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## SELF-CLINCHING LOCKNUTS HOLD MATING SCREWS TIGHT

by Michael J. Rossi, Marketing Services Supervisor

When fasteners are subjected to disruptive application-related forces – vibration, thermal cycling, or others – their reliability in service may be jeopardized. Mating screws particularly become targets for loosening and potential attachment failure. Self-clinching locknuts offer solutions on multiple fronts.

These fasteners effectively “self-lock” the threads of mating screws to eliminate any risk of screws loosening over time, regardless of application forces. And, unlike chemical locking methods or patches, locknuts do not require extra production steps and/or materials during the assembly process, saving time and money.

Beyond the central function of withstanding external forces and holding mating hardware securely, self-clinching locknuts offer yet another layer of reliability, thanks to self-clinching technology. Upon their installation, the locknuts become permanent and integral parts of a thin metal assembly, will not loosen or fall out, never have to be restrained from rotation with a tool, and never have to be handled again.

Specific types of self-clinching locknuts carry specific benefits, based on design. Some integrate floating threads to compensate for misalignment; miniature versions feature smaller footprints accommodating smaller design envelopes; and others will achieve particularly high clamp strength. The universe of self-clinching locknuts continues to expand in response to application and marketplace needs.

Self-clinching locknuts are available in two primary categories: prevailing torque locknuts (in many variations) and free-running types.

**Self-clinching prevailing torque locknuts** encompass all-metal styles as well as locknuts integrating plastic inserts (usually nylon).

All-metal types “self-lock” the threads of mating hardware by fundamentally altering the shape of the nut



THE ENTIRE FAMILY OF AVAILABLE SELF-CLINCHING LOCKNUTS.

during manufacture to grip a screw during tightening. A common method is the purposeful distortion of the nut's threads. Depending on type, the nut's threads may be elliptically squeezed (slightly deforming the thread barrel into an elliptical shape), flexing jaws may be created by vertically slitting the thread barrel and squeezing the two sections together, or one or two of the last threads on the head side of the nut may be deformed.

The particular design feature of all-metal prevailing torque locknuts produces friction between threads of mated hardware, thereby increasing the force needed to tighten as well as loosen the nut. All-metal prevailing torque locknuts maintain essentially the same torque value, regardless of the amount of axial load applied, and have been engineered to provide up to 15 cycles of thread-locking performance.

**Self-clinching prevailing torque locknuts with nylon inserts** generate torque resistance using a plastic insert as the locking element.

The insert is added during manufacture into the self-clinching body of the nut on the screw exit side (with the inner diameter of the insert approximately at the screw pitch diameter).

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As the screw enters the insert, the resulting interference at the major diameter creates prevailing torque. A major advantage of this locking method is the ability to significantly reduce the chance of conductive debris forming from the repeated removal and re-installation of a screw. These, too, can offer up to 15 cycles of thread-locking performance.

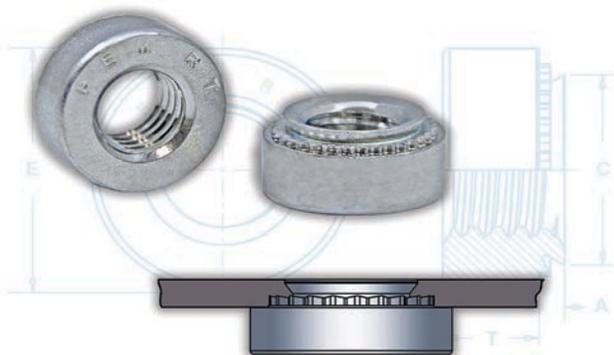
In contrast to prevailing torque types, **all-metal self-clinching free-running locknuts** require tightening against a bearing surface for the locking mechanism to function.

A modified thread formation on the loaded flank of these fasteners provides the vibration-resistant locking feature and allows mating screws to spin freely during the attachment process until clamp load is induced during the screw-tightening process. The applied clamp load then engages the locknut's vibration-resistant locking feature, which locks the mating screw in place. (If the clamp load, is removed for any reason, the nuts no longer will provide any torsional resistance to rotation.) Locking feature reusability will be unaffected by the number of on/off cycles.

Every application will be characterized by distinct requirements and, within the overall family of self-clinching locknuts, uniquely engineered options can be specified to meet the challenges.

Profiles of three (among many) individual prevailing torque types of self-clinching locknuts for thin metal assemblies illustrate the range and capabilities.

**Locknuts with "flexing jaws"** embody a design particularly appropriate for severe service applications. These fasteners utilize two rugged, semicircular flexing jaws (instead of several less-supported segments) to achieve greater retention for preventing relaxation and



**ALL-METAL SELF-CLINCHING FREE-RUNNING LOCKNUTS WITH MODIFIED THREAD FORMATIONS PROVIDING A VIBRATION-RESISTANT LOCKING FEATURE**



**SELF-CLINCHING PREVAILING TORQUE LOCKNUTS INTEGRATING NYLON INSERTS AS THREAD-LOCKING ELEMENTS**

loosening of the fastener over time. The design further protects the threads of a mating screw: clearances obtained by only two interruptions of a full circumference – together with the spreading of the jaws by the entering screw – will minimize the possibility of thread damage. A shoulder additionally provides increased pull-through performance and a positive stop during installation. The flexing action of their locking feature serves to permit repeated use and effective locking torque.

**Locknuts with floating threads** permit up to .030" or 0.76mm adjustment for mating hole misalignment. Extra strength and support in assembly is obtained by the threads of the floating nut extending into the fastener's retainer shank.

**Miniature locknuts** are relatively lightweight with a smaller footprint and can be specified in a range of especially small thread sizes – making them ideal in applications where size and weight matter. A strong knurled collar, which becomes embedded when installed in a host metal sheet, guarantees against rotation of the fasteners in the sheet. The torque-out resistance of the knurl greatly exceeds the torque that can be exerted by the self-locking feature.

As these examples illustrate, self-clinching locknuts have been designed for virtually any application where securing a mating screw is critical.

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