METHOD OF UNBRAKO DTI**

Place the DTI under the nut with the bumps facing the nut (Figure 3a). With a short-slotted or oversized hole under either the bolt head or nut add a hardened flat washer between the DTI and the hole. (For a long slotted hole, an external cover plated of sufficient size to completely cover the slot should be provided at a minimum of 8mm thick). (Figures 3b and 3c)



**TENSIONING :-**

For Grade 8.8 bolts turn the nut until the gap between the nut and the DTI face is reduced to less than 0.25mm in more than half of the entry spaces. For Grade 10.9 reduce gaps to less than 0.35mm and if desired not less than 0.25mm. When turning the nut, prevent the bolt head from spinning with a podger spanner.

