LOCTITE®

“Do it Right” User’s Guide

The “WHEN, WHERE & HOW” to use Loctite® Maintenance Products

Henkel

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The primary function of this User's Guide is to help you, the maintenance professional, with the proper selection and use of Loctite® products. A wide variety of preventative maintenance, as well as repair techniques, are explained in step-by-step detail. Consider this a supplemental service manual for every piece of equipment in your plant. Our goal is to make it easier for you to use our products, to your benefit, for faster repair times, reduced downtime, and extended equipment life. Additional information on these products, as well as others, is available by contacting your local Henkel adhesives and sealants representative at the telephone number listed on the back cover of this guide.

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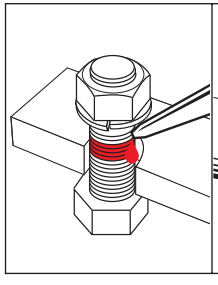
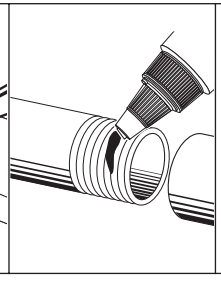
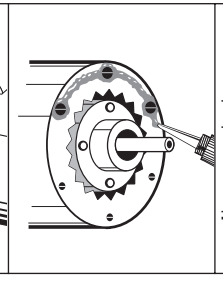
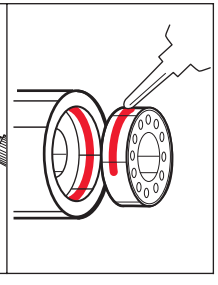
INTRODUCTION TO ANAEROBIC ADHESIVES AND SEALANTS

Anaerobic adhesives and sealants were developed by the founder of Loctite Corporation, now Henkel Corporation, in 1953 and, since then, they have significantly evolved to meet the highest requirements of equipment manufacturers, maintenance and overhaul.

Anaerobic adhesives and sealants are resins that convert from liquid to a tough structural solid in the absence of air and the presence of metal. The primary functions of anaerobic resins are:

Threadlocking	Thread Sealing	Gasketing	Retaining
			

Each one of these functions is based upon control of five major variables: strength, viscosity, adhesion, flexibility, and temperature resistance. These five parameters give anaerobics users considerable latitude in adjusting properties for optimum performance in specific application areas.

Another variable that should be considered is the substrate in which the adhesive will be applied. For certain substrates or other special requirements, the use of primer is recommended.

WHY USE A PRIMER?

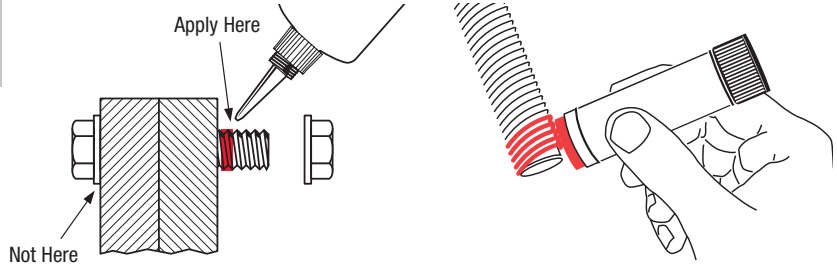
1. Primers activate inactive surfaces.
2. Primers speed cure times for faster return to service.
3. Primers speed curing through larger gaps and deep threads.
4. Primers substantially speed cure times on cold parts.
5. Primers act as cleaning agents.

Active surfaces (Primer optional): Brass, copper, bronze, iron, soft steel, nickel.

Inactive surfaces (Primer required): Aluminum, stainless steel, magnesium, zinc, black oxide, cadmium, titanium, others.

THRU HOLES (BOLTS AND NUTS)

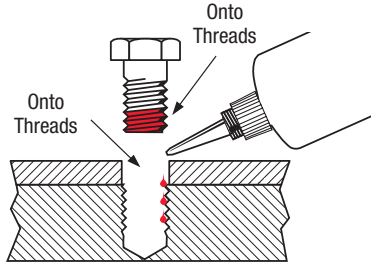
LIQUID AND SEMI-SOLIDS



1. Clean all threads (bolt and nut) with Loctite® ODC-Free Cleaner & Degreaser.
2. If necessary, spray all threads with Loctite® 7649™ Primer N™. Allow to dry.
3. Select the proper strength Loctite® threadlocker.
4. Insert bolt into thru hole assembly.
5. Apply several drops of liquid threadlocker onto bolt at targeted tightened nut engagement area or, when using the stick product, completely fill the root of the threads at the area of engagement.
6. Assemble and tighten nut as usual.

BLIND HOLES (CAP SCREWS, ETC.)

LIQUID ONLY

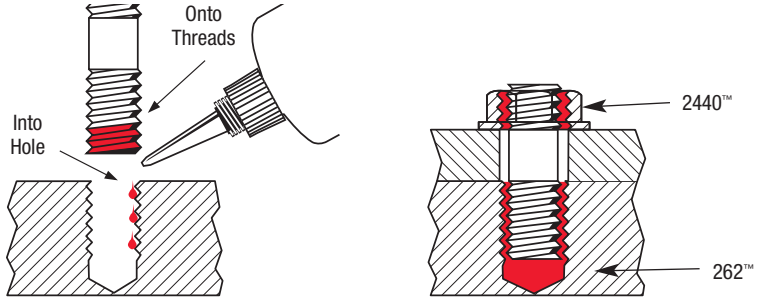


1. Clean all threads (bolt and hole) with Loctite® ODC-Free Cleaner & Degreaser.
2. If necessary, spray (bolt and hole) with Loctite® 7649™ Primer N™. Allow 30 seconds to dry.
3. Select the proper strength Loctite® threadlocker.
4. Squirt several drops down the sides of the female threads.
5. Apply several drops to bolt.
6. Tighten as usual.

Note: Using Loctite® threadlockers will virtually eliminate stripped threads, in aluminum or magnesium housings, caused by galvanic corrosion.

BLIND HOLES (STUDS, ETC.)

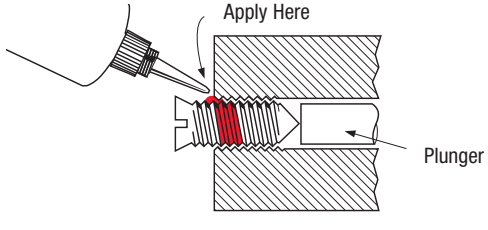
LIQUID ONLY



1. Clean all threads (bolt and hole) with Loctite® ODC-Free Cleaner & Degreaser.
2. If necessary, spray all threads with Loctite® 7649™ Primer N™. Allow to dry.
3. Squirt several drops of Loctite® 2670™ Threadlocker down the sides of the female threads.

   Note: Use Loctite® 277™ Threadlocker if stud is over 1" diameter.
4. Apply several drops of Loctite® 2670™ Threadlocker onto stud threads.
5. Install studs.
6. Position cover, head, etc.
7. Apply drops of Loctite® 2440™ Threadlocker onto exposed threads.
8. Tighten nuts as required.

ADJUSTMENT SCREWS

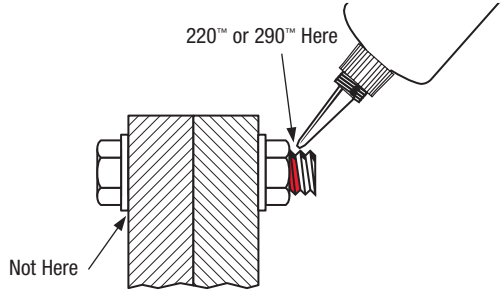


1. Adjust screw to proper setting.
2. Apply several drops of Loctite® 220™ or 290™ Threadlocker at screw and body juncture.
3. Avoid touching bottle tip to metal.

Note:
- If re-adjustment is difficult, apply heat to screw with soldering gun (450°F).
- Loctite® 220™ Threadlocker is a weaker version of Loctite® 290™ Threadlocker.

PRE-ASSEMBLED FASTENERS

LIQUID ONLY



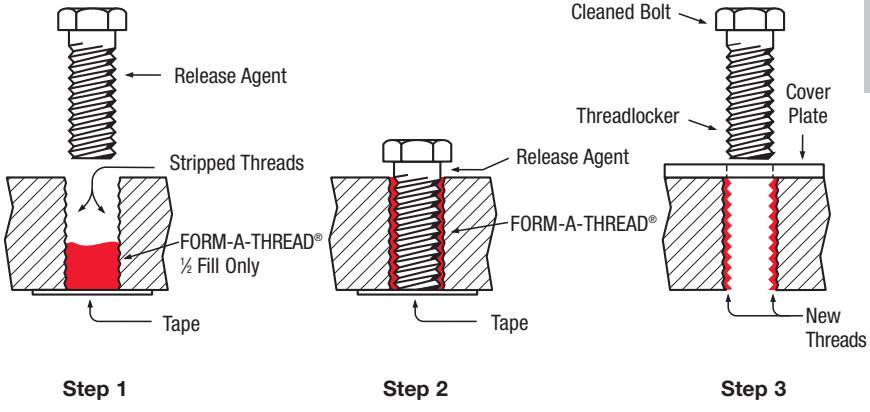
1. Clean bolts and nuts with Loctite® ODC-Free Cleaner & Degreaser.
2. Assemble components.
3. Tighten nuts.
4. Apply several drops of Loctite® 220™ or 290™ Threadlocker at the nut and bolt juncture.
5. Avoid touching bottle tip to metal.

   Note: For preventive maintenance on existing equipment: RETIGHTEN nuts and apply Loctite® 220™ or 290™ Threadlocker at the nut and bolt juncture.

LOCTITE® BRAND THREADLOCKER QUICK SELECTOR

Use	Strength	Product	Color
Small Screws	Low	222MS™	Purple
Nuts & Bolts	Medium	2440™ / QuickStix™ 248™	Blue
Pre-Assembled	Medium	290™	Green
Pre-Assembled	Low	220™	Blue
Nuts & Bolts	High	2670™ / QuickStix™ 268™	Red
Studs (up to 1")	High	2760™	Red
Studs (over 1")	High	277™	Red

STRIPPED THREAD REPAIR



Step 1 **Step 2** **Step 3**

STANDARD THREAD REPAIR

1. Follow instructions on Loctite® FORM-A-THREAD® package.
2. If cover plate is used for bolt alignment:
   (a) Apply release agent to mating faces around repair area.
   (b) Use "waxed" paper or similar film between faces.
3. A "jiggling/twisting" motion when initially inserting bolt improves thread conformation.
   Note: NOT intended for engine stud repair.

SMALL HOLE/FINE THREAD REPAIR

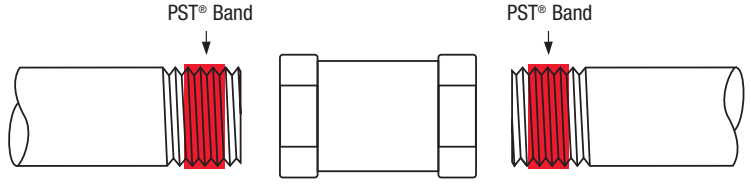
OPTION 1. Drill out damaged hole to oversize, then follow STANDARD THREAD REPAIR.

OPTION 2. Apply Loctite® FORM-A-THREAD® to screw and insert into damage hole. Clamp in place while product cures.

STUD INSTALLATION — PERMANENT (LIGHT DUTY)

1. Use stud or cut "all thread" to desired length.
2. Do NOT apply release agent to stud.
3. Proceed as with STANDARD THREAD REPAIR.
4. Allow 30 minutes to cure.
5. Assemble as required.

STANDARD FITTINGS – PIPES, HYDRAULIC, OR AIR

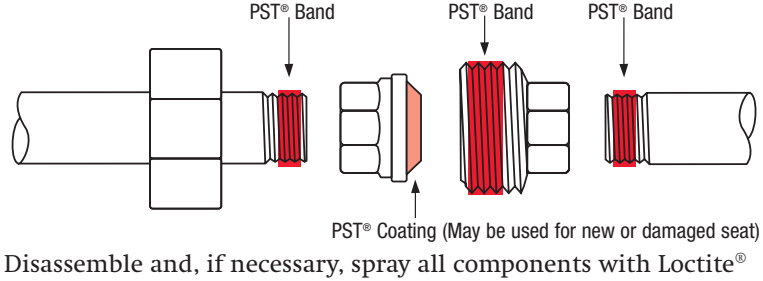


1. Clean parts of contamination. If necessary, spray Loctite® 7649™ Primer N™ onto threaded parts (male and female). Allow to dry.
   Note: Primer is not required for brass parts.
2. Apply a band of Loctite® PST® Thread Sealant to male threads starting one to two threads from end of pipe.
3. Assemble parts snugly. Do not overtighten.
4. If initial pressure exceeds 1000 psi*, wait 30 minutes before pressurizing.

Note:
- For stainless steel components, use Loctite® 567™ PST® Thread Sealant.
- For general purpose thread sealing, use Loctite® 565™ PST® Thread Sealant or Loctite® QuickStix™ 561™ PST® Pipe Sealant.
- For fine filtration systems requiring zero contamination, use Loctite® 545™ Thread Sealant for hydraulic/pneumatic fittings.
- For easier disassembly or large diameter fittings, use Loctite® 564™ Thread Sealant.
- If sealing chemicals or strong acids/bases, refer to Fluid Compatibility Chart (LT-836).
- Do not use on oxygen or strong oxidizers (chlorine).
- For PVC or ABS pipe, use Loctite® No More Leaks™.

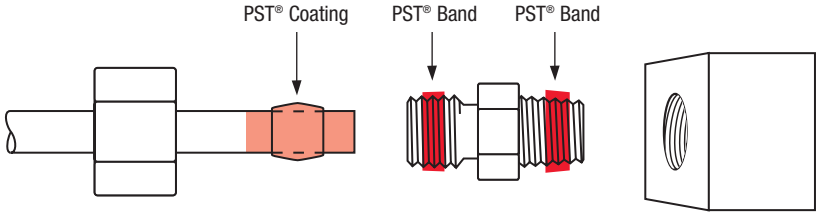
**Depending on conditions*

PIPE UNIONS



1. Disassemble and, if necessary, spray all components with Loctite® 7649™ Primer N™. Allow to dry.
2. Apply a thin coating of Loctite® PST® Thread Sealant to union face.
3. Apply a band of Loctite® PST® Thread Sealant to male threads.
4. Assemble parts snugly.

COMPRESSION FITTINGS

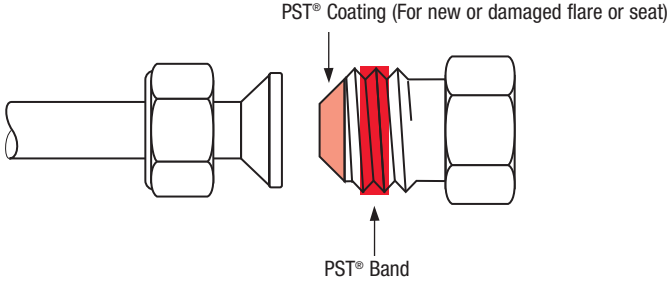


1. Slide fitting nut and ferrule back approximately ¾" from end of tubing.
2. If necessary, spray the entire assembly with Loctite® 7649™ Primer N™. Allow to dry.

   Note: Primer is not required for brass parts.
3. Apply a thin coating of Loctite® PST® Thread Sealant to tubing where ferrule will be located.
4. Slide ferrule forward over Loctite® PST® Thread Sealant coated tubing, then apply a thin bead of Loctite® PST® Thread Sealant coating to ferrule.
5. Slide ferrule forward over Loctite® PST® Thread Sealant coated tubing.
6. Apply a small band of Loctite® PST® Thread Sealant to male threads.
7. Assemble and tighten normally.

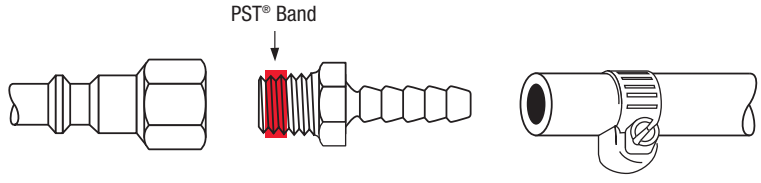
   Note: Do not use on plastic fittings or tubing.

FLARED/SWAGED FITTINGS



1. Disassemble and if necessary, spray all components with Loctite® 7649™ Primer N™. Allow to dry.
2. Apply a thin coating of Loctite® PST® Thread Sealant to fitting face.
3. Apply a band of Loctite® PST® Thread Sealant to male threads.
4. Assemble parts snugly.

HOSE ENDS – AIR & HYDRAULIC



1. If necessary, spray adapter threads with Loctite® 7649™ Primer N™. Allow to dry.
2. Insert barbed hose stem into hose I.D. with slight twisting motion.
3. Install appropriate hose clamp.
4. Apply a band of Loctite® PST® Thread Sealant to male hose stem threads upon installation or adding accessory device. Tighten snugly.

   Note: Loctite® PST® Thread Sealant may attack synthetic rubber tubing.

LOCTITE® BRAND THREAD SEALANT QUICK SELECTOR (TAPERED THREADS)

Application	Product	Primer	Instant Seal	Max. Pressure	Steam Pressure	Temp. Range
Stainless Steel and All Other Metal Fittings	567™ PST® Thread Sealant	Pimer N™	500 psi	10,000 psi (24 hours)	235 psi	-65°F to +400°F
Most Metal Fittings Except Stainless Steel	565™ or 561™ PST® Pipe Sealant	Primer N™	500 psi	10,000 psi (24 hours)	n/a	-65°F to +300°F
High Filtration/ Zero Contamination Systems	545™ Thread Sealant – Hydraulic/Pneumatic	Primer N™	500 psi (10 min.)	10,000 psi (24 hours)	n/a	-65°F to +300°F
Stainless Steel and All Other Metal Fittings (lower strength)	564™ Thread Sealant	Primer N™	500 psi	10,000 psi (24 hours)	n/a	-65°F to +300°F

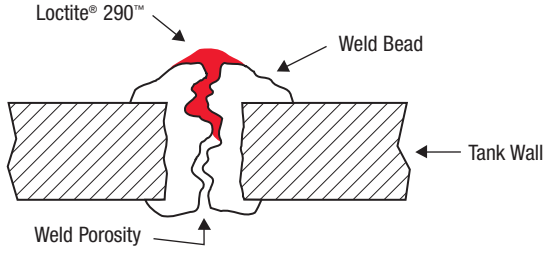
DO NOT USE THESE PRODUCTS ON OXYGEN OR STRONG OXIDIZERS.

FLUID COMPATIBILITY

1. Refer to Fluid Compatibility Chart – LT-836.
2. Contact your local Industrial Distributor.
3. Call Henkel Technical Information. See back cover for the Henkel Technical Information number in your area.

POROSITY SEALING

EXISTING WELD POROSITIES AND CASTINGS



1. IMPORTANT! TAKE PROPER SAFETY PRECAUTIONS IF WORKING WITH FLAMMABLE LIQUID TANKS. AVOID USE WITH COMPRESSIBLE GASSES.
2. Wire brush to remove paint, rust, etc. from repair area.
3. Clean repair area with Loctite® ODC-Free Cleaner & Degreaser.
4. Apply localized heat to bring repair area to approximately 250°F.
5. Allow repair area to cool to approximately 185°F.
6. Brush or spray sealant on repair area.

   Note:
   - Steel – Use Loctite® 290™ Threadlocker at 185°F.
   - Aluminum/Stainless Steel – Use Loctite® 290™ Threadlocker at 120°F.

   Note:
   - Not recommended for "blowholes".
   - Maximum porosity sealed – .005".
7. Allow to cure for 30 minutes (High Pressure, above 150 psi — 1 hour).
8. Clean with Loctite® ODC-Free Cleaner & Degreaser to remove excess sealant. Do not grind.
9. Paint as required.

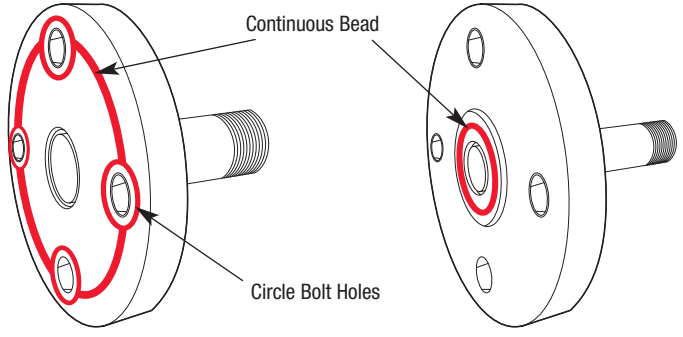
   Note: Casting repair uses same procedure.

SEALING NEW WELDS — PREVENTATIVE MAINTENANCE

1. Remove all slag and scale while hot.
2. Apply sealant when weld is 185°F and falling.
3. Follow information above.

FORM-IN-PLACE GASKETING

SEALING CAST RIGID FLANGES



1. Remove old gasketing material and other heavy contaminants with Loctite® Chisel® Gasket Remover. Use mechanical removal technique if required.

   Note: Avoid grinding.
2. Clean both flanges with Loctite® ODC-Free Cleaner & Degreaser.
3. Spray Loctite® 7649™ Primer N™ on only one surface. Allow 1-2 minutes to dry.
4. Apply a continuous bead of Loctite® Gasket Eliminator® Flange Sealant to the other surface.

   Note: Circle all bolt holes with sealant, if appropriate.
5. Mate Parts. Assemble and tighten as required.

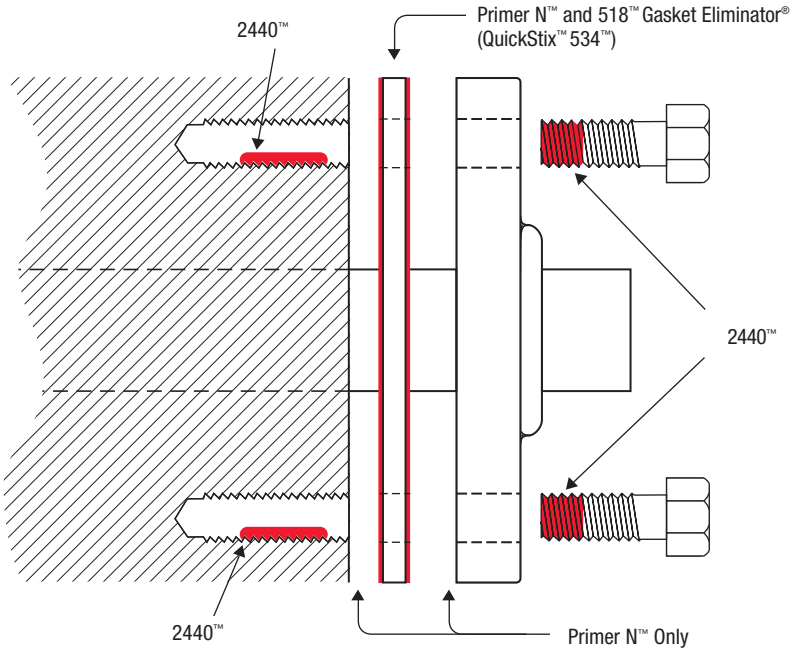
   Note: Immediate assembly not required; however avoid delays over 45 minutes.
6. Allow to cure:
   a. No pressure – immediate service
   b. Low pressure (up to 500 psi) – 30 to 45 minutes
   c. High pressure (500 to 2500 psi) – 4 hours
   d. Extreme high pressure (2500 to 5000 psi) – 24 hours

LOCTITE® BRAND GASKETING QUICK SELECTOR

Use	Product	Gap Fill	Temp. Range
General	518™ Gasket Eliminator®	.050"	-65°F to 300°F
General	515™ Gasket Eliminator®	.050"	-65°F to 300°F
High Temperature	510™ Gasket Eliminator®	.020"	-65°F to 400°F
General/Overhead	QuickStix™ 548™ Gasket Eliminator®	.010"	-65°F to 300°F

GASKET DRESSING

SEALED FLANGES



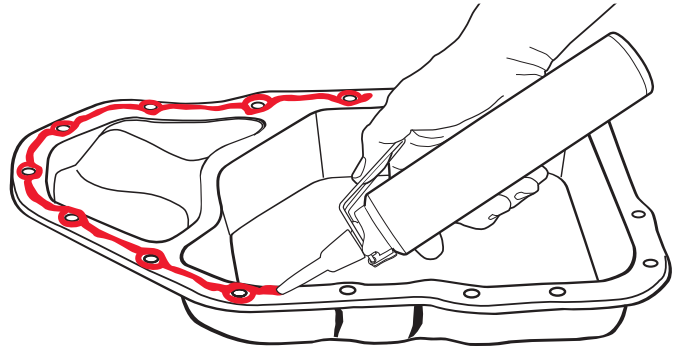
1. Remove old gasketing material and other heavy contaminants with Loctite® Chisel® Gasket Remover. Use mechanical removal technique if required.

   Note: Avoid grinding.
2. Clean both flanges with Loctite® ODC-Free Cleaner & Degreaser.
3. Spray Loctite® **7649™** Primer N™ on both flange faces and both sides of the precut gasket. Allow 1-2 minutes to dry.
4. Smear Loctite® Gasket Eliminator® Flange Sealant to both sides of precut gasket with a clean applicator.
5. Place coated gasket on flange surface and assemble parts immediately.

   Note:
   - If cover bolts into blind holes (as above), apply Loctite® **2440™** Threadlocker into hole and on threads. Tighten normally.
   - If it is a through bolt assembly, apply Loctite® **2440™** Threadlocker or Loctite® QuickStix™ **248™** Threadlocker to bolt threads.
6. Tighten normally.

FORM-IN-PLACE SILICONES

STAMPED OR SHEET METAL FLANGES



1. Remove old gasketing material and other heavy contaminants with Loctite® Chisel® Gasket Remover.
2. Clean both flanges with Loctite® ODC-Free Cleaner & Degreaser.
3. Apply a continuous bead of Loctite® Instant Gasket or Loctite® high performance silicones to sealing surface. Circle all bolt holes.

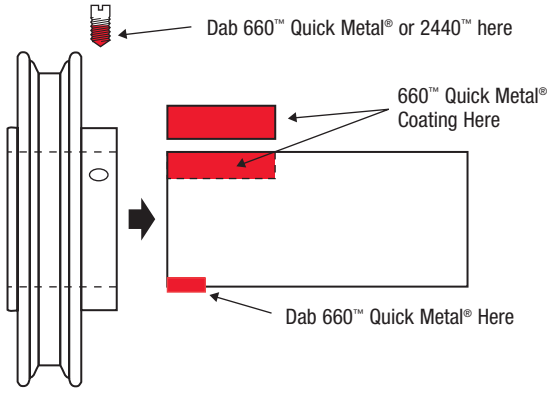
   Note:
   - Use proper bead diameter to seal flange width and depth.
   - Minimize excessive material “squeeze in”.
4. Assemble within 10 minutes by pressing together. Tighten as required.
5. Clean up any excess or squeeze out.
6. Cure times will vary with temperature, humidity, and gap. Typical full cure time is 24 hours.

	Loctite® Instant Gasket*	Loctite® 587™ Blue
COLOR	Black	Blue
VISCOSITY, cP	Paste	Paste
GAP FILL	¼"	¼"
CURE METHOD	Moisture/Oxime	Moisture/Oxime
CURE SPEED		
Tack-Free	30 minutes	30 minutes
Full Cure	24 hours	24 hours
SERVICE TEMP. RANGE		
Intermittent	-75°F to 500°F -59°F to 260°C	-75°F to 500°F -59°F to 260°C

**Loctite® Instant Gasket provides a low pressure instant seal (100 psi at zero gap).*

STRENGTHEN KEYED ASSEMBLIES

STANDARD DUTY



ASSEMBLY

1. Clean all parts with Loctite® ODC-Free Cleaner & Degreaser.
2. If necessary, spray all parts (I.D. and O.D.) with Loctite® 7649™ Primer N™.
3. Apply Loctite® 660™ Quick Metal® Retaining Compound coating into keyway and on key.
4. Apply dab(s) of Loctite® 660™ Quick Metal® Retaining Compound onto shaft opposite keyway or evenly spaced around shaft.
5. Assemble parts. Wipe off excess.
6. Apply Loctite® 660™ Quick Metal® Retaining Compound dab to set screw.
7. Tighten set screw.
8. Allow 5-10 minutes prior to service.

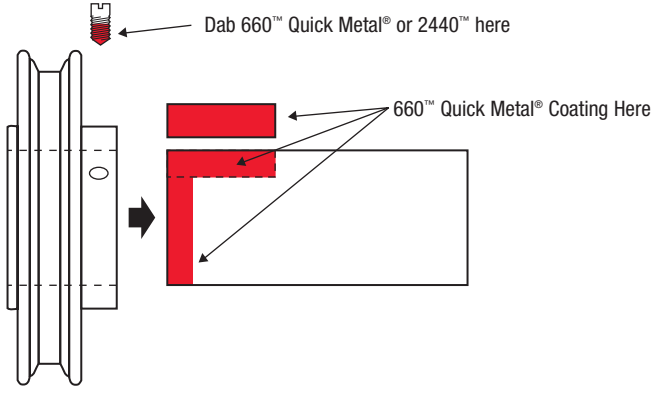
Note:
- Loctite® 660™ Quick Metal® Retaining Compound is NOT recommended for radial gaps exceeding .010" on shaft or keyway.
- See REPAIRING BADLY WALLOWED KEYWAY for procedure page 18.

DISASSEMBLY

1. Tap component and key with hammer.
2. Pull as usual.

STRENGTHEN KEYED ASSEMBLIES

HEAVY DUTY



ASSEMBLY

1. Clean all parts with Loctite® ODC-Free Cleaner & Degreaser.
2. Apply a Loctite® 660™ Quick Metal® Retaining Compound coating around shaft, into keyway, and on key.
3. Assemble parts. Wipe off excess.
4. Apply a Loctite® 660™ Quick Metal® Retaining Compound dab to screw.
5. Tighten set screw.
6. Allow 30 minutes prior to service.

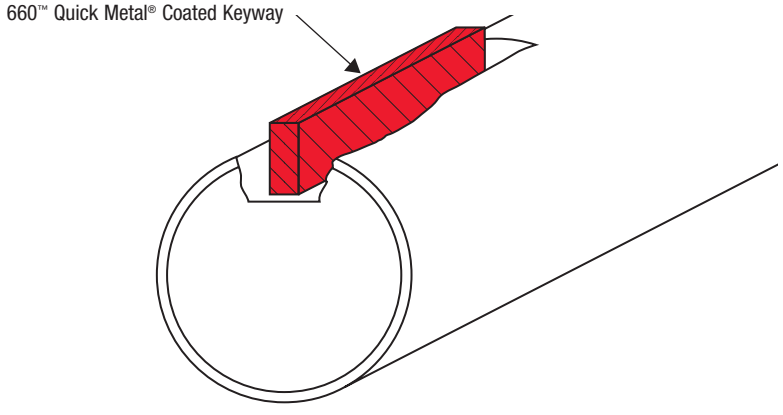
Note:
- If gap exceeds .005", use Loctite® 7649™ Primer N™ on appropriate area (shaft or keyway).
- Loctite® 660™ Quick Metal® Retaining Compound is NOT recommended for radial gaps exceeding .010" on shaft or keyway.
- See REPAIRING BADLY WALLOWED KEYWAY for procedure page 18.

DISASSEMBLY

1. Tap component and key with hammer.
2. If necessary, apply localized heat (450°F for five minutes).
3. Pull while hot.

STRENGTHEN KEYED ASSEMBLIES

REPAIRING BADLY WALLOWED KEYWAY

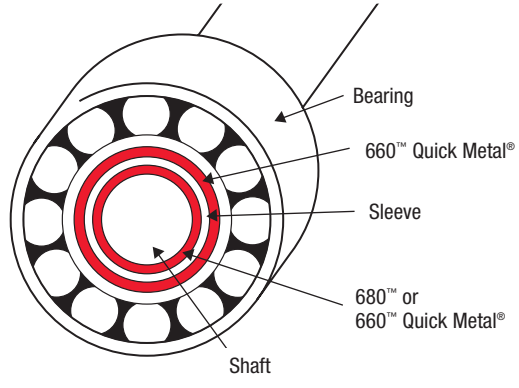


1. Clean all parts with Loctite® ODC-Free Cleaner & Degreaser.
2. If necessary, spray all parts with Loctite® 7649™ Primer N™. Allow to dry.
3. Apply a Loctite® 660™ Quick Metal® Retaining Compound coating into keyway.
4. Assemble as required using Loctite® 660™ Quick Metal® Retaining Compound.
5. Allow 30-60 minute cure time.

Note:
- Loctite® 660™ Quick Metal® Retaining Compound is NOT recommended for lateral gaps exceeding .010".
- Higher strengths are obtained by NOT using Loctite® 7649™ Primer N™ with small (.002"-.004") gap, and allowing longer cure (4-24 hours).

SHAFT MOUNTED ASSEMBLIES

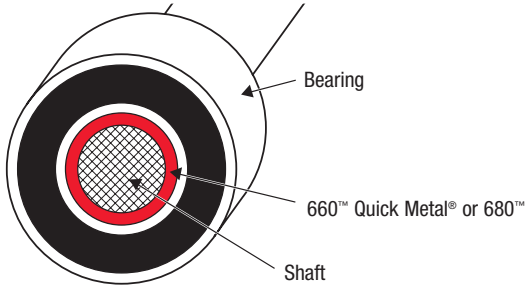
REPAIRING BADLY WORN SHAFT



1. Determine a minimum radial gap.
2. Select and trim appropriate sleeve to allow component slip fit.
3. Roughen sleeve O.D. with emery cloth.
4. Clean all parts with Loctite® ODC-Free Cleaner & Degreaser.
5. Apply a Loctite® 680™ or Loctite® 660™ Quick Metal® Retaining Compound coating around the shaft.
6. Install sleeve.
7. Apply a coating of Loctite® 660™ Quick Metal® Retaining Compound to sleeve O.D.
8. Install component as required onto sleeved shaft.
9. Allow 30-60 minute cure.

Note:
- Loctite® 660™ Quick Metal® Retaining Compound is NOT recommended for radial gaps exceeding .010".
- Higher strengths are obtained by NOT using Loctite® 7649™ Primer N™ with small (.002"-.004") gap, and allowing longer cure (4-24 hours).

SLIP FIT – LIGHT/HEAVY DUTY



ORIGINAL

1. Machine shaft to .002" radial slip fit with 50-80 rms finish (second cut).
2. Clean all parts with Loctite® ODC-Free Cleaner & Degreaser.
3. Spray all parts (I.D. and O.D.) with Loctite® 7649™ Primer N™. Do NOT use primer for heavy duty applications.
4. Apply a Loctite® 660™ Quick Metal® Retaining Compound coating around shaft and engagement area.
5. Assemble parts with rotating motion.
6. Wipe off excess.
7. Allow 2 hours prior to service.

WORN SHAFT

Follow directions above except:

1. Determine radial gap.
2. If radial gap exceeds .005", Loctite® 7649™ Primer N™ must be used.
3. Take steps to maintain concentricity with large gaps.
4. Larger gaps require longer cure times (30-60 minutes).
5. Loctite® 660™ Quick Metal® Retaining Compound is NOT recommended for radial gaps exceeding .010".
6. See procedure for BADLY WORN SHAFT page 19.

Note: Loctite® 660™ Quick Metal® Retaining Compound is very fast fixturing (30 seconds or less) with Loctite® 7649™ Primer N™.

MAXIMUM STRENGTH

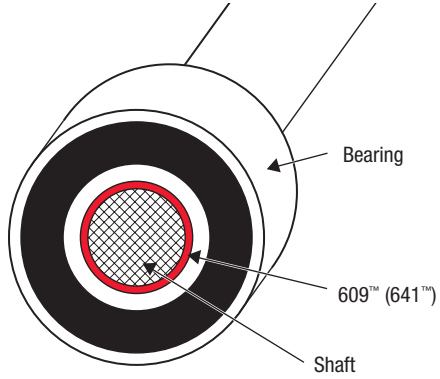
1. Same as above, except use Loctite® 680™ Retaining Compound with Loctite® 7471™ Primer N™ or no primer.
2. Allow 4-24 hours to cure.

MAXIMUM TEMPERATURE (400°F continuous)

1. Same as above, except use Loctite® 620™ Retaining Compound with Loctite® 7471™ Primer N™.

SHAFT MOUNTED ASSEMBLIES

PRESS FIT



STANDARD

1. Clean shaft O.D. and component I.D.
2. Apply a bead of Loctite® 609™ (641™) Retaining Compound to circumference of shaft at leading edge of insertion or leading area of engagement.

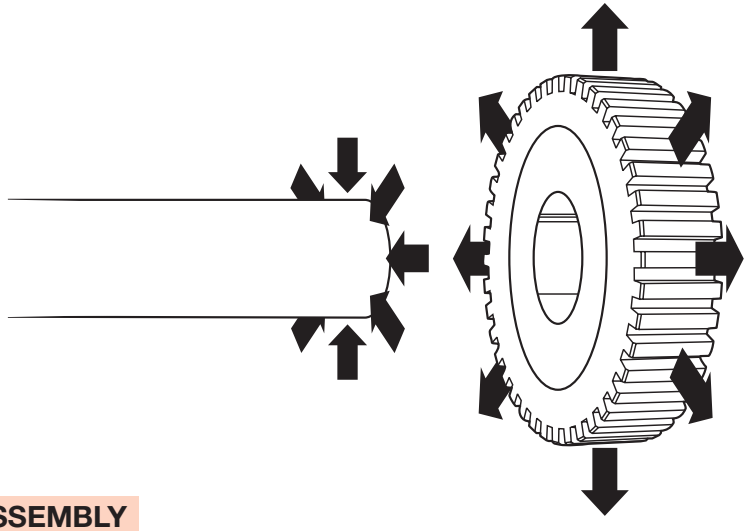
   Note:
   - Retaining compound will always be squeezed to the outside when applied to shaft.
   - Do NOT use with Loctite® Anti-Seizes or similar product.
3. Press as usual. Wipe off excess.
4. No cure time required.

   Note: Loctite® 609™ (641™) Retaining Compound is used due to low viscosity and wetting properties.

TANDEM MOUNT

1. Apply retaining compound to bore of inside component.
2. Continue assembly as above.

SHRINK FIT

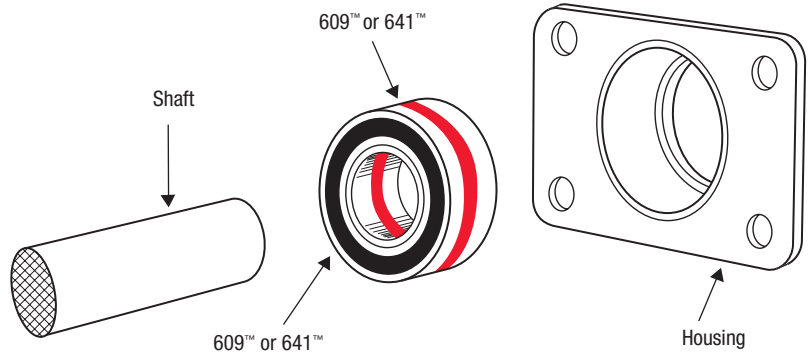


ASSEMBLY

1. Clean the shaft O.D. and component I.D.
2. Cool the shaft to cause contraction, or heat the component to cause expansion.
3. Apply a brush film of Loctite® 641™ Retaining Compound to the shaft or lower temperature part.
4. Install component and allow temperatures to equilibriate.
5. Wipe off excess.

Note: Loctite® 641™ Retaining Compound will add lubricity for easier assembly while sealing and protecting the bond area from environmental exposure and filling gaps for a more complete contact area.

SLIP FIT



ORIGINAL

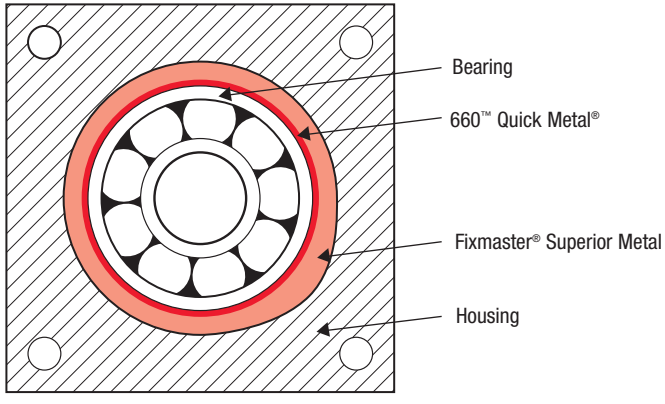
1. Select component to fit shaft.
2. Machine to reduce component O.D. or increase housing I.D. to permit approximate .002"-.004" diametral slip fit.
3. Clean all parts with Loctite® ODC-Free Cleaner & Degreaser and spray with Loctite® 7649™ Primer N™.
4. Apply Loctite® 609™ or 641™ Quick Metal® Retaining Compound to component O.D.
5. Install component. Do not rotate.
6. Wipe off excess.
7. Allow five minutes prior to service.

WORN

Procedures identical to original slip fit, except:

1. Determine the maximum radial gap.
2. If the maximum gap exceeds .005", Loctite® 7649™ Primer N™ must be used.
3. Take steps to maintain concentricity on large gaps.
4. Large gaps require longer cure times (30-60 minutes).
5. Loctite® 660™ Quick Metal® Retaining Compound is NOT recommended for radial gaps exceeding .010".
6. See procedure for BADLY WORN HOUSING page 24.

REPAIRING BADLY WORN HOUSING

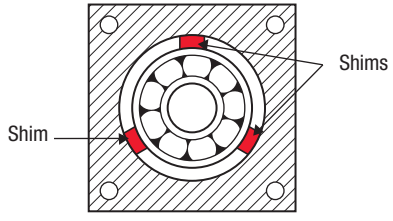


ASSEMBLY

1. Roughen housing I.D. with emery cloth or abrasive media.
2. Clean the housing I.D. with Loctite® ODC-Free Cleaner & Degreaser.
3. Clean the component O.D. and apply a release agent.
4. Prepare (mix) Loctite® Fixmaster® Superior Metal.
5. Apply a coating of Loctite® Fixmaster® Superior Metal to the I.D. of the housing.
6. Position the component in housing. Maintain concentricity.
7. Pack Loctite® Fixmaster® Superior Metal into the gaps and voids.
8. Wipe off excess material.
9. Allow to cure 30 minutes.
10. Pull component.
11. Clean the release agent from component O.D.
12. Clean and roughen the housing I.D.
13. Assemble with Loctite® 660™ Quick Metal® Retaining Compound as required.
14. Recommended for light duty service.

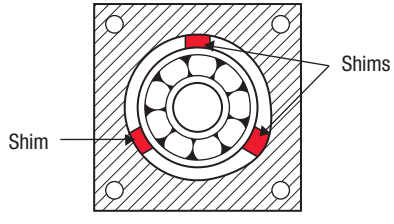
Note: This procedure is for use when machining is not an option. If you want a procedure for using Loctite® Fixmaster® Superior Metal and machining back to original tolerance, then contact your local Henkel Adhesive and Sealants Specialist.

COMPONENT CENTERING



EXCESSIVE / EVEN WEAR

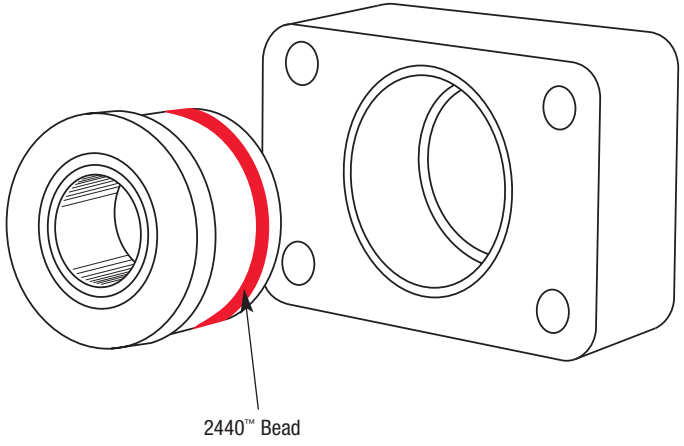
1. Position the component in bore.
2. Select three equilateral mounting points.
3. Determine the radial gap at those points.
4. Select appropriate shim stock.
5. Cut three pieces approximately ⅛" wide to fit bore depth.
6. Bond the shims to bore at mounting points using Loctite® 380™ Black Max® Instant Adhesive.
7. Assemble per instructions on page 23.



EXCESSIVE / UNEVEN WEAR

1. Position the component in bore.
2. Select three equilateral mounting points.
3. Determine the radial gap at those points.
4. Select and cut appropriate shim stock for each point.
5. Bond the shims to bore at mounting points using Loctite® 380™ Black Max® Instant Adhesive.
6. Assemble per instructions on page 24.

SEALING/RETAINING — METALLIC SEAL



1. Clean the housing I.D. and seal O.D. with Loctite® ODC-Free Cleaner & Degreaser.
2. Spray both the housing and seal with Loctite® 7649™ Primer N™.
3. Apply a bead of Loctite® 2440™ (QuickStix™ 248™) Threadlocker to the leading edge of metallic seal O.D.

   Note: Virtually any Loctite® Threadlocking product will work here. Medium strength liquid is recommended due to normal gap and strength requirement.
4. Install as usual.
5. Wipe off excess.
6. Allow to cure 30 minutes.

   Note:
   - Loctite® 2440™ (QuickStix™ 248™) Threadlocker is normally used with worn seal housings to prevent leakage or slippage.
   - It is not generally necessary to remove pre-applied sealant from seal O.D.

LOCTITE® RETAINING COMPOUND QUICK SELECTOR

Application	Loctite® Product	Loctite® Primer
Shaft Mount – Press fit		
Medium Strength	609™ (QuickStix™ 668™) Retaining Compound	NONE
	641™ Retaining Compound	N™
Shaft Mount – Shrink fit		
Medium Strength	641™ Retaining Compound	NONE
Shaft Mount – Slip Fit		
Small Gap (.002" Radial max.)	609™ (QuickStix™ 668™) Retaining Compound	N™
Larger Gap (.010" Radial max.)	660™ Quick Metal® Retaining Compound	N™
Maximum Strength (.010" Radial max.)	680™ Retaining Compound	N™
Maximum Temperature (400°F) (.008" Radial max.)	620™ Retaining Compound	N™
Medium Strength	641™ Retaining Compound	N™
Housing Mount – Press Fit		
Maximum Strength	609™ (QuickStix™ 668™) Retaining Compound	NONE
Medium Strength	641™ Retaining Compound	N™
Low Strength	2440™ Threadlocker	NONE
Housing Mount – Slip Fit		
Maximum Strength	680™ Retaining Compound	NONE
High Strength	660™ Quick Metal® Retaining Compound	NONE
Controlled Strength	660™ Quick Metal® Retaining Compound	N™
Medium Strength	641™ Retaining Compound	N™
Low Strength	2440™ (QuickStix™ 648™) Threadlocker	N™

Note:
- Softer metals (Aluminum, Bronze, etc.) provide lower shear strengths than ferrous components.
- Excessive gap reduces shear strengths.
- Ideal surface finish — 50 to 80 rms.

Refer to Technical Data Sheets for more information.

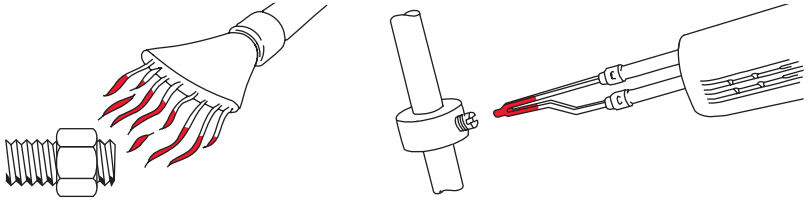
THREADLOCKING, THREAD SEALING & RETAINING

LOW AND MEDIUM STRENGTH PRODUCTS

Disassemble with hand tools.

HIGH STRENGTH PRODUCTS

- Apply localized heat (500°F or higher) to assembly for 5 minutes.
- Disassemble with hand tools while hot.

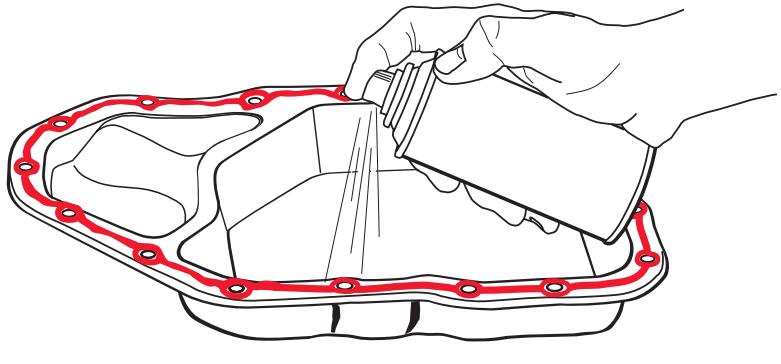


GASKETING

- Disassemble flange using hand tools.

Note: For anaerobic gaskets, clean with Loctite® Chisel® Gasket Remover.

For silicone gaskets, clean with Loctite® Chisel® MC-Free Gasket Remover.



GENERAL INFORMATION

Figure A

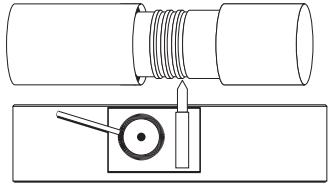


Figure B

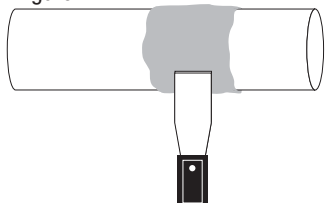
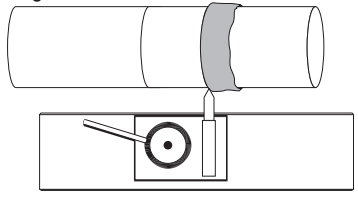


Figure C



1. Using a lathe, undercut desired depth according to the table below:

Shaft diameter	Desired undercut
½" to 1" (13 – 25 mm)	1/16" (1.5 mm)
1" to 3" (25 – 74 mm)	⅛" (3.0 mm)

2. Finish undercutting by machining a rough-cut surface or “gramophone” pattern; the larger the diameter of the shaft, the deeper the threads. (See Figure A)
3. Clean the shaft of any cutting fluids or oils with Loctite® ODC-Free Cleanser & Degreaser.
4. Apply a very thin layer of Loctite® Fixmaster® Superior Metal by forcing it into the bottom of the threads. Turn the shaft at a very low speed and continue to apply more material by using a tool, such as a putty knife, that can be bent. (See Figure B)
5. Allow the product to cure for the required period at 70°F (20°C) or higher (if necessary, apply dry heat to speed up the cure).
6. Machine repaired area to original dimensions of the shaft (see Figure C) using the guidelines below:

   Lathe Speed: 150 ft./min. (46 m/min.)

   Feed Rate:
   - Roughening: 0.025 in./rev. (0.64 mm/rev.)
   - Finishing: 0.010 in./rev. (0.25 mm/rev.)

   Top Rake/Side and Front Clearance: 3°

Note: Cut dry; use carbide or high-speed steel bits. If polishing is required, use only wet 400 to 600 grit emery paper.

INTRODUCTION TO BONDING ADHESIVES

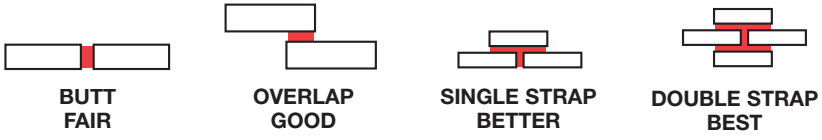
Within the broad range of Loctite® brand adhesives you will always find the solution to your bonding challenge. It is however, extremely important to have at least basic knowledge of adhesive methodology in order to successfully bond two substrates together. The three major causes of bonding failures are attributed to:

- Poor evaluation of the bonding assembly
- Inadequate substrate preparation
- Improper adhesive selection

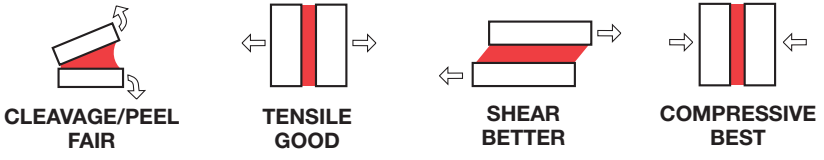
BONDING ASSEMBLY

Bonding assembly has a direct impact in the adhesive performance. Choose a combination of types of joints or joint stress distribution that maximizes bonding strength. Below are different types of joints and stress distribution:

TYPES OF JOINTS

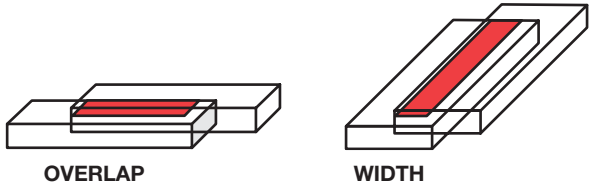


TYPES OF JOINT STRESS DISTRIBUTION



JOINT WIDTH VS. OVERLAP

A wider bond line (Width) will be stronger than a lengthier one (Overlap):



SURFACE PREPARATION

Abrasive Methods

Rubbing or striking a surface with hard, coarse material.

Abrasive examples:

- Sanding: Rubbing with abrasive paper or cloth (for small area/superficial wear-down)
- Blasting: Striking with steel grit, sand, or other abrasive material (for large areas/deep wear-down)

Chemical Methods

Cleaning process that uses solvents to dissolve contaminants.

Chemical examples:

- Solvent Dip: Immersing in solvent
- Solvent Wipe: Rubbing with solvent-soaked wipe
- Vapor Degreasing: Solvent in vapor form
- Ultrasonic Cleaning: Solvent dip method with high-frequency sound waves that vibrate the dirt away

LOCTITE® BRAND ADHESIVE QUICK SELECTOR

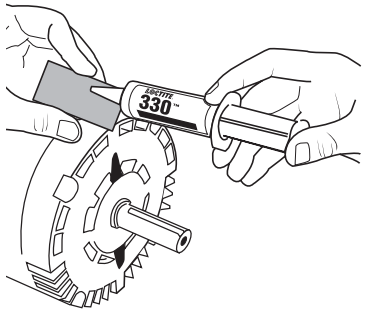
Product	Loctite® 404™ Quick Set™ Instant Adhesive	Loctite® 330™ Depend® Adhesive	Loctite® Fixmaster® Poxy Pak™ Adhesive	Loctite® H8600™ Weld Eliminator™ Structural Adhesive
Color	Clear	Pale Yellow	Clear	Blue
Temperature Range	Up to 180°F	Up to 250°F	Up to 180°F	Up to 300°F
Bond Time*	20 to 40 seconds	5 minutes	5 minutes	45 minutes
Full Cure*	24 hours	24 hours	1 hour	24 hours
Gap Fill	Small Gaps	Medium Gaps	Large Gaps	Medium Gaps
Agency Approvals	CFIA, ABS, Mil-Spec	CFIA	CFIA, ABS	In Progress
Bonds to a wide range of materials, including:	Metal, plastic, and rubber	Ferrite, wood, ceramic, plastic, and metal	Glass, hard plastics, rubber, and metal	Galvanized steel, other metals, and most plastics
Application Examples	Make o-rings, bond cuts in conveyer belts, nylon rails in production line, brass rings on spacer shafts	Bond metal labels to equipment, aggregate wear plates, vibration analysis pickup discs to equipment	Repair cracks in equipment, fill in damage on fiberglass tanks, general purpose bonding	Patching metal surfaces, sleeving metal conduit and ducts, metal fabrication (e.g. wagons, box trailers, material handling containers)

** Times are based on average room temperature of 70°F and may vary depending on the temperature and substrates used.*

O-RING MAKING

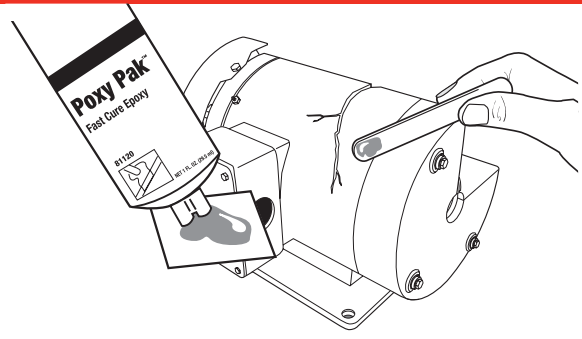
1. Cut the starting end of the cord stock with a clean razor blade. Ensure the cut is clean and square. Do not touch the clean cut end.
2. Measure cord stock to appropriate length. For precise measurement, use Loctite® O-Ring Tool or the ruler provided in the Loctite® O-Ring Making Kit.
3. Cut the measured end of the cord stock with a clean razor blade. Ensure the cut is clean and square to optimize bond area.
4. Apply one drop of Loctite® 404™ Quick Set™ Instant Adhesive and mate the two ends of the cord stock.

BONDING METAL LABEL



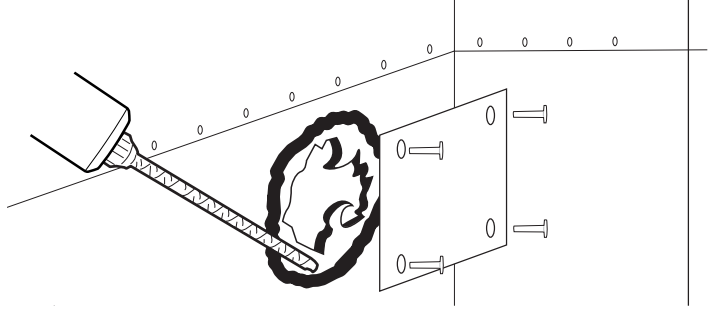
1. Clean surface.
2. Spray Loctite® 7387™ Depend® Activator onto main part. Let dry for two minutes.
3. Apply Loctite® 330™ Depend® Adhesive onto back of label.
4. Press label onto activated surface and hold for a few seconds.
5. Reaches handling strength in 5 minutes. Full cure in 24 hours.

FILLING CRACKS



1. Clean surface.
2. Mix Loctite® Fixmaster® Poxy Pak™ Epoxy Adhesive according to package directions.
3. Spread mixed material over crack.
4. Sets in 5 minutes, full cure in 8 hours.
5. For maximum protection, a piece of material can be applied over the top of the crack to spread the load after applying the mixed adhesive. The adhesive will hold it in place.

STRUCTURAL BONDING



1. Prepare the surface using Loctite® ODC-Free Cleaner and Degreaser.
2. Attach mix nozzle to the Loctite® H8600™ Weld Eliminator™ Structural Adhesive cartridge.
3. Dispense 50 mm (2") of material to prime nozzle.
4. Apply a continuous bead of adhesive in the area you want to patch and/or seal.
5. Assemble patch using pneumatic pins or rivets, or run screws to hold parts together while the adhesive reaches full cure.
6. Equipment can be back in operation after 24 hours.

OPTIMUM USE OF LOCTITE® EXTEND® RUST TREATMENT

SURFACE PREPARATION — OLD STEEL:

Loose or "flaky" rust must be removed. Only conversion of firmly bonded rust will result in durable protection. Oil, grease, old paint, mill scale, form oil, fingerprints, water soluble surfaces and chlorides must be removed to allow Loctite® Extend® Rust Treatment to react with rust. Ideal surfaces will show light rust as well as bare metal surfaces.

RUST CONVERSION TIME AND APPEARANCE:

Two coats of Loctite® Extend® Rust Treatment are recommended.

The first coat should develop a purple-black color within seconds. The second coat should dry to a black color. The second coat should be applied within 15-30 minutes of the first coat.

APPLICATION CONDITIONS:

Loctite® Extend® Rust Treatment may be applied when surface and air are between 50°F and 90°F. Reaction is slower at lower temperatures. If temperature is too hot, film may surface dry and bubble. High humidity is beneficial; it slows drying but assists rust conversion. Loctite® Extend® Rust Treatment should not be applied in conditions of condensing humidity (e.g. fog, dew), on ice, in rain or in heavy sea (salt) spray atmospheres. Steel surface may be damp but not wet (i.e. continuous visible film of water). DO NOT APPLY LOCTITE® EXTEND® RUST TREATMENT TO SURFACES IN DIRECT SUNLIGHT.

APPLICATION EQUIPMENT METHODS:

Loctite® Extend® Rust Treatment may be applied by brush, roller, or spray. Brush or roller is suitable for small areas. Avoid sags and ridges and keep edges wet by coating about a square yard at a time. Roll away from previously coated area and then roll back. Do not pour unused material back into the original container. NEVER add solvents to Loctite® Extend® Rust Treatment.

Spray application is recommended for larger areas. Airless spray equipment is faster, and provides more effective conversion due to improved surface penetration. Conventional air-spray equipment may be used, but Loctite® Extend® Rust Treatment may require thinning up to 10% with water for proper spraying.

GENERAL PURPOSE PARTS CLEANING

In general, Loctite® Natural Blue® Biodegradable Cleaner & Degreaser cleaning effectiveness is enhanced by:

a. Higher concentrations of Loctite® Natural Blue® Biodegradable Cleaner & Degreaser

b. Longer cleaner on-part times

c. Dilution with warm water (150°F to 180°F)

d. Agitation of parts or scrubbing

DIRECTIONS

1. Dilute Loctite® Natural Blue® Biodegradable Cleaner & Degreaser concentrate with water to most economical/effectiveness level. See package labels for suggested ratios.
2. Spray, dip or wipe dilution onto parts or surface to be cleaned.
3. Soak parts or scrub (if needed).
4. Flush soil/cleaner mixture off of parts or surfaces with water.
5. Disposal: Loctite® Natural Blue® Biodegradable Cleaner & Degreaser contains no hazardous ingredients. It should be disposed of in accordance with state and local regulations and will not harm sewage treatment microorganisms. Once Loctite® Natural Blue® Biodegradable Cleaner & Degreaser is mixed with hazardous waste, it must be treated as hazardous waste and disposed of accordingly.

Note: Loctite® ODC-Free Cleaner & Degreaser is recommended for cleaning substrates before Loctite® machinery adhesive use.

1. What type of failure is occurring? Has the application worked before?
2. Was proper and adequate adhesive/sealant used?
3. Was proper and adequate primer/activator used?
4. Do service conditions exceed the capability of the adhesive sealant?
   (a) operating temperature (c) fluid compatibility
   (b) excessive pressure too soon (d) impact on environment
5. Were parts adequately cleaned prior to applying adhesive?

   Note: If adhesive failure, is cured residue on one or both parts? If one part is bare, check that part for contamination.
6. Were proper assembly techniques utilized?
7. Was adhesive/sealant allowed adequate cure time prior to service?
8. Do assembly/part conditions exceed capability of the adhesive/sealant?
   (a) excessive gaps (c) improper joint design
   (b) component materials (d) inadequate clamping/fixturing
9. If additional assistance is required, please call our HENKEL TECHNICAL INFORMATION LINE. See back cover for the Henkel Technical Information number in your area.

Note: Reference Materials

(a) Product selection, cure times, gap fill, etc.; use Product Selector Slide Rule (LT-776)

(b) Fluid Compatibility Chart (LT-836)

LIMITATION OF WARRANTY

PRODUCT LISTING/ORDER INFO.

LOCTITE® ADHESIVES	SIZE	ITEM NO.
330™ DEPEND® ADHESIVE – NO-MIX	25 ml syringe kit	20251
	250 ml tube kit	20252
	250 ml tube	33058
	300 ml cartridge	33064
380™ BLACK MAX® INSTANT ADHESIVE – TOUGHENED	3 g tube	38004
	1 oz. bottle	38050
	1 lb. bottle	38061
404™ QUICK SET™ INSTANT ADHESIVE	⅓ oz. bottle	46551
	4 oz. bottle	46548
	1 lb. bottle	46561
H8600™ WELD ELIMINATOR™ STRUCTURAL ADHESIVE	50 ml dual cartridge	40875
	400 ml dual cartridge	38762
LOCTITE® CLEANERS	**SIZE**	**ITEM NO.**
CHISEL® GASKET REMOVER	18 oz. net wt.	79040
NATURAL BLUE® BIODEGRADABLE CLEANER & DEGREASER	24 fl. oz. spray	82249
	1 gallon bottle	82251
ODC-FREE CLEANER & DEGREASER	15 oz. aerosol	22355
	16 fl. oz. pump spray	20162
LOCTITE® EPOXIES	**SIZE**	**ITEM NO.**
FIXMASTER® SUPERIOR METAL	1 lb. kit.	97473
	4 lb. kit.	40900
FIXMASTER® POXY PAK™	1 oz. syringe	81120
LOCTITE® GASKETING PRODUCTS	**SIZE**	**ITEM NO.**
510™ GASKET ELIMINATOR® FLANGE SEALANT – HIGH TEMPERATURE	50 ml tube	51031
	250 ml tube	51041
515™ GASKET ELIMINATOR® FLANGE SEALANT	6 ml tube	51517
	50 ml tube	51531
	300 ml cartridge	51580
518™ GASKET ELIMINATOR® FLANGE SEALANT	6 ml tube	51817
	50 ml tube	51831
	300 ml cartridge	51845
QUICKSTIX™ 548™ GASKET ELIMINATOR® FLANGE SEALANT	19 g stick	39156
INSTANT GASKET	90 ml can	40479
	5 oz. cartridge	30509
	7 oz. can	30507
587™ BLUE RTV SILICONE GASKET MAKER	70 ml tube	58730
	8.75 oz. can	30567
	300 ml cartridge	58775
	300 ml cartridge	82046

PRODUCT LISTING/ORDER INFO.

LOCTITE® GENERAL MAINTENANCE PRODUCTS	SIZE	ITEM NO.
EXTEND® RUST TREATMENT	10.25 oz. aerosol	30539
	1 quart bottle	75430
	1 gallon bottle	75448
FORM-A-THREAD® STRIPPED THREAD REPAIR	4.8 ml syringe	28654
O-RING MAKING KIT	Kit	00112

LOCTITE® PRIMERS	SIZE	ITEM NO.
7387™ DEPEND® ACTIVATOR	1.75 fl. oz. bottle	18861
7649™ PRIMER N™ (Acetone)	25 g aerosol	21347
	1.75 fl. oz. bottle	19269
	4.5 oz. aerosol	21348

LOCTITE® RETAINING COMPOUNDS	SIZE	ITEM NO.
609™ RETAINING COMPOUND – GENERAL PURPOSE	10 ml bottle	60921
	50 ml bottle	60931
	250 ml bottle	60941
620™ RETAINING COMPOUND – HIGH TEMPERATURE	10 ml bottle	62015
	50 ml bottle	62040
	250 ml bottle	62070
641™ RETAINING COMPOUND – MEDIUM STRENGTH	10 ml bottle	28802
	50 ml bottle	21458
660™ QUICK METAL® RETAINING COMPOUND – PRESS FIT REPAIR	6 ml tube	66010
	50 ml tube	66040
	250 ml tube	30287
680™ RETAINING COMPOUND – HIGH STRENGTH/HIGH VISCOSITY	10 ml bottle	68015
	50 ml bottle	68035
	250 ml bottle	68060

ORDERING

PRODUCT LISTING/ORDER INFO.

LOCTITE® THREADLOCKERS	SIZE	ITEM NO.
220™ THREADLOCKER – LOW STRENGTH WICKING	10 ml bottle	37388
	250 ml bottle	22041
222MS™ THREADLOCKER – SMALL SCREWS	10 ml bottle	22221
	50 ml bottle	22231
	250 ml bottle	22241
2440™ THREADLOCKER – REMOVABLE	10 ml bottle	33946
	50 ml bottle	33947
	250 ml bottle	33948
QUICKSTIX™ 248™ THREADLOCKER – REMOVABLE	9 g stick	37684
	19 g stick	37087
2760™ THREADLOCKER – PERMANENT	10 ml bottle	32526
	50 ml bottle	32525
	250 ml bottle	32527
QUICKSTIX™ 268™ THREADLOCKER – HIGH STRENGTH	9 g stick	37685
	19 g stick	37686
277™ THREADLOCKER – LARGE STUD	10 ml bottle	21434
	50 ml bottle	27731
	250 ml bottle	27741
290™ THREADLOCKER – WICKING	10 ml bottle	29021
	50 ml bottle	29031
	250 ml bottle	29041

LOCTITE® THREAD SEALANTS	SIZE	ITEM NO.
545™ THREAD SEALANT – HYDRAULIC/PNEUMATIC	10 ml bottle	32439
	50 ml bottle	54531
	250 ml bottle	54541
QUICKSTIX™ 561™ PST® PIPE SEALANT	19 g stick	37127
564™ THREAD SEALANT	50 ml tube	28754
	250 ml tube	28755
565™ PST® THREAD SEALANT – CONTROLLED STRENGTH	50 ml tube	56531
	250 ml tube	56541
	300 ml cartridge	56571
567™ PST® THREAD SEALANT – HIGH TEMPERATURE	50 ml tube	56747
	250 ml tube	56765
	350 ml brush can	33241

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