

Technical Bulletin

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Description: Usage of Spirallock® Nuts on Torque Path Assemblies



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BACKGROUND INFORMATION:

Spirallock® is a registered trade mark of Spirallock Corporation.
Loctite® is a registered trade mark of 3M Corporation.

TESCO had standardized on Spirallock® flanged lock nuts for its torque track connectors and other torque path connections that are liable to be subjected to extreme vibration or many re-use cycles. The reason is that Spirallock® nuts provide assembly and usage advantages over standard grade 8 nuts and provide additional margin of safety and greater working life.

How the Spirallock® Thread Form Works

Spirallock® uses a modified thread form that incorporates a secondary helical wedge. The design permits greater free-spinning clearance, much more secure fastening, and longer re-use life. As a consequence Spirallock® is a one-way fastener that always has a flange (figure 1). In order to work properly Spirallock® nuts must be installed with the flange bearing against the material surface. The Spirallock® thread form is used for the nuts and threaded holes only and is designed to work with any standard UNC threaded bolt or stud. Usage of Spirallock® nuts is simpler than almost any other specialty fastener: just lubricate and torque to the same specification as for the same size standard UNC grade 8 fastener. See figure 2 showing a Spirallock® SPL thread form with the secondary helical wedge.



Figure 1

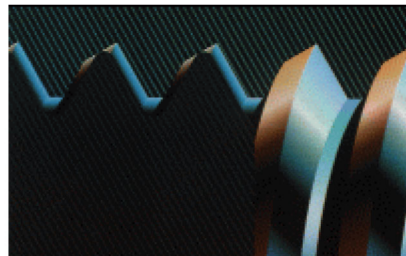


Figure 2

Once the flange face of the nut seats against the work piece and commences to apply tension to the bolt, the secondary helical wedge begins to press radially against the crests of the bolt threads, which tends to load all the threads equally (see figure 3). As it is tightened the Spirallock® nut develops a "hoop stress" similar to a pressure vessel such as a compressed air tank. The entire engaged thread becomes loaded uniformly. As a result there is a much longer contact area than a conventional UNC nut can develop, and thereby provides improved frictional resistance against thread loosening due to vibration. Another result is that the tensile load is shared nearly equally over all the nut and bolt threads, whereas for standard UNC fasteners only the first one or two threads support most of the load. Therefore a Spirallock® nut has much greater strength against thread stripping than a standard grade 8 UNC nut installation has (whether it is the nut or the bolt threads that actually strip). See figure 4 showing how bolt tension loads are distributed amongst the standard UNC thread form compared to a Spirallock® SPL thread form. Lastly, because the threads become loaded only when the nut flange has seated and commences to apply tension to the bolt, nuts with the Spirallock® thread form have looser assembly clearance than standard UNC nuts and are therefore easier to install since they spin on and off more freely.

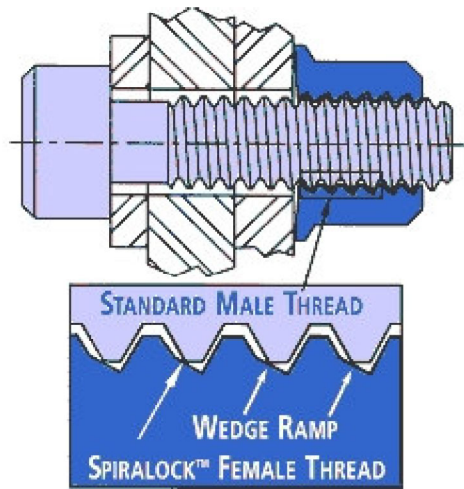
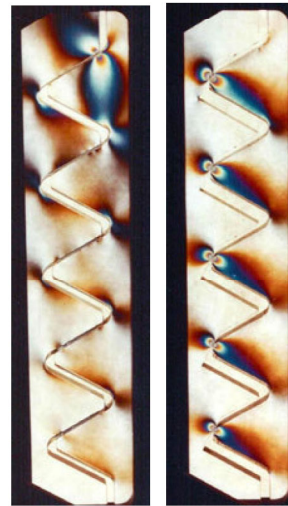


Figure 3



UNC SPL
Figure 4

For example: one notable real-world application that Spiralock® had been developed for is to hold the Space Shuttle engines together under extreme vibration. The Spiralock® actually performed better than every other thread locking mechanism tested, including Loctite®. According to NASA testing the Spiralock® did not back off or loosen even when subjected to vibrations 10 times greater than the specified requirement, and were found to have no loss of clamping power after 50 installation cycles.

AFFECTED PRODUCT:

All bolted-flange torque track assemblies, also all torque-path assemblies and all other assemblies that utilize Spiralock® fasteners as a standard component.

General Assembly or Model or Process

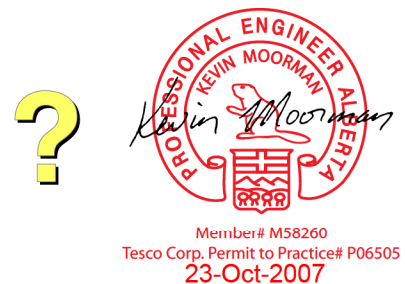
Description	Part No.
Torque Track Set, Standard, 8" x 12"	5791
Torque Track Set, Limited Clearance, 8" x 12"	5790
Torque Track Set, Telescopic, 8" x 12"	15554
Torque Track Set, HMI, 4" x 12"	6123

Component or Procedure/Instruction

Description	Part No.	Assembly Torque (dry)	Assembly Torque (lubricated)
Nut, Hex, Lock, Spiralock®, Flg, 1/4"-20SPL, Gr. 8, Pld	720473	144 lb*in	106 lb*in
Nut, Hex, Lock, Spiralock®, Flg, 5/16"-18SPL, Gr. 8, Pld	720472	25 lb*ft	18 lb*ft
Nut, Hex, Lock, Spiralock®, Flg, 3/8"-16SPL, Gr. 8, Pld	720193	45 lb*ft	35 lb*ft
Nut, Hex, Lock, Spiralock®, Flg, 1/2"-13SPL, Gr. 8, Pld	720195	110 lb*ft	80 lb*ft
Nut, Hex, Lock, Spiralock®, Flg, 9/16"-12SPL, Gr. 8, Pld	720768	150 lb*ft	110 lb*ft
Nut, Hex, Lock, Spiralock®, Flg, 5/8"-11SPL, Gr. 8, Pld	460188	220 lb*ft	170 lb*ft
Nut, Hex, Lock, Spiralock®, Flg, 3/4"-10SPL, Gr. 8, Pld	19218	380 lb*ft	280 lb*ft
Nut, Hex, Lock, Spiralock®, Ø1.25" Flg, 3/4"-10SPL, Gr. 8, Pld	720848	380 lb*ft	280 lb*ft
Nut, Hex, Lock, Spiralock®, Flg, 7/8"-9SPL, Gr. 8, Pld	720196	600 lb*ft	460 lb*ft
Nut, Hex, Lock, Spiralock®, Flg, 1"-8SPL, Gr. 8, Pld	720197	900 lb*ft	680 lb*ft

ACTION REQUIRED:

Always lubricate and torque a Spirallock® nut to the same specification as the equivalent size UNC nut, refer to the component usage table above. A washer is not necessary; however if one is desired, use only a flat washer. The only purpose the washer can serve is to protect the work piece surface. The flange face of the Spirallock® nut is cupped slightly, like a Belleville cone-shaped washer, and therefore serves to develop spring tension within the nut in the same manner. This tension is far superior than can be developed with a split spring lock washer. Never use split spring lock washers on TESCO torque-path equipment, and especially not as a replacement for Spirallock® fasteners. It takes very little load to compress a spring washer, at which point it is no better than a flat washer. One serious problem with the split spring lock washer is that the split can cause the washer to splay over time and break. The broken pieces tend to fall away from the fasteners, resulting in a loose connection. This condition is prevalent in situations where bolted connections utilizing lock washers are subjected to vibration.



Contact your local TESCO Parts and Service Center for further information regarding this bulletin and or supply of affected components noted above.