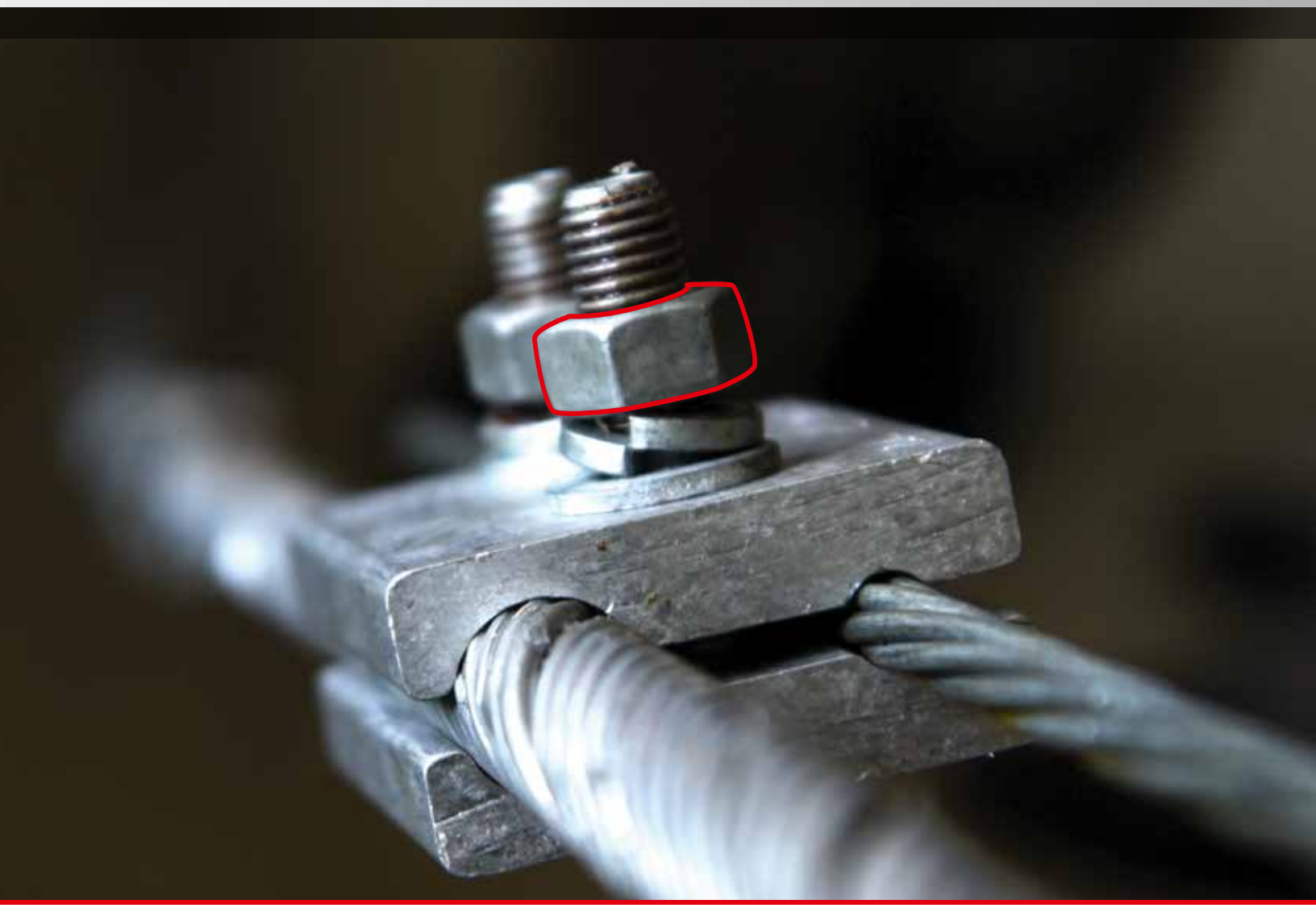
LOCTITE®

Threadlocking User's Guide

What You Need to Know to Ensure a Reliable Threaded Assembly



Henkel Excellence is our Passion

LOCTITE® – Finding a Better Way

Old Way

Mechanical Locking Devices
Mechanical locking devices (e.g., split washers, nylon nuts) were invented to solve the common problem of loosening that occurs in most threaded assemblies. Although they were made for this purpose, they have several shortcomings.

Shortcomings of Mechanical Locking Devices

- Loosen under vibration, thermal expansion and/or improper torque
- Do not seal threads
- Require extensive inventory of several shapes and sizes
- Prone to rust

Better Way

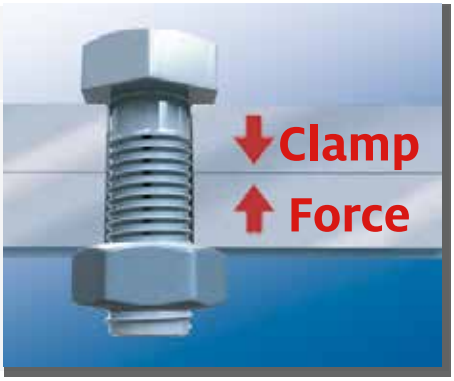
LOCTITE® Threadlockers
Invented 50 years ago by Loctite Corporation, now Henkel Corporation, this revolutionary method to lock and seal threaded fasteners with liquid anaerobic adhesives has found worldwide acceptance. Suited for a wide range of applications, from delicate electronic components to heavy industrial equipment, LOCTITE® threadlockers have dramatically increased the reliability of threaded assemblies.

Benefits of LOCTITE® Threadlockers

- Lock nuts and bolts against vibration and thermal expansion
- Seal against corrosion and leakage
- Reduce inventory costs
- Suitable for all shapes and sizes of fasteners
- Act as a thread lubricant
- Maintain critical adjustments of the assembly
- No on-torque adjustments needed
- High chemical resistance

Functions of a threaded assembly

1. CREATE CLAMP FORCE
2. MAINTAIN CLAMP FORCE
3. ALLOW DISASSEMBLY



Why do threaded assemblies fail?

Clamp force is not maintained

Threaded assemblies loosen because of:

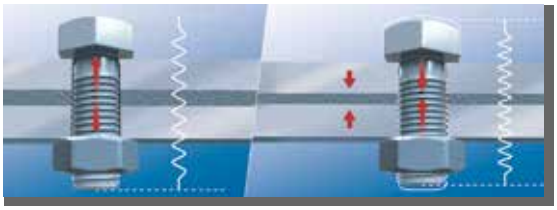
A. Gaps: In order to make the assembly possible, nuts and bolts must have some tolerance, which creates gaps between the threads.

Parts tolerance.

B. Vibration and side-to-side movement: These gaps allow the parts to move from side-to-side when exposed to vibration.

Vibration and loosening.

C. Expansion/contraction & loosening: Expansion and contraction can also cause side-to-side movement. This, in addition to vibration, leads to loosening and ultimately disassembly of parts.



Stretching of the bolt beyond its yield point and thermal expansion/ contraction of parts lead to lack of structural rigidity and relaxation of parts.

Disassembly is not always possible

This failure happens because, in certain conditions, a nut and a bolt can seize together. This seizing effect is caused by:

- **Corrosion,** rust, when dealing with:
  - ✓Humidity
  - ✓High temperatures
  - ✓Assembly of different metals (galvanic corrosion)
- **Galling** (friction welding)

Corroded assemblies can be difficult to take apart...

...which can lead to broken bolts.

Shortcomings of locking devices

Split ring or spring washers

Increased friction reduces clamp load; will not ensure reliable threadlocking under dynamic loads.

Tooth or ribbed flanged bolts

Prevent self-loosening, but are expensive; need larger flange-bearing surfaces and may damage the surfaces.

Tab washers, split pins, castle nuts

Expensive and time-consuming methods, they often impose challenges to line up their components appropriately (i.e., tabs, cotter pins).

Nylon nut

More expensive than a standard nut, nylon inserts increase friction, which results in inaccurate torque.

Why use LOCTITE® threadlockers?

LOCTITE® Benefits

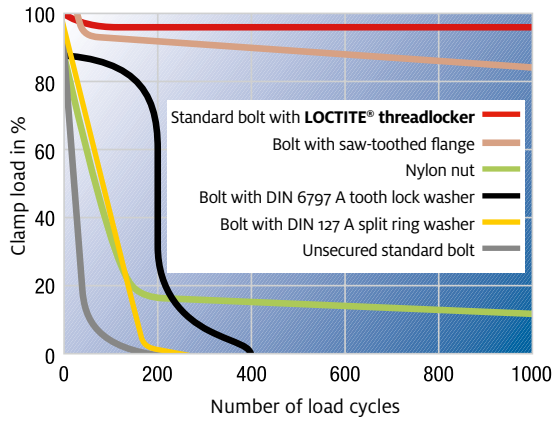
Better Performance

- **Reliable assembly:** Lock against vibration, shock and thermal cycling – plus seal against corrosion and galling.
- **Easy disassembly** using hand tools when low- or medium-grade formula is selected.
- **Outperform locking devices:** Better clamp load retention compared to all mechanical locking devices.

Cost Savings

- **Failure:** Reliable threaded assemblies reduce costly downtimes.
- **Inventory:** "One size fits all;" universally applicable for a wide range of fastener sizes.
- **Processing:** Ease of automation reduces assembly costs and increases throughput.
- **Material Cost:** Lower cost per unit compared to most locking devices.

Vibration loosening test



Note: *Results from the Transverse Vibration Test (Junkers Machine) that assesses fasteners' resistance to vibration loosening.*

Cost per locking application

Fastener Size	Split Ring Washer	LOCTITE® Threadlocker
3/8"	2¢	2¢
5/8"	9¢	5¢
7/8"	25¢	7¢

Note: *Washer pricing is based on 100 units purchased at an industrial distributor. LOCTITE® pricing is based on the price of a 50 ml bottle and the number of drops required per application.*

How does a LOCTITE® threadlocker work?

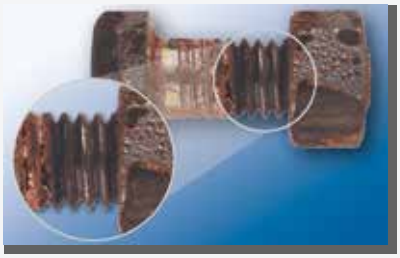
Fill Gaps

LOCTITE® threadlockers are single-component adhesives that cure in the absence of air and in contact with active metal to form a tough thermoset plastic. They completely fill all voids between the interfacing threads, which makes the assembly a unitized component and ultimately prevents loosening.

LOCTITE® threadlocker between the interfacing threads.

Seal Threads

Another property of LOCTITE® threadlockers is thread sealing. This property is especially important when assembling through-bolts in an oil reservoir or cooling jacket in order to keep the fluids sealed in and corrosion out. Examples of this application are common, but not limited, to gearboxes and internal combustion engines.



Engagement area of rusty bolt that did NOT have LOCTITE® threadlocker applied.

Engagement area of rusty bolt that DID have LOCTITE® threadlocker applied.

How do I use a LOCTITE® threadlocker?

Application Options

For through-holes.

For blind holes.

For post-assembly.

For overhead applications.

For pre-applied applications.

IMPORTANT:
To achieve optimum performance, all parts must be clean and free of contaminants (e.g., oil, grease).

Dispensing Options

250 ml and 50 ml push-pull nozzle.

250 ml and 50 ml LOCTITE® hand pumps.

LOCTITE® integrated semiautomatic dispenser, dispense valve and stationary dispense valve.

When should I use a LOCTITE® primer?

Speed up cure

Significantly speed up the cure time of LOCTITE® threadlockers when assembling metal parts that are cold, have large gaps or deep threads.

LOCTITE® 7088™ Primer Stick.

Inactive metal assemblies*

When assembling metal parts with inactive surfaces, LOCTITE® primers are recommended to ensure proper performance of LOCTITE® threadlockers. **Not required for primerless products.**

*Inactive Metals (Primers Recommended)			Active Metals (Primers Optional)	
Plated Parts	Zinc	Magnetite Steel	Iron	Manganese
Anodized Aluminum	Pure Aluminum	Inconel™	Plain Steel	Monel™
Titanium	Cadmium	Silver	Copper	Kovar™
Stainless Steel	Magnesium	Gold	Brass	
Galvanized Steel	Natural or Chemical Black Oxide		Bronze	

**LOCTITE® threadlockers cure in the absence of air and presence of metal ions. When assembling inactive metal parts, which are low in metal ions, the use of LOCTITE® primers is recommended to ensure proper performance of LOCTITE® threadlockers.*

LOCTITE® threadlocker key selection factors

Strength

- **Low Strength:** Ideal for fasteners <¼" (6 mm). Easy disassembly using hand tools.
- **Medium Strength:** Designed to be removable with standard hand tools on ¼" to ¾" fasteners.
- **High Strength:** Designed to deliver high strength on ¼" to ¾" (6 mm to 22 mm) fasteners. For removal, it may require localized heat (>550°F/260°C), hand tools and disassembly while hot.

Easy disassembly with hand tools when using low- and medium-strength formulas.

Viscosity

- **Liquid Formulas:** Everyday assembly; ideal for fine threads and blind holes
- **Semisolid Formulas:** Pocket-friendly, ideal for overhead applications
- **Tape Formula:** Pocket-friendly; controlled application; can be pre-applied several days before assembly.

Liquid.

Semi-Solid.

Application Methods

- **Pre-applied:** QuickTape® threadlocker can be applied beforehand on bolts that are waiting to be assembled.
- **Pre-assembly:** Most LOCTITE® liquid threadlockers are designed to be applied at the moment that parts will be assembled.
- **Post-assembly:** Wicking grade formula can be applied on parts that are already assembled.

Materials Being Assembled

- **All LOCTITE® threadlockers:** Metal-to-metal applications.
- **LOCTITE® 425™ Assure™:** Plastic-to-plastic, plastic-to-metal applications.

QuickTape®: pre-applied application.

HOW TO SELECT THE RIGHT LOCTITE® THREADLOCKER

Are the parts being assembled made from metal or plastic?

- **Plastic Assembly** → **Low Strength** → **Liquid Product**
- **Metal Assembly** → Wicking Grade → What strength do you require?
  - **Low Strength – Blue**
  - **Medium / High Strength – Green**
- **Metal Assembly** → What strength do you require?
  - **Medium Strength – Blue Paste**
  - **High Strength – Red Paste**
- **Metal Assembly** → **High Lubricity – Black** → **High Strength – Liquid**

Solution	LOCTITE® 425™ Assure™	LOCTITE® 220™ Threadlocker	LOCTITE® 290™ Threadlocker	LOCTITE® 2422™ Threadlocker	LOCTITE® 2620™ Threadlocker	LOCTITE® 2047™ Threadlocker
Fastener Size	Small fasteners	up to ¼"	#2 to ½"	½" to ¾"	½" to ¾"	> ⅞"
Cure Time[a]	1.5 min. / 24 hrs.	6 min. / 24 hrs.	20 min. / 24 hrs.	90 min. / 24 hrs.	30 min. / 24 hrs.	90 min. / 24 hrs.
Torque[b] (break/prevail)	4 / 2	85 / 170	90 / 260	102 / 12	161 / 10	204[b1] / 35
Temp.[c]	180°F (80°C)	300°F (150°C)	300°F (150°C)	650°F (340°C)	650°F (340°C)	300°F (150°C)
						
Product Details	**LOCTITE® 425™ Assure™ Instant Adhesive** Low strength, fast surface-curing threadlocker for plastic fasteners. Can be used as a tamper-proofing agent for the head of screws. Can be applied before or after assembly.	**LOCTITE® 220™ Threadlocker – Low Strength / Wicking / Blue** A low viscosity threadlocking adhesive that allows the product to wick along the threads of preassembled fasteners. Perfect for fasteners up to ¼" diameter (6 mm).	**LOCTITE® 290™ Threadlocker – High Strength / Wicking / Green** Recommended for locking pre-assembled fasteners, i.e., instrumentation screws, electrical connectors and set screws. Also seals porosities in welds and metal parts.	**LOCTITE® 2422™ Threadlocker – High Temp / Medium Strength** Recommended for locking fasteners that are exposed to temperatures up to 650°F (340°C). Removable with hand tools.	**LOCTITE® 2620™ Threadlocker – High Temp / High Strength** Recommended for locking fasteners that are exposed to temperatures up to 650°F (340°C). Recommended for locking fasteners permanently.	**LOCTITE® 2047™ Threadlocker – High Lubricity / High Strength** Recommended for fasteners over ⅞" (22 mm). Formulated with increased lubricity to reduce friction and allow proper clamp load to be achieved. Ideal for locking fasteners permanently.

HOW TO SELECT THE RIGHT LOCTITE® THREADLOCKER

IMPORTANT! See page 6 for more information on:

- Primers and inactive metals
- Strength
- Application methods

HELPFUL HINTS:

- Clean part with LOCTITE® ODC- Free Cleaner & Degreaser before applying the adhesive.
- If the threadlocker will be applied below 40ºF (4.4°C), pre-treat with LOCTITE® 7649™ Primer.
- Aqueous washing solutions and cutting fluids can leave a protective layer on the surface. Wash with hot water before use or use contaminant tolerant LOCTITE® 243™ or 263™ Threadlocker.

Are the parts already assembled?

- Yes
- No

Is the assembly exposed to extreme temperatures?

- Yes
- No

Are you assembling large fasteners?

- Yes
- No

What strength do you require?

Low Strength – Purple	Medium Strength – Blue			High Strength– Red	
Liquid Product	Liquid Product	Tape Product	Semisolid Product	Liquid Product	Semisolid Product
LOCTITE® 222™ Threadlocker	LOCTITE® 243™ Threadlocker	LOCTITE® QuickTape® 249™ Threadlocker	NEW LOCTITE® 248™ Threadlocker Stick	LOCTITE® 263™ Threadlocker	NEW LOCTITE® 268™ Threadlocker Stick
Up to ¼"	¼" to ¾"	¼" to >2"	¼" to ¾"	Up to 1"	Up to 3/4"
10 min. / 24 hrs.	10 min. / 24 hrs.	30 min. / 24 hrs.	5 min. / 24 hrs.	10 min. / 24 hrs.	5 min. / 24 hrs.
53 / 30	106 / 26	74 / 47	226[b1] / 36	275 / 290	311[b1] / 83
300ºF (150ºC)	360ºF (180ºC)	300ºF (150ºC)	300ºF (150ºC)	360ºF (150ºC)	300ºF (150ºC)

LOCTITE® 222™ Threadlocker – Low Strength

Recommended for low strength threadlocking of adjustment screws, countersunk head screws and set screws; on collars, pulleys, tool holders and controllers. Also for low-strength metals, such as aluminum or brass. Also available in LOCTITE® 222MS™ version which carries Mil-Spec (S-46163A) Type II, Grade M. NSF P1.

LOCTITE® 243™ Threadlocker – Medium Strength/ Primerless

Versatile, medium strength liquid threadlocker. Reliably locks and seals metal fasteners up to ¾" (19 mm). Engineered to cure consistently on a variety of metals, despite minor surface contaminants. Works on steel, stainless steel and most plated fasteners. Tolerates thread lubrication, anti-corrosion and protection fluids. Rated for 360°F (180°C).

LOCTITE® QuickTape® 249™ Threadlocking Tape

The one and only threadlocker in a tape form. This revolutionary medium-strength threadlocking adhesive is removable with hand tools, and offers the same reliability as traditional LOCTITE® removable- grade threadlocking liquids. Convenient, durable package is a must for every toolbox. LOCTITE® QuickTape® 249™ is easy to apply and can be preapplied for future assembly.

LOCTITE® 248™ Threadlocker Stick – Medium Strength/ Primerless

Semisolid stick form is convenient, portable and great for hard-to-reach applications. General purpose threadlocker for fasteners between 1/4" and 3/4" (6mm to 19mm). New formula bonds through contaminants and cures on metal without primer. Removable with hand tools.

LOCTITE® 263™ Threadlocker – High Strength/ Primerless

Versatile, high-strength, liquid threadlocker. Reliably locks and seals metal fasteners up to 1" (25 mm). Engineered to cure consistently on a variety of metals, despite minor surface contaminants. Works on steel, stainless steel and most plated fasteners. Tolerates thread lubrication, anticorrosion and protection fluids. Rated for 360°F (180°C). Heat required for removal.

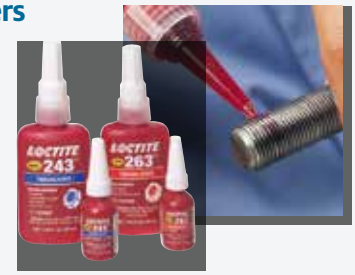
LOCTITE® 268™ Threadlocker Stick – High Strength/ Primerless

Semisolid stick form is convenient, portable and great for hard-to-reach applications. Its high strength makes it well-suited for heavy-duty applications of threaded fasteners up to 3/4" (19mm). New formula bonds through contaminants and cures on metal without primer. Heat required for removal.

LOCTITE® THREADLOCKING INNOVATIONS

Primerless Products – Speed and Performance

LOCTITE® 243™ Medium Strength and LOCTITE® 263™ High Strength Threadlockers

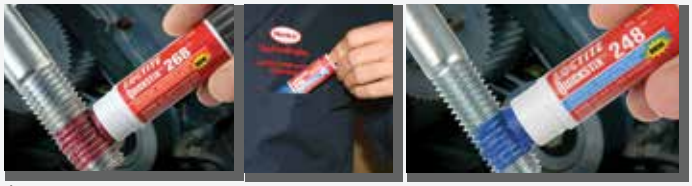


The LOCTITE® 243™ Medium Strength and 263™ High Strength Threadlockers offer all of the performance properties of the original LOCTITE® 242® and 262™ products, plus more, to meet the ever-changing, ever-demanding industrial environments of today and tomorrow. These formulas offer:

- High temperature performance able to withstand temperatures up to 360°F (182°C)
- Improved cure performance on oil-contaminated surfaces
- Cure without primer, even on inactive surfaces such as stainless steel

Semisolid and Tape Products – Versatility and Cleanliness

LOCTITE® 248™ Medium Strength Stick NEW
LOCTITE® 268™ High Strength Stick NEW



No mess, easy to apply and pocket-friendly.
Ideal for overhead and pre-dispensed applications.
Upgraded formula to provide enhanced performance properties, just like the advanced LOCTITE® 243™ and 263™ products:

- Improved cure performance on oil-contaminated surfaces
- Cure without primer, even on inactive surfaces such as stainless steel

LOCTITE® QuickTape® 249™ Threadlocking Tape

The first threadlocker in a convenient, tape form. Easy to use with no mess and no waste, LOCTITE® QuickTape® 249™ provides the same reliable performance as traditional LOCTITE® medium-strength threadlocking liquids and sticks. It can even be pre-applied for future assemblies. It's a MUST HAVE for every toolbox!

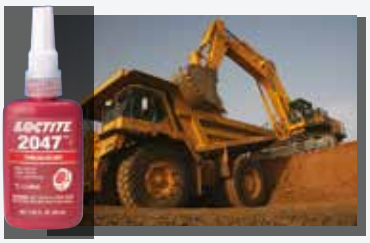
High Temperature Products – Performance and Convenience

LOCTITE® 2422™ Threadlocker, High Temp., Medium Strength
LOCTITE® 2620™ Threadlocker, High Temp., High Strength

New paste formula does not run or migrate, and withstands continuous exposure to temperatures up to 650ºF (340°C). These products are conveniently packaged in syringes for easy dispensing. Disassembling LOCTITE® 2620™ Threadlocker, High Temp., High Strength requires heating to above 650°F (340°C) and disassembling while hot.

Large Fastener Product – High Lubricity and High Strength

LOCTITE® 2047™ Threadlocker, High Lubricity and High Strength



Designed for applications on fasteners over 7/8" (22 mm) in diameter, this threadlocker and its formula with increased lubricity allow proper clamp load to be achieved by reducing friction. In addition, its high strength property will ensure that clamp load is maintained when exposed to vibration. Standard threadlockers may not have sufficient lubricity on large fasteners to achieve ultimate clamp load.

LOCTITE® THREADLOCKER PROPERTIES CHART

KEY FACTORS	KEY FEATURES	PRODUCT	ITEM NUMBER	PACKAGE TYPE & SIZE	COLOR	TYPICAL USE	VISCOSITY (cP)†	TORQUE‡ in.-lbs. (break/prevail)	TEMP. RANGE	CURE SPEED (STEEL @ 25°C)	AGENCY APPROVALS
LOW STRENGTH	Small Fasteners	222™ ☑ 🌐	21463 21464	10 ml bottle 50 ml bottle	Purple	Small screws under 1/4"	1,200/5,000 Thixotropic	53/30	-65°F to 300°F	Fixture – 10 min. Full – 24 hrs.	N/A
REMOVABLE STRENGTH	General Purpose/ Primerless	243™ ☑ 🌐	1330255 1329837 1329467 1329505 1330333	0.5 ml capsule 10 ml bottle 50 ml bottle 250 ml bottle 1 liter bottle	Blue	1/4" to 3/4" bolts, primerless, medium strength	1,300/3,000 Thixotropic	106/26	-65°F to 360°F	Fixture – 10 min. Full – 24 hrs.	NSF™/ANSI 61, CFIA Listed
	General Purpose Tape	QuickTape® 249™	1372603	260" Roll	Blue	Removable strength, 1/4" to > 2", pre-applied	Tape	74/47	-65°F to 300°F	Fixture – 30 min. Full – 24 hrs.	CFIA
	General Purpose Semisolid Stick	248™ NEW	37684 37087	9 g stick 19 g stick	Blue	1/4" to 3/4" bolts, overhead, pre-dispensed, hard-to-reach areas, primerless	Semisolid	226*/36	-65°F to 300°F	Fixture – 5 min. Full – 24 hrs.	CFIA
	High Temperature	246™	29513 29514 29515	10 ml bottle 50 ml bottle 250 ml bottle	Blue	High temperature, medium strength	2,600	170*/48	-65°F to 450°F	Fixture – 5 min. Full – 24 hrs.	N/A
	Ultra-High Temperature	2422™	1134601 1134602	30 g syringe 300 g cartridge	Blue	Ultra-high temperature, medium strength for 1/2" to 3/4" bolts	Paste	102/12	-65°F to 650°F	Fixture – 30 min. Full – 24 hrs.	N/A
HIGH STRENGTH	General Purpose/ Primerless	263™ ☑ 🌐	1330582 1330583 1330585 1330335 1330334	0.5 ml capsule 10 ml bottle 50 ml bottle 250 ml bottle 1 liter bottle	Red	Primerless, high strength	400/600	275/290	-65°F to 360°F	Fixture – 10 min. Full – 24 hrs.	NSF™/ANSI 61, CFIA
	General Purpose Semisolid Stick	268™ NEW	37685 37686	9 g stick 19 g stick	Red	Up to 3/4" bolts, overhead, pre-dispensed, hard-to-reach areas, primerless	Semisolid	311*/83	-65°F to 300°F	Fixture – 5 min. Full – 24 hrs.	CFIA
	High Temperature	272™ 🌐	27240 27270 27285	50 ml bottle 250 ml bottle 1 liter bottle	Red	High temperature applications	9,500	200/220	-65°F to 450°F	Fixture – 30 min. Full – 24 hrs.	CFIA
	Ultra-High Temperature	2620™	1138282	30 g syringe	Red	Ultra-high temperature, high strength for 1/2" to 3/4" bolts	Paste	161/10	-65°F to 650°F	Fixture – 30 min. Full – 24 hrs.	N/A
	Large Bolts	277™	21434 27731 27741 27743	10 ml bottle 50 ml bottle 250 ml bottle 1 liter bottle	Red	Large bolts > 7/8"	7,000	275/275	-65°F to 300°F	Fixture – 60 min. Full – 24 hrs.	MIL-S-46163A for existing designs, ASTM D-5363**
	High Lubricity Large Bolts	2047™	1134607	50 ml bottle	Black	Large bolts > 7/8". High lubricity allows proper clamp load to be achieved	2,000/12,000 Thixotropic	375/80	300°F	Fixture – 90 min. Full – 24 hrs.	N/A
WICKING	Low Strength	220™	37388 39186 22041	10 ml bottle 50 ml bottle 250 ml bottle	Blue	Wicking grade for small, pre-assembled fasteners under 1/4"	20	85/170	-65°F to 300°F	Fixture – 6 min. Full – 24 hrs.	MIL-S-46163A for existing designs, ASTM D-5363**, CFIA
	General Purpose	290™ ☑ 🌐	29005 29021 29031 29041 29043	0.5 ml capsule 10 ml bottle 50 ml bottle 250 ml bottle 1 liter bottle	Green	Medium/high strength. Wicking grade for pre-assembled parts	25/55	90/260	-65°F to 300°F	Fixture – 20 min. Full – 24 hrs.	MIL-S-46163A for existing designs, ASTM D-5363**, NSF™/ANSI 61, NSF™ P1, CFIA
PLASTIC	Plastic Fasteners	425™ Assure™	42540 42561	20 g bottle 1 lb. bottle	Blue	For small metal and plastic fasteners and tamper-proofing	80	4/2	-65°F to 180°F	Fixture – 1.5 min. Full – 24 hrs.	N/A
FOOD COMPLIANT	Processing Equipment That Can Contact Food	2046™ 🌐	1186840	12 ml syringe	Blue	Strengthening/coupling agent for joints on equipment	Gel	111/60	-65°F to 400°F	Fixture – 90 min. Full Cure – 24 hrs.	FDA 21 C.F.R. 175.300
LOW HALOGEN/ LOW SULFUR	Use in nuclear facilities	2432	25523	50 ml bottle	Blue	For use on sensitive metals, like titanium	300	150/53 (black oxide steel nuts/bolts)	-65°F to 300°F	Fixture - 30 min. Full - 24 hrs.	N/A
ENHANCED HEALTH & SAFETY	Removable Strength	2400 NA 🌐	1526121 1526122	50 ml bottle 250 ml bottle	Blue	General-purpose for 1/4" to 3/4"bolts	3,070 Thixotropic	160/20	-65°F to 300°F	Fixture - 5 min. Full - 24 hrs.	N/A
	High Strength	2700 NA 🌐	1526123 1526565	50 ml bottle 250 ml bottle	Red	High strength up to 3/4" bolts	5,000 Thixotropic	300/265	-65°F to 300°F	Fixture - 5 min. Full - 24 hrs.	N/A
MIL-SPEC	Small Fasteners	222MS™	22205 22221 22231 22241	0.5 ml capsule 10 ml bottle 50 ml bottle 250 ml bottle	Purple	Low Strength, small screws under 1/4"	1,200/5,000 Thixotropic	53/30	-65°F to 300°F	Fixture – 10 min. Full – 24 hrs.	MIL-S-46163A for existing designs. ASTM D-5363**, NSF™ P1, CFIA
	Removable Strength	242®	24205 24221 24231 24241	0.5 ml capsule 10 ml bottle 50 ml bottle 250 ml bottle	Blue	Medium Strength, 1/4" to 3/4" bolts	1,200/5,000 Thixotropic	110/43	-65°F to 300°F	Fixture – 5 min. Full – 24 hrs.	MIL-S-46163A for existing designs. ASTM D-5363**, NSF™ P1, ABS[SM], CFIA NSF™/ANSI 61
	High Strength	262™	26205 26221 26231 26241	0.5 ml capsule 10 ml bottle 50 ml bottle 250 ml bottle	Red	High Strength, up to 3/4" bolts	1,800/5,000 Thixotropic	189/275	-65°F to 300°F	Fixture – 10 min. Full – 24 hrs.	MIL-S-46163A for existing designs. ASTM D-5363**, NSF™ P1, ABS[SM], CFIA
	Low Viscosity	271™	27105 27121 27131 27141	0.5 ml capsule 10 ml bottle 50 ml bottle 250 ml bottle	Red	High strength for fasteners up to 1" diameter	500	250/275	-65°F to 300°F	Fixture – 10 min. Full – 24 hrs.	MIL-S-46163A for existing designs. ASTM D-5363**, UL™ Classified for U.S., CFIA

*Breakloose value †See TDS for spindle and speed test measurement **For new designs ☑ Top choice product
‡M10 and/or 3/8 x 16 steel fasteners 🌐 Worldwide availability

LOCTITE® Primers Properties Chart

	PRODUCT	ITEM NO.	PACKAGE TYPE & SIZE	PHYSICAL PROPERTY	ON-PART LIFE	DRY TIME	AGENCY APPROVALS
SOLVENT-BASED	7649™ Primer	19269 38402 21347 21348 19266	1.75 fl. oz. glass bottle 1.75 fl. oz. aluminum bottle 25 g net wt. aerosol can 4.5 oz. net wt. aerosol can 1 gallon can	Liquid	30 days	30 to 70 seconds	MIL-S-22473E for existing designs, ASTM D-5363 for new designs, NSF™/ANSI 61, NSF™ P1, CFIA
SOLVENT-LESS	7088™ Primer Stick	1069258	17 g stick	Semisolid	30 days	–	–