

LOCTITE®

**Don't let a little
Fastener become a
Big problem.**

Secure threaded assemblies.
More reliable fasteners.
Reduced costs.



Henkel

Rely on our expertise. Your trusted partner for the best design solutions against loosening.



Benefit from our expertise.

Our 60 years expertise has enabled us to develop new solutions to prevent fasteners from loosening. And we are committed to continue our tradition of innovation to ensure that our existing solutions keep pace with the latest technological developments. Anaerobic resins have been used to fill the gaps between threaded fittings providing resistance to vibration whilst maintaining the clamping force even in tough conditions. This is how the first THREADLOCKERS came into being.

Secure threaded assemblies imply reduced costs

In this e-book, we will discuss secure threaded connections and how they can replace and solve the problems involved with conventional mechanical fastening methods (such as spring washers, nylon insert nuts, etc.). Liquid threadlockers solve the problem of loosening, the main cause of failure in your machinery and equipment. More reliable and effective than mechanical fastening methods, they are ideal for meeting your challenges while simultaneously reducing costs.

OVERVIEW



Chapter 1
**Why do fasteners
loosen?**



Chapter 2
**How can we
improve fastener
performance?**



Chapter 3
**How do we select
the most suitable
liquid threadlockers?**



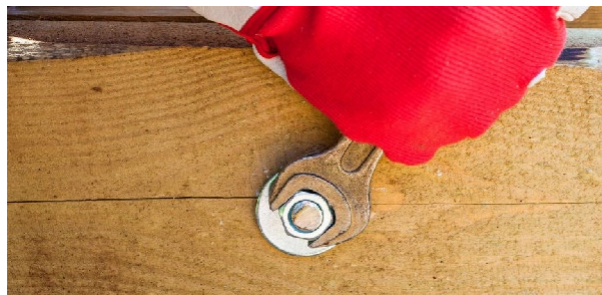
Chapter 4
**How are liquid
threadlockers different
from conventional
fastening methods?**

Chapter 1

WHY DO FASTENERS LOOSEN?

Why do fasteners loosen?

Did you know that there is only 15% metal-to-metal contact in the interior of a bolted assembly and that the remaining 85% is simply air? This leads to gaps and the loosening of threaded connections. Fasteners can loosen and this in turn can cause serious accidents and a total shutdown of a production plant. Customised solutions with liquid threadlockers save time, reduce costs and optimise performance.



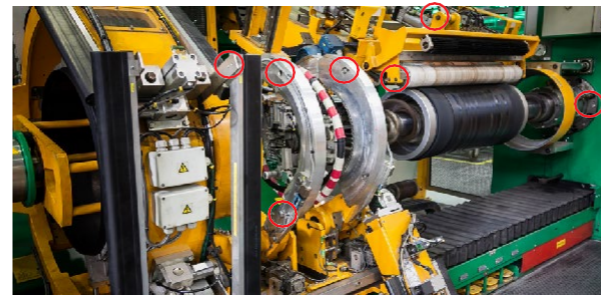
Improper tightening

Improper tightening torque can lead to either an excessive (deformation) or insufficient clamping force on the fastener. This inevitably causes the fastener to loosen.



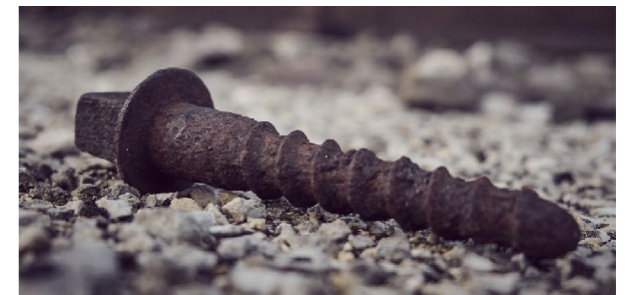
Shocks and vibrations

The effect of vibrations on gaps within a bolted assembly leads to self-loosening and a loss of clamping force. Vibrations cause movements in a bolted assembly and, consequently, loosening.



Thermal expansion

Micro-movements can also be caused by differential expansion of the materials. The influence of temperature on fasteners can cause dimensional changes that can lead to a loss of clamping force.



Corrosion

Fasteners may corrode under the influence of temperature, humidity or chemical action. This can lead to seizure, loss of mechanical contact, or failure of the assembly. It can in fact even make disassembly impossible.

Chapter 2

**HOW CAN WE IMPROVE
FASTENER
PERFORMANCE?**

How can we improve fastener performance?

Nuts and bolts are exposed to high stresses and the clamping force must withstand all kinds of external forces. This is an element that must be taken into account in the assembly design.

Likewise, use-related stresses too must be taken into account. To prevent loosening, the assembly must be as strong as possible. Liquid threadlockers fasten and seal. This helps increase the strength and retention force of the threaded assembly.

Tension and torque

Optimum tightening torque is essential in a threaded joint to ensure correct tension in the joint while simultaneously allowing for the spring effect resulting from the elasticity of the component materials.

The tightening tension of a threaded connection must ensure the rigidity of the assembly. This tension is calculated as a function of several parameters (materials, fastener/bolt size, coefficient of friction, etc.).

Optimisation of fastener performance

LOCTITE makes any fastener a locking fastener and provides a total also. Different strengths are available so fasteners can be permanent or removable and a range of product viscosities are available to cater for varying gaps between the threads.



For optimum fastening, tighten to the recommended torque.



Apply the threadlocker on the first three threads, fully around each thread (if a through bored hole), or at the bottom of the blind hole.



Chapter 3

HOW DO WE SELECT THE MOST SUITABLE LIQUID THREADLOCKER?



How do we select the most suitable liquid threadlocker for your applications?

Answer these three questions:

- What is the size of the fastener?
- What is the required torque?
- How often are the fasteners disassembled?

Criteria	LOCTITE 222	LOCTITE 243	LOCTITE 270
Fastener size	> M6	M6 to M20	M6 to M20
Strength	Low	Medium	High
Temperature resistance	150°C	180°C	180°C
Frequency of disassembly	Frequent	Normal	Rare
Curing time (initial/final strength)	10 min/24 h	10 min/24 h	10 min/24 h
Breakaway/loosening torque (Nm)	6/3	20/7	33/33
Application	Ideal for securing small screws, countersunk screws and adjusting screws	All-purpose. Effective on all metal threaded assemblies.	Very high strength. Effective on all metal threaded assemblies.

LOCTITE product portfolio for threaded connections

Threaded fasteners are available in all shapes and sizes for a wide range of functions and applications. Products therefore need the ability to be applied in various ways depending on the particular application, in order to further improve performance.

Thanks to their range of **viscosity, curing speed and final strength**, LOCTITE threadlockers allow you to choose the right solution for each specific application.

Health and safety



Offering safety data sheets that are without risk phrases, **LOCTITE 2400 and LOCTITE 2700 Health & Safety** threadlockers offer you significant occupational health and safety benefits. **No hazard symbols** on the labels, a high level of quality and reliable performance.

HOW ARE LIQUID THREADLOCKERS DIFFERENT FROM CONVENTIONAL FASTENING METHODS?

Conventional methods with mechanical fasteners



Double nut

Advantage: Increases surface-to-surface contact within the assembly.

Disadvantage: Requires a second nut and stocking/storage facilities for the different dimensions.



Spring washer

Advantage: Maintains the tension on the bolt by virtue of the spring effect and the ends of the spring washer digging into the mating surfaces.

Disadvantage: Must be replaced after every use and requires stocking/storage facilities for the different dimensions.



Nylon insert nut

Advantage: Increases the frictional forces in the thread.

Disadvantage: Must be replaced after every use and requires stocking/storage facilities for the different dimensions.

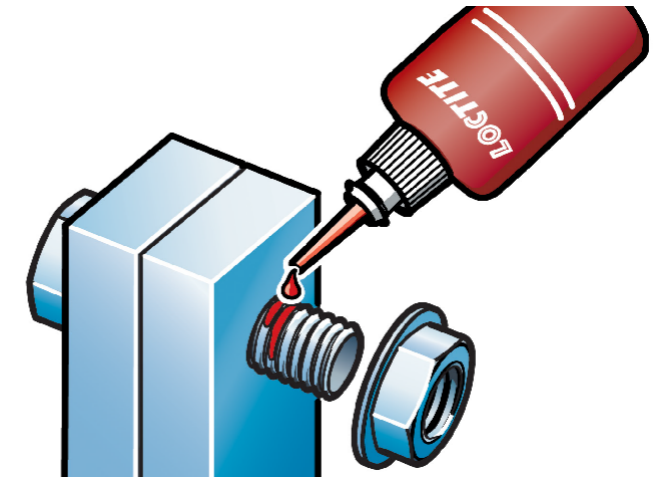


Toothed flange bolt

Advantage: Increases surface roughness to create the required clamping force.

Disadvantage: Higher bolt costs compared to standard bolts and can damage the mating surfaces.

With these solutions, a constant clamping force cannot be maintained in the assembly under various stresses (vibration, temperature, corrosion, etc.). This ultimately leads to loosening.



The advantages of LOCTITE threadlockers

Maintains the clamping force

Prevents loosening under heavy external loads (for instance, vibrations, differential expansion, etc.).

Fills all gaps

There is only 15% metal-to-metal contact between the male and female threads of a threaded connection. LOCTITE threadlockers fill the remaining 85% of the gaps that are just air. The elimination of all gaps thus guarantees a secure threaded connection.

Completely sealed and air-tight (metal-to-metal contact)

LOCTITE threadlockers have a dual function: they fill gaps and seal threads. Thanks to this sealing function, engineers and designers can opt for the through hole design over the blind hole design for threaded assemblies and thereby reduce costs.

1 bottle = nuts and bolts of all sizes

Comparison of costs

Fastening systems	Costs*
Toothed flange bolt	25
Castellated nut	20
Nylon insert	5
Lock washer	5
Star washer	3
Locknut	2
Spring washer	1.2
LOCTITE threadlocker	1

*Cost comparison on a one-to-one basis with LOCTITE.

LOCTITE liquid threadlockers are cheaper than conventional fastening systems: **One 50-ml bottle of LOCTITE is sufficient for 800 M10 fasteners.**

The cost-saving advantages compared to other systems are therefore significant:

- Reduced design costs
- Reduced production costs
- Enhanced productivity
- Reduced storage and warehousing costs
- Fewer rejects and returns due to installation problems

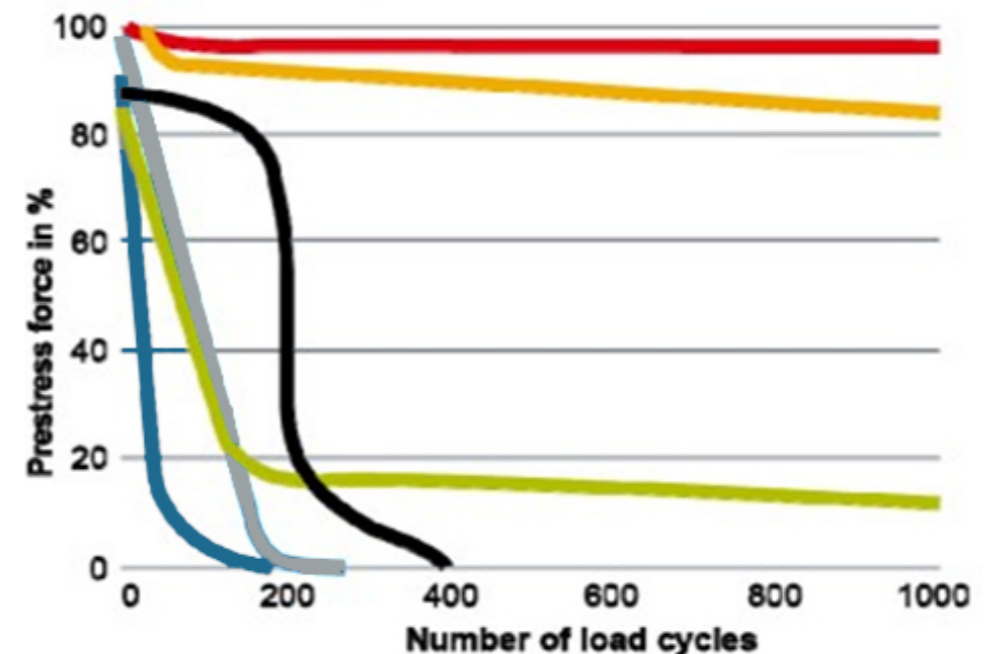
Clamping force

Loss of clamping force of different assemblies that are exposed to extreme vibrations.



In contrast to conventional methods, LOCTITE threadlockers **maintain the clamping force** within the assembly, despite the vibrations.

Comparative shock and vibration performance (transverse shock test)



- Standard bolt with LOCTITE® threadlocker
- Toothed flange bolt
- Nylon insert nut
- Nut with star washer DIN 6797Ar
- Nut with spring washer DIN 127A
- Standard bolt without fastener

Our expertise, your added value



#1
In-plant
assessment

In-plant assessment
conducted by LOCTITE
engineers

#2
Identification
of problems

Problem identified:
Loosening of fasteners

#3
Training

Maintenance experts trained to
implement a proactive
maintenance process throughout
the plant

#4
LOCTITE solutions

Each and every nut and bolt
is now secured with
LOCTITE® threadlockers

**SCHEDULE A LOCTITE
TRAINING PROGRAM**



Assessment of how to
optimise your production and
maintenance processes



Seminars and
workshops on
maintenance practices

Thank you!

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