

Process Specification for the Application of Liquid Locking Compounds

Engineering Directorate

Structural Engineering Division

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Process Specification for the Application of Liquid Locking Compounds

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REVISIONS		
VERSION	CHANGES	DATE
--	Original version	2/2012
A	Added drying time for Primer N	3/2012
B	Updated signatory, clarified scope, rewrote usage section 3 and process requirement section 6, removed Primer N, added definition for safety-critical.	5/2020

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1.0 SCOPE

This process specification establishes the requirements for the application of anaerobic liquid locking compound (LLC) to non-safety-critical fasteners.

2.0 APPLICABILITY

This specification covers the process requirements for application of liquid locking compounds to ground and non-safety critical flight fasteners.

3.0 USAGE

This process specification shall be called out on the engineering drawing. For example:

APPLY LIQUID LOCKING COMPOUND PER NASA/JSC PRC-4006.

The liquid locking compound (LLC) and primer shall be specified in the engineering parts list, along with the procurement specifications.

Consult with M&P Engineering before omitting primer.

The table below shows the primers and LLCs used most commonly at JSC. The assembly and cure times are found in section 6.2. If other primers or LLCs are used, the assembly and cure times shall be specified on the engineering drawing.

	Product	Procurement Specification
Primer	Loctite Primer T	ASTM D5363
LLC	Loctite 222	ASTM D5363
	Loctite 242	ASTM D5363
	Loctite 262	ASTM D5363

LLCs should only be used as a locking feature in joints with preload.

This process specification is not to be used for safety-critical fasteners. This procedure does not provide verification of LLC cure. Safety critical is defined in Section 10.0. Generally, this means the PRC should not be used for fracture critical, NFC-Low Risk, or Fail-Safe fasteners.

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This process specification should not be used for LLCs in blind holes. Trapped air pumps LLC out of the threads. Use of LLCs in blind holes must be approved by M&P and a custom procedure specified on the engineering drawing or shop floor procedure.

Use of LLCs with helical wire inserts is not recommended.

Primer is essential to cure LLCs, particularly on stainless steel, superalloy, and titanium fasteners.

LLCs are anaerobic, depending on a lack of oxygen to cure. Short thread engagements may inhibit the cure and the adhesive strength of the LLC. Thread engagement should be a minimum of 1X nominal thread diameter.

Unless otherwise specified, LLC's will be applied by the technician to the thread engagement area of the external thread only. The use of a metered application device can be required on the engineering drawing, especially when a large quantity of joints are being processed, in order to control the quantity of LLC applied to each thread.

Excess LLC squeezed out of a joint must be removed during the assembly process. LLCs do not cure in air, and can migrate and cure in nearby locations, such as mechanisms. If the assembly process could squeeze out excessive amounts of LLC unseen by the technician, a method to prevent this should be detailed on the engineering drawing.

Threads shall be free of lubricant, plating, or coatings.

4.0 REFERENCES

ASTM D5363 Standard Specification for Anaerobic Single-Component Adhesives

5.0 MATERIAL REQUIREMENTS

None.

6.0 PROCESS REQUIREMENTS

6.1 WORK INSTRUCTIONS

All work procedures shall be performed to written procedures.

For work performed at JSC facilities, these work procedures shall consist of Detailed Process Instructions (DPI's).

For contracted work, the contractor shall be responsible for preparing, Verify current version before use.

maintaining, and certifying written work procedures to meet the requirements of this specification. These procedures shall be provided to NASA/JSC M&P upon request.

6.2 GENERAL REQUIREMENTS

Threads shall be cleaned with solvent and visibly inspected before primer is applied.

Primer shall be applied to both external and internal threads. The drying time shall be between min and max limits. If not used within max time limit, parts shall be re- cleaned and re-primed.

The LLC shall be shaken immediately before use.

The LLC shall be applied only to the thread engagement area of the externally threaded fastener. Enough LLC should be applied to fill the space between the external and internal threads, but excessive LLC should be minimized. Small amounts of squeeze-out are acceptable but shall be removed after assembly. The use of a metered application device is recommended.

Assembly after application of the LLC shall be accomplished within the specified time limit.

After application of LLC, parts shall be subjected to only light handling until full cure.

Primer	Drying Time, min	Drying Time, max
Loctite Primer T	1 minute	Up to 5 days (in sealed bag)

LLC	Assembly Time	Cure, light handling	Full Cure
Loctite 222	Within five minutes	6 hours	24 hours
Loctite 242	Within five minutes	6 hours	24 hours
Loctite 262	Within five minutes	6 hours	24 hours

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7.0 PROCESS QUALIFICATION

None required.

8.0 PROCESS VERIFICATION

Assembled joint shall be inspected to assure that excess LLC, cured or uncured, is not visible.

9.0 TRAINING AND CERTIFICATION OF PERSONNEL

All application of liquid locking compounds shall be performed by personnel qualified to conduct the process through training or experience. If these processes are to be performed by an outside vendor, the development of an appropriate training program shall be the responsibility of the vendor.

10.0 DEFINITIONS

Safety-Critical: Term describing any condition, event, operation, process, equipment, or system that could cause or lead to severe injury, major damage, or mission failure if performed or built improperly, or allowed to remain uncorrected.

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