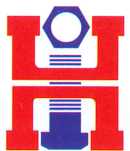
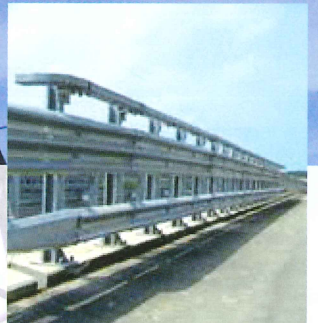


TORQUE SHEAR TAMPER-RESISTANT NUTS® (TSTR Nuts)



**INDUSTRIAL HARDWARE
SUPPLY SDN. BHD.**

(21382-M)



TORQUE SHEAR TAMPER-RESISTANT NUTS® (TSTR Nuts)

Tamper Resistant Lock Nut (Torque Shear Tamper-Resistant Nuts®)

Worry about steel members being stolen and affect structural performance?

Use **TSTR Nuts**

TSTR Nuts (Torque Shear Tamper-Resistant Nuts®):
Innovative fasteners# which prevent unfastening of bolts & nuts from steel structures.

The **TSTR Nut** consists of a "Torque-Shear (Fastening) nut and a freely rotating outer nut. Once the **TSTR Nut** is tightened to a specific tightening torque, with the assistance of a spanner, the "Torque-Shear" nut will be self-detached and the outer nut will be freely rotating, thus preventing it from being removed.



The **TSTR Nut** is suitable for use on outdoor or indoor structure with zinc galvanised for corrosion protection. The standard sizes are for 16mm, 20mm and 24mm bolts. Other sizes can be requested.

Malaysia Patent No. UI 20083063

TORQUE SHEAR TAMPER-RESISTANT NUTS® (TSTR Nuts)

Torque Shear Tamper-Resistant Nuts®

Torque Shear Tamper-Resistant Nuts (TSTR Nuts) are special designed multi-features nuts that are non-removable on steel bolted joints once fastened properly onto mating bolts.

Benefits of using TSTR Nuts include:-

- (1) **Permanent Bolted Joints** - The fastening-ends of nuts will be self-detached (sheared off) under specific tightening torques (Table 1). This feature eliminates loose bolts problems, commonly found at steel erection works due to absence of effective tightening method on site.
- (2) **Tamper-Resistance** - Every properly fastened TSTR Nut is **theft-proof** and permanently fastened onto bolted joints. It may be destroyed but can never be unfastened from the mating bolt using common hand tools.
- (3) **Corrosion-Resistance** - Suitable for used on outdoor steel structures, TSTR Nuts are Zinc galvanised to Class 50 corrosion resistance, with an average minimum Zinc coating thickness exceeding 45µm (or 325 g/m).
- (4) **Cost efficient** - no additional **theft-proof** (lock) nut is required. Thus, eliminates the needs for extending standard bolts' lengths.

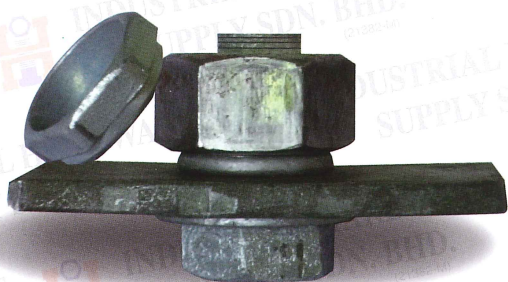


Figure 1: Standard Assembly
Bolt & TSTR Nut, c/w Spring Washer



Figure 2: TSTR Nut Assembly
Right - fastened with sheared off end

Standard Assembly of TSTR Nuts for Transmission Line Towers:-

- (i) The standard assembly consists of: 1 pc. Hex Bolt, 1 pc. TSTR Nut & 1 pc. Spring Washer; flat round washer may be added, if so desired. (Figure 1)
- (ii) A properly fastened TSTR nut assembly shows a **washer-face** nut with spring washer completely flattened against the bolted joints. (Figure 2)

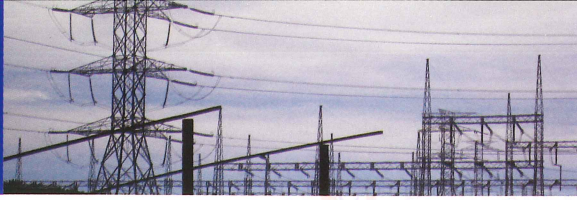
Table 1: Mechanical Properties and Prescribed Torque-Shear Values

Size	Stress Area	Proof Loads*	Shearing Torques	Axial Tensions on Bolts
M16 x 2.0P	157 mm ²	138 kN	170-230 N.m	min 70 kN
M20 x 2.5P	245 mm ²	225 kN	260-360 N.m	min 85 kN
M24 x 3.0P	353 mm ²	325 kN	380-520 N.m	min 105 kN

*ISO 898-2 Property Class 8 ($S_p = 890 \text{ N/mm}^2$)

Size	Stress Area	Proof Loads*	Shearing Torques	Axial Tensions on Bolts
M16 x 2.0P	157 mm ²	110 kN	95-125 N.m	min 40 kN
M20 x 2.5P	245 mm ²	176 kN	140-180 N.m	min 47 kN
M24 x 3.0P	353 mm ²	254 kN	300-370 N.m	min 83 kN

*ISO 898-2 Property Class 6 ($S_p = 720 \text{ N/mm}^2$)



TORQUE SHEAR TAMPER-RESISTANT NUTS® (TSTR Nuts)

Specification Of The Torque Shear Tamper-Resistant Nuts®

1. The **TSTR NUT** Dimension follows DIN 934-8 Specifications. To be used with high tensile bolts (grade 5.8, 6.8 & 8.8)
2. Nut size : 16 mm dia, 20 mm dia, 22 mm dia & 24 mm dia. (any size)
3. Zinc galvanised to ASTM B 695 : 1991, ENISO 1461 : 1999 & ENISO 12683 : 2004

Advantages Of The Torque Shear Tamper-Resistant Nuts®

- A) **TSTR Nut** is a structural-cum-'anti-theft' nut (TWO IN ONE)
- B) TORQUE CONTROL - **TSTR Nut** will ensure the fastening nuts will be tightened to a specific torque (Torque Shear).
- C) Simple and fast to install.
- D) No corrosion effect to tower member.
- E) Do not require special tool to install.
- F) Do not require additional protruding threads.
- G) Once installed, the **TSTR Nuts** cannot be unscrewed using conventional method, eg. spanner.

Standard Operation Procedure (Sop)

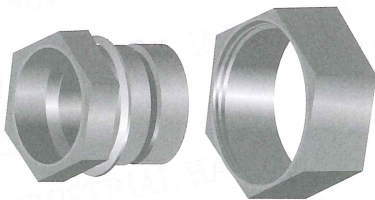
1. Install the **TSTR Nut**, as in the normal way of installing conventional bolt & nut.
2. Tighten the '**Torque-Shear**' nut until it is self-detached. The breaking-torque will be as specified in the 'technical data'.
3. Finally apply a coat of zinc rich paint at the newly detached face of the **TSTR Nut**.



**TORQUE SHEAR
TAMPER-RESISTANT NUTS[®]
(TSTR Nuts)**

Assembly of TSTR Nut

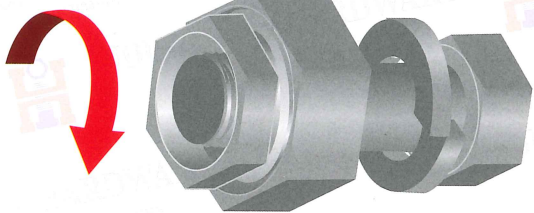
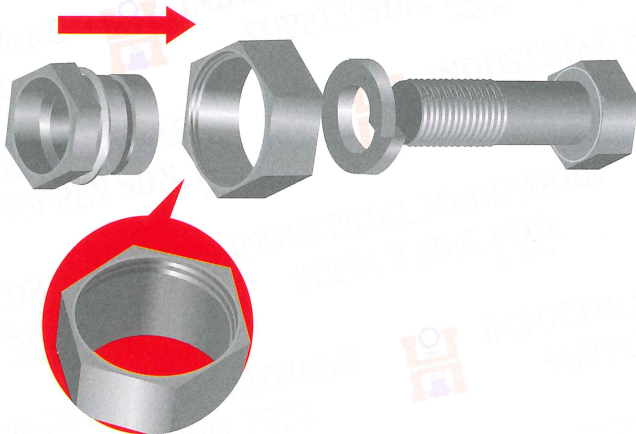
TSTR Nut Components:



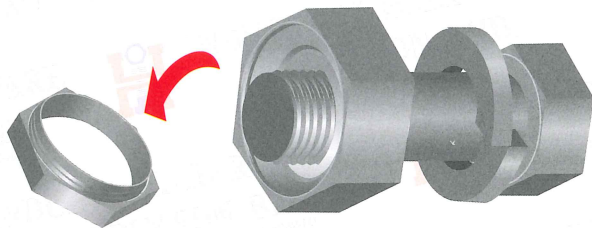
Hand Tools:

Ring Spanner / Box Spanner / Box Wrench

Assembly of TSTR Nuts & Bolts, with Spring Washers



Pre-Tightening



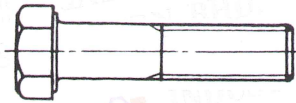
Post-Tightened

Component	Standard Specification
Hex Bolts	DIN 7990 / 931, JIS B1180
Spring Lock Washers	DIN127 A/B, JIS 1251



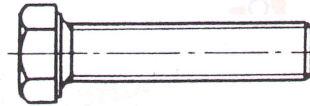
TORQUE SHEAR TAMPER-RESISTANT NUTS[®] (TSTR Nuts)

STANDARD HEXAGON BOLTS & NUTS

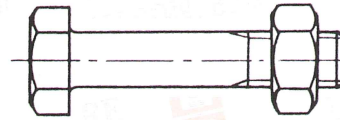


HEXAGON HEAD BOLTS

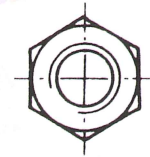
Specification:
DIN 931 / 933 & DIN 934
DIN 7990
ISO 4014 / 4017



HEXAGON HEAD SCREWS



HEXAGON BOLTS WITH HEXAGON
NUTS FOR STEEL STRUCTURES



HEXAGON NUTS

TAILOR MAKE PRODUCTS