

## Loctite Application Procedure

### Approval:

Approving Authority	Signature	Date
Manufacturing Manager	 Ron Garner / Signature on file	1/10/11
Production Engineering Supervisor	 Greg A. King II / Signature on file.	1/10/11
Mechanical Engineering Supervisor	 Trushar Patel / Signature on file.	12/30/10
Manufacturing Engineer	 Pascal Grizard / Signature on file.	12/30/10
Author	 Patrick T. Evers / Signature on file.	12/30/10

### Revision History

Revision	Description of Change	Date
B	Sec. 3.4 added, Electronic Assemblies.	10/8/04
C	Added "Outer race only" to section 3.3.3.	8/10/05
D	Added 2.6, Revised Sec.3.3 adding ref. Doc, revised Sec. 3.4, added ref. Doc.125071.	4/17/06
E	Updated to include improved types of Loctite products. Updated to reflect current manufacturing practices. Updated to follow Document #117140 Procedure/Work Instruction Template.	2/4/10
F	Removed note regarding waveguide runs/radio mounting locations in Section 5.2. Added colors to Loctite types. Added "Use, in conjunction with Loctite Primer 7649" to Loctite 2760. Removed Torque Seal application from Loctite 425.	
G	ECO 8216. Added Torque Seal application.	1/5/10

# Loctite Application Procedure

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## 1. Purpose:

- 1.1. This document is the guideline for the use and application of Loctite® Anaerobic Adhesives on Sea Tel products.

## 2. Scope:

- 2.1. This Procedure applies to the following:
- All Sea Tel (mechanical) assemblies.

## 3. Definitions:

- **Anaerobic:** taking place in the absence of oxygen.
- **Active Metals:** metal containing metal ions (**see Appendix A**).
- **Inactive Metals:** metals not containing metal ions (**see Appendix A**).
- **Removable hardware:** hardware that will be removed by end user (customer) while unpacking and/or installing system after shipment.

## 4. Responsibilities:

- 4.1. It is the responsibility of all SeaTel employees, involved in or responsible for the assembly of mechanical components or electromechanical assemblies, to adhere to this procedure, following all company, corporate, local, and state regulations.
- 4.2. Recommended Personal Protection Equipment:
- Eye protection required.
  - Gloves (optional, not required).
  - Proper Ventilation.
- 4.3. It is the responsibility of each individual employee using Loctite and associated materials to be familiar with the hazards and precautions of said materials. This information can be found in the MSDS's, located in the Human Resources Department and on the Production Floor near Central Inventory (by the Time Clock).



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### 5. Procedure:

#### 5.1. Material Prep (if necessary):

- Heavily contaminated substrates of metal parts (i.e., studs covered in machining oil) shall be prepared by wiping with a small amount of acetone applied to a lint-free cloth, followed by wiping with a small amount of Isopropyl Alcohol (IPA) with a minimum alcohol content of 70% applied to a lint-free cloth. **NOTE: Most hardware is covered in a light oil coating. No material prep is required for typical "as received" hardware.**
- Loctite Primer 7649 is to be used on all *mating metal parts* and *hardware* before applying adhesive.

#### 5.2. Application Guidelines:

- Loctite is to be applied to all threaded fastener assemblies, with the following exceptions:
  - When otherwise specified not to be used (i.e. Delta Note on drawing).
  - When nylon insert lock nuts are used.
- Loctite is an anaerobic material that cures in the **absence of air** and **presence of metal ions**, typically between two threaded surfaces. It is important to understand this, because any Loctite that is not contained between two surfaces **will not** cure. This can become hazardous to surrounding components (i.e. bearings, plastic parts, electronic assemblies, etc.) if they should become contaminated. **Excess material must be wiped off as soon as possible.**
- Loctite comes in a wide number of types, designed for specific strengths, viscosities, and uses. It has been commonly identified by color (red, pink, green etc), but this can be very misleading and is often incorrect. Loctite should be identified by its number (222, 242, etc) which accurately describes the material.
- **Primer:** The use of Primer will accelerate Loctite's cure rate significantly, sometimes limiting it to just a few seconds. When used, move quickly to locate your parts to their correct locations, dry fitting the parts first is also desirable. Primer will remain effective on a part for up to 30 days. Primer is made up of a solvent base and active ingredients. The solvent will help clean away surface contamination, but must be allowed to "flash" off and dry before contact with the Loctite, or it will get trapped and the Loctite will not cure. **The use of Primer should not be a substitute for making sure your parts' surfaces are clean.**

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### 5.2. Application Guidelines (continued):

- The following Adhesives **will** be used as specified below, within the temperature ranges listed below:
  - **Loctite 222 (Purple):** Use, in conjunction with Loctite Primer 7649, on ***set screws*** #10 (M4) and smaller and RF cable connections (F, N & SMA Type) **(Temp. Range: -65°F to 300°F)**.
  - **Loctite 242 (Blue Liquid):** Use, in conjunction with Loctite Primer 7649, on hardware & threaded stand-offs that are smaller than 1/4-20 (M6). Also, use on all "removable" shipping hardware, and when mounting Radio Equipment (regardless of hardware size) **(Temp. Range: -65°F to 300°F)**.
  - **Loctite 248 (Blue Paste):** Use, in conjunction with Loctite Primer 7649, on hardware that is smaller than 1/4-20 (M6) in applications where dripping causes concern (i.e. PCB Assemblies, on or near plastic parts). Apply to F and SMA type bullets/connectors and BNC connectors (***external threads only***) when mounting to a bulkhead or connector bracket **(Temp. Range: -65°F to 300°F)**.
  - **Loctite 2760 (Primerless) (Red):** Use, in conjunction with Loctite Primer 7649, on hardware, threaded spindles and stand-offs that are 1/4-20 (M6) or larger **(Temp. Range: -65°F to 300°F)**.
  - **Loctite 638 (Green):** Use, in conjunction with Loctite Primer 7649, on "slip-fit" applications (i.e. pulleys, sprockets, roll pins, dowel pins, and bearings) **(Temp. Range: -65°F to 300°F)**. **Not to be used on threaded fasteners.**
  - **Loctite 425 (Blue):** **Do not use Primer 7649.** Use on all plastic/nylon fasteners and metal-to-plastic/nylon (i.e., stainless screw into plastic/nylon threads) threaded applications **(Temp. Range: -65°F to 180°F)**.
  - **Loctite Primer 7649:** Use on all "inactive" metal surfaces (**see Appendix A**).
  - **Torque Seal (Orange Gel):** Use on all co-axial (F & SMA) connection points after proper torque has been applied.



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### 5.3. Application on Threaded Fasteners:

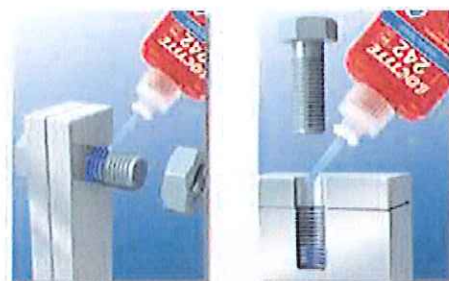
**5.3.1.** Apply Loctite Primer 7649 to clean, dry mating parts. Primer can be applied with either spray nozzle or brush (included W/Primer). **Note: Use caution around "unsealed" bearings, plastic, painted, electronic parts/assemblies.**

**5.3.2.** Apply Loctite (per Sec. 5.2.); in small quantities (one to three drops), enough to "wet" the mating surfaces only.

**5.3.3.** Apply Loctite to one of the mating surfaces, identified as the best location for effective distribution to its mating surface. This may be on the screw thread, inside the threaded hole, or both. **Note: Applied to holes, Loctite pushes through the hole. Applied to screws, Loctite pushes back up the screw.**

**5.3.4.** Torque fasteners per Sea Tel Spec. 122305.

**5.3.5.** Remove any excess Loctite immediately.



For through holes

For blind holes

### 5.4. Motor/Sprocket Assemblies (General):

**5.4.1.** Apply Loctite Primer 7649 to clean and dry mating parts. Primer can be applied with either spray nozzle or brush (included W/Primer). **Note: Use caution around "unsealed" bearings, plastic, painted, electronic parts/assemblies.**

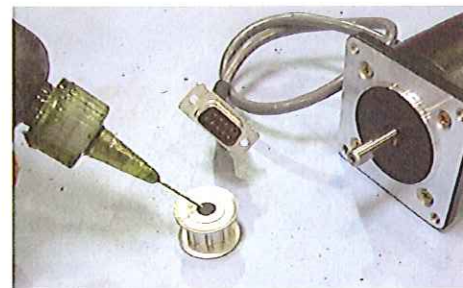
**5.4.2.** When using Loctite 638, it should be applied into the inside surface of the pulley/sprocket to keep the Loctite from being pushed back along the shaft. If the motor shaft is flattened on one side, apply Loctite to the opposite side as the set screw; put the set screw on the flat. Excess 638 on the flat will run out and could easily damage the motor.

**5.4.3.** Apply Loctite 222 to set screw (apply Loctite 638 to dowel/roll pin) and install into pulley.

**5.4.4.** Apply a small amount of Loctite 638 to the inside edge of the pulley.

**5.4.5.** Insert the pulley onto the motor shaft turning the pulley to spread the Loctite evenly.

**5.4.6.** Adjust the pulley to its proper height (per motor/sprocket assembly drawing or Procedure 127459), and tighten the set screw (per Sea Tel Spec. 122305).



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### 5.4. Motor/Sprocket Assemblies (General): (Cont.)

5.4.7. Remove any excess Loctite immediately.

5.4.8. Allow Loctite to cure 5-10 minutes before use.

### 5.5. Bearing Retention (General):

5.5.1. Apply Loctite Primer 7649 to clean, dry mating parts. Primer can be applied with either spray nozzle or brush (included W/Primer). **Note:** Use caution around "unsealed" bearings, plastic, painted, electronic parts/assemblies.



5.5.2. Apply Loctite 638 to the race of the bearing being secured (as shown) in a uniform bead, allowing it to spread as the bearing is inserted into the seat.

5.5.3. Seat the bearing. The use of a mechanical press may be required. If necessary, clamp bearings to hold in place until Loctite cures.

5.5.4. Remove any excess Loctite immediately.

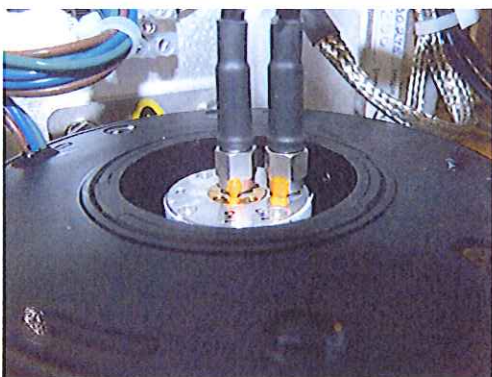
5.5.5. Allow Loctite to cure 5-10 minutes before use.

### 5.6. Torque Seal:

5.6.1. Apply proper torque to co-axial connection points.

5.6.2. Apply Torque Seal in a 1/8" wide, approximately 1/4" to 3/8" long bead to connection points (as shown below).

5.6.3. Allow 5-10 minutes to dry before touching.





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## 6. Records:

6.1. Training records to be kept/maintained by the Human Resources Department.

## 7. Training:

7.1. Classes to be given by the Engineering Department biennially.

## 8. References:

8.1. This procedure is referenced in all Sea Tel assembly drawings.

8.2. Spec. #122305 Sea Tel Fastener Torque Values.

8.3. Loctite® "The Adhesive Sourcebook 2009 Volume 9".

8.4. Loctite® "Threadlocking User's Guide".

## 9. Appendices:

### Appendix A:

INACTIVE METALS* (PRIMERS RECOMMENDED)		ACTIVE METALS (PRIMERS OPTIONAL)
PLATED PARTS	SILVER	IRON
ANODIZED ALUMINUM (ALODINE, IRRIDITE)	GOLD	PLAIN STEEL
TITANIUM	ZINC	COPPER
STAINLESS STEEL	PURE	BRASS
GALVANIZED STEEL	ALUMINUM	BRONZE
MAGNETITE STEEL	CADMIUM	NICKEL
ICONEL®	MAGNESIUM	MANGANESE
	NATURAL OR CHEMICAL BLACK OXIDE	MONEL® KOVAR®

HELPFUL HINTS

**Please note:** Loctite Anaerobic Adhesives cure in the absence of air and presence of metal ions. When assembling inactive metal parts (see Appendix A), which are low in metal ions, the use of Loctite Primer is recommended to ensure proper performance of Loctite Anaerobic Adhesives.