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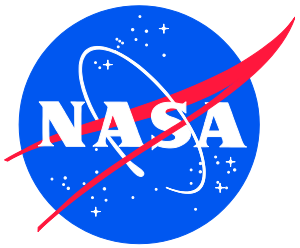

Process Sensitivity, Performance, and Direct Verification Testing of Adhesive Locking Features

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September 2012

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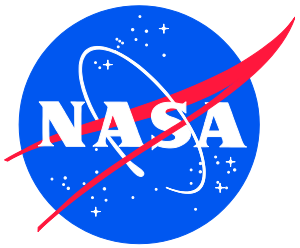

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Larry Thomson	Technical Manager, from June 2010 to December 2011
Carey David	Technical Manager, from January 2012.
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NASM1312-7	FASTENER TEST METHODS, METHOD 7, VIBRATION
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MS21060	NUT, SELF-LOCKING, PLATE, TWO LUG, FLOATING, LOW HEIGHT, CRES, 125 KSI Ftu, 450º F & 800º F

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BOEING

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EWAA-EA-10-021-R1	Loctite® 078, 242 and 290 Cure Assessment and Breakaway Torque Tests (Boeing Test Report)
EWBB-EA-11-003	NESC Direct Verification Torque Test for Liquid Locking Compound (Boeing Test Report)

DEFINITIONS OF TERMS

During the adhesive locking features test program, the terminology used evolved because of the specific test conditions being evaluated. As such, terms are defined here which were specific to the Phase I and Phase II test programs. The terms “adhesive locking features” and “liquid locking compounds” are used interchangeably throughout this report.

Phase I Terminology

Static Residual Breakaway Torque (After Rework):
The initial static breakaway torque achieved in the off direction after reworking inserts and nutplates (no preload). Rework is removal of the mechanical locking feature.

Static Breakaway Torque:
The initial static breakaway torque achieved in the off direction (for unseated fasteners) after Loctite cure cycle.

Dynamic Residual Torque (After Rework):
The maximum dynamic run off torque achieved during one revolution after the insert and nutplate have been reworked to remove the existing self-locking feature.

Dynamic Run Off Torque:
The dynamic run off torque are the readings at 90°, 180°, 270° and 360° rotation after static breakaway torque. Run off torque is also commonly known as prevailing or running torque.

Net Dynamic Run Off Torque:
“Net” dynamic” is the difference between the average of the four dynamic readings and the dynamic residual torque after insert and nutplate rework.

Phase II Terminology

Breakaway Torque:
The torque value to overcome static friction in the off (counterclockwise) direction after Loctite cure (without preload).

Break-Loose Torque:
The torque value to overcome static friction in the on (clockwise) direction after Loctite cure (with or without preload).

Direct Verification Torque:
The Verification Test Torque plus the installation torque. Used to determine the integrity of a fastener joint’s secondary locking feature in Loctite applications.

Prevailing Torque (CCW):
The dynamic run off torques in the counterclockwise direction, with readings at 90°, 180°, 270° and 360° rotation after static break-loose torque (without preload).

Verification Test Torque:
Fifty percent of the average breakaway torque (non-preloaded) of cured Loctite derived by test.

TRADEMARK

Loctite® is a registered trademark of the Henkel Corporation. In this document the Loctite name is used frequently, as it is the brand of liquid locking compound (LLC) used for these tests. The trademark symbol has been omitted herein, but is recognized as applicable to the Henkel Corporation. The terms “adhesive locking feature”, LLC, and Loctite are used interchangeably in this document.

ABSTRACT

Phase I

The use of adhesive locking features or liquid locking compounds (LLCs) (e.g., Loctite) as a means of providing a secondary locking feature has been used on NASA programs since the Apollo program. In many cases Loctite was used as a last resort when (a) self-locking fasteners were no longer functioning per their respective drawing specification, (b) access was limited for removal & replacement, or (c) replacement could not be accomplished without severe impact to schedule. Long-term use of Loctite became inevitable in cases where removal and replacement of worn hardware was not cost effective and Loctite was assumed to be fully cured and working.

The NASA Engineering & Safety Center (NESC) and United Space Alliance (USA) recognized the need for more extensive testing of Loctite grades to better understand their capabilities and limitations as a secondary locking feature. These tests, identified as Phase I, were designed to identify processing sensitivities, to determine proper cure time, the correct primer to use on aerospace nutplate, insert and bolt materials such as A286 and MP35N, and the minimum amount of Loctite that is required to achieve optimum breakaway torque values. The .1900-32 was the fastener size tested, due to wide usage in the aerospace industry. Three different grades of Loctite were tested. Results indicate that, with proper controls, adhesive locking features can be successfully used in the repair of locking features and should be considered for design.

Phase II

Threaded fastening systems used in aerospace programs typically have a requirement for a redundant locking feature. The primary locking method is the fastener preload and the traditional redundant locking feature is a self-locking mechanical device that may include deformed threads, non-metallic inserts, split beam features, or other methods that impede movement between threaded members. The self-locking resistance of traditional locking features can be directly verified during assembly by measuring the dynamic prevailing torque.

Adhesive locking features or LLCs are another method of providing redundant locking, but a direct verification method has not been used in aerospace applications to verify proper installation when using LLCs because of concern for damage to the adhesive bond. The reliability of LLCs has also been questioned due to failures observed during testing with coupons for process verification, although the coupon failures have often been attributed to a lack of proper procedures. It is highly desirable to have a direct method of verifying the LLC cure or bond integrity.

The purpose of the Phase II test program was to determine if the torque applied during direct verification of an adhesive locking feature degrades that locking feature. This report documents the test program used to investigate the viability of such a direct verification method. Results of the Phase II testing were positive, and additional investigation of direct verification of adhesive locking features is merited.

INTRODUCTION

Threaded fastening systems used in aerospace applications incorporate locking features which do not depend on fastener preload to function as a resistance to fastener rotation. Often, these threaded fastening system designs which are intended to augment preload in the resistance to vibration-induced loosening or the retention against complete disengagement of fastening elements are termed “secondary locking features” (with preload in the fastening system assumed to serve as the “primary”). There have been a number of NASA studies conducted on the use of adhesives as locking features, yet the topic remains an area of contention among fastener experts. This report details the activities conducted by the NASA Engineering and Safety Center (NESC) Threaded Fastening System Assessment Team (TFSAT) to help clarify some of the issues associated with the design, use, and verification of adhesive locking features.

There are a number of specifications for prevailing torque locking features depending on the type of design (nut, bolt, helicoil, insert, etc.). Self-locking nuts must meet the performance requirements of NASM25027, which defines the running and breakaway torque range for each thread size, reuse requirements and the vibration test requirements. Typical prevailing torque locking features have deformed threads or non-metallic locking elements that provide frictional thread resistance easily verified by direct measurement of the prevailing/breakaway torque during installation. Fasteners qualified to NASM25027 must meet a 15 unseated cycles of reuse qualification and remain within a designated prevailing/breakaway torque range. In actual applications, reuse cycle life of the locking feature for prevailing torque locking features can be significantly reduced due to deformation and wear as a result of high preloads and removal cycles. Such fasteners are removed and replaced when prevailing torque values fall below specification requirements. However, there are times when access is limited and replacement cannot be accomplished without impact to structure or project schedule, especially with self-locking nutplates and inserts. Adhesives such as Loctite have been used in these instances to repair the locking feature.

For the purposes of this investigation, NASM25027, the requirements specification for self-locking nuts, was used as the bench mark for Loctite testing, due to the absence of any existing performance specification for adhesive locking features or liquid locking compounds (LLCs).

Loctite usage had been approved by the Space Shuttle Orbiter program for locking feature repair based on lab testing along with commercial data published by Henkel, the Loctite manufacturer. Henkel’s data utilized a 3/8-24 inch diameter zinc-plated alloy steel bolt with a breakaway torque requirement of 9.5 to 24 inch-pounds. In the case of the Orbiter program, zinc-plated alloy steel test coupons were utilized to verify acceptable Loctite and process only. However, the Orbiter program wanted test coupons matching the fastener materials used in critical joints. Therefore, United Space Alliance (USA) directed the Boeing Orbiter program Materials & Processes (M&P) engineers to develop various Loctite process sensitivity tests using MP35N bolts and A286 silver plated inserts and dome nutplates.

The Orbiter program test planning had been completed by not yet executed when, in 2009, members of the NESC TFSAT Locking Features Team were considering additional efforts to evaluate various Loctite grades as well as to test application process sensitivities, such as

application method, time required for cure, and the minimum amount required to develop optimum bond strength. Since the tests being proposed were very similar, USA and the NESC TFSAT Locking Features Team agreed to collaborate. The bolts selected for test were .1900-32 size, made from A286 and MP35N materials. The mating parts were silver plated A286 nutplates and inserts. Three grades of Loctite liquid locking compound were tested, Grades 078, 242, and 290. The process sensitivity testing conducted is identified in this report as Phase I Testing.

Based on Henkel technical data, the product description for the three types of Loctite tested are as follows:

- Loctite 078 is a low strength thread locking material used to lock and seal fine thread series fasteners where very low locking strength is required.
- Loctite 242 is a medium strength locking material designed for the locking and sealing of threaded fasteners, preventing loosening and leakage for shock and vibration environments. The 242 has a thixotropic characteristic that reduces migration after application to the substrate.
- Loctite 290 is a medium to high strength locking material that has low viscosity, allowing capillary action to wick the Loctite between engaged threads.

Once Loctite is applied to the bolt threads and installed into an insert or nutplate, the presence of metal acts as a catalyst to initiate the polymeric reaction. The more “active” the metal, the faster the adhesive will cure. Active metals are metals that oxidize or rust easily, such as alloy steel, aluminum, brass and copper. Inactive metals are those that do not easily oxidize and include stainless steels and nickel-based alloys. Inert surfaces and inactive metals, such as A286 and MP35N that were tested in this report, require a primer to activate the Loctite. Otherwise, the Loctite will not cure properly or consistently. Although primer T (Loctite 7471) was used for all tests performed in this report, it is unknown if other primers would develop a more complete cure and in turn produce better breakaway torque values.

All tests in Phase I were performed in the unloaded condition. ISO 10964 and ASTM D 5649-01 are existing test method specifications for performing torque testing of adhesives used on threaded fasteners, and were used as references for the Phase I testing set-up. The ASTM D5649-01 only addresses an unloaded fixture; the ISO 109964 standard depicts fixtures for testing both unloaded and loaded specimens, but the loaded fixture does not isolate the effect of the adhesive from the preload. The fixtures used for the Phase I tests were specifically designed to measure the adhesive torque resistance in a typical aerospace applications without the influence of preload.

After Phase I testing was completed, it was clear that, with proper process controls, adhesive locking compounds or LLCs could be employed as a locking feature in repair, and should be considered for design. For adhesive locking compounds to be used successfully in design, the issue of inconsistent cure, which was clearly observed in the Phase I testing, needed to be addressed. The use of witness coupons, the typical approach employed for the use of adhesives in general, would not identify inconsistent cure problems associated with LLC use in blind application (for example). However, direct verification of adhesive locking feature performance has not been used in aerospace applications because of concern that direct verification would, in and of itself, defeat or at least damage the adhesive locking feature. This lack of a direct verification methodology has adversely influenced the use of adhesive locking

features in design. Phase II testing by the Locking Features Team was conducted to validate a method to directly verify adhesive bond integrity after installation without degrading bond strength.

The NESC TFSAT Locking Features Team developed a test plan to directly verify LLC bond integrity after installation, and to validate the method by subsequently subjecting the specimens to vibration test requirements per NASM25027 and NASM1312-7. The industry acceptance requirements for prevailing torque locking features for self-locking nuts are defined in NASM25027, and NASM1312-7 is the standard vibration test method used to qualify nut locking performance.

For self-locking crimp style nutplates, vibration test failure is defined by NASM25027 as relative rotation over 360 degrees. For LLC applications, the pass-fail criterion was changed conservatively for the Phase II test program by defining failure as any relative rotation between the nut element and the bolt. The Phase II test specimens were subjected to a direct verification torque test prior to vibration testing, to assess whether the torque test degraded the LLC adhesive bond enough to fail the vibration test.

Loctite 078, 242 and 290 were candidates for the Phase II test plan, but Loctite 242 was selected because the locking torques measured in Phase I were relatively close to the mid range of the self-locking requirements per NASM25027.

OBJECTIVES

Phase I

The objective of the Phase I tests was to augment NASA understanding of adhesive (liquid) locking compound behavior, specifically evaluating three different grades (strengths) of Loctite® for sensitivity of the volume of application, the method of application (whether on bolt threads, nut threads, or both), the cure time allowed prior to test, and application to closed or open inserts. Test specimens were evaluated using breakaway torque (without having applied preload), prevailing (dynamic run off) torque, and visually to inspect the degree of adhesive cure.

Phase II

The objective of the Phase II tests was to build on the Phase I experience and to extend that experience to the evaluation of a direct verification methodology for adhesive locking compound use. The Phase II test was broken into 4 sub-phases. The first sub-phase was to evaluate the bond strength (break-loose torque) of Loctite® 242 without preload, and to demonstrate that the application of 50% of this torque applied to the test bolts could be resisted for 2 seconds without bolt movement. The second sub-phase was to evaluate torque loss due to joint relaxation. The third sub-phase was to apply the direct locking feature verification methodology, applying installation torque plus the verification torque (50% of the break-loose torque) to fasteners installed with Loctite® 242 (cured) to demonstrate no bolt movement for 2 seconds. The final sub-phase was to subject these specimens passing direct verification torque testing to the vibration test requirements of NASM25027 and NASM1312-7 with the more-conservative acceptance criteria of zero relative movement.

TEST APPROACH

Phase I

SENSITIVITY TEST PLANS

Listed below are the various test plans prepared for Phase I. NESC Sensitivity Test 1, Test 2 and Test 3 were the original tests submitted to and approved by the NESC Team 3, Locking Features working group. Tests 1A, 1B, 1C and the Special Blind Application Test were subsequently added and approved due to issues encountered during Test 1. Test procedure details are located in Appendix A.

NESC SENSITIVITY TEST 1 - Apply Loctite to bolt threads only in blind applications.

This test plan was developed to determine and compare the bond strengths of Loctite 078 when applied to A286 and MP35N bolt threads, and 242 and 290 when applied to A286 bolt threads, installed into A286, silver plated inserts in a blind (closed end) and dome nutplate applications.

NESC SENSITIVITY TEST 1A - Apply Loctite to internal threads only in blind applications.

This test was added for Loctite 078 only because test results from NESC Sensitivity test 1 for blind inserts did not meet anticipated breakaway torque values for several specimens. Test 1A was to apply the Loctite 078 to the insert threads and compare with results from Test 1.

NESC SENSITIVITY TEST 1B - Apply Loctite to bolt only in open applications.

This test plan also added to the original test plan to determine bond strengths of Loctite 078, 242 and 290 when applied to A286 bolt threads installed into A286, silver plated open inserts and open nutplate applications. The open condition data was compared to the blind application data.

NESC SENSITIVITY TEST 1C - Apply Loctite to both external and internal threads in blind applications.

This test was also added for Loctite 078 only because test results from NESC Sensitivity test 1 for blind inserts did not meet anticipated breakaway torque values for several specimens.

SPECIAL BLIND APPLICATION TEST

This was another add on test that was recommended by Henkel Corp. the manufacturer of Loctite. The test was to fill the blind area with Loctite and let the Loctite flow into the thread engaged area as bolt is installed and eliminate trapped air in the engaged area.

NESC SENSITIVITY TEST 2 - Cure time

This was part of the original test plan to determine optimum cure time for Loctite 078, 242 and 290. This test was not performed during the Phase I test period due to addition of tests 1A, 1B and 1C. Limited cure time testing was evaluated as part of Phase II.

NESC TEST 3 - Direct verification

Because of the addition of tests 1A, 1B and 1C to Phase I testing, the direct verification planning was not actually performed until Phase II.

Phase II

Below is a summary of the test planning for Phase II. The detailed test procedures are located in Appendix B.

DIRECT VERIFICATION PHASE IIA – Develop Verification Test Torque Without Preload
The purpose of this test was to determine the Loctite 242 bond strength by applying a controlled volume of Loctite, and to determine the average bond strength (breakaway torque) using three different Loctite application methods. Cure time (48 versus 72 hours) was also evaluated.

DIRECT VERIFICATION PHASE IIB – Determine Effects of Joint Relaxation
The purpose was to determine torque loss due to joint relaxation.

DIRECT VERIFICATION PHASE IIC - Direct Verification Tests - With Preload
Specimens were subjected to a preloaded direct verification test for 2 seconds.

DIRECT VERIFICATION PHASE IID - Vibration Testing
The purpose was to validate PHASE IIC methodology by subjecting specimens to the vibration test requirements of NASM25027 and NASM1312-7.

RESULTS AND OBSERVATIONS

Phase I

Two bars with eight .1900-32 blind inserts and two bars with eight .1900-32 dome nutplates for a total of 32 test fasteners were used for NESC Sensitivity Test 1. The deformed thread locking features of the inserts and nutplates were reworked utilizing Besly Express non-cutting taps to remove the existing locking features. The reworked parts were inspected with a “go, no-go” gage to check for thread functionality.

The NAS1003 screws and reworked inserts and nutplates were cleaned using stainless steel wire brushes, acetone and cotton swabs. After cleaning, the internal and external threads were coated with Loctite primer T using the applicator brush attached to the cap of the primer bottle. The primer was allowed to dry for approximately one hour before applying the Loctite thread locking compound. Henkel Corporation recommendation for time from application of primer to application of locking compound is a minimum of fifteen (15) minutes to maximum of one (1) week.

The Boeing chemistry laboratory recommended utilizing a micropipette with disposable tips as an accurate method of measuring dispersed Loctite. Bench testing convinced the Engineering team to use this method for the Loctite test. The micropipette disposable tips and tare cups were sent to the Chemistry laboratory to test for possible contamination which could influence the Loctite cure. Test results showed no evidence of contamination.

After determining the amount of Loctite to achieve full coverage (discussed below), 35 microliters (µl) of Loctite 078 was applied to the bolt threads utilizing a plastic tare cup and micropipette. See Figures 1, 2 and 3.

FIGURE 1 - MICROPIPETTE WITH DISPOSABLE TIPS AND TARE CUP

FIGURE 2 - MICROPIPETTE WITH GRADUATIONS TO CONTROL AMOUNT OF LOCTITE

FIGURE 3 - LOCTITE DISPENSED FROM TARE CUP

The Loctite was applied by running a bead of Loctite from the micropipette disposable tip back and forth until all 35 microliters transferred to the threads. The screw was then tilted and rotated until even coverage was achieved. See Figure 4. Immediately following the application of the Loctite the screws were installed two turns past the end of the internal threads of the inserts and nutplate elements.

FIGURE 4 - LOCTITE APPLIED TO BOLT THREADS

After 72 hours cure time, the breakaway torque was measured in the off direction for each fastener test specimen. See Figures 5 and 6. Additional prevailing torque measurements were taken at 90, 180, 270, and 360 degrees.

FIGURE 5 - BREAKAWAY TORQUE MEASUREMENT IN OFF DIRECTION

FIGURE 6 - MINIATURE TORQUE WRENCH, FULL SCALE = 10 INCH-POUNDS

DETERMINE FULL EXTERNAL THREAD (100%) COVERAGE

Full thread coverage was determined based on the following:

-total thread coverage applied with bolt in a horizontal position
-no visual build-up of locking compound
-with bolt rotated to a vertical position with threads down, the end of the bolt thread shall have evidence of locking compound coverage forming a small bead

To determine the volume of full thread coverage, the micropipette tool was set to achieve the same visual coverage as above without requiring shaking. This was defined as the amount of Loctite required to achieve 100% coverage. Based on the 100% volume, 50% and 125% coverage were calculated. The micropipette was then used to achieve the required test coverage. The amount of Loctite applied was based on the diameter and thread length of the specific bolt used in the test.

For the NAS1003 (A286 bolt) with a thread length of .481 inch 100% coverage was determined to be 35 µl. For MD111-3001-0314 (MP35N bolt) with a thread length of .390 inch was determined to be 30 µl.

APPLICATION METHOD FOR INTERNAL THREAD

Full coverage was determined based on the external thread coverage and the internal thread length. Locking compound was applied starting from the bottom of the tapped threads and continuing to apply the locking compound to the opposite end of the threads. This method applied only to Tests 1A and 1C. See Figure 7.

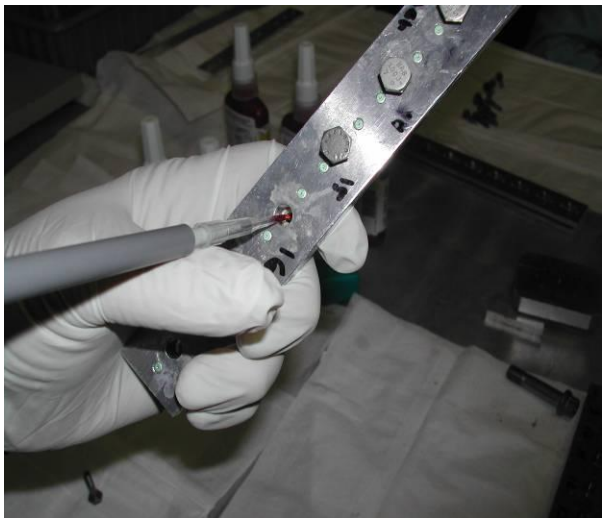

FIGURE 7 - LOCTITE APPLIED TO INTERNAL THREADS

GENERAL OBSERVATIONS

Once Loctite is applied to the bolt threads and installed into an insert or nut plate, the presence of metal acts as a catalyst to initiate the polymeric reaction. The more “active” the metal, the faster the adhesive will cure. Active metals are metals that oxidize or rust easily such as steel, aluminum, brass, and copper. Inactive metals are those that do not easily oxidize including stainless steel, zinc dichromate or nickel. These inactive metals, in particular the ones tested in this report, A286 and MP35N, require a primer to activate the Loctite. Otherwise the Loctite will stay in the uncured state. Although primer T was used for all tests performed in this report it is unknown if other primers would develop a more complete cure and therefore better breakaway torque values. It is suggested to repeat some of the tests using primer N to see if there is an improvement in the breakaway strength and cure. Primer is not necessary when Loctite is applied to zinc plated alloy steel bolts, however to ensure good cure within 24 hours it is recommend by Henkel Corporation.

Regardless of which Loctite was tested, Loctite applied to blind inserts did not cure as well as when applied to open inserts and nutplates. Early observations showed Loctite formed a meniscus around the periphery of and in the counterbore area of the insert/nut element. It was theorized trapped air inside the blind hole is not allowing the Loctite to cure (aerobic). It has also been theorized air pressure from the trapped hole is preventing the majority of the Loctite from making its way down into the insert threads. In several instances the Loctite remained wet regardless of cure time.

It should be noted that Loctite applied to blind nutplates appeared more cured than the blind insert applications. Dome type nutplates have a floating nut element allowing trapped air to escape before the joint clamps up.

Cured Loctite has a “clean white crystalline fracture” appearance, as well as an off-colored hue, depending on the grade of Loctite used. The off-colored hue will be a lighter shade of the wet “right out of the bottle” appearance. Loctite 078 is clear red when applied, but when cured the Loctite can look white crystalline to a light pink hue (see Figure 8). Loctite 290 is clear dark green when applied but when it cures the appearances looks white crystalline to a light pea green hue (see Figure 9), and Loctite 242 has a baby blue paste appearance following installation, but when cured appears white crystalline to a powder blue (see Figure 10).

FIGURE 8 - LOCTITE 078 APPEARANCE

FIGURE 9 - LOCTITE 290 APPEARANCE

FIGURE 10 - LOCTITE 242 APPEARANCE

Loctite will cure only in the absence of air, and additionally must be confined between two metal surfaces. Thus excess adhesive outside the joint did not cure on both ends of the bolt threads.

The highest degree of cured Loctite correlates with the highest breakaway torque values. However, there were several cases where the Loctite was not crystalline in appearance yet the breakaway torque values were above 6 inch-pounds for a #10 fastener. What needs to be determined is how much time is required to achieve an acceptable breakaway torque.

LOCTITE 078 - SUMMARY AND OBSERVATIONS

Loctite 078 is tested to the lot acceptance requirements of MIL-S-22473. Testing is performed with a 3/8-24 size zinc plated, alloy steel bolt and nut. The locking torque after 24 hours cure time shall be within 10 to 25 in-lb. For this test, 72 hours cure time was selected to ensure "full" cure locking torque for a .1900-32 size fastening system using inactive materials such as A286 and MP35N bolts mated with A286 silver plated inserts and nutplates. "Full" cure is characterized in this report by the presence of white crystalline structure (see Figure 11). However, based on the breakaway torque values and the examination of the individual fasteners, 72 hours was not a sufficient amount of time for full cure. Most of the test bolts had indications of uncured Loctite on the threads. Red uncured Loctite near the surface and counterbore area was also observed on all test specimens. Since Loctite cures only in the absence of air it was not considered unusual to see indications of uncured Loctite near these surfaces exposed to air.

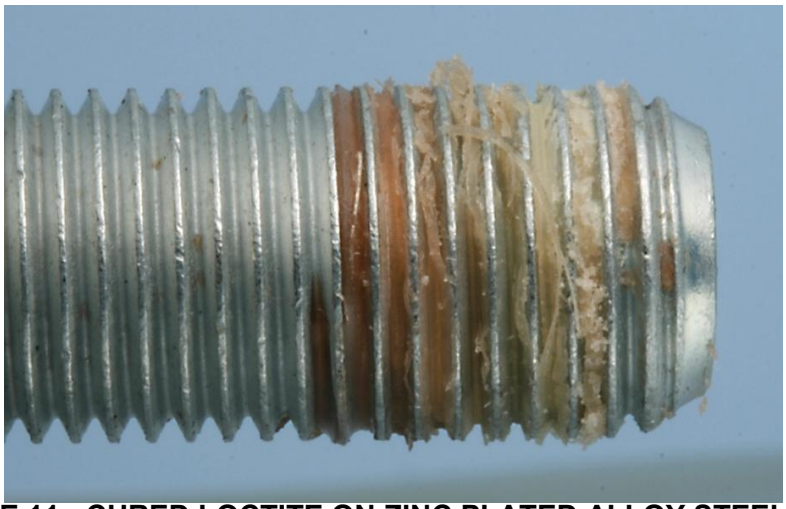

FIGURE 11 - CURED LOCTITE ON ZINC PLATED ALLOY STEEL BOLT

Loctite 078 was the lowest strength grade tested, and had the lowest breakaway torque values as compared to 242 and 290, as expected. Higher breakaway torque values (above 18 in-lbs) could lead to removal issues for .1900-32 diameter sizes.

Loctite 078 applied to bolt threads only in blind (non thru) insert applications with no preload resulted in unacceptable low breakaway torque values with uncured Loctite on both bolt and mating internal threads after 72 hours cure time (see Table 1, NESC Test 1 and Figure 12).

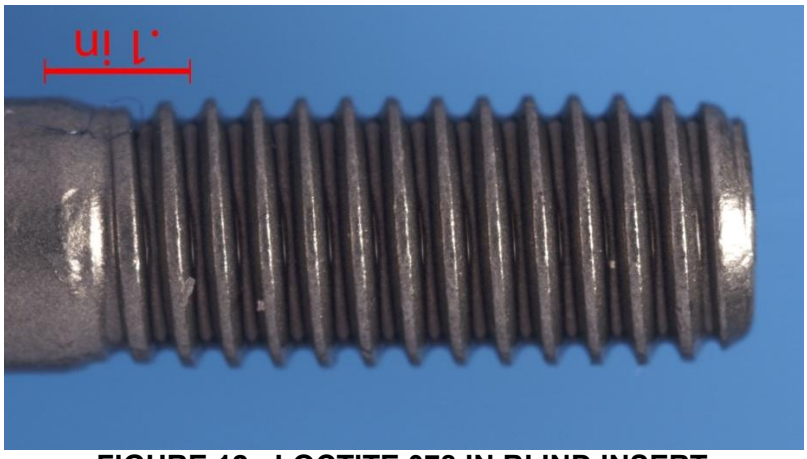

FIGURE 12 - LOCTITE 078 IN BLIND INSERT

Loctite 078 applied to internal threads only in blind (non thru) applications with no preload also resulted in unacceptable low breakaway torque values with uncured Loctite on both bolt and mating internal threads after 72 hours cure time. Full internal thread coverage for 078 Loctite by volume is approximately 14 to 16 microliters. This is equivalent to about ½ of a drop directly from a Loctite bottle. The amount of full thread coverage follows closely with the required full coverage for a NAS1003 thread. In this case the threads are approximately twice the length of the internal threads of the insert tested. (See Table 2, NESC Test 1A.)

Loctite 078 applied to both external and internal threads in blind applications with no preload also resulted in unacceptable low breakaway torque values with uncured Loctite on both bolt and mating internal threads after 72 hours cure time (See Table 3, NESC Test 1C). Regardless, there appeared to be more Loctite in the thread engaged area after disassembly.

A special test was conducted per Henkel recommendation for blind insert applications. Eight blind insert test specimens were flooded with enough Loctite to completely fill the blind cavity and up into the insert threads so that the Loctite would be forced up through the threads to the surface when the bolts were installed (see Figure 13). Thus no air could be trapped in the blind cavity area. Grades 078 (4 specimens) and 242 (4 specimens) were tested. The breakaway torque values were greater for this test, but the Loctite still did not cure completely (see Figure 14). This method does not lend itself to practical applications, but does show the presence of air inhibits Loctite cure. (See Table 4, Special Blind Insert Test)

FIGURE 13 - HENKEL TEST

FIGURE 14 - BOLT WITH LOCTITE 078 REMOVED FROM HENKEL TEST

Loctite 078 applied to bolt threads only in open applications had breakaway torque values that were within the specification requirements of 2.0 in-lb to 18.0 in-lb per NASM25027 (for self-locking nuts with prevailing torque locking feature). See Figure 15. Although the Loctite 078 breakaway torque results for this test were within NASM25027 requirements, to complete the acceptance requirements of NASM25027, a vibration test per NASM1312-7 should be performed.

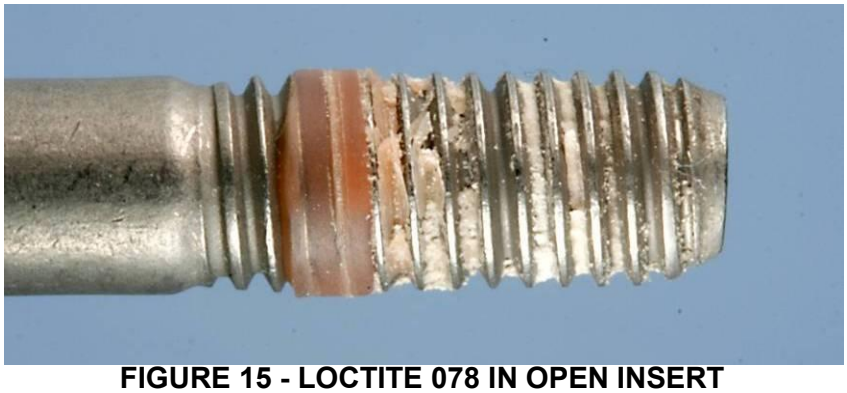

FIGURE 15 - LOCTITE 078 IN OPEN INSERT

SHUTTLE ORBITER LOCTITE 078 OBSERVATIONS

Concurrent with the NESC test program, there was an activity on the Shuttle Orbiter to remove some fasteners in the window applications that were previously installed with Loctite 078. The following observations are included herein for additional related information on Loctite 078.

Loctite 078 is used on MP35N bolts installed into silver plated A286 blind inserts and domed nutplates on one of the Shuttle Orbiter windows. After 16 days the fasteners were rotated approximately 15 degrees in the off direction to remove the preload. The prevailing torque was then measured, with prevailing torque values from 4 in-lb to 20 in-lb within 180 degrees of rotation. The higher prevailing torque number suggests there may be some slight offset in the joint causing interference fit. Examination of the inserts, nutplates and bolts showed evidence of dry crystalline Loctite, indicating Loctite with primer does eventually cure when applied to MP35N bolts. It was noted bolts removed from nutplates had larger amounts of Loctite on the threads as compared to the bolts removed from inserts. It was determined the hex wrenching system is slicing the Loctite off the bolts threads. The nutplates and inserts in the window frame were examined with a borescope. It was evident the insert threads had more crystalline dry Loctite than the nutplate threads in all cases. A few bolts had some indication of wet Loctite on the threads. In these locations there seem to also have excessive uncured Loctite material found on the bolt shank. Again it was determined the bolt threads were re-wetted during bolt removal. Based on the information gathered on the Loctite window application it suggests approximately 2 weeks cure time and perhaps preload is required for Loctite 078 applied to MP35N bolts and silver plated A286 inserts to sufficiently cure to achieve an acceptable breakaway torque for a secondary locking feature.

TABLE 1 - LOCTITE 078 - SUMMARY OF RESULTS - APPLIED TO BOLT THREADS ONLY

BOLT	RECEPTACLE A286/SILVER PLATE		LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
	INSERT	NUTPLATE				RANGE	AVE	
NAS1003 A286 (NESC TEST 1)	BLIND		100% (35µl)	72	16	0.5 - 9.5	5.3	4 below 2.0 in-lbs.
			50% (17µl)	n/a	0	n/a	n/a	Did not test because !00% results low
			125% (45µl)	72	16	2.0 – 6.5	3.7	1 at 2.0 in-lbs Average prevailing torque at 90° was 1.8 in-lbs
MD111-3001-03 MP35N (USA TEST 1)	BLIND		100% (30µl)	(2) 96/120	15	1.0 – 3.0	2.0	9 equal to or below 2.0 in-lbs.
			50% (15µl)		16	1.0 – 2.0	1.4	16 equal to or below 2 in-lbs
			125% (38µl)		16	1.0 – 3.5	1.7	15 equal to or below 2 in-lbs
NAS1003 A286 (NESC TEST 1)		DOME	100% (35µl)	72	16	2.5 – 8.0	5.3	Fairly good results, but Loctite did not completely cure
			50% (17µl)	72	0	n/a	n/a	Did not test because blind inserts at !00% results low
			125% (45µl)	72	16	1.0- -2.5 4.0 – 9.0 @ 90°	2.0 7.4 @ 90°	Recorded breakaway was not actual breakaway. Later determined that this was due to floating nut rotating until seated against base wall. Torque values at 90° are closer to actual breakaway torque.

TABLE 1 - LOCTITE 078 - SUMMARY OF RESULTS - (CONTINUED)
APPLIED TO BOLT THREADS ONLY

BOLT	RECEPTACLE A286/SILVER PLATE		LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
	INSERT	NUTPLATE				RANGE	AVE	
MD111-3001-03 MP35N (USA TEST 1)		DOME	100% (30µl)	(2) 96/120	16	3.5 – 5.0	4.0	Fairly good results, but Loctite did not completely cure.
			50% (15µl)		16	2.0 – 4.5	3.3	4 at 2.0 in-lbs
			125% (38µl)		16	2.0 – 6.0 3.5 – 7.0 @ 90°	2.9 5.0 @ 90°	Recorded breakaway was not actual breakaway. Later determined that this was due to floating nut rotating until seated against base wall. Torque values at 90° are closer to actual breakaway torque.
NAS1003 A286 (TEST 1B)	OPEN		100% (35µl)	72	16	3.5 – 12.0	9.5	Better results with open receptacle applications than blind applications. .
			50% (17µl)	72	16	2.0 – 12.0	8.7	
			125% (45µl)	72	16	3.0 – 11.5	6.6	
		OPEN	100% (35µl)	72	16	3.0 – 7.0	5.4	
			50% (17µl)	72	16	2.5 – 6.5	5.1	
			125% (45µl)	72	16	2.5 – 7.0	5.0	

NOTES:
1. Loctite 078 in blind (non thru) application resulted in unacceptable low breakaway torque values. Little to no cure was observed.
2. Test was divided into two different cure times. 120 hours was due to Thanksgiving Holiday.
3. MP35N bolts did not cure as well as A286.
4. Majority of the specimens did not display full cure, as characterized by white crystalline appearance.

TABLE 2 - LOCTITE 078 - SUMMARY OF RESULTS - APPLIED TO INTERNAL THREADS ONLY

BOLT	RECEPTACLE A286/SILVER PLATE		LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
	INSERT	NUTPLATE				RANGE	AVE	
NAS1003 A286 (NESC TEST 1A)	BLIND		100% (17µl)	72	16	0.5 -8.0	4.0	4 equal to or lower than 2.0 in-lbs
		DOME	100% (17µl)	72	16	1.5 – 8.5	4.5	2 equal to or below 2.0 in-lbs

NOTES:

1. Static breakaway torque values for Loctite application on internal threads only were similar to applications on bolt only.
2. Majority of the specimens did not display full cure, as characterized by white crystalline appearance.

TABLE 3 - LOCTITE 078 - SUMMARY OF RESULTS - APPLIED TO BOTH BOLT & INTERNAL THREADS

BOLT	RECEPTACLE A286/SILVER PLATE		LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
	INSERT	NUTPLATE				RANGE	AVE	
NAS1003 A286 (NESC TEST 1C)	BLIND		50%/50% (17µl) BOLT (7.5µl) INSERT	72	16	1.0 – 2.5	1.8	13 out of 16 equal to or below 2.0 in-lbs
		DOME	50%/50% (17µl) BOLT (7.5µl) NUT	72	16	3.5 – 6.0	4.4	

NOTES:
1. Majority of the specimens did not display full cure, as characterized by white crystalline appearance.

TABLE 4 - LOCTITE 078 - SUMMARY OF RESULTS - SPECIAL BLIND INSERT TEST
LOCTITE RECOMMENDED PROCEDURE FOR BLIND INSERT APPLICATIONS

BOLT	RECEPTACLE A286/SILVER PLATE	LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
					RANGE	AVE	
NAS1003 A286	BLIND INSERT	Fill blind void area with Loctite	72	4	4.5 – 9.0	7.3	Static breakaway torque values were better than those where Loctite was added to bolt threads only. Internal threads only and to both bolt and internal threads. Loctite 078 did not fully cure.

NOTES:
1. Fill void area with Loctite. Bolt was installed until 2 threads protruded beyond the insert.
2. Loctite filled the thread engaged area and began to appear in the insert counterbore area. Cure time 72 hours.

LOCTITE 242 - SUMMARY AND OBSERVATIONS

Acceptance test utilizing alloy steel bolts and nuts with 242 was not performed. However, the specimens tested exhibited white crystalline fibers and cured sufficiently to produce higher breakaway torque values than Loctite 078.

Loctite 242 displayed a higher degree of cure than Loctite 078, but many specimens had some uncured Loctite (see Figure 16). This condition appeared more with 100% and 125% application, which may be due to excess Loctite in areas exposed to air.

FIGURE 16 - LOCTITE 242

All breakaway torque values, regardless of coverage (100%, 50% or 125%) were above the minimum breakaway torque range of 2 in-lb (.1900-32 thread size) per NASM25027. Several specimens with 100% and 125% Loctite coverage exceeded the maximum specification requirement of 18 in-lbs. Coverage of 125% also resulted in excess Loctite outside the threaded area and inside the counterbore or fixture (see Figure 17).

FIGURE 17 - LOCTITE 242 WITH 125% COVERAGE

Loctite 242 with 50% coverage may be the best candidate of Loctite grade and coverage that were tested. All specimens displayed minimum breakaway torque values that were within specification range with a minimum amount of Loctite. This will also minimize contamination of surrounding structures and out gassing in space environment.

A special test was conducted per Henkel recommendation for blind insert applications. Eight blind insert test specimens were flooded with enough Loctite to completely fill the blind cavity and up into the insert threads so that the Loctite would be forced up through the threads to the surface when the bolts were installed. Thus no air could be trapped in the blind cavity

area. Grades 078 (4 specimens) and 242 (4 specimens) were tested. The breakaway torque values were greater for this test, but the Loctite still did not cure completely. For the 242, the average breakaway torque exceeded the maximum requirements (18 in-lb) of NASM25027 (see Figure 18). This method does not lend itself to practical applications, but does show the presence of air inhibits Loctite cure.

FIGURE 18 - LOCTITE 242 REMOVED FROM HENKEL TEST

Loctite 242 at 50% of a drop out of a Loctite bottle has very good repeatable breakaway torques. The problem is ½ drop is not easily obtained. It would require a special application method or device.

See Table 5 and 6 for Loctite 242 tests performed with summary of results.

TABLE 5 - LOCTITE 242 - SUMMARY OF RESULTS - APPLIED TO BOLT THREADS ONLY

BOLT	RECEPTACLE A286/SILVER PLATE		LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
	INSERT	NUTPLATE				RANGE	AVE	
NAS1003 A286 (NESC TEST 1)	BLIND		100% (35µl)	72	16	7.5 – 20.0	14.6	4 equal to or greater than 18.0 in-lbs
			50% (17µl)	72	16	5.0 – 9.0	6.8	
			125% (45µl)	72	16	7.0 – 20.0	13.9	2 equal to or greater than 18.0 in-lbs
NAS1003 A286 (NESC TEST 1)		DOME	100% (35µl)	72	15	3.0 – 17.0	11.2	
			50% (17µl)	72	16	9.0 – 16.0	10.4	
			125% (45µl)	72	16	9.0 – 17.0	13.2	
NAS1003 A286 (TEST 1B)	OPEN		100% (35µl)	72	16	9.0 – 18.0	14.0	
			50% (17µl)	72	16	10.0 – 18.0	13.3	
			125% (45µl)	72	16	10.0 – 23.0	16.5	7 equal to or greater than 18.0 in-lbs
		OPEN	100% (35µl)	72	16	9.0 – 18.0	12.5	1 equal to or greater than 18.0 in-lbs
			50% (17µl)	72	16	7.0 – 16.0	11.5	
			125% (45µl)	72	16	9.0 – 18.0	13.4	1 equal to or greater than 18.0 in-lbs

NOTES:

1. Loctite 242 displayed a higher degree of cure than Loctite 078, even though most of the 242 specimens had some uncured Loctite. Wet Loctite was present more in the 125% specimens. This is most likely due to excessive Loctite exposed to air and therefore not curing.
2. Majority of the specimens did not display full cure, as characterized by white crystalline appearance.

TABLE 6- LOCTITE 242 - SUMMARY OF RESULTS - SPECIAL BLIND INSERT TEST
LOCTITE RECOMMENDED PROCEDURE FOR BLIND APPLICATIONS

Fill void area with Loctite. Install bolt until Loctite fills thread engaged area and begins to appear in the insert counterbore area. Cure time 72 hours.

BOLT	RECEPTACLE A286/SILVER PLATE	LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
					RANGE	AVE	
NAS1003 A286	BLIND INSERT	Fill blind void area with Loctite	72	4	15.0 – 22.0	19.6	Static breakaway torque values were greater than those where Loctite was added to bolt threads only. Loctite 242 did not fully cure.

LOCTITE 290 - SUMMARY AND OBSERVATIONS

Acceptance test utilizing alloy steel bolts and nuts with 290 were not performed. However, the specimens tested exhibited white crystalline fibers and cured sufficiently to produce high breakaway torque values.

Loctite 290 is a wicking type of locking compound, and is generally intended to be applied after assembly. However, for consistency and comparison purposes, Loctite 290 was applied prior to assembly.

Loctite 290 were tested using NAS1003-7A, A286 passivated bolts with silver plated A286 inserts and nutplates. Loctite 290 in dome nutplates did not have the traditional static breakaway torque as compared with self-locking deformed metal nuts per NASM25027. After initial breakaway the prevailing torque continued to increase within the first 90 degrees of rotation. Several fasteners continued to increase in torque thru 180 degrees rotation. For 100% application the prevailing torque went as high as 39.0 in-lbs and 26.5 in-lbs for 50% application.

Loctite 290 applied to blind inserts had the same breakaway anomaly as dome nutplates, except to a lesser degree. For 100% application the prevailing torque went as high as 30.0 in-lbs and 22.0 in-lbs for 50% application. Blind inserts typically had lower breakaway torque for all Loctite tested in this report. This may be due to trapped air forced into the thread engaged area creating uncured Loctite. See Figure 19.

FIGURE 19 - LOCTITE 290 IN BLIND INSERT

Loctite 290 applied to open inserts with 50% coverage continued to increase and fluctuate thru 360 degrees rotation. This is the same anomaly as with the dome nutplates. The prevailing torque range was 11 to 49 in-lbs thru 360 degrees rotation. See Figure 20.

FIGURE 20 - LOCTITE 290 IN OPEN INSERT

The 290 did not exhibit a traditional breakaway. Generally, the torque would plateau during the first 90 degrees of rotation. The torque would then fluctuate throughout the following rotation of 360 degrees. For those specimens, two value ranges are noted in the summary Table 7 for the breakaway torque values. The torque values at 90 degrees were additionally noted in the table for comparison purposes.

The 100% test for open inserts had erroneous maximum readings that were less than the actual values. It was later learned after the test that the torque wrench used was faulty in the off direction with a maximum torque capability of 23.0 in-lbs. This torque wrench was not used for other tests. Loctite 290 had the highest breakaway and prevailing torque range compared to Loctite 078 and 242. In most cases it exceeded the maximum torque requirement per NASM25027 (18.0 in-lb).

Loctite 290 is not recommended for applications with small .190 size fasteners requiring repeated installation and removal cycles. The high breakaway and prevailing torque plus installation torque could cause problems during removal by exceeding torque capability of internal recess fasteners. Loctite 290 may be a candidate for permanent applications only. Figure 21 shows a bolt installed with Loctite 290 that pulled out the insert when the bolt was removed.

FIGURE 21 - LOCTITE 290 WITH INSERT PULLED OUT

See Table 7 for Loctite 290 tests performed with summary of results.

TABLE 7 - LOCTITE 290 - SUMMARY OF RESULTS - APPLIED TO BOLT THREADS

BOLT	RECEPTACLE		LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
	INSERT	NUTPLATE				RANGE	AVE	
NAS1003 A286 (NESC TEST 1)	BLIND		100% (35µl)	72	16	7.0 – 18.5 6.0 – 28.5 @ 90°	11.1 19.3 @90°	After initial breakaway, the torque continues to increase within 90° rotation, and then decreases within 360° rotation.
			50% (17µl)	72	16	6.0 – 14.0 4.0 -37.0 @ 90°	10.3 16.0@ 90°	4 did not have breakaway and torque increase to 90°. Others had breakaway and then increased within 90° rotation.
			125% (45µl)	n/a	0			Did not test because of high prevailing torque at 100%
NAS1003 A286 (NESC TEST 1)		DOME	100% (35µl)	72	16	4.0 – 13.0 7.0 -38.0 @ 90°	8.46 23.2@ 90°	Static breakaway torque noted in 14 of 16 specimens. Other 2 had no breakaway, but continued to increase within 90° rotation. The 14 after breakaway continued to increase within 90° rotation, and then slowly decreased within 360° rotation.
			50% (17µl)	72	16	3.5 – 8.5 6.5 – 25.5 @90°	6.0 18.2 @ 90°	After initial breakaway, the torque continues to increase within 90° rotation, and then decreases within 360° rotation.
			125% (45µl)	n/a	0			Did not test because of high prevailing torque at 100%

TABLE 7 - LOCTITE 290 - SUMMARY OF RESULTS - (CONTINUED)
APPLIED TO BOLT THREADS

BOLT	RECEPTACLE		LOCTITE APPLIED QUANTITY	CURE TIME (HRS)	QTY TESTED	STATIC BREAKAWAY TORQUE (IN-LB)		REMARKS
	INSERT	NUTPLATE				RANGE	AVE	
NAS1003 A286 (TEST 1B)	OPEN		100% (35µl)	72	16	11.0 – 23.0 BAD MAXIMUM READING	24.2	Torque wrench (0 to 30 in-lbs) model TER3FUA, serial # 2086 used in this test. After test it was learned that the maximum torque capability was 23 in-lbs. Switched wrenches for other tests over 10 in-lbs.
			50% (17µl)	72	17	11.0 – 48.0	35.6	3 of 17 had defined breakaway between 12.0 and 13.0 in-lbs. Torque continued to increase through 90° rotation. No breakaway in 14. Torque continued to rise thru 90° rotation.
			125% (45µl)	72	16	n/a	n/a	Did not test because of high prevailing torque at 100%
		OPEN	100% (35µl)	72	15	15.0 – 26.0	20.3	14 of 15 equal to or greater than 18.0 in-lbs
			50% (17µl)	72	16	8.5 -32.0	23.7	14 of 16 equal to or greater than 18.0 in-lbs
			125% (45µl)	n/a	0	n/a	n/a	Did not test because of high prevailing torque at 100%

NOTES:

1. Loctite 290 did not have the traditional static breakaway torque as seen in the deformed metal self locking nuts per NASM25027. Breakaway torque values were noted in some specimens, but in most cases the torque continued to increase through 90 degrees rotation. Many increased beyond the 18 in-lbs maximum requirement per NASM25027.
2. Majority of the specimens did not display full cure, as characterized by white crystalline appearance.

Phase II

PHASE IIA - DEVELOP VERIFICATION TEST TORQUE WITHOUT PRELOAD

Phase IIA was to develop the verification test torque, which was arbitrarily (Locking Features Team engineering judgment) defined as 50% of the average clockwise break-loose torque without preload, and subsequently use this torque in a 2 second hold test on fasteners installed with cured Loctite and without preload. The 2 second hold tests were performed for one cycle, 3 cycles and 5 cycles. Additional cycles were performed on selected specimens to determine if any LLC degradation occurs due to cyclic repetition.

The first part of Phase IIA was to determine Loctite 242 break loose torque (bond strength) by applying a controlled volume of Loctite with a micropipette (see Figure 22) and to determine the optimum bond strength and cure time using three different Loctite application methods. The "optimum volume" is defined as full thread coverage determined Phase I. The three different methods used were: on bolt threads only, on nut threads only and on both bolt and nut threads, and with two different cure times of 48 hours and 72 hours. Ten specimens each were tested and the static break-loose torques recorded. Fifty percent of the average breakaway torques were calculated (verification test torque) and used in the 2 seconds torque resistance tests without preload.

FIGURE 22 - LOCTITE 242, PRIMER T, AND MICROPIPETTE

- 48 HOUR CURE VS 72 HOURS CURE

The average break-loose torques for the three application methods with 48 hours cure were 7.4 in-lb for bolt only, 6.9 in-lb for nut only, and 7.7 in-lb for bolt and nut (Appendix B, Tables B3, B4, and B5, respectively). Two (2) out of ten (10) specimens with application on bolt only application failed the 2 second hold test (Appendix B, Table B6). As a result the amount of Loctite applied to the bolt threads was increased from 17 µL (50% of full thread coverage) to 35 µL.

> NOTE: The tests began by applying 50% (17 µL) on the bolt threads. This was recommended in report EWAA-EA-10-21-R1 because of good breakaway torques and to minimize structural contamination. However, this application along with 48 hour cure time failed the 2 seconds hold test. Therefore, 72 hours cure time was selected for the remainder of tests and to increase LLC application to the bolt threads from 17 µL to 35 µL.

The average break-loose torque for 72 hours cure was approximately 8 in-lb (Appendix B, Tables B7 and B8), and 4 in-lb was selected as the verification test torque for the subsequent 2 second hold tests.

- OBSERVATION OF LOCTITE CURE ON BOLT AFTER REMOVAL

The appearance of the Loctite on the bolts after removal differed depending on the removal procedure (Appendix B, Table B3). Figure 23 shows a bolt removed from the nutplate after test and examined for Loctite cure. The appearance of the Loctite on the thread engaged area was a blue color and slightly wet. The wet Loctite in the counterbore area of nut prior to removal migrated over the cured Loctite in the thread engaged area during bolt removal and the appearance is uncured Loctite.

FIGURE 23 - LOCTITE APPEARANCE AFTER REMOVAL FROM NUTPLATE

Figure 24 shows the appearance of the Loctite on the bolt after the bolt was threaded further into the nutplate to expose the Loctite in the thread engaged area. The Loctite observed in this manner had a fully cured, white crystalline appearance in the thread engaged area.

FIGURE 24 - LOCTITE APPEARANCE WHEN THREADED FURTHER INTO NUTPLATE

- TWO (2) SECONDS HOLD TEST WITHOUT PRELOAD

Thirty (30) specimens with Loctite applied to the nuts only were assembled for the 2 seconds torque resistance test at 4 in-lb. Ten specimens were tested for the 1 cycle hold, ten specimens for 3 cycles, and ten specimens for 5 cycles. All specimens with nut only applications passed all three test requirements. Subsequent clockwise break-loose torques were measured and recorded. The break-loose torques after one cycle ranged from 5.5 in-lb to 8.0 in-lb, after three cycles ranged from 6.0 in-lb to 8.5 in-lb, and after five cycles ranged from 4.5 in-lb to 8.0 in-lb (Appendix B, Table B9).

Thirty (30) specimens with applications on both nuts and bolts were assembled and all passed for the 2 seconds torque resistance test at 4 in-lb. Specimens subjected to the 5 cycle tests were subsequently tested for an additional 5 cycles for a total of 10 cycles. One specimen moved at the 10^{th} cycle and one moved at the 8^{th} cycle. This indicates that there may be some LLC bond degradation after cycling (Appendix B, Table B10).

Application of Loctite on both bolt and nut had good breakaway torque values, but were no better than those for nut application only. Recognize that application to both bolt and nut can be difficult in the field, depending on the hardware configuration. Excess Loctite inducing contamination is also a concern for bolt and nut application.

The clockwise break-loose torques were measured after the 2 second hold tests. These measurements were not part of the original test plan, but added for information. All values were within the self-locking requirements of NASM25027.

A summary of the results of the Phase IIA testing are shown in Table 8. The detail data sheets are included in Appendix B, Tables B2 through B10.

TABLE 8 - PHASE IIA SUMMARY TABLE, DIRECT VERIFICATION TEST, DETERMINE BOND STRENGTH (BREAK-LOOSE TORQUE) WITHOUT PRELOAD

TEST PHASE	LOCTITE APPLICATION AREA AND VOLUME	CURE TIME (HRS)	SAMPLE SIZE	NO PRELOAD CW BREAK-LOOSE TORQUE (IN-LB)		NO PRELOAD CW 2 SECONDS TORQUE TEST @ 4 IN-LB (50% AVERAGE BREAK-LOOSE)			TABULATED TABLES IN APPENDIX B	REMARKS
				RANGE	AVERAGE	1 CYCLE	3 CYCLES	5 CYCLES		
1	BOLT THREADS 17µL	48	20	6.0 TO 9.0	7.4				VII	
			10			2 Failed	Did not test	Did not test	X	
	NUT THREADS 25µL	48	10	6.5 TO 7.5	6.9	Did not test			VIII	
		72	30	7.5 to 9.5	8.6	Passed	Passed	Passed	XIII	
	BOLT AND NUT THREADS 35µL on bolt and 25µL on nut	48	10	7.0 to 8.5	7.7	Did not test			IX	
		72	30	7.0 to 8.5	7.8	Passed	Passed	Passed	XIV	Continued test to 10 cycles

PHASE IIB – DETERMINE EFFECTS OF JOINT RELAXATION

The purpose of this test was to determine potential torque loss due to joint relaxation. Ten specimens were assembled by installing bolts into Phase IIB test fixtures (Appendix B. Figures B2 and B3). All ten bolts were installed with Loctite and tightened to 35 in-lb within two minutes to prevent any influence from possible Loctite cure. Following a 2 minute hold the break-loose torque was measured and recorded in the clockwise direction. Joint relaxation was found to be negligible and was not used in Phase IIC.

Following is a summary table with the results of the Phase IIB testing. The complete data sheets are included in Appendix B, Table B11.

TABLE 9 - PHASE IIB SUMMARY TABLE, DIRECT VERIFICATION TEST, DETERMINE EFFECTS OF JOINT RELAXATION

TEST PHASE	LOCTITE APPLICATION AREA AND VOLUME	CURE TIME	SAMPLE SIZE	NO PRELOAD CW BREAK-LOOSE TORQUE (IN-LB)	TABULATED TABLES IN APPENDIX B	REMARKS
2	**BOLT AND NUT THREADS 35µL on bolt and 25µL on nut**	**2 minutes**	**10**	**The average delta torque was -1.0 in-lb**	**B11**	**This data was disregarded in Phase 3 Direct Verification Tests.**

PHASE IIC - DIRECT VERIFICATION TESTS - WITH PRELOAD

Phase IIC was the direct verification test with preload. The plan was to apply a controlled volume of Loctite determined in earlier tests on the bolt threads only, on nut threads only and on both bolt and nut threads and installing the fastener to 36 in-lb.

> NOTE: The first two tests were performed with 35 in-lb installation torque, but subsequently changed to 36 in-lbs to conform to the vibration requirements specified in NASM25027 for .1900-32 size fasteners. The one in-lb difference did not affect the outcome of the results.

Following the 72 hours cure, the fasteners were subjected to the direct verification test of 40 in-lb (36 in-lb plus the verification test torque of 4 in-lb developed in Phase IIA). Any movement within a 2 second hold at 40 in-lb was considered failure.

All specimens in Phase IIC were assembled in a vice with the bolt axis in the horizontal position. Loctite was applied evenly to the entire bolt threads in the horizontal position and applied evenly to the nut element from the back side to obtain optimum coverage in the engaged area.

Application of Loctite to the bolt threads is the easiest method, but there are several concerns, such as structural contamination during assembly and inconsistent Loctite in the thread engaged area.

For this study, the Loctite was applied after the bolts were installed through the top plate to minimize runoff and excess LLC on other parts. Also, the holes in the bottom plates were intentionally drilled with larger holes (.250 diameter) to provide sufficient bolt clearance to eliminate Loctite run-off during bolt installation. In structural shear applications, the holes will typically be tighter and Loctite will be applied to the bolt threads and installed through all structural members resulting in varying degrees of Loctite displaced onto the structure resulting in a reduced and unknown volume reaching the thread engaged area. In addition, a large portion of the Loctite applied to bolt threads will be forced onto the bolt shank as the bolt is threaded into the nut resulting in excess Loctite migrating onto the structure (see Figure 25).

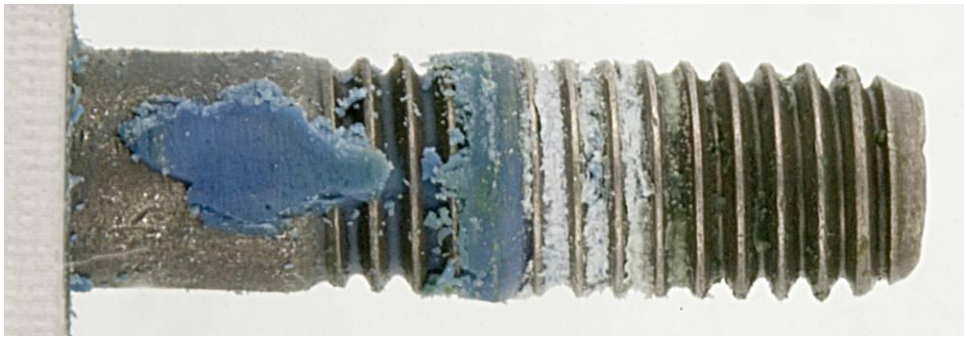

FIGURE 25 - 35 µL LOCTITE 242 ON BOLT THREADS ONLY

Application of Loctite to the nut threads may be a more ideal method for optimum Loctite application in the thread engaged area with minimal Loctite on the structure. The concern is the difficulty of applying this method in actual field operation. Loctite application to the nut may not be an issue in relatively thin structural stack-up, but the problem increases as the stack-up thickness increases and hole clearance decreases.

Primer and Loctite will rub off onto adjoining surfaces, inside the holes and in the counterbore of the nut using currently available application tools, resulting in inconsistent Loctite application in the thread engaged area. The primer and Loctite for these tests were applied from the backside of the nut element resulting in complete coverage in the thread engaged area. Loctite, when applied to the nut only, resulted in some of the Loctite being forced out of the back end of the nut as the bolt is threaded into the nut and onto the exposed protruding bolt threads. The bolt shank and specimen holes were free of Loctite (See Figure 26).

FIGURE 26 - 25 µL ON NUT THREADS ONLY

Application of Loctite on both bolt and nut had good break-loose torque values, but were no better than those for nut application only. (See Figure 27) Again, the concerns are excess Loctite on bolt shank and structure and difficulty to apply in field applications.

FIGURE 27 - 35 µL ON BOLT THREADS AND 25 µL ON NUT THREADS

The original test procedure was to perform Phase IIC testing without the use of countersunk washers, because the test specimens had a countersink to provide head to shank fillet clearance. During the trial test, it was noted that typical applications requiring bolt rotation are designed with countersunk washers under the bolt head for bearing and surface protection. Therefore, both designs were investigated in trial tests prior to the start of Phase IIC. Countersunk washers were not available at this time and flat alloy steel, cadmium plated washers (AN960-3) were used.

The trial tests were performed with Loctite applied on the nut only and on both nut and bolt. Five specimens with nut applications were tested with washers under the bolt head and five specimens without washers. The other set with Loctite on both nut and bolt were tested without washers. The majority of specimens without washers failed this test. (Appendix B, Table B12)

Four out of five specimens with washers passed the 2 second direct verification test and the fifth moved at 38 in-lb. (See Appendix B, Table B12)

- TESTING WITHOUT WASHERS

Thirty specimens were tested with no washers. Ten specimens tested with Loctite applied to the bolt threads, ten with Loctite on the nut only and ten with Loctite on both nut and bolt. Three out of ten from those with Loctite on the bolt threads only and three from those with Loctite on both nut and bolt passed the 2 seconds hold test. The remaining 24 specimens failed. (Appendix B, Table B13)

- TESTING WITH WASHERS

Twenty (20) specimens were assembled with washers under the bolt head, and Loctite applied to both bolt and nut. Ten specimens were installed with ST116-3C countersunk washers and ten with AN960-3 flat washers. One specimen with a ST116-3C washer failed at 39 in-lb, but this can be considered invalid due to wrench slippage. The subsequent clockwise break-loose torque range was 41 to 46 in-lb with an average of 43.8 for the ST116 washers, and 41 to 47 in-lb with an average of 44.6 in-lb for the AN960 washers (Appendix B, Table B14).

NOTE: Phase IIC testing was discontinued at this point due to lack of test bolts, and testing continued to Phase IID vibration testing. The application of 35 µl resulted in excess Loctite on the vibration test fixtures which may have influenced the vibration test results. Therefore, the 35 µl was reduced to 20 µl to reduce the influence of excess Loctite. For Phase IID, in addition to applications with 35 µl on the bolts, 20 µl was also tested and passed the tests with no movement. The following 20 µl application testing was added to Phase IIC to ensure that 20 µl application would also meet the direct verification requirements.

- LOCTITE APPLIED TO NUT ONLY AND TO BOLT ONLY

Thirty specimens were tested with ST116-3 washers under the heads of previously used bolts that were chemically cleaned and installed with new Loctite 242 and Primer T. This was necessary because of limited supply of bolts and Loctite. The bolts were cleaned using a cleaning method developed by the Boeing Huntington Beach Chemistry lab (see Appendix C).

Ten specimens were tested with Loctite on the nut only, ten tested with 35 µl (100%) on the bolt threads and ten with 20 µl (approximately 50%) on the bolt threads. All specimens passed the 40 in-lb direct verification test. The clockwise break-loose torques were then recorded. The average break-loose torques were 45.9 in-lb for nut application, 46.1 in-lb for 35 µl on bolt threads and 45 in-lb for 20 µl on bolt thread. As mentioned above, the average break-loose torque for similar washer configurations with Loctite applications on both nuts and bolts were 43.8 in-lb. (Appendix B, Table B15)

Specimens with new primer and Loctite had average break-loose torques that were slightly greater than the previous specimens using the older primer and Loctite. One would expect that those with Loctite added to both bolt and nut would be equal to or greater than those with Loctite added to the single elements. The break-loose torque differences could also be due to different strength levels of Loctite (from different adhesive lots) which introduces another variable into using this direct verification method.

- TESTING WITHOUT LOCTITE

Additional tests were performed to determine preload or torque loss of specimens in non locking nuts without Loctite after 72 hours. Ten specimens were tested with ST116-3C washers under the bolt head and ten specimens tested without washers. The break-loose torque recorded with washers ranged from 35 to 37 in-lb with an average torque of 35.7.

The break-loose torque recorded without washers ranged from 31 to 36 in-lb with an average torque of 34.7 (see Appendix B, Table B16). This limited sample size resulted in a slightly greater reduction in the average torque (35.7 in-lb vs. 34.7 in-lb) for specimens without washers, which may be the reason why specimens without washers were failing this 2 second torque test.

All of the Phase IIC test results are summarized in Table 10.

TABLE 10 - PHASE IIC SUMMARY TABLE, DIRECT VERIFICATION TEST, WITH PRELOAD

TEST PHASE IIC	LOCTITE APPLICATION AREA AND VOLUME	CURE TIME (HRS)	SAMPLE SIZE	INSTALL-ATION TORQUE (IN-LB)	PRELOAD DIRECT VERIFICATION CW 2 SECONDS HOLD (INSTL TORQUE PLUS 4 IN-LB)	TABULATED TABLES IN APPENDIX B	REMARKS
NO WASHER *	BOLT THREADS 100% (35µL)	72	10	36	3 passed	XVII	36 in-lb installation torque is the torque selected to meet vibration test requirement per NASM25027
	NUT THREADS 25µL		10 (1ST TRIAL)	35	4 passed with washer (See remarks)	XVI	*4 out of 5 specimens had AN960-3 cadmium plated, aluminum washers under head.
			10	36	0 passed	XVII	
	BOLT AND NUT 35µL bolt, 25 µL nut		10 (1ST TRIAL)	35	0 passed	XVI	
			10	36	2 passed	XVII	
WITH WASHER	BOLT AND NUT 35µL bolt, 25 µL nut	72	10	36	9 passed, 1 moved @ 39 in-lb	XVIII	ST116-3C Countersunk, A286 washer under bolt head
			9	36	All passed		AN960-3 Cadmium plated steel washer under bolt head. Could not install one specimen due to thread interference.
	NUT ONLY 25 µL		10	36	All passed	XVIX	New Loctite 242 and primer T used in these tests. Chemically cleaned used bolts used in these tests.
	BOLT ONLY 35µL		10	36	All passed		
	BOLT ONLY 20 µL		10	36	All passed		
(MISC TEST)	No Loctite Test No washer	72	10	36		XX	This was to determine installation torque loss after 72 hours without Loctite. 0 to 5 in-lb torque loss noted.
	No Loctite Test With washer	72	10	36			Same as above except ST116

PHASE IID - VIBRATION TESTING

Phase IID of the test plan was to validate the direct verification test methods of PHASE IIC by subjecting specimens to the vibration test requirements of NASM25027 and NASM1312-7.

Tests were performed by applying Loctite 242 on the bolt threads only and on the nut threads only and subjecting the test specimens to the direct verification requirements in Phase IIC. Testing with Loctite on both bolt and nut was deemed unnecessary due to excessive contamination with no improvement in bond strength, and because the other two application methods passed the 2 second hold test with zero rotation.

Again for this test the test block was held in a vice where the bolt axis is in the horizontal position. The bolts were installed through the spools and washers prior to applying Loctite on the bolt threads to eliminate runoff and contamination to the fixture. For nut applications, Loctite was applied directly onto the nut element.

The first test set had 10 specimens with 25 µL of Loctite applied to the nut threads only. Five specimens were subjected and 5 specimens were not subjected to the direct verification test, for comparison purposes. All test specimens subjected to the 2 second hold test passed the vibration testing.

The second set had 10 specimens with Loctite applied to the bolt threads only. Five specimens with 35 µL and five with 20 µL applied. The 20 µL application was added because the 35 µL application resulted in excess Loctite being forced on to the adjacent washers and fixtures that could influence the test results.

Test specimens were assembled in the NASM1312-7 test fixtures and mounted onto the vibration test table. Torque stripes were added to the bolt threads and nut element to indicate any rotation. See Figures 28 and 29.

NOTE: Vibration tests were performed on the nut elements only, rather than the complete nutplate, as shown in Figure 28, to comply with the requirements of NASM25027.

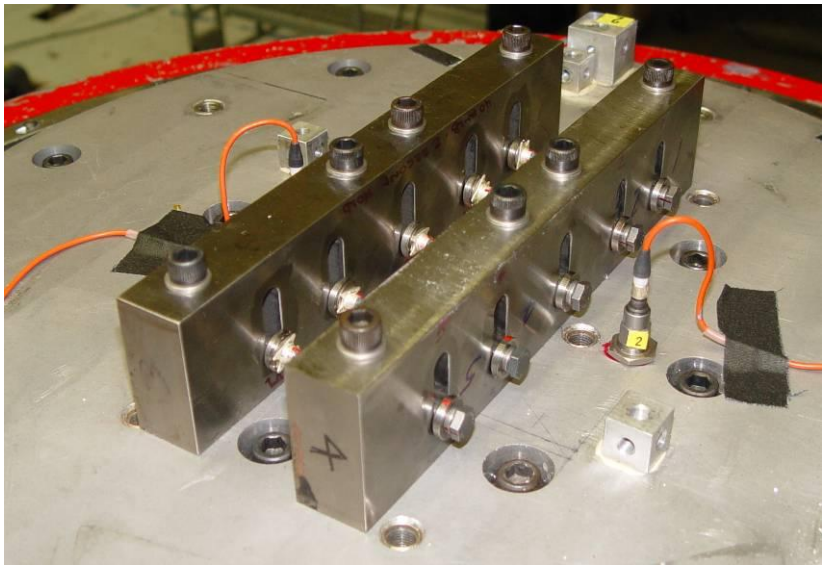

FIGURE 28 - TEST FIXTURES MOUNTED ON VIBRATION TEST TABLE

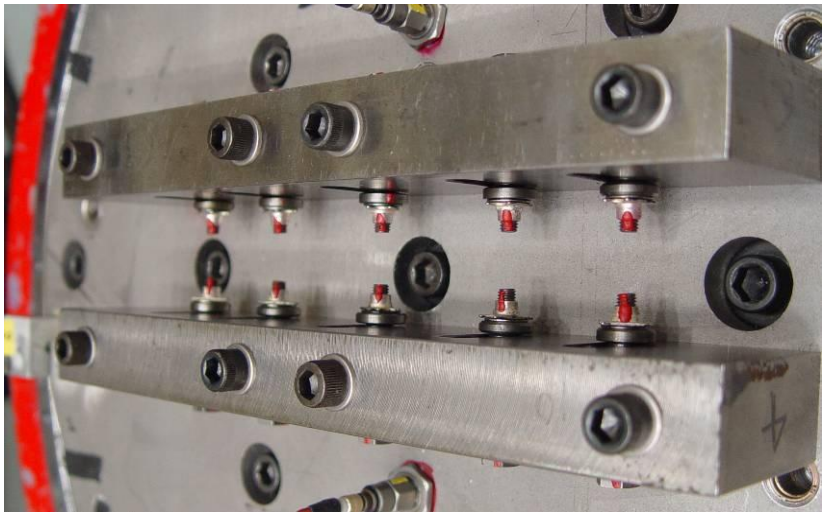

FIGURE 29 - VIBRATION TEST FIXTURES WITH TORQUE STRIPES

All specimens passed the vibration tests with no relative movement between bolt and nut after the required 30,000 cycles.

NOTE: NASM25027 allows 360 degrees rotation for the conventional self-locking nuts.

Additional vibration tests were performed on the same specimens after breaking the Loctite bond to remove any preload. Again, no movement observed after 30,000 additional cycles. Prior to disassembly, the breakaway torques were recorded. The breakaway torque range after two vibration tests for nut only application was 6.0 to 11.0 in-lb with an average of 8.5 in-lb. This compares closely with the range of 7.5 to 9.5 in-lb and the average of 8.6 in-lb found in Phase IIA for nut application only with 72 hours cure. The minimum breakaway torque per NASM25027 for this size fastener is 2.0 in-lb.

The specimens were disassembled and examined. The specimens with 20µL on the bolt threads only and 25µL on nut threads only had minimal Loctite on the test fixtures. Specimens with 35µL on the bolt threads had cured and uncured Loctite on the adjacent washers and test spools.

Bolts with Loctite applied to the nut element had cured Loctite in the thread engaged area and some in the threads that protrude from the nut element. No Loctite was found below the nut element and adjacent washer area of the test fixture.

Following is a summary of the results of the Phase IID testing, Table 11. The complete data sheets are included in Appendix B, Table B17.

TABLE 11- PHASE IID SUMMARY TABLE, DIRECT VERIFICATION TEST, VIBRATION TESTING

TEST PHASE IID NASM1312-7 VIBRATION TEST	LOCTITE APPLICATION AREA AND VOLUME	2 SECONDS HOLD AT 40 IN-LB	ROTATION AFTER 30,000 CYCLES	SECOND VIBRATION TESTS AFTER UNSEATING BOLT TO BREAK LOCTITE BOND AND NO PRELOAD
	(1) BOLT THREADS 35µL	YES	No rotation	No rotation after 30,000 cycles
	(2) BOLT THREADS 20µL	YES	No rotation	No rotation after 30,000 cycles
	NUT THREADS 25µL	YES	No rotation	No rotation after 30,000 cycles
	NUT THREADS 25µL	NO	No rotation	No rotation after 30,000 cycles

(1) 35µL volume of Loctite added to bolt threads resulted in excess Loctite migrating to washer under nut element and NASM1312-7 washer component.

(2) Due to excess Loctite noted in (1 above), the volume of Loctite was reduced to 20 µL on bolt thread. The Loctite was added to the upper portion of the threads near the lead.

The following (Figures 30-32) are photos showing the appearance of the Loctite on the bolt thread after the vibration tests.

FIGURE 30 - AFTER VIBRATION TEST - LOCTITE APPLIED TO NUT ELEMENT ONLY

Bolts with Loctite applied to the bolt threads had concentration of Loctite in the area in contact with the nut counterbore feature and the thread area adjacent to the fixture washer and

inside the fixture spool. There was no Loctite in the area that protrudes from the nut element. (See Figure 31 for 20µL application and Figure 32 for 35 µL application.) The nut element had some cured Loctite in the engaged area.

FIGURE 31 - AFTER VIBRATION TEST - 20 µL ON BOLT THREADS

FIGURE 32 - AFTER VIBRATION TEST - 35µL ON BOLT THREADS

CONCLUSIONS AND RECOMMENDATIONS

Phase I

The results of Phase I testing indicated that blind applications (i.e., closed inserts) without preload on the bolt showed reduced and/or variable degree of cure when compared to open applications. For example, examination of MP35N bolts installed with 078 Loctite has shown Loctite was not curing in the thread roots after 72 hours. It is theorized this may be because of non-intimate contact between the internal and external thread roots (no preload). In some cases, wet, uncured Loctite from the internal exit threads wetted the bolt threads extending beyond the end of the nut element during bolt removal. Also, uncured Loctite in the nut element/insert counter-bore area rewetted bolt threads previously bonded, during bolt removal. Because of wet Loctite reintroduced onto the bolt threads during test processing, the appearance of wetness on the bolt threads may be misleading. Therefore, relying totally on visual examination of the bolt threads is not considered the best indication of Loctite cure. Breakaway torque values should be used to determine acceptability of Loctite for a given fastener configuration (size, material, etc.).

Loctite 078 may be used for fastener size .1900-32 in open hole applications. One drop of Loctite applied to the bolt threads yielded best results. Two drops is considered excessive and will result in some Loctite dripping off.

For .1900-32 fasteners installed with Loctite 242, a 50%-coverage application is recommended. The breakaway torque values developed with this coverage were near mid-range of the NASM25027 torque requirements of 2 to 18 in-lb, and may also be the most suitable for other sizes as well. Further testing would be required to validate applicability to other fastener hardware configurations.

For Loctite 242, using more than 50%-coverage application (or other conditions) could result in exceeding a maximum breakaway torque of 18 inch-pounds. When a Loctite application requires anything less than 100% (one drop), a special applicator such as a micropipette is recommended. The use of 242 at 50%-coverage will limit contamination concerns while providing reasonable breakaway torque values.

Loctite 290 is a high-strength locking compound that results in very high breakaway and prevailing torque values. Removal of small .190 size fasteners installed with Loctite 290 would be problematic. Therefore, Loctite 290 should not be used with .190 fasteners unless the objective is a permanent installation.

These test results demonstrate the potential for using prevailing torque locking feature requirements (i.e., NASM25027) in the evaluation of adhesive locking features.

Phase I observations pointed to the need to evaluate the effect of preload on cure (and prevailing torque). Such an evaluation is problematic, since it would require a special test fixture which can release preload from the test fastener after the adhesive has cured and without any relative motion in the threads. The LFT also saw need for vibration testing (NASM1312-7; Method 7 Vibration), in order to tie use of prevailing torque locking feature characterics into the validation of adhesive locking features for design.

Phase II

Phase IIA intent was to determine the average breakaway torque of Loctite 242 without preload, for the specific threaded fastening system and process method detailed in this report. The data was used to establish a Verification Test Torque value which would be used to directly evaluate adhesive cure in subsequent tests. The Locking Features team selected 50% of the average break-loose torque for our Verification Test Torque, based on engineering judgment (a significant fraction of the cured adhesive's average strength, but not so much as to risk damage to adhesion).

Phase IIA testing then used the Verification Test Torque on a set of fasteners to determine if damage to the adhesion system was induced. During the two-second hold test (with 50% of break-loose torque in the "on" (CW) direction) some of specimens cured for 48 hours failed. A slightly longer cure time of 72 hours was selected for subsequent testing and yielded more consistent results. While more time may result in additional cure, more than 72 hours could be problematic for field use.

During the Phase IIA two-second hold testing, a break-loose test was also performed on the specimens, showing similar values as the established average break-loose torque. As a result, a verification test torque at 50% of the break-loose torque was considered acceptable (not damaging) and was used throughout the subsequent testing. A value higher than 50% may have increased the confidence level of Loctite cure. However, based on our test data, any increase in the verification test torque could result in bond strength degradation. The 4 in-lb verification test torque used in this test may be the practical limit for our test system because of the minimum break-loose torque value of 4.5 in-lb measured.

Phase IIC testing involved evaluating Loctite 242 using our fastener system with preload. The verification test torque (4 in-lb) was added to the installation torque (36 in-lb) to determine the Direct Verification Torque (40 in-lb). During Phase IIC, observations from direct verification torque testing were used to evaluate the quantity of Loctite used (minimizing contamination potential) and the use of washers under bolt heads.

Loctite 242 as applied in our open-hole application has a bond strength that is within the self-locking torque requirements of NASM25027 and meets the NASM1312-7 vibration test requirements, before and after subjecting the specimens to the direct verification torque per this test plan. Specimens were subsequently vibration tested after breaking the bond and removing fastener preload. All specimens passed the vibration test requirements with zero rotation, exceeding the requirements for the conventional self locking fasteners that allows up to 360 degrees rotation within the 30,000 cycles.

To reiterate, the results of Phase II testing indicate that the direct verification method has merit. But we also observed that our concern for the potential damage which could be induced during direct verification torque testing may be unfounded. Even after the adhesive bond was broken and preload (the primary locking feature) was relieved, our test configuration still exceeded the prevailing torque locking feature vibration test requirement.

Testing conducted under this project used well-cleaned fasteners, employing a standard cleaning method, and always applied a primer to ensure a consistent set of surface conditions. In so doing, the test program has clearly shown that the method (quantity and surface treated) of adhesive locking compound application to a fastener is critical to ensuring the necessary thread coverage and the exclusion of oxygen to effect cure. As a consequence, closed/sealed

applications are problematic. In addition, contamination potential or the unintended transfer of adhesive locking compound to neighboring structure during installation is real, as optimal methods of application may not be possible for some configurations. New application tools and procedures that would apply full Loctite coverage to the internal threads are needed to ensure optimum coverage in the thread engaged area and minimize/eliminate contamination to surrounding structures.

All specimens in this test plan were assembled in laboratory conditions where the fasteners were easily accessible. However, the direct verification method used in this test plan may not be practical in the field because maintaining a steady torque for 2 seconds could be difficult because of fastener orientations, close quarters, and awkward body positions.

These tests were also performed based on a single bolt installation without any added effects due to “cross talk” that is present in joints with multiple bolt patterns. Applications with multiple fastener patterns typically require incremental cross pattern bolt torque, resulting in temporary preload or torque loss of adjacent fasteners. During this process, an adhesive locking feature like Loctite 242 would be in the process of curing. Therefore, the direct verification torque method for multiple bolt patterns requires further investigation.

The specimens used in this study displayed minimal preload loss, but the typical preload loss has been reported to be around 10%. This test method may not be suitable for applications with different joint stiffness or increased installation torques, preloads, etc.

Consideration for the issues discussed in these Conclusions should be taken into account prior to usage of the direct verification torque method, and additional tests using actual design conditions should be performed to validate this method.

Please note that MIL-S-46163A is the performance specification for Loctite 242 and other anaerobic liquid locking compounds. This specification was cancelled on 4 May 2010 and superseded by ASTM D5363. ASTM D5363-03 is not a comparable replacement and each user should perform a review and evaluation prior to adoption for aerospace applications.

These results indicate that an adhesive locking feature can have performance characteristics equivalent or superior to the minimum requirements for prevailing torque locking features. Additional testing is recommended to corroborate our findings, to extend the test conditions evaluated to encompass other configurations of materials, finishes, fastener orientation, and fastener size, and to assess the sensitivity of the direct verification method for adhesive locking features.

APPENDIX A – PHASE I TESTING

APPENDIX A.1 - PHASE I TEST PROCEDURES

NESC SENSITIVITY TEST 1 - DETERMINE SENSITIVITY OF GRADE H (078) LOCTITE APPLICATION IN BLIND APPLICATIONS ON EXTERNAL THREADS ONLY

OBJECTIVE:

Using calibrated micropipette applicator, determine if Loctite applied to less than full thread coverage or more than full thread coverage (without drip off) compromises the bond strength.

MATERIALS:

TABLE A1 - MATERIALS - SENSITIVITY TEST 1

PART NUMBER	DESCRIPTION	REMARKS
NAS1003-6A	Hex bolt	Furnished by USA Logistics. Grips -5 and -7 optional
MD115-2002-0003	Insert, silver plated	Furnished by USA Logistics.
MD114-5011-0004	Dome nutplate	Furnished by USA Logistics
MS20426A3-6	Solid rivet	Furnished by USA Logistics Any flush head aluminum rivet optional. i.e., MD121-0001-0306
FIGURE 8	Long Block, Blind Inserts	Fabricate or purchased by Boeing.
FIGURE 9	Long Block, Blind Nutplates	Fabricate or purchased by Boeing.
Micropipette (5 to 50 µl)	Applicator	Manufactured by VWR Scientific Products
Loctite 078	Grade H per MIL-S-22473E	Furnished by USA Logistics. Select one production lot from those tested and approved in Lot Acceptance Test Document. Record lot number.
Primer T	Primer	Furnished by USA Logistics
Sturtevant p/n 850188 Model M101	Torque Wrench 0 to 10 in-lbs, .5 in-lbs graduation	Purchase by Boeing. Recommended source Automation Aides or Sturtevant. Required to accurately measure low breakaway torque
Besly P/N 15527	Besly Express Roll Tap (Plug style)	Purchase by Boeing. Recommended source Besly. Required to remove locking feature from inserts and dome nutplates Need bottom tap for blind applications.
Besly P/N 15528	Besly Express Roll Tap (Bottoming style)	
Cotton swab		
Acetone		
CRES spiral bristle brush		
Kimwipes® or terry cloth		

1 TEST PREPARATION

1.1 Obtain:
-NAS1003-6A bolts, as required
-Twenty (20) MD115-2002-0003 inserts
-Twenty (20) MD114-5011-0004 dome nutplates
-Two (2) Figure 8 - Long Block, Blind Insert
-Two (2) Figure 9 - Long Block, Blind Nutplate

1.2 Install twenty (20) MD115-2002-0003 inserts into two (2) Figure A1 - Long Blocks, Blind Inserts, per MA0101-304.

1.3 Rework insert locking feature per real time engineering directions to reduce locking feature to 1.9 in-lbs or less. (In most cases, the locking feature was reduced to zero.)
-Record the final residual static breakaway and dynamic run off torque achieved. The static breakaway torque is achieved in the off (counter clock) direction (no preload). The dynamic run off torque is the maximum dynamic torque during one revolution (360 degrees) after breakaway.
-Engineering to verify acceptability of insert reuse

1.4 Install twenty (20) MD114-5011-0004 dome nutplates on two (2) Figure A2 - Long Block, Blind Nutplates, with MS20426A3-6 rivets per MA0101-302.

1.5 Rework nutplate locking feature real time per engineering directions to reduce locking feature to 1.9 in-lbs. or less. (In most cases, the locking feature was reduced to zero.)
-Record the final residual static breakaway and dynamic run off torque achieved.
-Engineering to verify acceptability of nutplate reuse.

1.6 Clean both internal threads of inserts, nutplate element and bolt threads with terry cloth, Kimwipes® or cotton swab soaked with acetone, until no evidence of discoloration is observed.

1.7 Apply primer T on both external and internal threads to achieve full thread coverage. Allow primer to dry for 15 minutes minimum.

2 TEST PROCEDURE (100% COVERAGE)

2.1 Obtain four (4) clean bolts and apply Loctite 078 using applicator at different applicator settings to determine the minimum amount of Loctite to fully cover the bolt threads. Record applicator setting that produces this condition.

2.2 Take thirty two (32) bolts and set applicator as determined above and apply Loctite 078 at this setting to fully cover the bolt threads.

2.3 Install sixteen (16) bolts in Figure A1 Long Block, Blind Inserts, and sixteen (16) bolts in Figure A2 - Long Block, Blind Nutplates, until two threads minimum protrudes beyond the insert and dome nutplate element without bottoming out on blind side. No preload.
-Note: Install bolts within five (5) minutes after Loctite application.
-Note any loss of due to dripping.

2.4 Allow specimens to cure for 72 hours minimum.

2.5 Unseat bolts and record initial static breakaway torque and the dynamic run off torque at 90°, 180°, 270° and 360°.
-Calculate and record the average dynamic run off torque of the four readings
-Calculate and record the “net” run off torque. This is the difference between the average run off torque above and the maximum dynamic run off torque achieved in 1.3 for blind inserts and 1.5 for nutplates.

-Calculate and record the net static breakaway torque by subtracting the static breakaway torque measured after insert rework from the initial static breakaway torque measured after Loctite cure.

2.6 Identify specimens.

3 TEST PROCEDURE (50% COVERAGE)

3.1 Obtain thirty two (32) additional bolts and clean inserts and nutplates from previous test with terry cloth, Kimwipes® or cotton swab soaked with acetone. Nylon or CRES spiral bristle brushes may be used as required. New or used bolts may be used, but must be cleaned accordingly until discoloration is removed.

3.2 Record the final residual static breakaway and dynamic run off torque achieved.
-The static breakaway torque is achieved in the off (counter clock) direction (no preload).
-The dynamic run off torque is the maximum dynamic torque during one revolution after breakaway.

3.3 Set applicator to apply half (50%) the amount of Loctite and apply to bolt threads.

3.4 Record applicator setting.

3.5 Repeat steps 2.3 thru 2.6.

3.6 Identify specimens.

4 TEST PROCEDURE (125% COVERAGE)

4.1 Obtain thirty two (32) additional bolts and clean inserts and nutplates from previous test with terry cloth, Kimwipes® or cotton swab soaked with acetone. Nylon or CRES spiral bristle brushes may be used as required. New or used bolts may be used, but must be cleaned accordingly until discoloration is removed.

4.2 Record the final residual static breakaway and dynamic run off torque achieved.
-The static breakaway torque is achieved in the off (counter clock) direction (no preload)
-The dynamic run off torque is the maximum dynamic torque during one revolution after breakaway.

4.3 Set applicator to apply 125% the amount of Loctite in 3.2.1 and apply to bolt threads.

4.4 Record applicator setting.

4.5 Repeat steps 2.3 thru 2.6.

4.6 Identify specimens.

REPEAT STEPS 1 THRU 4 USING LOCTITE 242

REPEAT STEPS 1 THRU 4 USING LOCTITE 290

5 DATA EVALUATION

5.1 Evaluate the resulting data by comparing net static breakaway and net dynamic run off torques for each coverage amount to each other.

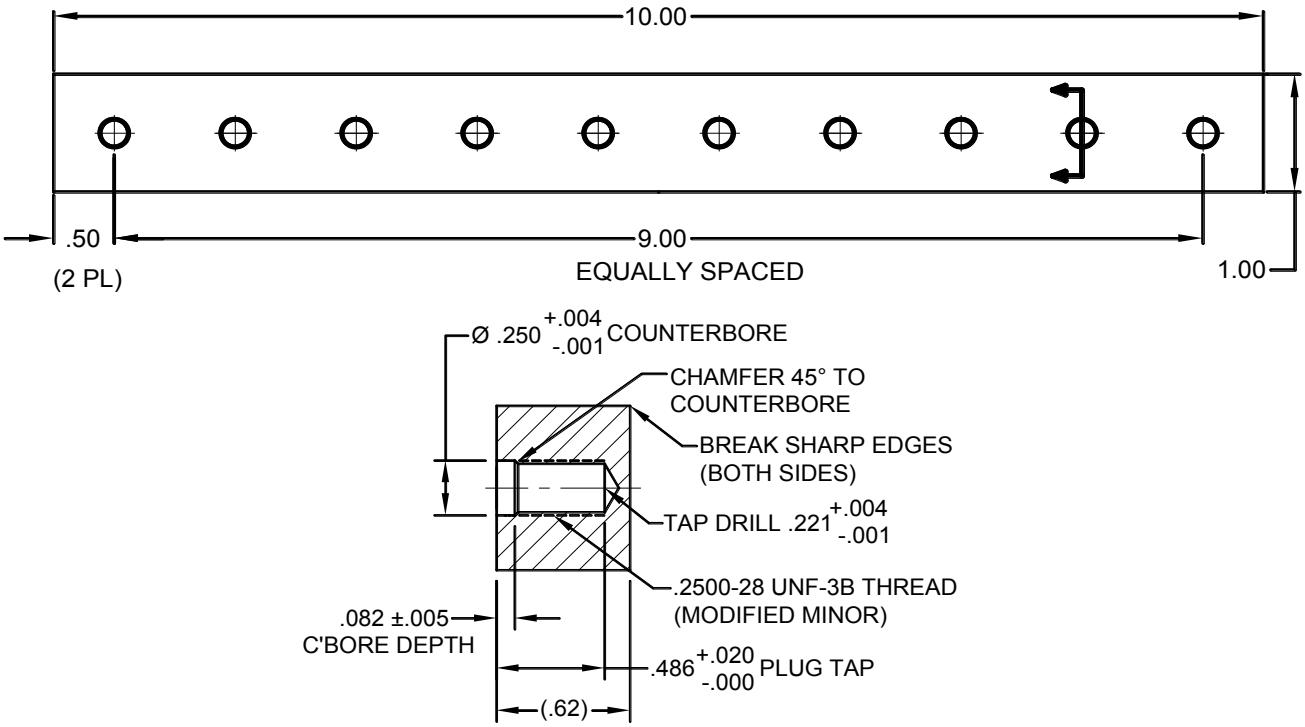

FIGURE A1 - LONG BLOCK, BLIND INSERTS (2 REQUIRED)
MATERIAL: 2219-T6 Aluminum Alloy

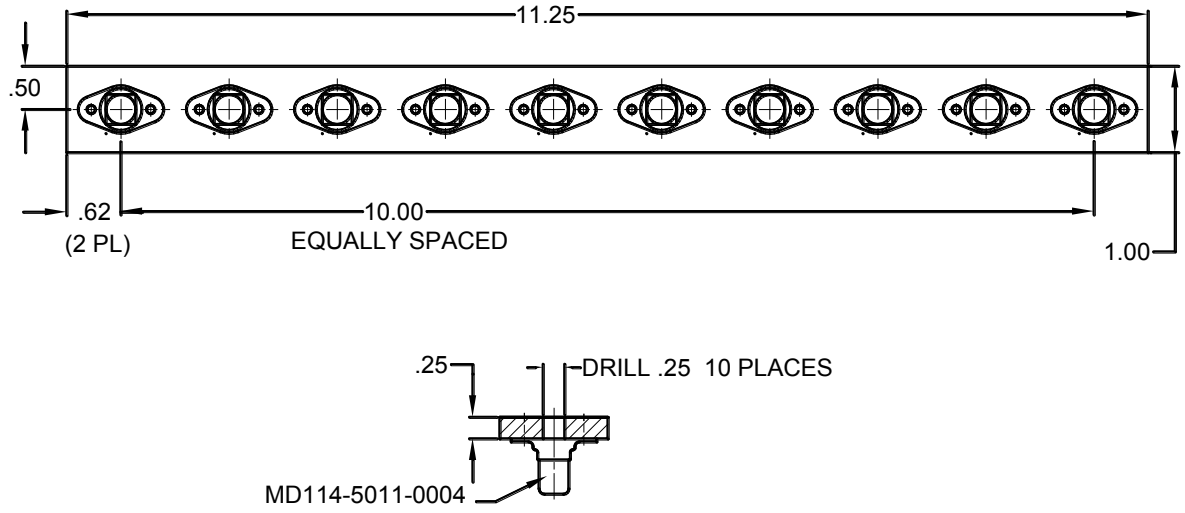

FIGURE A2 - LONG BLOCK, BLIND NUTPLATES (2 REQUIRED)
BLOCK MATERIAL: 2219-T6 ALUMINUM ALLOY

NESC SENSITIVITY TEST 1A - DETERMINE SENSITIVITY OF GRADE H LOCTITE APPLICATION IN BLIND APPLICATIONS ON INTERNAL THREADS ONLY

OBJECTIVE:

Compare bond strength between application of Loctite 078 on external threads only and application on internal threads only.

MATERIALS:

Same as Test 1, Table A1

1 TEST PREPARATION

Same as Test 1, except quantities required for bolts, inserts and nutplates

-NAS1003-6A bolts, as required
-Sixteen (16) MD115-2002-0003 inserts
-Sixteen (16) MD114-5011-0004 dome nutplates

2 TEST PROCEDURE

Same as Test 1, except:

-Quantities of hardware, as required
-Only 100% coverage was tested.
-Only Loctite 078 was tested

3 DATA EVALUATION

Evaluate the resulting data by comparing net static breakaway and net dynamic run off torques for each coverage amount to the values found in Sensitivity Test 1, Blind application with Loctite 078, 100% application on bolt threads only.

NESC SENSITIVITY TEST 1B - DETERMINE SENSITIVITY OF GRADE H LOCTITE APPLICATION IN OPEN APPLICATIONS ON EXTERNAL THREADS

OBJECTIVE:

Using calibrated applicator, determine if applied to less than full thread coverage or more than full thread coverage (without drip off) compromises the bond strength.

MATERIALS:

TABLE A2 - MATERIALS - SENSITIVITY TEST 1B

PART NUMBER	DESCRIPTION	REMARKS
NAS1003-6A	Hex Bolt	Furnished by USA Logistics. Grips -5 and -7 optional
MD115-2002-0003	Insert, silver plated	Furnished by USA Logistics.
MS21060-3	Nutplate	Furnished by USA Logistics
MS20426A3-6	Solid rivet	Furnished by USA Logistics Any flush head aluminum rivet optional, e.g., MD121-0001-0306
FIGURE 10	Long Block, Open Inserts	Fabricate or purchased by Boeing.
FIGURE 11	Long Block, Open Nutplates	Fabricate or purchased by Boeing.
Micropipette (5 to 50µl)	Applicator	Manufactured by VWR Scientific Products
Loctite 078	Grade H per MIL-S-22473E	Furnished by USA Logistics. Select one production lot from those tested and approved in Lot Acceptance Test Document.
Primer T	Primer	Furnished by USA Logistics
Sturtevant p/n 850188 Model M101	Torque Wrench 0 to 10 in-lbs, .5 in-lbs graduation	Purchase by Boeing. Recommended source Automation Aides or Sturtevant. Required to accurately measure low breakaway torque
Besly P/N 15527	Besly Express Roll Tap (Plug style)	Purchase by Boeing. Recommended source Besly. Required to remove locking feature from inserts and dome nutplates.
Besly P/N 15528	Besly Express Roll Tap (Bottoming style)	
Cotton swab		
Acetone		
CRES spiral bristle brush		
Kimwipes® or terry cloth		

1 TEST PREPARATION

1.1 Obtain:
-NAS1003-6A bolts, as required
-Twenty (20) MD115-2002-0003 inserts
-Twenty (20) MS21060-3 nutplates
-Two (2) Figure 10 - Long Block, Open Insert
-Two (2) Figure 11 - Long Block, Open Nutplate

1.2 Install twenty (20) MD115-2002-0003 inserts into two (2) Figure A3 - Long Block, Open Inserts, per MA0101-304.

1.3 Rework insert locking feature per real time engineering directions to reduce locking feature to 1.9 in-lbs or less. (In most cases, the locking feature was reduced to zero.)
-Record the final residual static breakaway and dynamic run off torque achieved.
The static breakaway torque is achieved in the off (counter clock) direction (no preload)
The dynamic run off torque is the maximum dynamic torque during one revolution (360 degrees) after breakaway.
-Engineering to verify acceptability of insert reuse

1.4 Install twenty (20) MS21060-3 nutplates on two (2) Figure A4 - Long Block, Open Nutplates, with MS20426A3-6 rivets per MA0101-302.

1.5 Rework nutplate locking feature real time per engineering directions to reduce locking feature to 1.9 in-lbs. or less. (In most cases, the locking feature was reduced to zero.)
-Record the final residual static breakaway and dynamic run off torque achieved.
-Engineering to verify acceptability of nutplate reuse.

1.6 Clean both internal threads of inserts, nutplate element and bolt threads with terry cloth, Kimwipes® or cotton swab soaked with acetone, until no evidence of discoloration is observed.

1.7 Apply primer T on both external and internal threads to achieve full thread coverage. Allow primer to dry for 15 minutes minimum.

2 TEST PROCEDURE (100% COVERAGE, 35 µl)

2.1 Obtain four (4) clean bolts and apply Loctite 078 using applicator at different applicator settings to determine the minimum amount of Loctite to fully cover the bolt threads. Record applicator setting that produces this condition.

2.2 Take thirty two (32) bolts and set applicator setting determined in 2.1 and apply Loctite 078 at this setting to fully cover the bolt threads.

2.3 Install sixteen (16) bolts in Figure A3 - Long Block, Open Inserts, and sixteen (16) bolts in Figure A4 - Long Block, Open Nutplates, until two threads minimum protrudes beyond the insert and nutplate element. No preload.
-Note: Install bolts within five (5) minutes after Loctite application.
-Note any loss of due to dripping.

2.4 Allow specimens to cure for 72 hours minimum.

2.5 Unseat bolts and Record initial static breakaway torque and the dynamic run off torque at 90°, 180°, 270° and 360°.
-Calculate and record the average dynamic run off torque of the four readings
-Calculate and record the “net” run off torque. This is the difference between the average run off torque and the maximum dynamic run off torque achieved in 1.3 for open inserts and 1.5 for open nutplates.

-Calculate and record the net static breakaway torque by subtracting the static breakaway torque measured after insert rework from the initial static breakaway torque measured after Loctite cure.

2.6 Identify the specimens.

3 TEST PROCEDURE (50% COVERAGE, 17µl)

3.1 Obtain thirty two (32) additional bolts and clean inserts and nutplates from previous test with terry cloth, Kimwipes® or cotton swab soaked with acetone. Nylon or CRES spiral bristle brushes may be used as required. New or used bolts may be used, but must be cleaned accordingly until discoloration is removed.

3.2 Record the final residual static breakaway and dynamic run off torque achieved.
-The static breakaway torque is achieved in the off (counter clock) direction (no preload)
-The dynamic run off torque is the maximum dynamic torque during one revolution after breakaway.

3.3 Set applicator to apply half (50%) the amount of Loctite in 2.1 and apply to bolt threads.

3.4 Record applicator setting.

3.5 Repeat steps 2.3 thru 2.6.

3.6 Identify the specimens.

4 TEST PROCEDURE (125% COVERAGE)

4.1 Obtain thirty two (32) additional bolts and clean inserts and nutplates from previous test with terry cloth, Kimwipes® or cotton swab soaked with acetone. Nylon or CRES spiral bristle brushes may be used as required. New or used bolts may be used, but must be cleaned accordingly until discoloration is removed.

4.2 Record the final residual static breakaway and dynamic run off torque achieved.
The static breakaway torque is achieved in the off (counter clock) direction. (no preload)
The dynamic run off torque is the maximum dynamic torque during one revolution after breakaway.

4.3 Set applicator to apply 125% the amount of Loctite in 2.1 and apply to bolt threads.

4.4 Record applicator setting.

4.5 Repeat 2.3 thru 2.6.

4.6 Identify specimens

REPEAT STEPS 1 THRU 4 USING LOCTITE 242

REPEAT STEPS 1 THRU 4 USING LOCTITE 290

5 DATA EVALUATION

5.1 Evaluate the resulting data by comparing net static breakaway and net dynamic run off torques for each coverage amount to each other.

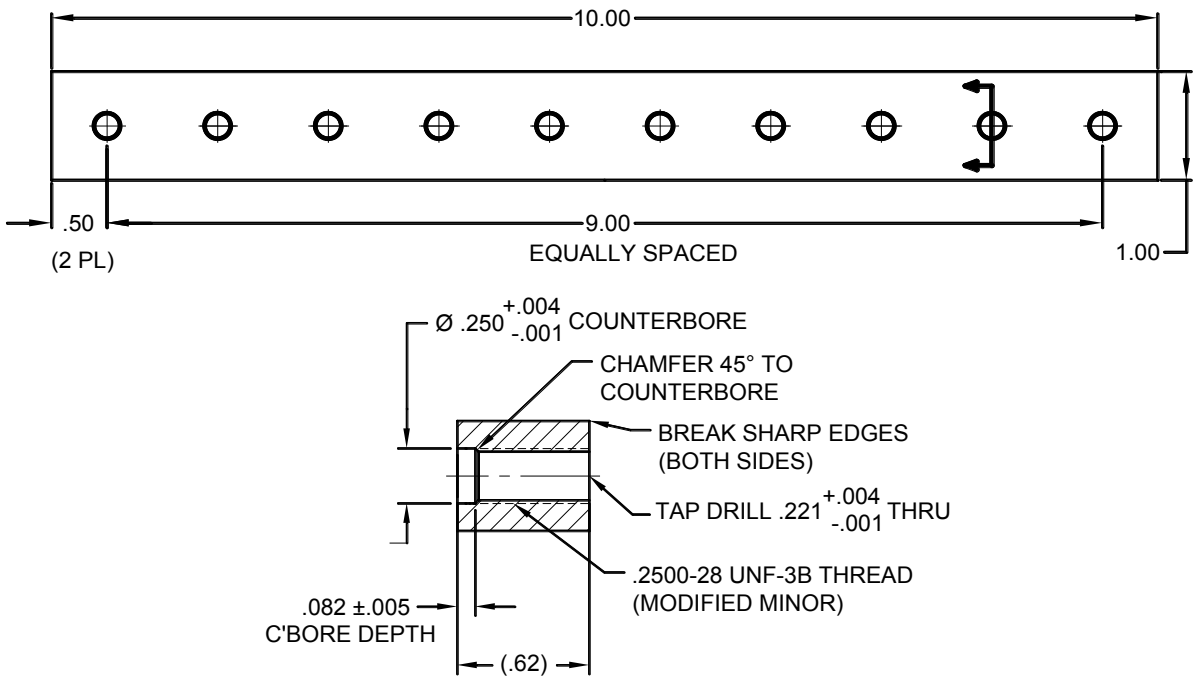

FIGURE A3 - LONG BLOCK, OPEN INSERTS (2 REQUIRED)

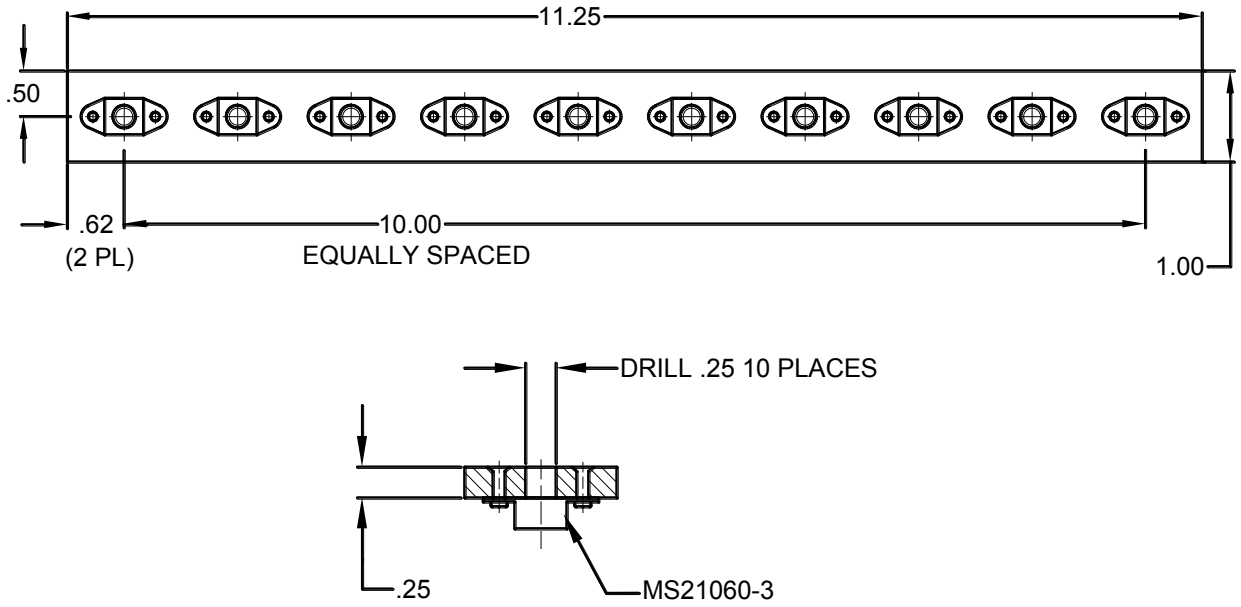

FIGURE A4 - LONG BLOCK, OPEN NUTPLATES (2 REQUIRED)

NESC SENSITIVITY TEST #2 - CURE TIME

OBJECTIVE:

Determine Loctite bond strength as a function of time using Grade H Loctite (Loctite 078), Loctite 240 and Loctite 290.

MATERIALS:

Same as Test 1, Table A1

1 TEST PREPARATION

Same as Test 1, except quantities for bolts

-NAS1003-6A bolts, as required

2 TEST PROCEDURE

2.1 Apply Loctite 078 to hardware per application method adopted in Sensitivity Test 1. Record Loctite lot number and applicator setting.

2.2 Install twenty (20) NAS1003 bolts in Figure A1 - Long Block, Blind Inserts, until two (2) threads minimum protrudes beyond the insert without bottoming out on blind side (no preload).

-Note: Install bolts within five (5) minutes after application of Loctite.

2.3 Allow specimens to cure for:

3 to 3.5 hours and unseat five (5) bolts
8 to 8.5 hours and unseat five (5) bolts
24 to 24.5 hours and unseat five (5) bolts
48 to 48.5 hours and unseat five (5) bolts

2.4 Unseat bolts and record initial static breakaway torque and the dynamic run off torque at 90°, 180°, 270° and 360°.

-Calculate and record the average dynamic run off torque of the four readings

-Calculate and record the "net" run off torque.

2.5 Install twenty (20) NAS1003 bolts in Figure A2 - Long Block, Blind Nutplates, until two (2) threads minimum protrudes beyond the nut element without bottoming out on blind side (no preload).

-Note: Install bolts within five (5) minutes after application of Loctite.

2.6 Allow specimens to cure for:

3 to 3.5 hours unseat five (5) bolts
8 to 8.5 hours and unseat five (5) bolts
24 to 24.5 hours and unseat five (5) bolts
48 to 48.5 hours and unseat five (5) bolts

2.7 Record initial static breakaway torque and the dynamic run off torque at 90°, 180°, 270° and 360°.

-Calculate and record the average dynamic run off torque of the four readings

-Calculate and record the "net" run off torque.

REPEAT TEST EXCEPT USE LOCTITE 242

REPEAT TEST EXCEPT USE LOCTITE 290

3 DATA EVALUATION

3.1 Evaluate data and establish minimum recommended cure time for each Loctite tested.

NESC DIRECT VERIFICATION TORQUE TEST

OBJECTIVE:

Assess effect of direct verification torque test on Loctite performance.

MATERIALS:

TABLE A3 - MATERIALS NEEDED - DIRECT VERIFICATION

PART NUMBER	DESCRIPTION	QUANTITY
NAS1003-6A	0.1900-32 UNJF-3A non-locking hex bolt	80
MD114-5028-0003	Non-locking nutplate	80
Micropipette (5 to 50 µl)	Applicator	Manufactured by VWR Scientific Products
Loctite 078	Very low strength anaerobic adhesive	1
Loctite 242	Medium strength anaerobic adhesive	1
Loctite primer T	Loctite primer 7471	2
Sturtevant 850222, M251	Torque wrench (0 to 25 in-lbs; 1 in-lbs increments)	1
Cotton Swab		As required
Acetone		As required
CRES spiral bristle brush		As required
Kimwipes® or terry cloth		As required

1 TEST PROCEDURE - Direct verification test with Loctite 078

1.1 -Obtain forty (40) MD114-5028-0003 non-locking nutplate and fabricate four (4) Figure 1 nutplate assemblies.
-Obtain forty (40) NAS1003-6A bolts

1.2 Clean threads of all bolts and nutplates with terry cloth, “Kimwipes” or cotton swab soaked with acetone.

1.3 Apply primer T on both external and internal threads to achieve full thread coverage. Allow primer to dry for 15 minutes minimum.

1.4 Apply Loctite 078 on both external threads per application method adopted in sensitivity test #1. Record Loctite lot number and applicator setting.

1.5 Install 40 bolts into 40 non-locking nut-plates until two (2) threads minimum protrudes beyond the nut element without bottoming out on blind side.(No preload)
Note: Install bolts within five (5) minutes after application of Loctite.
Allow specimens to cure for TBD hours adopted in sensitivity test #2

1.6 Secure nutplate assembly in a vice and use torque wrench to apply removal torque to ten (10) bolts.
-Record initial static breakaway torque and the dynamic prevailing torque at 90°, 180°, 270° and 360°.

-Calculate and record the average dynamic prevailing torque of the four readings for each bolt.
-Calculate and record the average static breakaway torque for the ten (10) bolts
-Calculate and record 50% of the average static breakaway torque. This will be used as the verification torque

1.7 Secure nutplate assembly in a vice and use torque wrench to apply counterclockwise torque equal to verification torque value to the remaining bolts. Hold verification torque for two (2) seconds.
Note: Stop test if bolt fails to maintain hold verification torque and discuss next step with the NESC working group.

1.8 Repeat step 1.6 for ten (10) more bolts

1.9 Repeat step 1.7 two more times

1.10 Repeat step 1.6 for ten (10) more bolts

1.11 Repeat step 1.7 two more times

1.12 Repeat step 1.6 and 1.7 for remaining ten (10) bolts

REPEAT TEST EXCEPT USE LOCTITE 242

2 DATA EVALUATION

2.1 Plot static breakaway torque vs. number of verification tests (i.e., 0, 1, 3, 5) for each Locite grade

2.2 Plot dynamic prevailing torque vs. number of verification tests for each Loctite grade

2.3 Assess effect of direct verification torque tests on performance, i.e., static breakaway torque and dynamic prevailing torque

APPENDIX A.2 – PHASE I TEST DATA SHEETS

TABLE A4. TEST DATA WITH OBSERVATIONS - SUMMARY OF TABLES

Color codes correspond to Loctite 078, 242, and 290 compound colors

USA TEST 1 - BLIND INSERTS - LOCTITE 078	50% (15µl) ON BOLT ONLY	MD111-3001-0314 BOLT/MD115-2002-0003 INSERT	141
USA TEST 1 - BLIND INSERTS - LOCTITE 078	125% (38µl) ON BOLT ONLY	MD111-3001-0314 BOLT/MD115-2002-0003 INSERT	144
TEST 1C (NEW) - BLIND NUTPLATES - L0CTITE 078	15µl ON BOLT AND 7.5 µl ON INTERNAL THREADS ONLY	MD111-3001-0314 BOLT/MD114-5011-0004 NUTPLATE	146
TEST 1C (NEW) - BLIND INSERTS - L0CTITE 078	15µl ON BOLT AND 7.5 µl ON INTERNAL THREADS ONLY	MD111-3001-0314 BOLT/MD115-2002-0003 INSERT	148
TEST 1A (NEW) - BLIND NUTPLATES - LOCTITE 078	100% (17µl) APPLIED ON NUTPLATE ONLY	NAS1003-7A BOLT WITH MD114-5011-0004 ANCHOR	150
TEST 1A (NEW) - BLIND INSERTS - LOCTITE 078	100% (17µl) APPLIED ON INSERT ONLY	NAS1003-7A BOLTS WITH MD115-2002-0003 INSERTS	152
NESC TEST 1B - OPEN NUTPLATES - LOCTITE 078	100% (35µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MS21060-3 NUTPLATE	155
NESC TEST 1B - OPEN NUTPLATES - LOCTITE 078	50% (17µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MS21060-3 NUTPLATE	158
NESC TEST 1B - OPEN NUTPLATES - LOCTITE 078	125% (45µl)) ON BOLT ONLY	NAS1003 BOLT/MS21060 NUTPLATE	161
NESC TEST 1B - OPEN INSERTS - LOCTITE 078	100% (35µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MD115-2002-0003	166
NESC TEST 1B - OPEN INSERTS - LOCTITE 078	50% (17µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MD115-2002-0003	168
NESC TEST 1B - OPEN INSERTS - LOCTITE 078	125% (45µl) ON BOLT ONLY	NAS1003 BOLT/MD115-2002-0003 INSERT	172
NESC TEST 1B - OPEN NUTPLATES - LOCTITE 242	100% (35 µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MS21060-3 NUTPLATE	176
NESC TEST 1B - OPEN NUTPLATES - LOCTITE 242	50% (17µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MS21060-3 NUTPLATE	179
NESC TEST 1B - OPEN NUTPLATES - LOCTITE 242	125% (45 µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MD114- NUTPLATE MOD	184
NESC TEST 1B - OPEN INSERTS - LOCTITE 242	100% (35µl) ON BOLTS ONLY	NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS	189
NESC TEST 1B - OPEN INSERTS - LOCTITE 242	50% (17µl) ON BOLTS ONLY	NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS	192
NESC TEST 1B - OPEN INSERTS - LOCTITE 242	125% (45 µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MD114- NUTPLATE MOD	196
NESC TEST 1B - OPEN NUTPLATES - LOCTITE	100% (35 µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MS21060-3	200

290		NUTPLATE	
NESC TEST 1B - OPEN INSERTS - LOCTITE 290	100% (35 µl) ON BOLT ONLY	NAS1003-XX BOLT WITH MS21060-3 NUTPLATE	203
NESC TEST 1B - OPEN NUTPLATES - LOCTITE 290	50% (17µl) ON BOLT ONLY	NAS1003 BOLT/MD114-5011-0004 NUTPLATE (OPENED)	207
NESC TEST 1B - OPEN INSERTS - LOCTITE 290	50% (17µl) ON BOLT ONLY	NAS1003 BOLT/MD115-2002-0003 INSERT	212
SPECIAL BLIND INSERT TEST	078 AND 242 FILLED	NAS1003 BOLT/MD115-2002-0003 INSERT	216

NESC TEST #1 BLIND NUTPLATES - LOCTITE 078
100% (35µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 100% (35µl)	1	0	7.5	7.5	0	6.5	6.5	5.0	5.0	5.8	**5.8**	1NP: 1ST, 2ND & 3RD THREADS → DRY 4TH & 5TH THREADS → DRIED WHITE CRYSTALLINE POWDER 6TH THREAD → BUILD-UP OF WET TRANSLUCENT PINK LOCTITE NUT PLATE: COUNTERBORE → NO EVIDENCE OF LOCTITE
	2	0	4.5	4.5	0	2.5	2.0	2.0	2.0	2.1	**2.1**	2NP: 1ST 4 THREADS → WHITE OPAQUE TO PINK CRYSTALLINE LOCTITE 5TH & 6TH THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: SPORADIC PINK BUILD-UP OF LOCTITE IN THREADS
	3	0	8.0	8.0	0	6.5	6.5	5.0	3.5	5.8	**5.8**	3NP: 1ST & 2ND THREADS → DRY 3RD & 4TH THREADS → WHITE CRYSTALLINE LOCTITE NUT PLATE: SPORADIC PINK BUILD-UP OF LOCTITE IN THREADS
	4	0	7.5	7.5	0	5.5	5.0	5.0	5.0	5.1	**5.1**	4NP: 1ST & 2ND THREADS → DRY 3RD THREAD → PINK DRY TRANSLUCENT CRYSTALLINE LOCTITE NUT PLATE: NO EVIDENCE OF LOCTITE
	5	0	5.0	5.0	0	3.0	3.0	3.0	2.5	2.9	**2.9**	5NP: DID NOT EXAMINE NUT PLATE: DID NOT EXAMINE
	6	0	6.5	6.5	0	5.0	4.5	4.5	2.0	4.0	**4.0**	6NP: 1ST THREAD → WET OPAQUE SALMON LOCTITE 2 THRU 6 THREADS → WET TRANSLUCENT PINK FILM IN THREAD ROOTS
	7	0	7.0	7.0	0	5.0	4.5	5.5	5.5	5.1	**5.1**	7NP: ALL THREADS → CLEAR WET FILM OF LOCTITE 7TH THREAD → SEMI CURED SALMON COAT OF LOCTITE NUT PLATE: SEVERAL THREADS → PINK CRYSTALLINE LOCTITE
	8	0	3.0	3.0	0	2.0	2.0	2.0	2.0	2.0	**2.0**	8NP: 1ST 2 THREADS DRY 3 THRU 4 THREADS → SEMI CURED TRANSLUCENT PINK GEL NUT PLATE: EXIT THREADS → PINK CRYSTALLINE LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	9	0	7.5	7.5	0	7.0	7.0	6.0	4.5	6.1	**6.1**	9NP:1ST 4 THREADS → FROM WHITE CRYSTALLINE TO PINK GEL LOCTITE NUT PLATE: SPORADIC THREADS AND COUNTERBORE → PINK GEL LOCTITE
	10	0	2.5	2.5	0	2.0	2.0	1.5	1.0	1.6	**1.6**	10NP: NUT PLATE: EXIT THREADS → PINK CRYSTALLINE LOCTITE
	11	0	7.5	7.5	0	8.5	8.5	6.5	5.5	7.3	**7.3**	11NP: 1ST 4 THREADS → DRY 5TH & 6TH THREADS PINK CRYSTALLINE LOCTITE 7TH , 8TH & 9TH THREADS → PINK GEL LOCTITE NUT PLATE: SPORADIC INSTANCES OF CURED PINK-SALMON CRYSTALLINE LOCTITE
	12	0	3.0	3.0	0	2.0	1.5	1.5	1.5	1.6	**1.6**	12NP: ALL THREADS → WET CLEAR LOCTITE FILM IN THREAD ROOTS NUT PLATE: SPORADIC TRACES OF CURED PINK CRYSTALLINE LOCTITE LAST 2 THREADS → CURED SALMON CRYSTALLINE LOCTITE
	13	0	4.0	4.0	0	2.5	2.5	2.5	2.5	2.5	**2.5**	13NP: 1ST & 2ND THREADS → DRY 3RD & 4TH THREADS → PINK CRYSTALLINE LOCTITE 5TH & 6TH THREADS → OPAQUE PINK GEL NUT PLATE: SPORADIC TRACES OF CURED SALMON CRYSTALLINE LOCTITE
	14	0	3.5	3.5	0	2.5	2.0	2.0	1.5	2.0	**2.0**	14NP: 1ST 3 THREADS → DRY 4TH, 5TH, & 6TH THREADS → SEMI CURED TRANSLUCENT PINK GEL ANY REMAINING THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: MINUTE TRACES OF SEMI CURED TRANSLUCENT PINK GEL
	15	0	5.5	5.5	0	5.0	4.5	3.5	3.5	4.1	**4.1**	15NP: ALL THREADS → CLEAR WET FILM IN THREAD ROOTS NUT PLATE: LAST 3 THREADS → SEMI CURED TRANSLUCENT PINK

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												GEL
	16	0	3.0	3.0	0	1.0	1.0	1.0	1.0	1.0	**1.0**	16NP: ALL THREADS → CLEAR WET PINK COAT OF LOCTITE NUT PLATE: ALL THREADS & COUNTERBORE ONE SIDE → SEMI CURED TRANSLUCENT PINK GEL
		AVE		**5.34**		**4.0**	**3.9**	**3.5**	**3.0**			

NESC TEST #1 BLIND NUTPLATES - LOCTITE 078
125% (45µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 125% (45µl)	1	0	2.5	2.5	0	7.5	6.0	5.5	5.0		**6.0**	1NP: BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	2	0	1.5	1.5	0	5.5	2.5	2.5	2.5		**3.3**	2NP: BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA 4TH THREAD → PINK CRYSTALLINE DRY LOCTITE BUILD-UP DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	3	0	2.0	2.0	0	9.5	6.0	4.0	4.0		**5.8**	3NP: BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	2.0	2.0	0	6.0	2.5	2.0	1.5		**3.0**	4NP: ALL THREADS → CLEAR WET TO DRY SALMON LOCTITE BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	5	0	1.5	1.5	0	6.5	2.5	2.0	2.0		**3.3**	5NP: BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	6	0	2.0	2.0	0	8.5	5.5	4.0	2.5		**5.1**	6NP: BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	0	1.0	1.0	0	4.0	1.5	1.0	1.0		**1.9**	7NP: BUILD-UP OF LOCTITE IN THE THREADS UP TO THE MAJOR DIAMETER AND UP TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	8	0	1.5	1.5	0	8.0	5.0	4.5	4.5		**5.5**	8NP: 1ST 4 THREADS → PINK CRYSTALLINE DRY LOCTITE BUILD-UP OF LOCTITE IN THE THREADS UP TO THE MAJOR DIAMETER AND UP TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	9	0	2.0	2.0	0	9.5	5.5	4.5	4.5		**6.0**	9NP: 2ND THRU 5TH THREADS → BUILD-UP OF CLEAR PINK CRYSTALLINE LOCTITE BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	10	0	2.0	2.0	0	5.0	2.5	2.5	2.5		**3.1**	10NP: 2ND THRU 5TH THREADS → BUILD-UP OF CLEAR PINK CRYSTALLINE LOCTITE BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: DRY BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	11	0	2.0	2.0	0	9.0	6.0	6.0	5.0		**6.5**	11NP: 2ND THRU 5TH THREADS → BUILD-UP OF CLEAR PINK CRYSTALLINE LOCTITE BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	12	0	2.5	2.5	0	9.0	6.0	4.0	3.5		**5.6**	12NP: 2ND THRU 5TH THREADS → BUILD-UP OF CLEAR PINK CRYSTALLINE LOCTITE BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT & WHITE CRYSTALLINE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												LOCTITE IN INTERNAL THREADS
	13	0	1.5	1.5	0	7.0	2.0	2.0	3.0		**3.5**	13NP: 2ND THRU 5TH THREADS → BUILD-UP OF CLEAR PINK CRYSTALLINE LOCTITE BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	14	0	2.5	2.5	0	9.5	4.5	3.5	3.0		**5.1**	14NP: 1ST THREAD → CLEAR PINK CRYSTALLINE LOCTITE 2ND & 3RD THREADS → WHITE CRYSTALLINE FIBERS 4TH, 5TH, & 6TH THREADS → CRYSTALLINE PINK DRY LOCTITE REMAINING THREADS → WET CLEAR PINK LOCTITE BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 11-06-09/2:05PM**
BOLT REMOVAL DATE/TIME 11-09-09/1:00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)						OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE 90°	180°	270°	360°	AVE	(5") AVE NET	
	15	0	2.5	2.5	0	9.0	5.5	4.0	3.0		**5.4**	15NP: 2ND THRU 5TH THREADS → BUILD-UP OF CLEAR PINK CRYSTALLINE LOCTITE BUILD-UP OF LOCTITE IN THE THREAD TO SHANK AREA DEFINITE TEAR ACROSS LOCTITE DUE TO TWISTING REMAINING THREADS → WET RED TO CLEAR LOCTITE NUT PLATE: BUILD-UP OF LOCTITE FOUND ON THE BOLT SHANK ORIGINATED FROM THE COUNTERBORE OF THE NUT ELEMENT & BOLT HOLE SOME INDICATION OF TRANSLUCENT LOCTITE IN INTERNAL THREADS
	16	0	2.5	2.5	0	5.5	2.5	2.5	2.5		**3.3**	16NP: VERY LITTLE INDICATIONS OF LOCTITE IN BOLT THREADS MOST OF THE LOCTITE STAYED INSIDE THE NUT PLATE & COUNTERBORE NUT PLATE: COUNTERBORE & THREADS → FILLED WITH TRANSLUCENT SALMON LOCTITE
		AVE		**2.0**		**7.4**	**4.1**	**3.4**	**3.1**			
	125% specimens have initial static breakaway torque values as shown, then the prevailing torque builds up and has second breakaway appears after 10 to 30 degrees rotation. Did not record actual breakaway torque The low breakaway was later determined to be due to the floating nut element moving in the CCW direction until it rested against nutplate base. The values at 90 degrees may be closer to the true breakaway torque.											

NESC TEST #1 BLIND INSERTS - LOCTITE 078
100% (35µl)

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 100% (35µl)	1	0	1.5	1.5	0	1.0	.5	.5	.5	.625	**0.6**	1I: SKIPPED INSERT: SKIPPED
	2	0	.5	.5	0	.5	.5	.5	.5	.5	**0.5**	2I: 1ST 4 THREADS → SOME INDICATIONS OF DRY TRANSLUCENT SALMON LOCTITE 5 THRU 12 THREADS → DRY WITH NO INDICATIONS OF LOCTITE INSERT: 1ST 2 THREADS PINK COAT OF TRANSLUCENT SALMON LOCTITE
	3	0	1.5	1.5	0	.5	.5	.5	.5	.5	**0.5**	3I: SKIPPED INSERT: SKIPPED
	4	0	4.0	4.0	0	2.0	1.5	.5	.5	.5	**1.1**	4I: SKIPPED INSERT: SKIPPED
	5	0	4.0	4.0	0	3.0	2.5	2.5	1.0	1.0	**2.3**	5I: SKIPPED INSERT: SKIPPED
	6	0	8.5	8.5	0	6.0	5.0	5.5	5.5	5.5	**5.5**	6I: ALL THREADS → SOME INDICATIONS OF DRY TRANSLUCENT SALMON LOCTITE INSERT: 1ST 2 THREADS → PINK COAT
	7	0	1.5	1.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	7I: SKIPPED INSERT: SKIPPED
	8	0	4.0	4.0	0	2.5	2.0	1.0	.5	1.5	**1.5**	8I: SKIPPED INSERT: SKIPPED
	9	0	5.0	5.0	0	3.0	1.5	.5	.5	1.375	**1.4**	9I: SKIPPED INSERT: SKIPPED
	10	0	4.0	4.0	0	2.0	2.0	2.0	2.0	2.0	**2.0**	10I: 1ST 8 THREADS → PINK GEL COAT INSERT: SKIPPED
	11	0	5.0	5.0	0	2.5	2.5	2.5	2.5	2.5	**2.5**	11I: SKIPPED

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												INSERT: SKIPPED
	12	0	4.0	4.0	0	2.0	2.0	2.0	1.5	1.875	**1.9**	12I: SKIPPED INSERT: SKIPPED
	13	0	3.0	3.0	0	1.0	.5	0+	.5	.5	**0.5**	13I: ALL THREADS → SOME INDICATIONS OF SLIGHTLY WET TO DRY LOCTITE 10^{TH} & 11^{TH} THREADS → BUILD UP OF SALMON DRY LOCTITE INSERT: NO INDICATION OF LOCTITE
	14	0	5.0	5.0	0	2.5	2.0	2.0	2.0	2.125	**2.1**	14I: SKIPPED INSERT: SKIPPED
	15	0	7.0	7.0	0	3.5	2.5	1.5	.5	2.0	**2.0**	15I: SKIPPED INSERT: SKIPPED
	16	0	9.5	9.5	0	5.5	4.5	4.0	3.5	4.375	**4.4**	16I: ALL THREADS → SOME INDICATION OF DRY TRANSLUCENT SALMON LOCTITE INSERT: 1^{ST} 2 THREADS → PINK COAT
		AVE		**5.34**		**2.4**	**1.9**	**1.6**	**1.4**			

NESC TEST #1 BLIND INSERTS - LOCTITE 078
125% (45µl)

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 125% (45µl)	1	0	2.5	2.5	0	1.0	1.0	1.0	.5		**0.9**	II: ALL THREADS → CLEAR WET RED TO ORANGE TINGE FILM OF LOCTITE IN THREAD ROOTS INSERT: 1ST THREAD + COUNTERBORE TRANSLUCENT PINK TO SALMON HEAVY COAT OF LOCTITE REMAINING THREADS →SOME INDICATION OF LOCTITE IN THREAD ROOTS
	2	0	4.0	4.0	0	2.5	2.0	1.5	.5		**1.6**	2I: 1ST 4 THREADS → INDICATIONS OF CLEAR WET FILM OF LOCTITE 5TH & 6TH THREADS → CLEAR RED-PINK CRYSTALLINE LOCTITE 7TH, 8TH, & 9TH THREADS → CLEAR WET RED-PINK TRANSLUCENT COAT OF LOCTITE REMAINING THREADS + SHANK → BUILD-UP OF WET LOCTITE IN THE THREAD TO SHANK INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	3	0	4.0	4.0	0	2.5	2.0	2.0	1.0		**1.9**	3I: 1ST 4 THREADS → SOME INDICATIONS OF CLEAR WET FILM OF LOCTITE 5TH & 6TH THREADS → CLEAR WET LOCTITE IN THREAD ROOTS 7TH, 8TH → CLEAR WET RED-PINK TRANSLUCENT COAT OF LOCTITE 9TH & 10TH THREADS → CLEAR RED-PINK CRYSTALLINE LOCTITE REMAINING THREADS + COUNTERBORE → BUILD-UP OF WET LOCTITE IN THE THREAD TO SHANK AREA (FROM INSERT COUNTERBORE) INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE
	4	0	5.0	5.0	0	2.5	1.5	1.0	.5		**1.4**	4I: 1ST 4 THREADS → SOME INDICATIONS OF CLEAR WET FILM OF LOCTITE 5TH & 6TH THREADS → CLEAR WET LOCTITE IN THREAD ROOTS 7TH, 8TH → CLEAR RED-PINK TRANSLUCENT COAT OF LOCTITE 9TH & 10TH THREADS → CLEAR RED-PINK CRYSTALLINE LOCTITE REMAINING THREADS + COUNTERBORE → BUILD-UP OF WET LOCTITE IN THE THREAD TO SHANK AREA (FROM INSERT COUNTERBORE) INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0	6.5	6.5	0	3.0	2.0	1.5	.5		**1.8**	5I: 1ST 4 THREADS → SOME INDICATIONS OF CLEAR WET FILM OF LOCTITE 5TH & 6TH THREADS → CLEAR WET LOCTITE IN THREAD ROOTS 7TH, 8TH → CLEAR RED-PINK TRANSLUCENT COAT OF LOCTITE 9TH & 10TH THREADS → CLEAR RED-PINK CRYSTALLINE LOCTITE REMAINING THREADS + COUNTERBORE → BUILD-UP OF WET LOCTITE IN THE THREAD TO SHANK AREA (FROM INSERT COUNTERBORE) INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE
	6	0	4.5	4.5	0	2.5	1.5	1.0	.5		**1.4**	6I: 1ST 4 THREADS → SOME INDICATIONS OF CLEAR WET FILM OF LOCTITE 5TH & 6TH THREADS → CLEAR WET LOCTITE IN THREAD ROOTS 7TH, 8TH → CLEAR RED-PINK TRANSLUCENT COAT OF LOCTITE 9TH & 10TH THREADS → CLEAR RED-PINK CRYSTALLINE LOCTITE REMAINING THREADS + COUNTERBORE → BUILD-UP OF WET LOCTITE IN THE THREAD TO SHANK AREA (FROM INSERT COUNTERBORE) INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ON TO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	**BREAKAWAY TORQUE (IN-LBS)**			**DYNAMIC RUN OFF TORQUE (IN-LBS)**							**OBSERVATIONS**
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	0	3.0	3.0	0	1.5	1.0	1.0	.5		**1.0**	7I: 1ST 4 THREADS → SOME INDICATIONS OF CLEAR WET FILM OF LOCTITE 5TH & 6TH THREADS → CLEAR WET LOCTITE IN THREAD ROOTS 7TH, 8TH → CLEAR RED-PINK TRANSLUCENT COAT OF LOCTITE 9TH & 10TH THREADS → CLEAR RED-PINK CRYSTALLINE LOCTITE REMAINING THREADS + COUNTERBORE → BUILD-UP OF WET LOCTITE IN THE THREAD TO SHANK AREA (FROM INSERT COUNTERBORE) INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE
	8	0	2.0	2.0	0	1.0	.5	.5	.5		**0.6**	8I: 1ST 5 THREADS BARE WET DRY CLEAR LOCTITE 7 THRU 12 THREADS → WET CLEAR RED LOCTITE IN THREAD ROOTS INSERT: 1ST THREAD + COUNTERBORE TRANSLUCENT PINK TO SALMON HEAVY TRANSLUCENT COAT OF LOCTITE REMAINING THREADS → INDICATIONS OF LOCTITE IN THREAD ROOTS
	9	0	3.0	3.0	0	1.0	1.0	.5	.5		**0.7**	9I: 1ST 2 THREADS → CLEAR RED LOCTITE IN THREAD ROOTS REMAINING THREADS → BUILD-UP OF WET LOCTITE UP TO THE BOLT MAJOR DIAMETER INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	10	0	3.0	3.0	0	1.5	1.0	1.0	1.0		**1.1**	101: 1ST 2 THREADS → CLEAR RED LOCTITE IN THREAD ROOTS REMAINING THREADS → BUILD-UP OF WET LOCTITE UP IN THREAD ROOTS SHY OF THE BOLT MAJOR DIAMETER INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE
	11	0	3.5	3.5	0	2.5	2.5	1.5	.5		**1.8**	11I: 1ST 4 THREADS → SOME INDICATIONS OF CLEAR FILM OF LOCTITE 5TH & 6TH THREADS → CLEAR DRY LOCTITE IN THREAD ROOTS 7TH, 8TH → CLEAR RED-PINK TRANSLUCENT COAT OF LOCTITE 9TH & 10TH THREADS → CLEAR RED-PINK CRYSTALLINE LOCTITE REMAINING THREADS + COUNTERBORE → BUILD-UP OF WET LOCTITE IN THE THREAD TO SHANK AREA (FROM INSERT COUNTERBORE) INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE
	12	0	4.0	4.0	0	1.5	1.5	1.5	1.0		**1.4**	12I: 1 THRU 6 THREADS → DRIED LOCTITE FILM 7TH & 8TH THREADS → BUILD-UP OF DRY LOCTITE 9 THRU 12 THREADS → WET CLEAR RED LOCTITE IN THREAD ROOTS INSERT: TRANSLUCENT SALMON COAT IN COUNTERBORE & 1ST 2 THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	13	0	3.0	3.0	0	1.0	1.0	1.0	1.0		**1.0**	13I: 1ST 5 THREADS → CLEAR WET LOCTITE FILM REMAINING THREADS → CLEAR WET RED LOCTITE IN THREAD ROOTS INSERT: TRANSLUCENT SALMON COAT IN COUNTERBORE & 1ST 2 THREADS
	14	0	3.5	3.5	0	2.0	1.5	1.5	1.0		**1.5**	14I: ALL THREADS → WET CLEAR RED LOCTITE IN THREAD ROOTS TEAR IN WET CLEAR RED LOCTITE COAT AT THE THREAD AREA COINCIDING WITH THE COUNTERBORE OF THE INSERT INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE
	15	0	3.5	3.5	0	2.0	1.0	1.0	1.0		**1.3**	15I: ALL THREADS → CLEAR WET PINK LOCTITE IN THREAD ROOTS NO DEFINITE BUILD-UP OF LOCTITE INSERT: TRANSLUCENT SALMON COAT IN COUNTERBORE & 1ST 2 THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	16	0	4.5	4.5	0	1.5	1.5	1.5	1.5		**1.5**	16I: 11I: 1ST 4 THREADS → SOME INDICATIONS OF CLEAR FILM OF LOCTITE 5TH & 6TH THREADS → CLEAR DRY LOCTITE IN THREAD ROOTS 7TH, 8TH → CLEAR RED-PINK TRANSLUCENT COAT OF LOCTITE 9TH & 10TH THREADS → CLEAR RED-PINK CRYSTALLINE LOCTITE REMAINING THREADS + COUNTERBORE → BUILD-UP OF WET LOCTITE IN THE THREAD TO SHANK AREA (FROM INSERT COUNTERBORE) INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA LOCTITE FROM COUNTERBORE CAME OFF THE COUNTERBORE & ONTO THE BOLT SHANK REMAINING THREADS → SMALL INDICATION OF SPORADIC CURED LOCTITE
			AVE	**3.7**		**1.8**	**1.4**	**1.2**	**0.8**			
	During bolt installation it was noted that air was being forced out of the blind cavity causing Loctite bubbles to form in insert counterbore area.											

NESC TEST #1 BLIND NUTPLATES - LOCTITE 242
100% (35µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 100% (35µl)	1	0	14.0			11.0	11.0	10.0	10.0		**10.5**	1NP: ALL THREADS WHITE CRYSTALLINE LOCTITE NUT PLATE: BABY BLUE TO WHITE CRYSTALLINE LOCTITE FIBERS
	2	0	11.0			7.0	7.0	7.0	6.0		**6.8**	2NP: 1ST 4 THREADS → WET CLEAR LOCTITE FILM 5TH THRU 8TH THREADS → CRUST BABY BLUE CRYSTALLINE LOCTITE 9TH THRU 12TH THREADS → WET TO BLUE CLEAR LOCTITE SHANK → DRY BLUE LOCTITE SLEEVE NUT PLATE: INDICATIONS OF LOCTITE IN THREADS
	3	0	3.0			3.0	3.0	3.0	2.5		**2.9**	3NP: DID NOT EXAMINE NUT PLATE: INDICATIONS OF LOCTITE IN THREADS
	4	0	**BAD BOLT-DID NOT TEST**									
	5	0	11.0			6.0	6.0	6.0	5.0		**5.8**	5NP: 1ST 3 THREADS → WET BLUE-GREEN LOCTITE FILM 4TH, 5TH, & 6TH THREADS → BABY BLUE GREEN TO WHITE CRYSTALLINE CRUST LOCTITE 7TH THRU 12TH THREADS → WET BABY BLUE LOCTITE PASTE UP TO MAJOR DIAMETER NUT PLATE: SPORADIC CHUNKS OF LOCTITE GEL ON THREADS
	6	0	11.5			9.5	9.5	7.0	5.5		**7.9**	6NP: 1ST 3 THREADS → WET CLEAR LOCTITE FILM 4TH, 5TH, & 6TH THREADS → WHITE TO BABY BLUE CRYSTALLINE CRUST LOCTITE 7TH THRU 12TH THREADS → BROWN-BLUE-GREEN LOCTITE PASTE UP TO MAJOR DIAMETER NUT PLATE: SPORADIC CHUNKS OF LOCTITE GEL ON THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	0	9.5			9.5	10.0	7.5	5.0		**8.0**	7NP: DID NOT EXAMINE NUT PLATE: SPORADIC LOCTITE FIBERS IN THREADS
	8	0	14.0			12.0	12.0	9.0	7.0		**10.0**	8NP: 1ST 8 THREADS → WHITE TO BABY BLUE DRY CRYSTALLINE LOCTITE 9TH THREAD → DRY BLUE-GREEN LOCTITE FIBER BUILD-UP ABOVE MAJOR DIAMETER 10TH THRU 12TH THREADS → WET TO DRY BLUE-GREEN LOCTITE PASTE TO PITCH DIAMETER NUT PLATE: SPORADIC FIBERS OF LOCTITE IN THREAD ROOTS
	9	0	13.0			9.0	9.0	9.0	8.0		**8.8**	9NP: 1ST 8 THREADS → WHITE TO BABY BLUE DRY CRYSTALLINE LOCTITE 9TH THREAD → DRY BABY BLUE LOCTITE FIBER BUILD-UP ABOVE MAJOR DIAMETER 10TH THRU 12TH THREADS → DRY BLUE-GREEN LOCTITE PASTE IN THREAD ROOTS SHANK → DRY BLUE PASTE SLEEVE NUT PLATE: NO INDICATIONS OF LOCTITE IN THREADS COUNTERBORE → INDICATIONS OF DRY BLUE LOCTITE
	10	0	8.0			5.0	5.0	5.0	4.0		**4.8**	10NP: 1ST 3 THREADS → WET CLEAR LOCTITE IN THREAD ROOTS 4TH & 5TH THREADS → SPORADIC WET ORANGE TINGE FIBERS UP TO THE PITCH DIAMETER 6TH THRU 8TH THREADS → WHITE TO BABY BLUE DRY CRYSTALLINE LOCTITE 9TH & 12TH THREADS → WET BABY BLUE PASTE UP TO MAJOR DIAMETER NUT PLATE: WET BABY BLUE GEL IN COUNTERBORE SPORADIC FIBERS IN THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	11	0	17.0			11.0	11.0	10.0	9.0		**10.3**	11NP: DID NOT EXAMINE NUT PLATE: SPORADIC ORANGE TINGE FIBERS IN THREAD ROOTS
	12	0	11.0			14.0	14.0	7.5	9.0		**11.1**	12NP: 8NP: 1ST 8 THREADS → WHITE TO BABY BLUE DRY CRYSTALLINE LOCTITE 9TH THREAD → DRY BLUE-GREEN LOCTITE FIBER BUILD-UP ABOVE MAJOR DIAMETER 10TH THRU 12TH THREADS → DRY BLUE GREEN LOCTITE PASTE IN THREAD ROOTS SHANK → DRY BLUE PASTE SLEEVE NUT PLATE: SPORADIC ORANGE TINGE FIBERS IN THREAD ROOTS
	13	0	13.0			3.0	5.0	5.0	2.0		**3.8**	13NP 1ST 3 THREADS WET BLUE-GREEN LOCTITE PASTE IN THREAD ROOTS 4TH, 5TH, & 6TH THREADS → WET BLUE-GREEN GEL TO CRUST LOCTITE 7TH THRU 12 THREADS → WET BABY BLUE LOCTITE PASTE UP TO MAJOR DIAMETER NUT PLATE: WET BABY BLUE GEL IN COUNTERBORE THREADS → SPORADIC ORANGE TINGE FIBERS IN THREAD
	14	0	11.0			11.0	11.0	6.5	6.5		**8.8**	14NP: 1ST 7 THREADS → DRY WHITE TO BABY BLUE CRYSTALLINE POWDER 8TH & 9TH THREADS → WET BABY BLUE PASTE BUILD-UP ABOVE MAJOR DIAMETER 10TH THRU 12TH THREADS → WET BABY BLUE PASTE UP TO THE MAJOR DIAMETER SHANK → WET BABY BLUE SLEEVE NUT PLATE: SPORADIC DRY FIBERS IN THREAD ROOTS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	15	0	9.0			7.0	7.0	5.5	5.0		**6.1**	15NP: 1ST 2 THREADS → DRY 3RD THRU 7TH THREADS → WHITE TO BABY BLUE CRYSTALLINE POWDER 8TH & 9TH THREADS → BLUE GREEN GEL BUILD-UP ABOVE MAJOR DIAMETER 10TH THRU 12TH THREADS → WET BABY BLUE LOCTITE PASTE IN THREAD ROOTS SHANK → BABY BLUE GEL SLEEVE NUT PLATE: SPORADIC FIBERS OF LOCTITE IN THREAD ROOTS
	16	0	11.5			11.0	11.0	9.0	7.5		**9.6**	16NP: 1ST 8 THREADS → WHITE TO BABY BLUE DRY CRYSTALLINE LOCTITE 9TH THREAD → DRY BLUE-GREEN LOCTITE FIBER BUILD-UP ABOVE MAJOR DIAMETER 10TH THRU 12TH THREADS → WET BLUE GEL SHANK→ WET BABY BLUE PASTE TO GEL LOCTITE NUT PLATE: SPORADIC FIBERS OF LOCTITE IN THREAD ROOTS
		AVE	**11.2**			**8.6**	**8.8**	**7.1**	**6.1**			

NESC TEST #1 BLIND NUTPLATES - LOCTITE 242
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 50% (17µl)	1	0	16.0	16.0	0	5.5	5.5	5.5	4.0		**5.1**	1NP: 1ST THREAD DRY 2, 3, & 4 → BLUE CRUSTY DRY LOCTITE 5 THRU 12 → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS AMOUNT OF LOCTITE DIMINISHES TOWARDS SHANK DIRECTION NUT PLATE: COUNTERBORE HAS THE MAJORITY OF BLUE LOCTITE THREADS HAVE SOME INDICATIONS OF BLUE LOCTITE
	2	0	9.0	9.0	0	4.0	3.5	2.5	2.0		**3.0**	2NP: 1ST THREAD DRY 2ND & 3RD WHITE CRYSTALLINE FIBERS 4TH THREAD → CLEAR BLUE GEL 5 THRU 10 THREADS → OPAQUE BABY BLUE WET PASTE 11 &12 THREADS CLEAR WET FILM NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS
	3	0	10.0	10.0	0	4.0	3.5	1.5	2.0		**2.8**	3NP: 1ST THREAD DRY 2ND & 3RD THREADS → WHITE CRYSTALLINE BROKEN FIBERS 3RD THREAD → CLEAR BLUE GEL TO CRUSTY IN APPEARANCE 4 THRU 10 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 11 & 12 THREADS WET CLEAR LOCTITE FILM NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	11.0	11.0	0	4.5	4.5	3.5	2.5		**3.8**	4NP: 1ST THREAD DRY 2ND & 3RD THREADS → CLEAR BLUE CRYSTAL GEL 4 THRU 10 THREADS → OPAQUE BABY BLUE WET PASTE 11 & 12 THREADS → CLEAR WET FILM NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS
	5	0	12.0	12.0	0	5.5	5.5	4.5	2.5		**4.5**	5NP: 1ST THREAD DRY 2ND THREAD → WHITE TO BABY BLUE CRYSTALLINE POWDER 3 THRU 12 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS
	6	0	11.0	11.0	0	4.5	4.5	3.5	3.5		**4.0**	6NP1ST THREAD DRY 2ND THREAD → WHITE TO BABY BLUE CRYSTALLINE FIBERS 3 THRU 8 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 9 THRU 12 THREADS → OPAQUE BABY BLUE WET PASTE COAT BUILD-UP NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS
	7	0	11.0	11.0	0	4.0	4.0	3.5	2.5		**3.5**	7NP: 1ST THREAD DRY 3RD THREAD → CLEAR BLUE GEL 4 THRU 10 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 11 & 12 THREADS → GEL FORMING ON THREADS ABOVE MAJOR DIAMETER NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	8	0	9.0	9.0	0	4.0	3.0	2.5	2.0		**2.9**	8NP: 1ST 3 THREADS → CLEAR WET FILM 4TH THREAD → CLEAR BLUE CRYSTALLINE GEL 5 THRU 11 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 12TH THREAD → OPAQUE BABY BLUE WET PASTE BUILD-UP ABOVE MAJOR DIAMETER NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE OPAQUE BLUE-GREEN LOCTITE BUILD UP IN THREADS
	9	0	10.0	10.0	0	4.0	3.0	2.5	2.0		**2.9**	9NP: 1ST 3 THREADS → CLEAR DRY TO CLEAR WET LOCTITE FILM 4TH, 5TH, & 6TH THREADS → OPAQUE BLUE-GREEN WET PASTE IN THREAD ROOTS 7 THRU 10 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS BABY BLUE TRANSLUCENT COAT ON BOLT SHANK 11 & 12 THREADS → DRY NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE BLUE-GREEN LOCTITE BUILD UP IN THREADS
	10	0	10.0	10.0	0	3.0	2.5	2.0	1.5		**2.3**	10NP: 1ST 3 THREADS → CLEAR WET FILM 4TH THREAD INDICATIONS OF BLUE GEL IN THREAD ROOTS 5 & 6 THREADS → OPAQUE BABY BLUE TO BLUE-GREEN PASTE IN THREAD ROOTS 7 THRU 10 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 11 & 12 THREADS → NO INDICATIONS OF LOCTITE NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	11	0	9.0	9.0	0	4.5	5.0	4.0	2.5		**4.0**	11NP: 1ST THREAD DRY 2ND & 3RD THREADS → DRY BABY BLUE CRYSTAL FIBERS TO CLEAR BLUE GEL 4TH THRU 10TH THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 11 & 12 THREADS → NO INDICATIONS OF LOCTITE NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE BLUE-GREEN LOCTITE BUILD UP IN THREADS
	12	0	9.0	9.0	0	4.0	4.0	3.0	2.0		**3.3**	12NP: 1ST THREAD DRY 2ND THREAD ROOT → WHITE TO BABY BLUE CRYSTAL FIBER 3RD THREAD ROOT → BLUE-GREEN LOCTITE GEL 4 THRU 9 THREADS → OPAQUE BABY BLUE WET PASTE COAT 10 THRU 12 THREADS CLEAR WET FILM BLUE-GREEN COAT ON SHANK NUT PLATE: VERY LITTLE INDICATION OF LOCTITE
	13	0	10.0	10.0	0	3.5	4.0	4.0	3.0		**3.6**	13NP 1ST 2 THREADS DRY 3RD & 4TH THREADS → BABY BLUE GEL 5 THRU 8 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 9 THRU 10 THREADS → BABY BLUE WET PASTE BUILD-UP 11 & 12 THREADS → CLEAR WET FILM SHANK → TRANSLUCENT BLUE-GREEN PATCH/COAT NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **APPLICATION DATE/TIME: 12-07-09/11:00AM**
BOLT REMOVAL DATE/TIME 12-10-09/12::00PM
CURE TIME: APPROX 72 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	14	0	10.0	10.0	0	6.5	6.0	4.0	2.5		**4.8**	14NP: 1st 3 THREADS → WHITE TO BABY BLUE CRYSTALLINE FIBER 4 THRU 9 THREADS → BABY BLUE WET PASTE 10, 11, & 12 → CLEAR WET FILM SHANK → CLEAR BLUE-GREEN PATCH NUT PLATE: OPAQUE BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS
	15	0	9.0	9.0	0	4.0	4.5	4.5	3.0		**4.0**	15NP: 1ST THREAD DRY 2ND & 3RD THREAD → WHITE BABY BLUE CRYSTALLINE FIBER TO CLEAR BLUE GEL 4 THRU 9 THREADS →OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 10 & 11 THREADS → PATCH OF OPAQUE BABY BLUE WET PASTE BUILD UP 12TH THREAD & SHANK → CLEAR BLUE-GREEN PATCH NUT PLATE: BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS
	16	0	10.0	10.0	0	5.0	5.5	4.0	2.5		**4.3**	16NP: 1ST 2 THREADS DRY 3, 4, & 5 THREADS → CLEAR BLUE-GREEN GEL TO CRUSTY IN APPEARANCE 6 THRU 10 THREADS → BABY BLUE WET PASTE IN THREAD ROOTS 11TH & 12TH THREADS → BABY BLUE WET PASTE ABOVE MAJOR DIAMETER NUT PLATE: BLUE-GREEN LOCTITE IN COUNTERBORE SOME INDICATIONS OF LOCTITE IN THREADS
		AVE		**10.4**		**4.4**	**4.2**	**3.4**	**2.5**			

NESC TEST #1 BLIND NUTPLATES - LOCTITE 242
125% (45µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **CURE TIME: APPROX 72 HOURS**

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 125% (45µl)	1	0	14.0	14.0	0	9.0	8.5	9.0	9.0		**8.9**	1NP: 1ST THREAD WET CLEAR 2ND THREAD BLUE CLEAR CRYSTAL INDICATIONS IN THREAD ROOT 3RD &4TH WHITE CRYSTALLINE TO DRY BABY BLUE FIBERS 5TH TRANSITION FROM OPAQUE BABY BLUE WET PASTE TO CLEAR BLUE REMAINING THREADS HAVE OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: SPORADIC INDICATIONS OF BABY BLUE FIBERS
	2	0	12.0	12.0	0	4.0	4.0	3.5	2.5		**3.5**	2NP: THREADS 1, 2, & 3 CLEAR BLUE-GREEN LOCTITE THREADS 7 TO 12 HAVE BABY BLUE WET CLEAR LOCTITE IN THREAD ROOTS THERE IS A BUILD UP OF LOCTITE FIBERS ON THE 5TH THREAD NUT PLATE: OPAQUE BLUE-GREEN PASTE IN COUNTERBORE NO INDICATIONS OF LOCTITE IN INTERNAL THREADS
	3	0	12.0	12.0	0	4.5	4.5	3.5	3.0		**3.9**	3NP: THREADS 1, 2 & 3 BLUE-GREEN CLEAR LOCTITE THREADS 4, 5, & 7 OPAQUE BABY BLUE WET PASTE TOTALLY FILLED ROOT UP TO THE MAJOR DIAMETER OF THE THREAD 8 THRU 12 THREADS → OPAQUE BABY BLUE PASTE IN ROOTS NUT PLATE: CLEAR BLUE-GREEN LOCTITE IN COUNTERBORE NO INDICATIONS OF LOCTITE IN INTERNAL THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **CURE TIME: APPROX 72 HOURS**

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	14.0	14.0	0	5.0	5.0	4.5	4.0		**4.6**	4NP: THREADS 1, 2 & 3 CLEAR BLUE-GREEN LOCTITE THREADS 4, 5, & 7 OPAQUE BABY BLUE WET PASTE TOTALLY FILLED ROOT UP TO THE MAJOR DIAMETER OF THE THREAD 8 THRU 12 THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS NUT PLATE: BUILD UP OF BABY BLUE WET LOCTITE COAT IN COUNTERBORE NO OTHER INDICATIONS OF LOCTITE IN INTERNAL THREADS
	5	0	14.0	14.0	0	6.0	7.0	5.0	5.0		**5.8**	5NP: THREADS 1, 2, &3 CLEAR WET BLUE-GREEN LOCTITE IN THREAD ROOTS 4TH THREAD FILLED WITH WHITE TO BABY BLUE FIBERS 5^{TH} & 6^{TH} THREADS → OPAQUE BABY BLUE WET PASTE BUILD UP FILL THE ROOTS THE REMAINING THREADS HAVE OPAQUE BABY BLUE WET PASTE IN ROOTS NUT PLATE: OPAQUE BLUE-GREEN PASTE IN COUNTERBORE NO INDICATIONS OF LOCTITE IN INTERNAL THREADS
	6	0	17.0	17.0	0	6.0	6.0	5.0	4.0		**5.3**	6NP: THREADS 1, 2&3 → CLEAR BLUE-GREEN CLEAR LOCTITE THREADS 4, 5, &7 → OPAQUE BABY BLUE WET PASTE TOTALLY FILLED ROOT UP TO THE MAJOR DIAMETER OF THE THREAD THREADS 8 THRU 12 → OPAQUE BABY BLUE PASTE IN ROOTS NUT PLATE: NO INDICATIONS OF LOCTITE IN THREADS
	7	0	14.0	14.0	0	8.0	9.0	7.5	5.0		**7.4**	7NP: 1^{ST} 1.5 THREADS → CLEAR WET THREADS 3, 4, &5 → BUILD-UP OF CLEAR WET BABY BLUE LOCTITE ABOVE MAJOR DIAMETER THREADS 7 & 8 → OPAQUE BABY BLUE WET PASTE PATCH REMAINING THREADS HAVE OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: CLEAR BLUE-GREEN LOCTITE IN COUNTERBORE NO INDICATION OF LOCTITE IN REMAINING THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **CURE TIME: APPROX 72 HOURS**

*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	8	0	13.0	13.0	0	6.0	6.5	6.5	5.0		**6.0**	8NP: 1ST 6 THREADS → CLEAR BLUE-GREEN PASTE ABOVE MAJOR DIAMETER REMAINING THREADS → BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: NO INDICATION OF LOCTITE
	9	0	14.0	14.0	0	6.0	6.5	4.5	4.0		**5.3**	NOT EXAMINED
	10	0	15.0	15.0	0	5.0	5.0	5.5	4.5		**5.0**	NOT EXAMINED
	11	0	14.0	14.0	0	8.0	8.0	6.5	5.5		**7.0**	NOT EXAMINED
	12	0	11.0	11.0	0	7.0	5.5	5.5	4.5		**5.6**	NOT EXAMINED
	13	0	10.0	10.0	0	4.5	3.5	3.0	3.0		**3.5**	NOT EXAMINED
	14	0	13.0	13.0	0	8.5	9.0	8.0	7.0		**8.1**	NOT EXAMINED
	15	0	9.0	9.0	0	4.0	4.5	4.0	4.0		**4.1**	15NP: 1ST 2 THREADS → WET CLEAR FILM 3RD THREAD → WET BLUE-GREEN LOCTITE IN THREAD ROOTS 4TH THREAD → CLEAR BLUE-GREEN GEL 5TH & 6TH THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS ABOVE MAJOR DIAMETER 7 THRU 12 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: DID NOT EXAMINE
	16	0	15.0	15.0	0	7.0	7.0	5.0	4.5		**5.9**	NOT EXAMINED
		AVE		**13.2**		**6.2**	**6.2**	**5.4**	**4.7**			

NESC TEST #1 BLIND INSERTS - LOCTITE 242
100% (35µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 100% (35µl)	1	0	12.5		0	10.0	7.0	5.5	2.0		**6.1**	1I: 1st 8 THREADS → DRY WHITE CRYSTALLINE TO BABY BLUE POWDER 9TH & 10TH THREADS → WET OPAQUE BABY BLUE PASTE BUILD-UP 11TH & 12TH THREADS → WET BABY BLUE PASTE FILLED TO MAJOR DIAMETER INSERT: 1ST 3 THREADS → DRY WHITE CRYSTALLINE TO BABY BLUE POWDER REMAINING THREADS → DRY WHITE CRYSTALLINE BABY BLUE POWDER IN THREAD ROOTS COUNTERBORE → BLUE GEL
	2	0	16.5		0	12.0	9.0	6.5	6.0		**8.4**	2I: 1ST 8 THREADS → WET BABY BLUE PASTE FILLED TO MAJOR DIAMETER 9TH & 10TH THREADS → WET OPAQUE BABY BLUE PASTE BUILD-UP 11TH & 12TH THREADS → WET BABY BLUE PASTE FILLED TO MAJOR DIAMETER INSERT: ALL THREADS → LIGHT BLUE GEL TO BABY BLUE FIBERS COUNTERBORE → WET OPAQUE BABY BLUE PASTE
	3	0	13.0		0	11.0	6.5	4.5	3.0		**6.3**	3I: 1ST 3 THREADS → DRY SPORADIC LOCTITE 4TH THRU 8TH THREADS → DRY WHITE, BABY BLUE POWDER 9TH & 10TH THREADS → WET OPAQUE BABY BLUE PASTE BUILD-UP 11TH & 12TH THREADS → WET BABY BLUE PASTE FILLED TO MAJOR DIAMETER INSERT: ALL THREADS → LIGHT BLUE GEL TO BABY BLUE FIBERS COUNTERBORE → WET OPAQUE BABY BLUE PASTE
	4	0	19.0		0	16.0	11.0	7.0	5.0		**9.8**	4I: 1ST 5 THREADS → WET CLEAR FILM LOCTITE 6TH THRU 12TH THREADS → WET OPAQUE BABY BLUE PATCHES

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												INSERT: 1ST THREAD & COUNTERBORE → WET BABY BLUE PASTE 2ND & 3RD THREADS → DRY WHITE CRYSTALLINE TO DRY BABY BLUE FIBERS
	5	0	20.0		0	8.5	6.0	4.5	2.0		**5.3**	5I: 1ST 5 THREADS → DRY 6TH & 7TH THREADS → DRY WHITE CRYSTALLINE TO DRY BABY BLUE FIBERS 8TH, 9TH & 10TH THREADS → BABY BLUE TRANSLUCENT COAT (BUILD-UP) 11TH & 12TH THREADS → WET BABY BLUE PASTE FILLED TO MAJOR INSERT: BABY BLUE CRUST FIBERS IN THREAD ROOTS
	6	0	14.5		0	6.0	6.0	6.0	3.0		**5.3**	6I 1st 7 THREADS → DRY 8TH THREAD DRY WHITE BABY BLUE CRYSTALLINE FIBERS 9TH & 10TH THREADS → BABY BLUE TRANSLUCENT COAT (BUILD-UP) 11TH & 12TH THREADS → WET BABY BLUE PASTE FILLED TO MAJOR INSERT: BABY BLUE CRUST FIBERS IN THREAD ROOTS
	7	0	15.5		0	11.0	7.0	6.0	3.0		**6.8**	7I: 1st 6 THREADS→ SPORADIC BROWN BLUE CRUST IN THREAD ROOTS 7TH & 8TH THREADS → DRY BROWN BLUE CRUST FILLED TO MAJOR DIAMETER 9TH & 10TH THREADS → WET OPAQUE BABY BLUE COAT (BUILD-UP) 11TH & 12TH THREADS → WET OPAQUE BABY BLUE PASTE TO MAJOR DIAMETER INSERT: SPORADIC BLUE TRANSLUCENT FIBERS IN THREAD ROOTS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	8	0	18.0		0	11.0	7.0	5.0	3.0		**6.5**	8I: 1ST 4 THREADS → SPORADIC DRY WHITE CRYSTALLINE IN THREAD ROOTS 5TH THRU 8TH THREADS → DRY WHITE BABY BLUE CRYSTALLINE FILLED MAJOR DIAMETER 9TH & 10TH THREADS → WET OPAQUE BABY BLUE COAT 11TH & 12TH THREADS → WET OPAQUE BABY BLUE PASTE IN THREAD ROOTS INSERT: SPORADIC WHITE BABY BLUE CRYSTALLINE FIBERS IN THREAD ROOTS
	9	0	9.5		0	5.0	3.0	2.5	1.5		**3.0**	9I: ALL THREADS → WET BABY BLUE PASTE FILL TO MAJOR DIAMETER INSERT: ALL THREADS → SPORADIC WET BABY BLUE PASTE COUNTERBORE → WET BABY BLUE PASTE
	10	0	7.5		0	5.0	3.5	3.0	1.5		**3.3**	10I: 1ST 6 THREADS → DRY TO WET CLEAR FILM IN THREAD ROOTS 7TH & 8TH THREADS → WET BABY BLUE CRUST LOCTITE FILLED TO MAJOR DIAMETER 9TH & 10TH THREADS → TRANSLUCENT BLUE-GREEN COAT BUILD UP 11TH & 12TH THREADS → WET OPAQUE BLUE-GREEN PASTE LOCTITE FILLED TO MAJOR DIAMETER INSERT: SPORADIC BABY BLUE CRUST LOCTITE IN THREAD ROOTS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	11	0	14.0		0	8.0	4.0	3.0	2.5		**4.4**	11I: 1ST 3 THREADS → DRY 4TH THRU 7TH THREADS → WET OPAQUE BABY BLUE PASTE LOCTITE FILLED TO MAJOR DIAMETER 8TH & 9TH THREADS → WET OPAQUE BABY BLUE PASTE BUILD-UP 10TH, 11TH & 12TH THREADS → WET OPAQUE BLUE-GREEN PASTE LOCTITE FILLED TO MAJOR DIAMETER INSERT: INDICATIONS OF BLUE TRANSLUCENT FIBERS IN THREAD ROOTS COUNTERBORE → WET CLEAR FILM OF LOCTITE
	12	0	12.0		0	8.5	4.5	3.0	3.0		**4.8**	12I: 1ST 3 THREADS → WET CLEAR FILM OF LOCTITE 4TH THRU 8TH THREADS → WET OPAQUE BABY BLUE PASTE LOCTITE FILLED TO MAJOR DIAMETER 9TH & 10TH THREADS → WET OPAQUE BABY BLUE PASTE BUILD-UP 11TH & 12TH THREADS → WET OPAQUE BABY BLUE PASTE FILLED TO MAJOR DIAMETER INSERT: THREADS & COUNTERBORE → DRY WHITE BABY BLUE CRYSTALLINE FIBERS
	13	0	16.0		0	7.0	6.5	5.5	2.5		**5.4**	13I: 1ST 6 THREADS→ DRY 7TH & 8TH THREADS → DRY WHITE BABY BLUE CRYSTALLINE CRUST 9TH & 10TH THREADS → WET OPAQUE BABY BLUE PASTE BUILD-UP 11TH & 12TH THREADS → WET OPAQUE BABY BLUE PASTE FILLED TO MAJOR DIAMETER INSERT: THREADS & COUNTERBORE → DRY WHITE BABY BLUE CRYSTALLINE FIBERS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	14	0	14.0		0	7.0	6.0	6.0	3.0		**5.5**	14I: 1st 3 THREADS → WET CLEAR FILM 4TH THRU 8TH THREADS → WET OPAQUE BABY BLUE PASTE LOCTITE FILLED TO MAJOR DIAMETER 9TH & 10TH THREADS → WET OPAQUE BABY BLUE PASTE BUILD-UP 11TH & 12TH THREADS → WET OPAQUE BABY BLUE PASTE FILLED TO MAJOR DIAMETER INSERT: INDICATIONS OF DRY BABY BLUE FIBERS IN THREAD ROOTS COUNTERBORE → WET BABY BLUE PASTE LOCTITE
	15	0	12.0		0	10.0	6.5	4.5	3.0		**6.0**	15I: 1st 6 THREADS→ DRY TO WET CLEAR FILM OF LOCTITE 7TH THRU 12TH THREADS → WET BLUE-GREEN PASTE FILLED TO MAJOR DIAMETER INSERT: WET BABY BLUE-GREEN FIBERS COUNTERBORE → WET BABY BLUE-GREEN FIBERS
	16	0	19.0		0	15.0	8.0	7.0	4.0		**8.5**	16I: 1st 6 THREADS→ BARE 7TH & 8TH THREADS → DRY WHITE BABY BLUE CRYSTALLINE POWDER FIBERS 9TH & 10TH THREADS → WET BLUE-GREEN OPAQUE COAT BUILD UP 11TH & 12TH THREADS → WET BABY BLUE-GREEN PASTE FILLED TO MAJOR DIAMETER INSERT: SPORADIC DRY WHITE CRYSTALLINE FIBERS COUNTERBORE → DRY WHITE BABY BLUE CRYSTALLINE
		AVE	**14.6**			**9.4**	**6.3**	**5.0**	**3.0**			

NESC TEST #1 BLIND INSERTS - LOCTITE 242
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 50% (17µl)	1	0	6.5	6.5	0	3.5	2.5	1.5	1.0	2.1	**2.1**	1I: 1ST 2 THREADS DRY THREADS 3 THRU 7 → BABY BLUE WET PASTE IN THREAD ROOTS 8TH THREAD → SHOW LOCTITE BUILD-UP ABOVE MAJOR DIAMETER 9 THRU 12 WET CLEAR FILM OF LOCTITE INSERT: BLUE-GREEN LOCTITE GEL IN COUNTERBORE VERY LITTLE EVIDENCE OF LOCTITE IN THREADS
	2	0	7.0	7.0	0	2.5	1.5	1.0	1.0	1.5	**1.5**	2I: 1ST 4 THREADS LOOK DRY LITTLE EVIDENCE OF LOCTITE THREADS 5 THRU 9 → OPAQUE BABY BLUE WET PASTE IN ROOTS 8TH THREAD SHOW LOCTITE BUILD-UP ABOVE MAJOR DIAMETER 9 THRU 12 WET CLEAR FILM OF LOCTITE INSERT: BLUE-GREEN LOCTITE GEL IN COUNTERBORE VERY LITTLE EVIDENCE OF LOCTITE IN THREADS
	3	0	5.0	5.0	0	2.5	1.0	.5	.5	1.1	**1.1**	3I: 1ST 6 THREADS → OPAQUE BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS 7TH & 8TH THREADS → SHOW LOCTITE BUILD-UP ABOVE MAJOR DIAMETER 9 THRU 12 WET CLEAR FILM OF LOCTITE INSERT: BLUE-GREEN LOCTITE GEL IN COUNTERBORE & IN THREAD ROOTS
	4	0	7.0	7.0	0	4.0	3.5	3.0	2.0	3.1	**3.1**	4I: 1ST 5 THREADS → LOOK DRY LITTLE EVIDENCE OF LOCTITE 6TH, 7TH, & 8TH THREADS → SHOW LOCTITE BUILD-UP ABOVE MAJOR DIAMETER FROM A CLEAR BLUE GEL TO BABY BLUE WET PASTE IN APPEARANCE 9 THRU 12 WET CLEAR FILM OF LOCTITE INSERT: LARGE BUILD-UP OF BABY BLUE GEL IN COUNTERBORE
	5	0	6.0	6.0	0	2.0	1.5	1.5	1.5	1.6	**1.6**	5I: EVEN DISTRIBUTION OF OPAQUE BABY BLUE WET PASTE

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												LOCTITE IN THREAD ROOTS INSERT: 1ST THREAD & COUNTERBORE → BABY BLUE TRANSLUCENT COAT
	6	0	8.0	8.0	0	7.5	4.5	3.5	2.5	4.5	**4.5**	6I: 1 THRU 5 THREADS → WHITE TO BABY BLUE CRYSTALLINE LOCTITE (NOT THICK) 6 THRU 9 THREADS → OPAQUE BABY BLUE WET PASTE LOCTITE IN ROOTS 10, 11, & 12 THREADS → WET CLEAR LOCTITE FILM INSERT: BLUE-GREEN WET GEL IN COUNTERBORE & 1ST THREAD SOME INDICATION OF LOCTITE IN REMAINING THREADS
	7	0	8.5	8.5	0	3.0	2.5	2.0	2.0	2.4	**2.4**	7I: EVEN DISTRIBUTION OF OPAQUE BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS INSERT: CLEAR BABY BLUE LOCTITE GEL IN COUNTERBORE & 1ST 2 THREADS INDICATIONS OF DRIED TRANSLUCENT LOCTITE FIBERS IN THREADS
	8	0	6.0	6.0	0	2.0	1.5	1.0	1.0	1.4	**1.4**	8I: EVEN DISTRIBUTION OF OPAQUE BABY BLUE WET PASTE IN 1ST 7 THREAD ROOTS 8TH & 9TH THREADS → BUILD-UP OF OPAQUE BABY BLUE WET PASTE UP TO THE MAJOR DIAMETER INSERT: BLUE GEL IN COUNTERBORE & 1ST 2 THREADS
	9	0	7.0	7.0	0	2.5	2.0	1.5	1.5	1.9	**1.9**	9I: THREADS 1 THRU 10 → EVEN DISTRIBUTION OF OPAQUE BABY BLUE WET PASTE OF LOCTITE IN THREAD ROOTS 8TH THREAD HAS A BUILD-UP OF BABY BLUE WET PASTE LOCTITE ABOVE MAJOR DIAMETER INSERT: OPAQUE BABY BLUE WET PASTE IN COUNTERBORE 1ST 3 THREADS WHITE TO BABY BLUE CRYSTALLINE FIBERS
	10	0	6.0	6.0	0	3.0	2.0	1.5	1.0	1.9	**1.9**	10I: 1ST 2 THREADS DRY 3RD & 4TH CLEAR WET FILM

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												5 THRU 9 BABY BLUE WET PASTE IN THREAD ROOTS 10 THRU 12 WET CLEAR FILM INSERT: LARGE CHUNK OF BABY BLUE WET PASTE LOCTITE IN FILLED THREAD ORIGINATED IN COUNTERBORE 1ST 2 THREADS → DRY FLAKEY BLUE FIBER
	11	0	6.5	6.5	0	3.5	2.5	2.0	1.5	2.4	**2.4**	11I: 1ST THREAD CLEAR WET FILM 2 THRU 7 BABY BLUE WET PASTE IN THREAD ROOTS 8TH THREAD HAS A BUILD-UP OF BABY BLUE WET PASTE ABOVE MAJOR DIAMTER 10, 11, & 12 BABY BLUE WET PASTE IN THREAD ROOT INSERT: SOME INDICATION OF TRANSLUCENT BABY BLUE COAT OF LOCTITE IN COUNTERBORE
	12	0	9.0	9.0	0	5.5	4.0	3.0	2.0	3.6	**3.6**	12I: 1ST 3 THREADS DRY 4TH, 5TH, & 6TH THREADS CLEAR BABY BLUE CRYSTAL 8TH THREAD BUILT-UP BABY BLUE WET PASTE 9 & 10 BABY BLUE WET PASTE IN THREAD ROOTS 11 & 12 CLEAR WET FILM INSERT: BLUE GEL IN COUNTERBORE
	13	0	9.0	9.0	0	5.0	3.5	3.0	2.5	3.5	**3.5**	13I: 1ST THREAD WHITE TO BABY BLUE SLIVER OF LOCTITE 2ND & 3RD THREADS CLEAR WET FILM 4 THRU 10 BABY BLUE WET PASTE IN THREAD ROOTS QUANTITY OF LOCTITE REDUCES APPROACHING TOWARDS SHANK 11 & 12 WET CLEAR FILM INSERT: COUNTERBORE AND RANDOM THREADS → DRY BABY BLUE COAT
	14	0	5.0	5.0	0	2.5	2.5	1.5	1.5	2.0	**2.0**	14I: 1ST 7 THREADS BABY BLUE WET PASTE IN THREAD ROOTS 8TH THREAD → BABY BLUE WET PASTE BUILD UP 9 THRU 12 BABY BLUE WET PASTE IN THREAD ROOTS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												INSERT: COUNTERBORE AND RANDOM THREADS → DRY BABY BLUE COAT
	15	0	7.5	7.5	0	6.5	3.5	2.5	1.5	3.5	**3.5**	15I:1ST 4 THREADS ARE DRY 5TH → CLEAR BLUE CRYSTAL 6TH & 7TH THREADS → BABY BLUE WET LOCTITE PASTE IN THREAD ROOTS 8TH THREAD BUILD-UP OF BABY BLUE WET LOCTITE PASTE 9 THRU 12 THREADS → BABY BLUE WET LOCTITE PASTE IN THREAD ROOTS INSERT: BABY BLUE PASTE IN COUNTERBORE
	16	0	5.5	5.5	0	3.0	1.5	1.5	1.5	1.9	**1.9**	16I: ALL THREADS → BABY BLUE WET PASTE IN THREAD ROOTS INSERT: BABY BLUE WET PASTE IN COUNTERBORE BABY BLUE TRANSLUCENT FIBERS THROUGH OUT RANDOM THREADS
		AVE		**6.84**		**3.7**	**2.5**	**1.9**	**1.5**			

NESC TEST #1 – BLIND INSERTS - LOCTITE 242
125% (45µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 125% (45µl)	1	0	20.0	20.0	0	7.0	4.0	3.0	2.5		**4.1**	1I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREAD HAS BUILD-UP OF OPAQUE BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	2	0	15.0	15.0	0	6.0	3.5	2.0	1.0		**3.1**	2I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREAD HAS BUILD-UP OF OPAQUE BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	3	0	11.0	11.0	0	4.0	2.5	2.0	2.0		**2.6**	3I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREAD HAS BUILD-UP OF OPAQUE BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	4	0	7.0	7.0	0	3.0	2.0	1.5	1.5		**2.0**	4I: ALL THREADS → OPAQUE BABY BLUE PASTE EVENLY DISTRIBUTED IN THREAD ROOTS INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0	11.0	11.0	0	7.0	2.5	2.0	1.5		**3.3**	5I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → BUILD-UP OF OPAQUE BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	6	0	17.0	17.0	0	6.5	4.5	4.0	2.0		**4.3**	6I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREAD → BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	7	0	12.0	12.0	0	6.0	2.5	1.5	1.0		**2.8**	7I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → BUILD-UP OF OPAQUE BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	8	0	12.0	12.0	0	5.0	3.0	2.0	1.0		**2.8**	8I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	9	0	17.0	17.0	0	7.0	4.5	2.5	2.0		**4.0**	9I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: BABY BLUE TRANSLUCENT FIBER COAT ON INTERNAL THREADS
	10	0	10.0	10.0	0	3.0	2.0	2.0	2.0		**2.3**	10I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	11	0	16.0	16.0	0	6.0	3.5	2.5	2.5		**3.6**	11I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	12	0	13.0	13.0	0	5.0	3.0	1.5	1.0		**2.6**	12I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	13	0	13.0	13.0	0	3.5	2.5	2.5	2.5		**2.8**	13I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

NAS1003-7A BOLT/MD115-2002-0003 INSERT*

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	14	0	16.0	16.0	0	6.0	3.5	2.5	1.5		**3.4**	14I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT:
	15	0	15.0	15.0	0	5.0	3.5	2.0	1.5		**3.0**	15I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: COUNTERBORE HAS AN EXCESSIVE OPAQUE BABY BLUE PASTE LOCTITE COATING WITH SOME EVIDENCE OF LOCTITE IN THREADS
	16	0	18.0	18.0	0	5.0	4.5	4.0	3.0		**4.1**	16I: ALL THREADS → OPAQUE BABY BLUE PASTE IN THREAD ROOTS 8TH & 9TH THREADS → HAS BUILD-UP OF BABY BLUE PASTE LOCTITE DRESS LIKE IN APPEARANCE INSERT: BABY BLUE TRANSLUCENT FIBER COAT ON INTERNAL THREADS
		AVE		**13.9**		**5.3**	**3.2**	**2.3**	**1.8**			

NESC TEST #1, BLIND NUTPLATES– LOCTITE 290
100% (35µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 100% (35µl)	1	0	8.0		0	30.0	38.0	34.0	27.0	**32.3**		1NP: 1st 3 THREADS → SPORADIC CLEAR GREEN CRYSTALLINE 4TH & 5TH THREADS → WHITE CRYSTALLINE POWDER 6TH, 7TH , 8TH THREADS → CLEAR GREEN CRYSTALLINE FILLED THREAD ROOTS 9 THRU 12 → WET CLEAR LOCTITE SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	2	0	5.0		0	8.0	8.0	8.0	5.5	**7.4**		2NP: ALL THREADS → CLEAR WET LOCTITE SPORADIC PIECES OF GREEN GEL SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	3	0	4.0		0	7.0	4.5	4.0	3.5	**4.8**		3NP: 1ST THREAD → WET LIME GREEN OPAQUE PASTE LOCTITE 2ND THREAD → CLEAR GREEN CRUST LOCTITE 3RD, 4TH & 5TH THREADS → DRY CRUST LOCTITE 6TH THRU 12TH → CLEAR WET FILM SHANK → CLEAR GREEN SLEEVE NUT PLATE: NOT EXAMINED

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	7.5		0	25.5	25.5	23.0	20.0	**23.5**		4NP: 1ST THREAD → WET LIME GREEN OPAQUE PASTE LOCTITE 2ND & 3RD THREAD → WHITE CRUST, DRY LOCTITE 4TH THREAD → GREEN CRUST LOCTITE 5TH THRU 12TH THREAD → WET OPAQUE LOCTITE IN THREAD ROOTS SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	5	0	4.0		0	21.5	24.0	19.0	15.0	**19.9**		5NP: 1ST 2 THREADS → WET LIME GREEN OPAQUE PASTE LOCTITE 3RD, 4TH, & 5TH THREADS → DARK BROWN-GREEN CRUST LOCTITE 6TH THRU 12TH THREAD → WET GREEN CLEAR FILM IN THREAD ROOTS NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	6	0	7.0		0	10.0	10.0	9.0	8.0	**9.3**		6NP: 1ST 4 THREADS → WET CLEAR GREEN GEL 5TH THRU 12TH THREADS→ WET CLEAR FILM WITH SPORADIC PIECES OF WET CLEAR GREEN GEL SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE WITH LARGE AMOUNTS OF CLEAR GREEN COAT IN ALUMINUM HOLE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	0	9.0		0	20.0	22.0	22.5	20.5	**21.3**		7NP: 1st 3 THREADS → SPORADIC CLEAR GREEN CRYSTALLINE 2ND & 3RD THREADS → WHITE CRYSTALLINE DRY POWDER 4TH & 5TH THREADS → BROWN-GREEN CRYSTALLINE LOCTITE 6TH THRU 12TH THREADS → OPAQUE GREEN LOCTITE FILLED ROOTS SHANK → CLEAR GREEN SLEEVE NUT PLATE: SPORADIC DRY GREEN FIBERS IN INTERNAL THREADS COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	8	0	7.0		0	17.0	20.0	18.0	16.0	**17.8**		8NP: 1ST & 2ND THREADS → OPAQUE LIME GREEN LOCTITE 3RD THREAD → WHITE CRYSTALLINE 4TH & 5TH THREADS → BROWN-GREEN CRUST LOCTITE 6TH THREAD → CLEAR GREEN GEL 7 THRU 12 THREADS → WET CLEAR GREEN FILM SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	9	0	10.0		0	15.0	14.5	13.0	13.5	**14.0**		9NP: 1ST 2 THREADS → OPAQUE WET GREEN LOCTITE IN THREAD ROOTS 3RD, 4TH, & 5TH THREADS → CLEAR WET GREEN LOCTITE GEL IN THREAD ROOTS FILLED UP TO THE MAJOR DIAMETER 6TH THRU 12TH THREADS → CLEAR WET GREEN LOCTITE IN THREAD ROOTS FILLED UP NEAR PITCH DIAMETER SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	10	0	10.0		0	21.0	22.0	18.0	14.5	**18.9**		10NP: ALL THREADS → CLEAR WET GREEN LOCTITE FILLED UP IN THREAD ROOTS SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	11	0	11.5		0	38.0	39.0	35.0	22.0	**33.5**		11NP: 1ST 2 THREADS → OPAQUE GREEN LOCTITE PASTE 3RD THREAD → WHITE CRYSTALLINE CRUST 4TH & 5TH THREADS → BROWN-GREEN CRUST 6TH THREAD → CLEAR WET GREEN GEL 7TH THRU 12TH THREADS → WET CLEAR GREEN LOCTITE IN THREAD ROOTS SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	12	0	13.0		0	24.0	24.5	22.0	17.0	**21.9**		12NP: 1ST 2 THREADS → CLEAR WET LIME GREEN LOCTITE FILM 3RD, 4TH, & 5TH THREADS → BROWN-GREEN CRUST LOCTITE 6TH THRU 12TH THREADS → CLEAR WET GREEN LOCTITE IN THREAD ROOTS FILLED UP TO THE PITCH DIAMETER SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	13	0	*		0	38.0	34.0	25.0	24.0	**30.3**		13NP: 1ST THREAD → DRY 2ND, 3RD, & 4TH THREADS → WHITE CRYSTALLINE POWDER 5TH & 6TH THREADS → CLEAR GREEN CRYSTALLINE 7TH THRU 12TH THREADS → SHANK → CLEAR GREEN SLEEVE NUT PLATE: DRY GREEN CRYSTALLINE LOCTITE IN COUNTERBORE
	14	0	11.5		0	38.0	46.0	43.0	33.0	**40.0**		14NP: 1ST THREAD → DRY BARE 2TH THREAD → WHITE CRYSTALLINE 3RD, 4TH, & 5TH THREADS → BROWN-GREEN CRUST 6TH THRU 12TH THREADS → CLEAR WET GREEN LOCTITE IN THREAD ROOTS FILLED UP APPROX 1/3 SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	15	0	11.0		0	20.5	21.0	20.0	18.0	**19.9**		15NP: 1ST 2 THREADS → CLEAR WET FILM 3RD THREAD → WET BROWN-GREEN CRUST 4TH THRU 12TH THREADS → CLEAR GREEN FILLED THREAD ROOTS TO MAJOR DIAMETER

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												SHANK → CLEAR GREEN SLEEVE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
	16	0	**		0	37.0	39.0	34.0	34.0	**36.0**		16NP: 1ST 2 THREADS → WET CLEAR FILM 3RD THREAD → WHITE CRYSTALLINE 4TH & 5TH THREADS → BROWN-GREEN CRUST 6TH THREAD → WET CLEAR GREEN FILLED UP THREAD ROOTS 7TH THRU 12TH THREADS → WET CLEAR GREEN LOCTITE FILLED ½ WAY UP THREAD ROOTS 1ST 2 THREADS → OPAQUE GREEN LOCTITE PASTE NUT PLATE: THREADS ARE DRY WITH INDICATIONS OF SPORADIC GREEN DRY LOCTITE COUNTERBORE IS BARE DUE TO LOCTITE TRANSFER TO BOLT SHANK
		AVE	**8.46**			**23.2**	**24.5**	**21.7**	**18.2**			

Note:
A definite static breakaway torque noted on all except #13 and #16, then the prevailing torque increased to values at 90°, then began to decrease to values shown.
#13: * No definite breakaway torque. Torque continues to climb to 38.0 in-lbs at 90°, and then begins to decline.
#16: ** No definite breakaway torque. Torque continues to climb to 39.0 in-lbs at 180°, and then begins to decline.
The noted run off torque values are the highest recorded prevailing torque within the rotating 90° segments.

NESC TEST #1, BLIND NUTPLATES– LOCTITE 290
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 50% (17µl)	1	0	4.5		0	17.0	21.0	20.0	13.0	**17.8**		1NP: 1ST 4 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 5TH THREAD → WHITE CRYSTALLINE POWDER 6TH THREAD → WHITE & BROWN CRYSTALLINE CRUST 7TH THREAD → DRY GREEN GEL BUILD-UP 8TH THRU 12TH THREADS → WET CLEAR FILM THE THREAD ROOTS NUT PLATE: THREADS ARE CLEAR COUNTERBORE → TRACES OF DARK GREEN LOCTITE
	2	0	6.0		0	13.0	14.0	14.0	13.5	**13.6**		2NP: 1ST 4 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 5TH THREAD → DRY WHITE CRYSTALLINE POWDER 6TH, 7TH, & 8TH THREADS → DRY BROWN-GREEN CRUST LOCTITE 8TH THREAD → DRY GREEN GEL BUILD-UP 9TH THRU 12TH THREADS → WET CLEAR FILM THE THREAD ROOTS NUT PLATE: THREADS ARE CLEAR COUNTERBORE → NO LOCTITE NOTE
	3	0	5.5		0	25.5	27.5	26.0	22.0	**25.3**		3NP: 1ST 2 THREADS → DRY 3RD, 4TH, & 5TH THREADS → DRY WHITE CRYSTALLINE CRUST 6TH & 7TH THREADS → DRY BROWN-GREEN CRUST LOCTITE 8TH THREAD → DRY TRANSLUCENT GREEN GEL 9TH THRU 12TH THREADS → WET CLEAR FILM THE THREAD ROOTS NUT PLATE: THREADS ARE CLEAR COUNTERBORE → TRACES OF DARK GREEN LOCTITE

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	7.5		0	18.0	17.5	14.0	10.5	**15.0**		4NP: 1ST 2 THREADS → DRY 3RD, 4TH, & 5TH THREADS → DRY WHITE CRYSTALLINE CRUST 6TH & 7TH THREADS → DRY BROWN-GREEN CRUST LOCTITE 8TH THREAD → DRY TRANSLUCENT GREEN GEL 9TH THRU 12TH THREADS → WET CLEAR FILM THE THREAD ROOTS NUT PLATE: SPORADIC DRY DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → NO LOCTITE NOTED
	5	0	6.5		0	23.0	26.0	21.0	16.0	**21.5**		5NP:1ST 2 THREADS → DRY 3RD, 4TH, & 5TH THREADS → DRY WHITE CRYSTALLINE CRUST 6TH & 7TH THREADS → DRY BROWN-GREEN CRUST LOCTITE 8TH THREAD → DRY TRANSLUCENT GREEN GEL 9TH THRU 12TH THREADS → WET CLEAR FILM THE THREAD ROOTS NUT PLATE: SPORADIC DRY DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → TRACES OF DARK GREEN LOCTITE
	6	0	8.0		0	24.0	23.0	22.0	21.5	**22.6**		6NP: 1ST 2 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 3RD, 4TH, & 5TH THREADS → DRY BROWN-GREEN CRYSTALLINE CRUST 6TH THREAD → DRY TRANSLUCENT GREEN GEL 7TH THRU 10TH THREADS → WET CLEAR GREEN FILM 11TH & 12TH THREADS → DRY NUT PLATE: THREADS ARE CLEAR COUNTERBORE → NO LOCTITE NOTED
	7	0	8.5		0	22.0	23.0	19.0	15.5	**19.9**		7NP: 1ST 2 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 3RD, 4TH, & 5TH THREADS → DRY BROWN-GREEN CRYSTALLINE CRUST 6TH THREAD → OPAQUE LIME-GREEN GEL IN THREAD ROOTS ½ FILLED 7TH THRU 12TH THREADS --> WET CLEAR FILM IN THREAD ROOTS NUT PLATE: NO LOCTITE NOTED

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	8	0	6.5		0	25.0	26.5	23.0	21.0	**23.9**		8NP: 1ST 2 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 3RD THREAD → DRY BROWN-GREEN CRUST 4TH THREAD → DRY WHITE CRYSTALLINE POWDER 5TH & 6TH THREADS → DRY BROWN-GREEN CRUST 7TH THREAD → CLEAR LIME-GREEN GEL 8TH THRU 12TH THREADS → WET CLEAR FILM IN THREAD ROOTS NUT PLATE: SPORADIC DRY DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → TRACES OF DARK GREEN LOCTITE
	9	0	5.5		0	25.0	23.5	20.5	20.5	**22.4**		9NP: 1ST 5 THREADS → WET CLEAR GREEN LOCTITE FILLED THREAD ROOTS 6TH, 7TH & 8TH THREADS → WET CLEAR GREEN GEL BUILD-UP 9TH, & 10TH THREADS → WET CLEAR FILM 11TH & 12TH THREADS → DRY NUT PLATE: SLIGHT INDICATIONS OF LOCTITE IN THREADS AND COUNTERBORE
	10	0	5.0		0	12.5	13.0	12.0	11.5	**12.3**		10NP: 1ST 2 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 3RD & 4TH THREADS → DRY BROWN-GREEN LOCTITE IN THREAD ROOTS 5TH, 6TH, & 7TH THREADS → DRY BROWN-GREEN CRUST LOCTITE FILLED IN THREAD ROOTS NUT PLATE: SLIGHT INDICATIONS OF LOCTITE IN THREADS AND COUNTERBORE
	11	0	6.5		0	14.0	8.5	8.0	8.5	**9.8**		11NP: 1ST 2 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 3RD, 4TH & 5TH THREADS → WET OPAQUE LIME-GREEN FILM IN THREAD ROOTS 6TH, 7TH & 8TH THREADS → DRY BROWN-GREEN CRUST 9TH THREAD → WET OPAQUE LIME-GREEN GEL 10TH & 12TH THREADS → WET CLEAR GREEN FILM NUT PLATE: SPORADIC DRY DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → TRACES OF DARK GREEN LOCTITE

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	12	0	6.0		0	6.5	6.0	3.0	5.0	**5.1**		12NP: 1ST 4 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 5TH, 6TH & 7TH THREADS → DARK GREEN GEL UP TO THE MAJOR DIAMETER 8TH THRU 12 THREADS → WET CLEAR GREEN FILM IN THREAD ROOTS NUT PLATE: SOME DARK GREEN INDICATIONS OF LOCTITE IN THREAD ROOTS
	13	0	3.5		0	8.5	8.0	8.5	7.0	**8.0**		13NP: 1ST THREAD → OPAQUE GREEN GEL IN THREAD ROOT 2ND THREAD → DRY 3RD THREAD → DRY WHITE CRYSTALLINE 4TH & 5TH THREAD → DRY BROWN-GREEN CRUST 6TH THREAD → OPAQUE GREEN GEL FILLED UP TO THE MAJOR DIAMETER 7TH THRU 12TH THREADS → WET CLEAR GREEN FILM IN THREAD ROOTS NUT PLATE: SPORADIC DRY DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → TRACES OF DARK GREEN LOCTITE
	14	0	6.0		0	14.0	14.0	16.0	10.0	**13.5**		14NP: 1NP: 1ST 2 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 3RD THREAD → DRY 4TH THREAD → DRY WHITE CRYSTALLINE 5TH & 6TH THREADS→ DRY BROWN-GREEN CRUST 7TH THREAD → WET GREEN GEL 8TH THRU 12TH THREADS → SOME DARK GREEN INDICATIONS OF LOCTITE IN THREAD ROOTS NUT PLATE: SPORADIC DRY DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → TRACES OF DARK GREEN LOCTITE
	15	0	5.0		0	17.5	17.5	17.0	14.5	**16.6**		15NP: 1ST THREAD → OPAQUE GREEN GEL IN THREAD ROOT 2ND, 3RD, & 4TH THREADS → DRY DARK BROWN-GREEN CRUST 5TH THREAD → DRY WHITE CRYSTALLINE

LOCTITE LOT NUMBER: L39AAG7007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLT/MD114-5011-0004 NUTPLATE* **Application Date: 1-4-2010**
Torque Test Date: 1-7-2010
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: APPROX 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												6TH & 7TH THREADS → DRY DARK BROWN-GREEN CRUST 8TH THRU 12TH THREADS → WET CLEAR GREEN FILM IN THREAD ROOTS NUT PLATE: NO INDICATION OF LOCTITE COUNTERBORE → DARK GREEN PATCH IN COUNTERBORE
	16	0	6.0		0	25.0	26.0	24.0	21.0	**24.0**		16NP: 1ST 2 THREADS → OPAQUE GREEN GEL IN THREAD ROOTS 3RD THREAD → DRY 4TH & 5TH THREADS → DRY WHITE CRYSTALLINE 6TH & 7TH THREADS → DRY BROWN-GREEN CRUST BUILD-UP 8TH THRU 12TH THREADS → WET CLEAR FILM IN THREAD ROOTS NUT PLATE: NO LOCTITE NOTED
		AVE	**6.0**			**18.2**	**18.4**	**16.8**	**14.4**			

NESC TEST #1 BLIND INSERTS– LOCTITE 290
100% (35µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 — **APPLICATOR SETTING: SEE TABLE**
Application Date: 1-4-2010
NAS1003-7A BOLT/MD115-2002-0003 INSERT* — **Torque Test Date: 1-7-2010**
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** — **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 100% (35µl)	1	0	7.0		0	7.5	6.0	7.0	7.0	**6.9**		1I: ALL THREADS → CLEAR WET GREEN TO OPAQUE GREEN IN THREAD ROOTS 7TH THRU 12TH THREADS → THREAD ROOTS ARE FILLED UP TO MAJOR DIAMETER INSERT: ALL THREADS COATED WITH CLEAR GREEN LOCTITE COUNTERBORE → CLEAR GREEN RING OF LOCTITE
	2	0	14.0		0	25.0	12.5	8.0	5.5	**12.8**		2I: 1ST 5 THREADS → WET OPAQUE GREEN IN THREAD ROOTS 6TH THREAD → CLEAR GREEN GEL UP TO MAJOR DIAMETER 7TH & 8TH THREADS → BUILD-UP OF CLEAR GREEN GEL 9TH THRU 12TH THREADS → CLEAR WET GREEN FILM IN THREAD ROOTS INSERT: CLEAR GREEN LOCTITE IN THREAD ROOTS COUNTERBORE → WET CLEAR FILM
	3	0	18.5		0	22.5	20.0	14.5	7.5	**16.1**		3I: 1ST THREAD → WHITE CRYSTALLINE LOCTITE 2 THRU 6TH THREADS → WET BROWN-GREEN CRUST LOCTITE 7TH, 8TH, &9TH THREADS → CLEAR DRY GREEN FIBEROUS BUILD-UP 10TH, 11TH, & 12TH THREADS → WET CLEAR FILM INSERT: INDICATIONS OF BROWN-GREEN DRY LOCTITE IN THREAD ROOTS COUNTERBORE → WET CLEAR & YELLOW FILM
	4	0	13.0		0	30.0	17.0	13.5	14.5	**18.8**		4I: 1ST THRU 6TH THREADS → WET BROWN-GREEN CRUST 7TH & 8TH THREADS → BUILD-UP WET GREEN CLEAR FIBROUS LOCTITE INSERT: CLEAR GREEN FILM IN THREAD ROOTS COUNTERBORE → WET CLEAR & YELLOW FILM

LOCTITE LOT NUMBER: L39GAA7846 — **APPLICATOR SETTING: SEE TABLE**
Application Date: 1-4-2010
NAS1003-7A BOLT/MD115-2002-0003 INSERT* — **Torque Test Date: 1-7-2010**
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** — **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0	8.0		0	9.0	4.5	4.0	3.0	**5.1**		5I: 1ST 5 THREADS → WHITE CRYSTALLINE LOCTITE 6TH & 7TH THREADS → BROWN-GREEN CRUST LOCTITE 8TH THRU 12TH THREADS → DRY INSERT: ALL THREADS WHITE CRYSTALLINE LOCTITE COUNTERBORE → WET CLEAR & YELLOW FILM
	6	0	16.5		0	21.0	12.5	9.0	5.5	**12.0**		6I: 1ST 5 THREADS → WET CLEAR GREEN GEL IN THREAD ROOTS 6TH THREAD CLEAR WET GREEN GEL FILLED TO THE MAJOR DIAMETER 9TH THRU 12TH THREADS → CLEAR WET FILM INSERT: WET DARK GREEN FILM IN THREAD ROOTS
	7	0	12.0		0	22.0	8.5	5.5	4.0	**10.0**		7I: 1ST 3 THREADS → MINOR AMOUNT OF WET CLEAR DARK GREEN FILM IN THREAD ROOTS 4TH & 5TH THREADS → OPAQUE BROWN-GREEN GEL TO CRUST LOCTITE 6TH, 7TH, & 8 THREADS → WET CLEAR GREEN GEL UP TO MAJOR DIAMETER 9TH THREAD → BUILD-UP OF CLEAR GREEN GEL 10, 11TH, & 12TH THREADS → CLEAR WET FILM IN THREAD ROOTS INSERT: SPORADIC DRY BROWN-GREEN LOCTITE IN THREAD ROOTS COUNTERBORE → WET CLEAR & YELLOW FILM
	8	0	10.0		0	15.0	8.0	4.5	2.5	**7.5**		8I: 1ST 7 THREADS → ½ FILLED WET OPAQUE GREEN IN THREAD ROOTS 8 THRU 12 THREADS → CLEAR WET LOCTITE INSERT: DARK GREEN FIBERS IN THREAD ROOTS COUNTERBORE → WET CLEAR & YELLOW FILM

LOCTITE LOT NUMBER: L39GAA7846 — **APPLICATOR SETTING: SEE TABLE**
Application Date: 1-4-2010
NAS1003-7A BOLT/MD115-2002-0003 INSERT* — **Torque Test Date: 1-7-2010**
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** — **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	9	0	10.0		0	23.0	10.0	7.0	6.0	**11.5**		9I: 1ST 7 THREADS → ½ FILLED WET OPAQUE GREEN IN THREAD ROOTS 7TH & 8TH THREADS → CLEAR WET GREEN GEL BUILD-UP 9TH THRU 12 THREADS → CLEAR WET GREEN LOCTITE FILLED UP1/3 IN THREAD ROOTS INSERT: APPROXIMATELY 40% OF THREADS → DARK GREEN COAT OF LOCTITE COUNTERBORE → WET CLEAR & YELLOW FILM
	10	0	10.0		0	18.0	9.0	5.0	3.0	**8.8**		10I: 1ST 2 THREADS → WET GREEN GEL IN THREAD ROOTS 3RD THREAD → DRY 4TH & 5TH THREADS → SPORADIC WET OPAQUE GREEN LOCTITE IN THREAD ROOTS 6TH & 7TH THREADS → OPAQUE WET GREEN GEL IN THREAD ROOTS UP TO MAJOR DIAMETER 8TH THREAD → BUILD-UP OF CLEAR GREEN GEL 9TH THRU 12 THREADS → WET CLEAR GREEN LOCTITE IN THREAD ROOTS & WET CLEAR LOCTITE FILM ON MAJORS INSERT: WET CLEAR GREEN LOCTITE IN THREAD ROOTS COUNTERBORE → WET CLEAR & YELLOW FILM
	11	0	10.5		0	26.5	13.0	7.0	6.5	**13.3**		11I: 1ST 5 THREADS → WET OPAQUE GREEN IN THREAD ROOTS 6TH THREAD → CLEAR GREEN GEL UP TO MAJOR DIAMETER 7TH & 8TH THREADS → BUILD-UP OF CLEAR GREEN GEL 9TH THRU 12TH THREADS → CLEAR WET GREEN FILM IN THREAD ROOTS INSERT: WET CLEAR GREEN LOCTITE IN THREAD ROOTS COUNTERBORE → WET CLEAR & YELLOW FILM

LOCTITE LOT NUMBER: L39GAA7846 — **APPLICATOR SETTING: SEE TABLE**
Application Date: 1-4-2010
NAS1003-7A BOLT/MD115-2002-0003 INSERT* — **Torque Test Date: 1-7-2010**
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** — **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	12	0	12.0		0	28.0	16.0	9.0	6.5	**14.9**		12I: 11I: 1ST 5 THREADS → WET OPAQUE GREEN IN THREAD ROOTS 6TH THREAD → CLEAR GREEN GEL UP TO MAJOR DIAMETER 7TH THREAD → BUILD-UP OF CLEAR GREEN GEL 8TH THRU 12TH THREADS → CLEAR WET GREEN FILM IN THREAD ROOTS INSERT: WET CLEAR GREEN LOCTITE IN THREAD ROOTS COUNTERBORE → WET CLEAR & YELLOW FILM
	13	0	10.5		0	17.5	10.0	4.5	3.0	**8.8**		13I: 1ST THREAD → CLEAR GREEN GEL 2ND THREAD → BUILD-UP OF CLEAR GREEN GEL 3RD, 4TH, 5TH, & 6TH THREADS → OPAQUE LIME GREEN PASTE IN THREAD ROOTS 7TH & 8TH THREADS → BUILD-UP OF CLEAR GREEN GEL 9TH THRU 12TH THREADS → CLEAR WET LIME GREEN LOCTITE IN THREAD ROOTS INSERT: TRANSLUCENT GREEN GEL FIBERS COUNTERBORE → WET CLEAR & YELLOW FILM
	14	0	7.0		0	6.0	3.0	2.5	2.5	**3.5**		14I: ALL THREADS → CLEAR LIME GREEN LOCTITE IN THREAD ROOTS MAJORS ARE WET CLEAR INSERT: ALL THREAD ROOTS FILLED TO FULL MINOR DIAMETER COUNTERBORE → WET CLEAR & YELLOW FILM
	15	0	9.0		0	9.0	6.5	5.0	5.0	**6.4**		15I: 1ST 6 THREADS → CLEAR LIME GREEN LOCTITE IN THREAD ROOTS MAJOR DIAMETERS ARE WET CLEAR FILM 7TH THREAD → CLEAR WET GREEN GEL BUILD-UP 8TH THRU 12 THREADS → CLEAR LIME GREEN LOCTITE IN THREAD ROOTS INSERT: ALL THREAD ROOTS FILLED TO FULL MINOR DIAMETER COUNTERBORE → WET CLEAR & YELLOW FILM

LOCTITE LOT NUMBER: L39GAA7846 | **APPLICATOR SETTING: SEE TABLE**
Application Date: 1-4-2010
NAS1003-7A BOLT/MD115-2002-0003 INSERT* | **Torque Test Date: 1-7-2010**
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** | **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	16	0	10.0		0	28.5	17.0	11.0	7.5	**16.0**		16I: 1ST 5 THREADS → OPAQUE GREEN LOCTITE 6TH THREAD → CLEAR GREEN CRUST 7TH THREAD → CLEAR WET GREEN GEL BUILD-UP 8TH THRU 12TH THREADS → WET CLEAR GREEN LOCTITE IN THREAD ROOTS MAJOR DIAMETERS ARE WET CLEAR FILM INSERT: WET GREEN CLEAR LOCTITE IN THREAD ROOTS COUNTERBORE → WET CLEAR & YELLOW FILM
		AVE	**11.1**			**19.3**	**10.8**	**7.3**	**5.6**			
	Note: A definite static breakaway torque noted, then the prevailing torque increased (one decreased) to values at 90°, then began to decrease to values shown. The noted dynamic run off torque values are the highest recorded prevailing torque within the rotating 90° segments.											

NESC TEST #1 BLIND INSERTS– LOCTITE 290
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
Application Date: 1-4-2010
NAS1003-7A BOLT/MD115-2002-0003 INSERT* **Torque Test Date: 1-7-2010**
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 50% (17µl)	1	0	12.5			18.0	12.0	6.0	4.0	**10.0**		1I: 1ST 6 THREADS → WET OPAQUE GREEN FILM 7TH THREAD → CLEAR GREEN GEL IN THREAD ROOTS 8TH & 9TH THREADS → CLEAR GREEN GEL LOCTITE UP TO MAJOR DIAMETER 10TH THRU 12TH THREADS → WET CLEAR FILM INSERT: 1ST 2 THREADS → DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → YELLOW WET FILM
	2	0	12.5			20.0	11.0	4.56	2.0	**9.4**		2I: 1ST THREAD → WET OPAQUE LIME-GREEN FILLED TO MAJOR 2ND, 3RD, & 4TH THREADS → WET CLEAR GREEN TINGE FILM 5TH THRU 8TH THREADS → CLEAR GREEN GEL FILLED TO MAJOR 9TH THRU 12TH THREADS → WET CLEAR GREEN TINGE FILM INSERT: ALL THREADS- → DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → YELLOW WET FILM
	3	0	*			37.0	22.0	14.0	10.0	**20.8**		3I: 1ST 6 THREADS → WET OPAQUE GREEN FILM 7TH & 8TH THREADS → CLEAR GREEN GEL LOCTITE UP TO MAJOR DIAMETER 9TH THREAD → TRANSLUCENT COAT BUILD-UP 10TH THRU 12 THREADS → WET CLEAR FILM INSERT: ALL THREADS- → SPORADIC DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → YELLOW WET FILM

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

Application Date: 1-4-2010

NAS1003-7A BOLT/MD115-2002-0003 INSERT* **Torque Test Date: 1-7-2010**

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	9.0			16.0	9.0	6.0	5.0	**9.0**		4I: 1ST 3 THREADS → DRY PIECES OF TRANSLUCENT GREEN FIBERS 4TH, 5TH, & 6TH THREADS → CLEAR GREEN CRYSTALLINE LOCTITE 7TH, 8TH & 9TH THREADS → TRANSLUCENT COAT BUILD-UP 10TH THRU 12TH THREADS → MINUTE AMOUNT OF WET CLEAR LOCTITE IN THREAD ROOTS INSERT: ALL THREADS → SPORADIC DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → YELLOW WET FILM
	5	0	12.0			20.0	9.0	6.5	4.0	**9.9**		5I: 1ST 4 THREADS → DRY 5TH, 6TH & 7TH THREADS → CLEAR GREEN CRYSTALLINE LOCTITE 8TH & 9TH THREADS → TRANSLUCENT COAT BUILD-UP 10TH THRU 12TH THREADS → MINUTE AMOUNT OF WET CLEAR LOCTITE IN THREAD ROOTS INSERT: ALL THREADS → SPORADIC DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → YELLOW WET FILM
	6	0	14.0			18.0	7.0	4.5	3.0	**8.1**		6I: 1ST 3 THREADS → OPAQUE LIME-GREEN GEL IN THREAD ROOTS 4TH THRU 7TH THREADS → CLEAR GREEN CRYSTALLINE LOCTITE 8TH & 9TH THREADS → TRANSLUCENT GREEN COAT BUILD-UP 10TH THRU 12TH THREADS → MINUTE AMOUNT OF WET CLEAR LOCTITE IN THREAD ROOTS INSERT: ALL THREADS → SPORADIC DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → YELLOW WET FILM

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

Application Date: 1-4-2010

NAS1003-7A BOLT/MD115-2002-0003 INSERT* **Torque Test Date: 1-7-2010**

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	0	13.5			22.0	9.0	4.0	4.0	**9.8**		7I: 1ST 2 THREADS → DRY 3RD THREAD → WET DARK GREEN LOCTITE IN THREAD ROOTS 4TH & 5TH THREADS → WET OPAQUE LIME-GREEN GEL UP TO MAJORS 6TH & 7TH THREADS →WET CLEAR GREEN GEL IN THREAD ROOTS 8TH & 9TH THREADS → TRANSLUCENT GREEN GEL COAT 10TH THRU 12TH THREADS → MINUTE AMOUNT OF WET CLEAR LOCTITE IN THREAD ROOTS INSERT: NO INDICATION OF LOCTITE
	8	0	*			22.0	13.0	8.0	6.5	**12.4**		8I: 1ST 4 THREADS → WET OPAQUE LIME-GREEN LOCTITE IN THREAD ROOTS 5TH & 6TH THREADS → OPAQUE LIME-GREEN LOCTITE FILLED TO MAJORS 7TH THREAD → WET CLEAR GREEN GEL FILLED TO MAJOR 8TH & 9TH THREADS → TRANSLUCENT GREEN GEL COAT 10TH THRU 12TH THREADS → MINUTE AMOUNT OF WET CLEAR LOCTITE IN THREAD ROOTS INSERT: SPORADIC DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → NO EVIDENCE OF LOCTITE
	9	0	9.0			15.5	5.0	4.0	2.0	**6.6**		9I: 1ST 4 THREADS → WET CLEAR GREEN TINGE FILM IN THREAD ROOTS 5TH, 6TH, & 7TH THREADS → WET CLEAR GREEN BUILD-UP TO MAJOR DIAMETER 8TH & 9TH THREADS → TRANSLUCENT GREEN GEL COAT 10TH THRU 12TH THREADS → TRANSLUCENT GREEN GEL COAT INSERT: ALL THREADS → SPORADIC DARK GREEN GEL IN THREAD ROOTS COUNTERBORE → YELLOW WET FILM

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

Application Date: 1-4-2010

NAS1003-7A BOLT/MD115-2002-0003 INSERT* **Torque Test Date: 1-7-2010**

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	10	0	10.5			14.0	5.0	3.5	3.0	**6.4**		10I: 1ST 6 THREADS → WET CLEAR FILM IN THREAD ROOTS 7TH THREAD → DRY BROWN-GREEN CRUST 8TH & 9TH THREADS → OPAQUE LIME-GREEN GEL FILLED TO MAJOR DIAMETER 10TH & 12TH THREADS → WET GREEN TINGE FILM INSERT: 1ST THREAD WET GREEN IN THREAD ROOT OTHER THREADS → SPORADIC INDICATIONS OF GREEN FIBERS COUNTERBORE → WET CLEAR FILM
	11	0	6.0			5.0	4.5	4.0	4.0	**4.4**		11I: 1ST THREAD → WET CLEAR GREEN GEL 2ND THRU 12TH THREADS → WET CLEAR FILM IN THREAD ROOTS INSERT: CLEAR GREEN GEL ABOVE MINOR DIAMETER OF INTERNAL THREADS ALL OF THE LOCTITE WAS IN THE INSERT, NOT THE BOLT COUNTERBORE → WET CLEAR LOCTITE
	12	0	*			8.0	5.0	2.5	2.0	**4.4**		12I: 1ST 6 THREADS → WET CLEAR FILM IN THREAD ROOTS 7TH & 8TH THREADS → CLEAR WET GREEN GEL FILLED TO MAJOR DIAMETER 9TH & 10TH THREADS → TRANSLUCENT GREEN GEL COAT BUILD-UP 11TH & 12 THREADS → WET CLEAR GREEN TINGE FILM INSERT: ALL THREADS → CLEAR DARK GREEN GEL ABOVE MINORS COUNTERBORE → WET CLEAR
	13	0	7.0			4.0	4.0	3.5	3.0	**3.6**		13I: ALL THREADS → WET CLEAR GREEN GEL INSERT: SOME INDICATIONS OF CLEAR GREEN FIBERS IN THREAD ROOTS COUNTERBORE → WET CLEAR GREEN RING

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**

Application Date: 1-4-2010

NAS1003-7A BOLT/MD115-2002-0003 INSERT* **Torque Test Date: 1-7-2010**

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	14	0	8.0			5.5	4.5	3.5	4.0	**4.4**		14I: 1ST THREAD → WET CLEAR GREEN GEL IN THREAD ROOTS 2ND THRU 6TH THREADS → WET CLEAR FILM IN THREAD ROOTS 7TH & 8TH THREADS → TRANSLUCENT GREEN GEL COAT BUILD-UP 9TH THRU 12TH THREADS → WET CLEAR GREEN TINGE FILM INSERT: TRANSLUCENT DARK GREEN FIBERS IN THREAD ROOTS COUNTERBORE → WET CLEAR FILM WITH A GREEN RING
	15	0	*			18.0	11.0	6.5	4.0	**9.9**		15I: 1ST 7 THREADS → WET CLEAR FILM IN THREAD ROOTS 8TH & 9TH THREADS → WET CLEAR GREEN GEL TO THREAD MAJORS 10TH THRU 12TH THREADS → WET CLEAR FILM INSERT: TRANSLUCENT DARK GREEN FIBERS IN THREAD ROOTS COUNTERBORE → WET CLEAR FILM WITH A GREEN RING
	16	0	9.0			13.5	6.0	3.5	2.5	**6.4**		16I: 1ST 5 THREADS → CLEAR LIME-GREEN FILM 6TH & 7TH THREADS → OPAQUE LIME-GREEN GEL FILLED TO THREAD MAJORS 8TH THREAD → CLEAR GREEN GEL 9TH THRU 12 THREADS → WET CLEAR GREEN TINGE FILM INSERT: SOME INDICATION OF LOCTITE IN THREAD ROOTS COUNTERBORE → WET CLEAR LOCTITE
		AVE	**10.3**			**16.0**	**8.6**	**5.3**	**3.9**			
	* No definite breakaway torque. Bolt continues to rotate while torque continues to increase or decrease to values noted. The noted values are the highest recorded prevailing torque within the rotating 90° segments.											

USA TEST 1 - BLIND NUTPLATE - LOCTITE 078
100% (30µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD114-5011-0004 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE 90°	180°	270°	360°	AVE	(5") AVE NET	
NUT-PLATE 100% (30µl on bolt)	1	0	4.0	4.0	0	4.0	3.0	2.5	2.5	3.0	**3.0**	1NP: ALL THREADS WET PINK TRANSLUCENT 6TH THREAD ROOT FILLED WITH DRY TRANSLUCENT LOCTITE SHANK AREA HAS A LARGE PATCH OF PINK TRANSLUCENT LOCTITE NUT PLATE: TRANSLUCENT PINK COAT
	2	0	4.0	4.0	0	3.5	3.5	2.5	2.0	2.9	**2.9**	2NP: ALL THREADS WET TRANSLUCENT SHANK AREA COATED WITH TRANSLUCENT PINK DRY LOCTITE NUT PLATE: COUNTERBORE → SALMON LOCTITE COAT PARTIAL COAT OF SALMON TRANSLUCENT LOCTITE ON THREADS
	3	0	5.0	5.0	0	4.0	3.0	3.0	2.5	3.1	**3.1**	3NP: ALL THREADS WET PINK TRANSLUCENT MAJORITY OF PINK TRANSLUCENT DRY LOCTITE ON SHANK AREA NUT PLATE: COUNTERBORE → SALMON LOCTITE COAT PARTIAL COAT OF SALMON TRANSLUCENT LOCTITE ON THREADS
	4	0	4.0	4.0	0	3.0	2.5	2.5	1.5	2.4	**2.4**	4NP: ALL THREADS WET PINK TRANSLUCENT MAJORITY OF PINK TRANSLUCENT DRY LOCTITE ON SHANK AREA NUT PLATE: COUNTERBORE → SALMON LOCTITE COAT PARTIAL COAT OF SALMON TRANSLUCENT LOCTITE ON THREADS NEAR COUNTERBORE WET SHINY IN APPEARANCE VERY LITTLE LOCTITE ON REMAINING THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD114-5011-0004 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0	3.5	3.5	0	3.0	3.0	3.0	2.5	2.9	**2.9**	5NP: ALL THREADS WET PINK TRANSLUCENT MAJORITY OF PINK TRANSLUCENT DRY LOCTITE ON SHANK AREA 6, 7 & 8 GEL FORMING A PATCH NUT PLATE: COUNTERBORE → SALMON LOCTITE COAT PARTIAL COAT OF SALMON TRANSLUCENT LOCTITE ON THREADS
	6	0	3.5	3.5	0	3.0	2.5	2.0	2.0	2.4	**2.4**	6NP: ALL THREADS WET PINK TRANSLUCENT GEL BEGINNING TO FORM ON THREADS MAJORITY OF PINK TRANSLUCENT DRY LOCTITE ON SHANK AREA NUT PLATE: COUNTERBORE → SALMON LOCTITE COAT PARTIAL COAT OF SALMON TRANSLUCENT LOCTITE ON THREADS
	7	0	3.5	3.5	0	4.0	3.5	3.5	3.0	3.5	**3.5**	7NP: ALL THREADS WET PINK TRANSLUCENT MAJORITY OF PINK TRANSLUCENT DRY LOCTITE ON SHANK AREA 6^{TH} THREAD FILLED WITH WET PINK GEL LOCTITE NUT PLATE: COUNTERBORE → SALMON LOCTITE COAT PARTIAL COAT OF SALMON TRANSLUCENT LOCTITE ON THREADS
	8	0	3.5	3.5	0	3.5	4.0	3.0	2.5	3.3	**3.3**	8NP: ALL THREADS WET TRANSLUCENT MAJORITY OF PINK TRANSLUCENT DRY LOCTITE ON SHANK AREA LAST 2 THREADS TO SHANK PINK AMBER TRANSLUCENT DRY COAT NUT PLATE: COUNTERBORE SALMON LOCTITE COAT PARTIAL COAT OF SALMON TRANSLUCENT LOCTITE ON THREADS
	9	0	3.5	3.5	0	1.5	1.5	1.5	1.5	1.5	**1.5**	NOT EXAMINED

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD114-5011-0004 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	10	0	3.5	3.5	0	2.0	2.0	2.0	2.0	2.0	**2.0**	NOT EXAMINED
	11	0	4.5	4.5	0	2.0	2.0	2.0	1.5	1.9	**1.9**	NOT EXAMINED
	12	0	3.5	3.5	0	2.0	1.5	1.5	1.0	1.5	**1.5**	NOT EXAMINED
	13	2.0	7.0	5.0	2	4.0	3.5	3.0	3.0	3.4	**3.4**	NOT EXAMINED
	14	0	5.5	5.5	0	2.0	2.0	2.0	2.0	2.0	**2.0**	NOT EXAMINED
	15	0	4.0	4.0	0	1.5	1.5	1.5	1.0	1.4	**1.4**	NOT EXAMINED
	16	0	4.0	4.0	0	1.5	1.5	1.5	1.0	1.4	**1.4**	NOT EXAMINED
		AVE		**4.0**		**2.8**	**2.5**	**2.3**	**2.0**	**2.4**		

USA TEST 1 - BLIND NUTPLATE - LOCTITE 078
50% (15µl)ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD114-5011-0004 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE 90°	180°	270°	360°	AVE	(5") AVE NET	
NUT-PLATE 50% (15µl on bolt)	1	0	4.5	4.5	0	1.5	1.5	1.0	1.0	1.3	**1.3**	1NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: TRANSLUCENT PINK FIBERS IN THREAD ROOTS
	2	0	2.0	2.0	0	1.5	1.5	1.5	1.5	1.5	**1.5**	2NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	3	0	2.0	2.0	0	1.5	1.5	1.5	1.5	1.5	**1.5**	3NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	4	0	4.0	4.0	0	1.5	1.5	1.5	1.0	1.4	**1.4**	4NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	5	0	4.0	4.0	0	1.5	1.5	1.5	1.0	1.4	**1.4**	5NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	6	0	3.0	3.0	0	2.0	2.0	1.5	1.5	1.8	**1.8**	6NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	7	0	3.5	3.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	7NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	8	0	3.5	3.5	0	1.5	1.5	1.5	1.0	1.4	**1.4**	8NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	9	0	4.0	4.0	0	1.5	1.5	1.5	1.5	1.5	**1.5**	9NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	10	0	3.5	3.5	0	2.0	2.0	1.5	1.0	1.6	**1.6**	10NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	11	0	3.0	3.0	0	1.0	1.0	1.0	1.0	1.0	**1.0**	11NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD114-5011-0004 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	12	0	2.0	2.0	0	1.5	1.5	1.0	1.0	1.3	**1.3**	12NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	13	0	5.5	5.5	0	3.0	3.0	3.0	2.0	2.8	**2.8**	13NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	14	0	3.5	3.5	0	2.5	2.5	2.0	2.0	2.3	**2.3**	14NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	15	0	3.5	3.5	0	2.5	2.5	2.5	2.5	2.5	**2.5**	15NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	16	0	3.0	3.0	0	2.0	3.0	3.0	2.0	2.5	**2.5**	16NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	17	0	3.5	3.5	0	2.0	2.0	1.5	1.5	1.8	**1.8**	17NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
	18	0	2.0	2.0	0	1.0	1.0	1.0	1.0	1.0	**1.0**	18NP: THREADS → CLEAR WET ORANGE TINT IN THREAD ROOTS NUT PLATE: OPAQUE PINK FIBERS IN THREAD ROOTS
		AVE		**3.3**		**1.7**	**1.8**	**1.6**	**1.4**	**1.6**		

USA TEST 1 – BLIND NUTPLATES - LOCTITE 078
125% (38µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

(1 thru 8) Application Date/Time: 11-25-09/2:00PM
Torque Test Date/Time 11-30-09/11:00AM
Cure Time: Approx. 120 hours
NOTE: Thanksgiving Holiday

(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM
Torque Test Date/Time: 12-07-09, 10:00 AM
Cure Time: Approx 96 Hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 125% (38µl on bolt)	1	0	2.5	2.5	0	4.0	3.5	2.0	2.0	2.9	**2.9**	1NP: THREADS → CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS & SPORADIC BUILD UP OF CLEAR ORANGE CRYSTALLINE LOCTITE NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK LOCTITE COAT DRY SALMON LOCTITE IN ALUMINUM BORE/HOLE THREADS; SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS
	2	0	3.5	3.5	0	4.0	3.5	3.0	3.0	3.4	**3.4**	2NP: 1ST 2 THREADS → CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK LOCTITE COAT THREADS; SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS
	3	0	5.0	5.0	0	3.5	3.5	2.5	2.0	2.9	**2.9**	3NP: ALL THREADS → CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK LOCTITE COAT NO EVIDENCE OF LOCTITE IN ALUMINUM BORE LOCTITE FROM BORE TRANSFERRED ONTO THE BOLT SHANK THREADS; SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

(1 thru 8) Application Date/Time: 11-25-09/2:00PM
Torque Test Date/Time 11-30-09/11:00AM
Cure Time: Approx. 120 hours
NOTE: Thanksgiving Holiday

(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM
Torque Test Date/Time: 12-07-09, 10:00 AM
Cure Time: Approx 96 Hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	3.0	3.0	0	4.5	2.0	2.0	2.5	2.8	**2.8**	4NP: ALL THREADS → BUILD-UP OF GEL & CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE DRY SALMON LOCTITE IN ALUMINUM BORE/HOLE THREADS; SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS
	5	0	2.0	2.0	0	4.0	2.0	2.5	2.5	2.8	**2.8**	5NP: ALL THREADS → BUILD-UP OF CLEAR WET ORANGE TINT WITH SPORADIC GEL LOCTITE IN THREAD ROOTS NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE DRY SALMON LOCTITE IN ALUMINUM BORE/HOLE THREADS; SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS
	6	0	2.0	2.0	0	4.5	2.5	2.0	2.0	2.8	**2.8**	6NP: ALL THREADS → CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE THREADS; VERY LITTLE INDICATION OF LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

(1 thru 8) Application Date/Time: 11-25-09/2:00PM
Torque Test Date/Time 11-30-09/11:00AM
Cure Time: Approx. 120 hours
NOTE: Thanksgiving Holiday

(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM
Torque Test Date/Time: 12-07-09, 10:00 AM
Cure Time: Approx 96 Hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	0	2.5	2.5	0	6.0	3.5	2.5	2.5	3.6	**3.6**	7NP: ALL THREADS → CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK LOCTITE COAT NO EVIDENCE OF LOCTITE IN ALUMINUM BORE LOCTITE FROM BORE TRANSFERRED ONTO THE BOLT SHANK THREADS; SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS
	8	0	6.0	6.0	0	4.0	3.5	3.0	3.0	3.4	**3.4**	8NP: ALL THREADS → WET CLEAR FILM OT LOCTITE NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK LOCTITE COAT THREADS → SOME INDICATIONS OF LOCTITE
	9	0	2.0	2.0	0	5.5	3.0	3.0	2.5	3.5	**3.5**	9NP: 1NP: THREADS → CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS & SPORADIC BUILD UP OF CLEAR ORANGE CRYSTALLINE LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE NO EVIDENCE OF LOCTITE IN ALUMINUM BORE LOCTITE FROM BORE TRANSFERRED ONTO THE BOLT SHANK THREADS; SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

(1 thru 8) Application Date/Time: 11-25-09/2:00PM
Torque Test Date/Time 11-30-09/11:00AM
Cure Time: Approx. 120 hours
NOTE: Thanksgiving Holiday

(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM
Torque Test Date/Time: 12-07-09, 10:00 AM
Cure Time: Approx 96 Hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	10	0	2.5	2.5	0	7.0	4.0	3.5	3.5	4.5	**4.5**	10NP: ALL THREADS → CLEAR WET FILM LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE NO EVIDENCE OF LOCTITE IN ALUMINUM BORE LOCTITE FROM BORE TRANSFERRED ONTO THE BOLT SHANK
	11	0	2.0	2.0	0	5.0	3.5	3.0	2.5	3.5	**3.5**	11NP: THREADS → WET CLEAR FILM OF LOCTITE 11^{TH} & 12^{TH} THREADS → CLEAR ORANGE LOCTITE GEL FORMING LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE NO EVIDENCE OF LOCTITE IN ALUMINUM BORE LOCTITE FROM BORE TRANSFERRED ONTO THE BOLT SHANK
	12	0	2.5	2.5	0	6.5	3.0	3.5	3.0	4.0	**4.0**	12NP: ALL THREADS → CLEAR WET ORANGE FILM IN THREAD ROOTS NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE DRY SALMON LOCTITE IN ALUMINUM BORE/HOLE THREADS → SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

(1 thru 8) Application Date/Time: 11-25-09/2:00PM
Torque Test Date/Time 11-30-09/11:00AM
Cure Time: Approx. 120 hours
NOTE: Thanksgiving Holiday

(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM
Torque Test Date/Time: 12-07-09, 10:00 AM
Cure Time: Approx 96 Hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	13	0	3.0	3.0	0	6.0	4.0	4.5	3.0	4.4	**4.4**	13NP: THREADS → WET CLEAR FILM OF LOCTITE 11TH & 12TH THREADS → CLEAR ORANGE LOCTITE GEL FORMING LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE THREADS → SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS NO EVIDENCE OF LOCTITE IN ALUMINUM BORE LOCTITE FROM BORE TRANSFERRED ONTO THE BOLT SHANK
	14	0	3.0	3.0	0	5.5	5.0	4.5	3.5	4.6	**4.6**	14NP: ALL THREADS → BUILD-UP OF GEL & CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS LARGE TRANSLUCENT SALMON COAT ON BOLT SHANK NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE DRY SALMON LOCTITE IN ALUMINUM BORE/HOLE THREADS → SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS
	15	0	3.0	3.0	0	4.0	2.0	2.5	2.0	2.6	**2.6**	15NP: THREADS → CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS & SPORADIC BUILD UP OF CLEAR ORANGE CRYSTALLINE NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE DRY SALMON LOCTITE IN ALUMINUM BORE/HOLE THREADS → SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

(1 thru 8) Application Date/Time: 11-25-09/2:00PM
Torque Test Date/Time 11-30-09/11:00AM
Cure Time: Approx. 120 hours
NOTE: Thanksgiving Holiday

(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM
Torque Test Date/Time: 12-07-09, 10:00 AM
Cure Time: Approx 96 Hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	16	0	2.5	2.5	0	6.5	3.0	2.5	3.0	3.8	**3.8**	16NP: THREADS → CLEAR WET ORANGE TINT LOCTITE IN THREAD ROOTS & SPORADIC BUILD UP OF CLEAR ORANGE CRYSTALLINE NUT PLATE: COUNTERBORE → LIGHT TRANSLUCENT PINK COAT OF LOCTITE DRY SALMON LOCTITE IN ALUMINUM BORE/HOLE THREADS → SPORADIC OPAQUE SALMON CRYSTALLINE SLIVERS
		AVE		**2.9**		**5.0**	**3.2**	**2.9**	**2.7**	**3.5**		

USA TEST 1 – BLIND INSERTS - LOCTITE 078
100% (30µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
***** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 100% (30µl on bolt)	1	0	3.0	3.0	0	2.0	1.5	1.0	1.0	1.4	**1.4**	1I: ALL THREADS → WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	2	0	2.0	2.0	0	1.0	1.0	1.0	.5	0.9	**0.9**	2I: ALL THREADS → WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	3	0	2.5	2.5	0	1.0	1.0.	1.0	1.0	1.0	**1.0**	3I: ALL THREADS → WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT:
	4	0	2.5	2.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	4I: ALL THREADS → WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	5	0	2.5	2.5	0	1.0	1.0	1.0	.5	0.9	**0.9**	5I: 1ST 2 THREADS → WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS EVEN WITH THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	6	0	2.0	2.0	0	1.5	1.0	1.0	.5	1.0	**1.0**	6I: 1ST 2 THREADS → WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS EVEN WITH THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	7	0	2.5	2.5	0	1.5	1.0	1.0	1.0	1.1	**1.1**	7I: 1ST 2 THREADS → WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS EVEN WITH THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	8	0	2.5	2.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	8I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	9	0	2.0	2.0	0	1.0	1.0	1.0	.5	0.9	**0.9**	9I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	10	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	10I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	11	0	1.5	1.5	0	1.0	1.0	1.0	.5	0.9	**0.9**	11I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	12	0	2.0	2.0	0	2.0	1.5	1.5	1.5	1.6	**1.6**	12I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	13	0	2.0	2.0	0	1.0	1.0	1.0	.5	0.9	**0.9**	13I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	14	0	1.5	1.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	14I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	**15	4.5	13.0	**8.5	4.5	6.0	6.0	6.0	5.0	5.8	**5.8**	15I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
	16	0	1.0	1.0	0	1.0	.5	.5	.5	0.6	**0.6**	16I: 1ST 2 THREADS → LARGER AMOUNTS OF WET TRANSLUCENT ORANGE LOCTITE IN THREAD ROOTS 3 THRU 12 THREADS → THE LOCTITE BEGAN TO INCREASE IN VOLUME UNTIL LOCTITE WAS ABOVE THE MAJOR DIAMETER NOTHING ON SHANK INSERT: 1ST 3 THREADS → PINK SALMON TRANSLUCENT COAT
		AVE		**2.0**		**1.2**	**1.0**	**1.0**	**0.8**			
	** Specimen 15 data deleted because of high residual torque.											

USA TEST 1 – BLIND INSERTS - LOCTITE 078
50% (15µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 50% (15µl on bolt)	1	0	1.0	1.0	0	1.0	.5	.5	.5	0.6	**0.6**	1I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	2	0	2.0	2.0	0	1.0	1.0	1.0	.5	0.9	**0.9**	2I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	3	0	2.0	2.0	0	1.0	1.0	1.0	.5	0.9	**0.9**	3I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	4	0	2.0	2.0	0	1.0	.5	.5	.5	0.6	**0.6**	4I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	5	0	2.0	2.0	0	1.0	1.0	1.0	.5	0.9	**0.9**	5I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	6	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	6I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	7	0	2.0	2.0	0	1.0	1.0	.5	.5	0.8	**0.8**	7I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	8	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	8I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	9	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	9I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	10	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	10I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	11	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	11I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	12	0	1.5	1.5	0	.5	.5	.5	.5	0.5	**0.5**	12I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
(1 thru 8) Application Date/Time: 11-25-09/2:00PM **(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM**
Torque Test Date/Time 11-30-09/11:00AM **Torque Test Date/Time: 12-07-09, 10:00 AM**
Cure Time: Approx. 120 hours **Cure Time: Approx 96 Hours**
NOTE: Thanksgiving Holiday

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	13	0	2.0	2.0	0	.5	.5	.5	.5	0.5	**0.5**	13I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	14	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	14I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	15	0	1.5	1.5	0	.5	.5	.5	.5	0.5	**0.5**	15I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
	16	0	1.0	1.0	0	1.0	1.0	.5	.5	0.8	**0.8**	16I: ALL THREADS → CLEAR ORANGE TINGE LOCTITE IN THREAD ROOTS INSERT: COUNTERBORE → WET SALMON TRANSLUCENT COAT 1ST 2 THREADS → DRY SALMON COAT
		AVE		**1.4**		**0.7**	**0.7**	**0.6**	**0.5**	**0.6**		

USA TEST 1- BLIND INSERTS - LOCTITE 078
125% (38µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

(1 thru 8) Application Date/Time: 11-25-09/2:00PM
Torque Test Date/Time 11-30-09/11:00AM
Cure Time: Approx. 120 hours
NOTE: Thanksgiving Holiday

(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM
Torque Test Date/Time: 12-07-09, 10:00 AM
Cure Time: Approx 96 Hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT* 125% (38µl on bolt)	1	0	1.0	1.0	0	1.0	.5	.5	.5	0.6	**0.6**	NOTE: WET CLEAR RED LOCTITE PUDDLED ON ALL COUNTERBORES 1 TO 16I: ALL THREADS → LIQUID ORANGE TINGE IN THREAD ROOTS 1 TO 16 INSERTS: COUNTERBORE + 1ST 2 THREADS TRANSLUCENT SALMON LOCTITE COAT WITH FORMED THREADS DUE TO THE BOLT THREAD FORM NO INDICATION OF LOCTITE IN THREAD AREA HOWEVER THREADS ARE WET SHINY IN APPEARANCE
	2	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	
	3	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	
	4	0	2.0	2.0	0	1.0	1.0	1.0	1.0	1.0	**1.0**	
	5	0	2.0	2.0	0	1.5	1.5	1.5	1.0	1.4	**1.4**	
	6	0	2.0	2.0	0	1.0	.5	.5	.5	0.6	**0.6**	
	7	0	1.5	1.5	0	1.0	1.0	1.0	.5	0.9	**0.9**	
	8	0	1.0	1.0	0	.5	.5	.5	.5	0.5	**0.5**	
	9	0	3.5	3.5	0	2.0	2.0	2.0	1.5	1.9	**1.9**	
	10	0	1.5	1.5	0	1.0	.5	.5	.5	0.6	**0.6**	
	11	0	2.0	2.0	0	1.0	1.0	1.0	.5	0.9	**0.9**	
	12	0	1.5	1.5	0	.5	.5	.5	.5	0.5	**0.5**	
	13	0	1.5	1.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	
	14	0	2.0	2.0	0	1.0	1.0	.5	.5	0.8	**0.8**	
	15	0	2.5	2.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	
	16	0	1.0	1.0	0	1.0	1.5	1.0	1.0	1.1	**1.1**	
		AVE		**1.7**		**1.0**	**0.9**	**0.8**	**0.7**	**0.9**		

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

(1 thru 8) Application Date/Time: 11-25-09/2:00PM
Torque Test Date/Time 11-30-09/11:00AM
Cure Time: Approx. 120 hours
NOTE: Thanksgiving Holiday

(9 thru 16) Application Date/Time: 12-03-09, 10:45 AM
Torque Test Date/Time: 12-07-09, 10:00 AM
Cure Time: Approx 96 Hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	**BREAKAWAY TORQUE (IN-LBS)**			**DYNAMIC RUN OFF TORQUE (IN-LBS)**							**OBSERVATIONS**
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		

*Loctite 078 begins to bubble as fasteners are being installed

TEST 1C (NEW): BLIND NUTPLATES - L0CTITE 078
15µl ON BOLT AND 7.5 µl ON INTERNAL THREADS ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD114-5011-0004 NUTPLATE*

CURE TIME: APPROX 120 HOURS
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **NOTE: Thanksgiving Holiday**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 50/50% (15µl on bolt) (7.5µl on nut)	1	0	4.5	4.5	0	2.5	2.0	1.5	1.5	1.875	**1.9**	1NP: ALL THREADS → WET CLEAR AMBER LOCTITE 10 THREAD & SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) NUT PLATE: NOT EXAMINED
	2	0	4.0	4.0	0	2.5	2.0	2.0	2.0	2.125	**2.1**	2NP: 8TH, 9TH, & 10TH THREADS → PINK WET GEL BUILD-UP SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) NUT PLATE: SOME SPORADIC INDICATIONS OF LOCTITE
	3	0	5.0	5.0	0	3.5	4.0	3.5	2.5	3.375	**3.4**	3NP: 7 THREAD → PATCH OF PINK TRANSLUCENT LOCTITE 8TH, 9TH & 10TH THREADS → PINK TRANSLUCENT LOCTITE IN THREAD ROOTS SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) NUT PLATE: SOME SPORADIC INDICATIONS OF LOCTITE
	4	0	3.5	3.5	0	2.5	2.5	2.0	2.5	2.375	**2.4**	4NP: ALL THREADS → WET CLEAR FILM 9TH & 10TH THREADS → PINK WET GEL BUILD-UP NUT PLATE: THREADS → SOME INDICATIONS OF A PINK COAT
	5	0	4.0	4.0	0	4.0	3.0	2.5	2.0	2.875	**2.9**	5NP: THREADS 2, 5 & 7 → TRANSLUCENT AMBER PATCHES OF LOCTITE 8TH, 9TH, & 10TH THREADS → TRANSLUCENT ORANGE WET GEL OF LOCTITE SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) NUT PLATE: SOME SPORADIC INDICATIONS OF LOCTITE
	6	0	4.0	4.0	0	3.0	2.5	1.5	1.5	2.125	**2.1**	6NP: ALL THREADS → WET CLEAR AMBER LOCTITE 10TH THREAD & SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) NUT PLATE: SOME SPORADIC INDICATIONS OF LOCTITE
	7	0	4.0	4.0	0	3.0	2.5	2.0	1.5	2.25	**2.3**	7NP: ALL THREADS → WET CLEAR AMBER LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD114-5011-0004 NUTPLATE*

CURE TIME: APPROX 120 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **NOTE: Thanksgiving Holiday**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												10TH THREAD & SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) NUT PLATE: SOME SPORADIC INDICATIONS OF LOCTITE
	8	0	3.5	3.5	0	2.5	2.5	2.0	1.5	2.125	**2.1**	8NP: ALL THREADS → WET CLEAR FILM 9TH & 10TH THREADS → PINK WET GEL BUILD-UP NUT PLATE: THREADS → SOME INDICATIONS OF A PINK COAT
	9	0	4.0	4.0	0	1.0	1.0	1.0	.5	.875	**0.9**	NOT EXAMINED
	10	0	3.5	3.5	0	1.5	1.5	1.5	1.0	1.375	**1.4**	NOT EXAMINED
	11	0	6.0	6.0	0	2.5	2.5	2.0	1.5	2.125	**2.1**	NOT EXAMINED
	12	0	4.5	4.5	0	2.0	2.0	2.0	1.5	1.875	**1.9**	NOT EXAMINED
	13	0	4.5	4.5	0	2.0	2.0	2.0	1.5	1.875	**1.9**	NOT EXAMINED
	14	0	4.5	4.5	0	3.0	3.0	3.0	2.0	2.75	**2.8**	NOT EXAMINED
	15	0	5.5	5.5	0	3.0	3.0	3.0	3.0	3	**3.0**	NOT EXAMINED
	16	0	5.0	5.0	0	2.5	2.5	2.5	2.0	2.375	**2.4**	NOT EXAMINED
	AVE			**4.4**		**2.6**	**2.4**	**2.1**	**1.8**			

TEST 1C (NEW): BLIND INSERTS - L0CTITE 078
15µl ON BOLT AND 7.5 µl ON INTERNAL THREADS ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*

CURE TIME: APPROX 120 HOURS
*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **NOTE: Thanksgiving Holiday**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 50/50% (15µl on bolt) (7.5µl on insert)	1	0	2.0	2.0	0	1.0	1.0	1.0	1.0	1	**1.0**	1I: ALL THREADS → WET CLEAR FILM INSERT: 1ST 3 THREADS & COUNTERBORE → TRANSLUCENT SALMON COAT
	2	0	2.0	2.0	0	1.0	1.0	1.0	1.0	1	**1.0**	2I: ALL THREADS → WET CLEAR FILM 9TH & 10TH THREADS → PINK WET GEL BUILD-UP INSERT: 1ST 3 THREADS → TRANSLUCENT SALMON COAT
	3	0	2.5	2.5	0	2.5	2.5	2.0	2.0	2.25	**2.3**	3I: ALL THREADS → WET CLEAR AMBER LOCTITE SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) INSERT: 1ST 3 THREADS → TRANSLUCENT SALMON COAT
	4	0	3.0	3.0	0	1.5	1.5	1.5	1.0	1.375	**1.4**	4I: ALL THREADS → WET CLEAR FILM 9TH & 10TH THREADS → PINK WET GEL BUILD-UP INSERT: 1ST 3 THREADS → TRANSLUCENT SALMON COAT
	5	0	1.5	1.5	0	1.0	1.0	.10	1.0	1.01	**0.8**	5I: ALL THREADS → WET CLEAR FILM INSERT: 1ST 3 THREADS AND COUNTERBORE → TRANSLUCENT SALMON COAT
	6	0	2.0	2.0	0	1.0	1.0	1.0	.5	.875	**0.9**	6I: THREADS 2, 5 & 7 → TRANSLUCENT AMBER PATCHES OF LOCTITE 8TH, 9TH, & 10TH THREADS → TRANSLUCENT ORANGE WET GEL OF LOCTITE SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) INSERT: 1ST 3 THREADS → TRANSLUCENT SALMON COAT

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
MD111-3001-0314 BOLT/MD115-2002-0003 INSERT*

CURE TIME: APPROX 120 HOURS

*** LOCKING FEATURE REWORKED TO 0 IN-LBS** **NOTE: Thanksgiving Holiday**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	0	2.0	2.0	0	1.0	.5	.5	.5	.635	**0.6**	7I: THREADS 2, 5 & 7 → TRANSLUCENT AMBER PATCHES OF LOCTITE 8TH, 9TH, & 10TH THREADS → TRANSLUCENT ORANGE WET GEL OF LOCTITE SHANK: DIRTY PINK LOCTITE COAT (MAJORITY OF LOCTITE) INSERT: 1ST 3 THREADS → TRANSLUCENT SALMON COAT
	8	0	2.5	2.5	0	1.5	4.5	1.0	1.0	2	**2.0**	8I: ALL THREADS → WET CLEAR FILM INSERT: 1ST 3 THREADS & COUNTERBORE → TRANSLUCENT SALMON COAT
	9	0	1.5	1.5	0	1.0	.5	.5	.5	.625	**0.6**	NOT EXAMINED
	10	0	1.5	1.5	0	1.0	.5	.5	.5	.625	**0.6**	NOT EXAMINED
	11	0	1.5	1.5	0	1.0	1.0	.5	.5	.75	**0.8**	NOT EXAMINED
	12	0	1.0	1.0	0	1.0	.5	.5	.5	.625	**0.6**	NOT EXAMINED
	13	0	1.0	1.0	0	.5	.5	.5	.5	.5	**0.5**	NOT EXAMINED
	14	0	1.5	1.5	0	1.0	.5	.5	.5	.625	**0.6**	NOT EXAMINED
	15	0	2.0	2.0	0	1.0	1.0	1.0	1.0	1	**1.0**	NOT EXAMINED
	16	0	1.0	1.0	0	1.0	1.0	.5	.5	.75	**0.8**	NOT EXAMINED
	AVE			**1.8**		**1.1**	**1.2**	**0.8**	**0.8**			

TEST 1A (NEW) BLIND NUTPLATES - LOCTITE 078
100% (17µl) APPLIED ON NUTPLATE ONLY

LOCTITE LOT NUMBER: L39DAA7124 (LLC 078) **Applicator setting: SEE TABLE**
NAS1003-7A BOLT WITH MD114-5011-0004 ANCHOR
***LOCKING FEATURE REWORKED TO 0 IN-LBS**

LLC 078 100% (17µl) APPLIED TO NUTPLATE **CURE TIME: 72 hours**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 100% (17µl)	1	0	5.5	5.5	0	5.0	5.0	4.5	3.0	4.4	**4.4**	1NP: WHITE CRYSTALLINE - PASTE - PINK NUT PLATE: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA
	2	0	5.5	5.5	0	4.5	5.5	5.5	5.0	5.1	**5.1**	2NP: WHITE CRYSTALLINE - PASTE - PINK NUT PLATE: CHUNKS OF SPORADIC LOCTITE
	3	0	5.0	5.0	0	2.5	2.0	2.0	2.0	2.1	**2.1**	3NP: WHITE – OPAQUE CRYSTALLINE - PINK 5.0 NUT PLATE: SMALL CHUNKS OF PINK LOCTITE
	4	0	3.0	3.0	0	1.5	1.5	1.5	1.5	1.5	**1.5**	4NP: SEMI CURED TRANSLUCENT - PINK NUT PLATE: EVIDENCE OF CURED/CRYSTALLINE LOCTITE
	5	0	8.5	8.5	0	4.5	4.0	4.0	3.5	4.0	**4.0**	5NP: DID NOT INSPECT BOLT NUT PLATE: THREADS LOOKED CLEAR
	6	0	3.0	3.0	0	1.0	1.0	1.0	1.0	1.0	**1.0**	6NP: LOOKED LIKE UNCURED LOCTITE NUT PLATE: 1ST 2 THREADS & COUNTERBORE HAVE SEMI CURED LOCTITE
	7	0	3.0	3.0	0	1.0	1.0	1.0	1.0	1.0	**1.0**	7NP: 1/3 OF 1 THREAD LOOKED SEMI CURED THE REST OF THE THREADS LOOKED WET NUT PLATE: SEVERAL THREADS SEMI CURED
	8	0	4.0	4.0	0	2.0	2.5	2.5	3.0	2.5	**2.5**	8NP: THREADS 3, 4, 5 & 6 INDICATIONS OF CURED LOCTITE & SEMI CURED LOCTITE – TRANSLUCENT PINK JELLY NUT PLATE: DID NOT EXAMINE
	9	0	4.0	4.0	0	3.0	3.0	2.5	2.5	2.8	**2.8**	9NP 1ST 4 THREADS HAD CURED LOCTITE NUT PLATE: AREAS OF SEMI CURED LOCTITE INCLUDING COUNTERBORE AREA
	10	0	1.5	1.5	0	1.5	1.0	1.0	1.0	1.1	**1.1**	10NP: THREADS LOOK CLEAN. SOME INDICATIONS OF RED NUT PLATE: BACK SIDE HAD CURED LOCTITE ON THREADS

LOCTITE LOT NUMBER: L39DAA7124 (LLC 078) **Applicator setting: SEE TABLE**
NAS1003-7A BOLT WITH MD114-5011-0004 ANCHOR
***LOCKING FEATURE REWORKED TO 0 IN-LBS**

LLC 078 100% (17µl) APPLIED TO NUTPLATE **CURE TIME: 72 hours**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	11	0	6.0	6.0	0	5.5	5.5	4.0	4.0	4.8	**4.8**	11NP: THREADS 5 & 6 WHITE CURED LOCTITE 7, 8, & 9 SEMI CURED LOCTITE PINK JELLY NUT PLATE: EVIDENCE OF CURED SPORADIC LOCTITE
	12	0	4.5	4.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	12NP: ALL WET NUT PLATE: 2 TO3 THREADS OF CURED LOCTITE REMAINING THREADS TRACES OF CURED LOCTITE
	13	0	6.5	6.5	0	8.0	8.5	6.5	5.5	7.1	**7.1**	13NP: THREADS 3 & 4 WHITE CURED LOCTITE THREADS 5 & 6 SEMI CURED LOCTITE NUT PLATE: TRACES OF CURED SPORADIC LOCTITE
	14	0	7.5	7.5	0	5.5	5.5	4.5	4.0	4.9	**4.9**	14NP: THREADS 4, 5, 6 & 7 SEMI CURED LOCTITE REMAINING THREADS ARE WET NUT PLATE: 2 TO 3 THREADS SMALL AREAS OF SEMI CURED LOCTITE
	15	0	2.0	2.0	0	1.0	1.0	1.0	1.0	1.0	**1.0**	15NP: ALL THREADS ARE WET NUT PLATE: SEVERAL THREADS ON THE BACK, EXIT SIDE SEMI CURED LOCTITE
	16	0	3.0	3.0	0	1.5	1.5	1.5	1.5	1.5	**1.5**	16NP: THREADS COATED BUT WET NUT PLATE: PINK JELLY THREADS AND IN COUNTERBORE AREA
	AVE			**4.5**		**3.1**	**3.1**	**2.8**	**2.5**			

TEST 1A (NEW): BLIND INSERTS - LOCTITE 078
100% (17µl) APPLIED ON INSERT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLTS WITH MD115-2002-0003 INSERTS*
*** Locking torque reduced to 0 in-lbs.**

LLC 078 APPLIED TO INSERT **CURE TIME: 72 hours**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 100% (17µl)	1	0	4.5	4.5	0	2.0	1.0	1.0	.5	1.125	**1.1**	1I: 90% CURED CRYSTALLINE LOCTITE MOST THREADS INSERT: 1ST 2 THREADS CAKED ON LOCTITE 90% CURED THE REMAINING THREADS → RED TRANSLUCENT
	2	0	2.0	2.0	0	.5	.5	0	0	0.25	**0.3**	2I: THREADS 1, 2, 5, 6 & 7 HAVE CHUNKS OF 85% CURED LOCTITE WET PINK IN COLOR INSERT: COUNTERBORE AREA HAS CAKED ON WET SEMI CURED LOCTITE PINK COLOR
	3	0	8.0	8.0	0	4.0	2.5	3.5	2.5	3.125	**3.1**	3I: THREADS 7, 8 & 9 CURED WHITE CRYSTALLINE LOCTITE INSERT: 1ST 3 THREADS HAVE INDICATIONS OF SEMI CURED LOCTITE
	4	0	4.0	4.0	0	2.0	4.5	1.0	.5	2	**2.0**	4I: APPROXIMATELY 7 THREADS HAVE CHUNKS OF 80% CURED CRYSTALLINE LOCTITE INSERT: 1ST 2 ½ THREADS HAVE 80% CURED LOCTITE
	5	0	4.0	4.0	0	1.5	1.5	1.0	1.0	1.25	**1.3**	5I: ALL THREADS WET PINK INSERT: 1ST 2 THREADS AMBER CLEAR APPEARANCE SEMI CURED LOCTITE
	6	0	5.0	5.0	0	2.0	1.5	1.5	1.0	1.5	**1.5**	6I: ALL THREADS WET PINK INSERT: 1ST 1 ½ THREADS AMBER DRY. SOME SPORADIC THREADS WITH AMBER CRYSTALLINE LOCTITE
	7	0	4.0	4.0	0	1.5	1.5	1.0	1.0	1.25	**1.3**	7I: 7TH 1 SMALL ¼ THREAD BUILD-UP OF LOCTITE GEL MAY OF CAME FROM INSERT 1ST THREAD INSERT: 1ST 3 THREADS AMBER IN COLOR. SPORADIC PIECES OF SEMI CURED LOCTITE DOWN THE INSERT THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLTS WITH MD115-2002-0003 INSERTS*
*** Locking torque reduced to 0 in-lbs.**

LLC 078 APPLIED TO INSERT **CURE TIME: 72 hours**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	8	0	5.0	5.0	0	2.5	2.0	1.5	1.5	1.875	**1.9**	8I: 1 OR 2 SMALL PIECES OF SEMI CURED LOCTITE THE MAJORITY OF THE THREADS ARE WET INSERT: 1ST 2 ½ THREADS HAVE CAKED ON 85% CURED LOCTITE SPORADIC AREAS OF SEMI CURED LOCTITE DOWN THRU THE REMAINING THREADS
	9	0	3.0	3.0	0	1.5	1.0	.5	.5	0.875	**0.9**	9I: INDICATIONS OF 80% CURED LOCTITE THROUGHOUT THE THREAD LENGTH INSERT: 1ST THREAD IS FULL OF BUILT UP CAKE LIKE 80% CURED LOCTITE
	10	0	3.0	3.0	0	1.5	1.5	1.5	1.5	1.5	**1.5**	10I: VERY LITTLE INDICATION OF LOCTITE PRESENT INSERT: AMBER TO TRANSLUCENT PINK FOR 1ST 1 ½ THREADS OTHER THREADS HAD DRIED LOCTITE INDICATIONS
	11	0	2.0	2.0	0	1.0	1.0	.5	.5	0.75	**0.8**	11I: ALL THREADS NOT "WET" BUT VERY LITTLE INDICATION OF LOCTITE PRESENT INSERT: DID NOT EXAMINE
	12	0	2.0	2.0	0	1.0	.5	.5	.5	0.625	**0.6**	12I: THREADS LOOKED WET PINK WITH NO INDICATION OF LOCTITE BUILD-UP INSERT: 1ST 2 1/2 THREADS WET AMBER COLOR OTHER THREADS INDICATIONS OF SEMI CURED LOCTITE
	13	0	.5	.5	0	1.0	.5	.5	.5	0.625	**0.6**	13I: THREADS LOOKED RED AND STILL WET INSERT: 1ST 2 1/2 THREADS ARE AMBER IN COLOR
	14	0	5.5	5.5	0	3.5	2.0	2.0	2.5	2.5	**2.5**	14I: THREADS 8 & 9 HAVE 80% CURED LOCTITE (AMBER) THE BOLT LOOKS AS IF WEARING A SKIRT OF LOCTITE MOST LIKELY TRANSFERRED FROM THE COUNTERBORE INSERT: NO EVIDENCE OF LOCTITE IN COUNTERBORE AREA SMALL INDICATION OF SPORADICALLY CURED LOCTITE DOWN THE REMAINING THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-7A BOLTS WITH MD115-2002-0003 INSERTS*
*** Locking torque reduced to 0 in-lbs.**

LLC 078 APPLIED TO INSERT **CURE TIME: 72 hours**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	15	0	5.0	5.0	0	3.5	2.5	1.5	1.0	2.13	**2.1**	15I: 1ST 3 AND 7, 8 & 9 CHUNKS OF 90% CURED LOCTITE (SALMON) INSERT: 1ST 3 THREADS FILLED WITH 90% CURED LOCTITE WHITE SALMON CRYSTALLINE
	16	0	6.0	6.0	0	3.5	2.0	1.5	1.0	2	**2.0**	16I: 2ND AND 7, 8 & 9 THREADS AMBER JELLY LIKE IN APPEARANCE INSERT: 1ST 2 THREADS ARE COATED WITH SALMON COLORED CHUNKS OF LOCTITE OTHER THREADS HAVE SMALL INDICATIONS OF CURED LOCTITE
	AVE			**4.0**		**2.0**	**1.6**	**1.2**	**1.0**			

NESC TEST 1B – OPEN NUTPLATES - LOCTITE 078
100% (35µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE* **Application Date/Time: 11/13/09, 11:30 AM**
*** Locking torque reduced to 0 in-lbs.** **Torque Test Date/Time: 11/16/09, 11:35 AM**

LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 100% (35µl)	1	0	5.0	5.0	0	2.0	2.0	1.5	1.5		**1.8**	1NP: NO INDICATION OF LOCTITE NUT PLATE: 90% CURED LOCTITE FOUND ON BOTH ENDS AND AROUND THE NUT ELEMENT BEARING FACE ON THE BACK SIDE
	2	0	6.5	6.5	0	4.5	4.5	3.0	3.0		**3.8**	2NP: 6TH THREAD → BUILD-UP OF SEMI CURED LOCTITE THREADS 1 THRU 5 → SHOWS WET LOCTITE NUT PLATE: FEW INDICATIONS OF LOCTITE THROUGHOUT THE THREADS
	3	0	6.0	6.0	0	4.0	4.0	4.0	2.5		**3.6**	3NP: THREADS 4, 5 & 6 → BUILD UP OF PINK GEL LOCTITE THREADS 1, 2 & 3 → WET PINK GEL LIKE IN THREAD ROOT NUT PLATE: POOLS OF LOCTITE ON NUT ELEMENT & BEARING FACE
	4	0	3.0	3.0	0	2.0	2.0	1.5	1.5		**1.8**	4NP: SMALL PATCH OF CURED LOCTITE NUT PLATE: ALL OF THE THREADS HAVE LOCTITE SEMI CURED
	5	0	6.5	6.5	0	5.0	5.5	5.5	6.0		**5.5**	5NP: 1ST 3 THREADS → WHITE CRYSTALLINE LOCTITE THREADS 4, 5 & 6 → TRANSLUCENT PINK-SALMON LOCTITE NUT PLATE: LAST 2 EXIT THREADS WHITE CURED LOCTITE
	6	0	7.0	7.0	0	4.5	5.0	5.5	5.0		**5.0**	6NP: 1st 6 THREADS → BUILD-UP OF LOCTITE, 80% CURED NUT PLATE: LITTLE TO NO INDICATIONS OF LOCTITE
	7	0	3.0	3.0	0	1.5	1.5	1.5	1.5		**1.5**	7NP: SLIVER OF LOCTITE ON EXIT THREAD NUT PLATE: 1ST 2 THREADS AND LAST 3 EXIT THREADS ARE SALMON IN COLOR
	8	0	4.0	4.0	0	6.5	6.5	7.0	7.5		**6.9**	8NP: 1ST 1 ½ THREADS WHITE CRYSTALLINE LOCTITE 3, 4 & 5 JELLY LIKE CAKED ON LOCTITE NUT PLATE: INDICATIONS OF LOCTITE SPORADIC IN THREADS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE* **Application Date/Time: 11/13/09, 11:30 AM**
*** Locking torque reduced to 0 in-lbs.** **Torque Test Date/Time: 11/16/09, 11:35 AM**

LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	9	0	5.0	5.0	0	4.0	3.0	2.5	2.5		**3.0**	9NP: 1ST 6 THREADS → OPAQUE DARK AMBER 6TH & 7TH THREADS → SEMI CURED LOCTITE NUT PLATE: SPORADIC PINK LOCTITE ALL THREADS
	10	0	4.5	4.5	0	3.0	3.0	2.5	2.0		**2.6**	10NP: 1ST 2 THREADS → HAVE BUILD-UP OF CLEAR TO AMBER LOCTITE REMAINING THREADS ARE WET TO TRANSLUCENT NUT PLATE: EXCESSIVE CLEAR TO CREAM LOCTITE ON ALL THREADS
	11	0	5.0	5.0	0	3.5	2.5	2.0	2.0		**2.5**	11NP: 1ST 6 THREADS → TRANSLUCENT SALMON WITH A PATCH OF LOCTITE ON THREAD 7 NUT PLATE: SMALL TRACES OF PINK CLEAR LOCTITE
	12	0	6.0	6.0	0	3.5	2.5	2.0	1.5		**2.4**	12NP: 1ST 7 THREADS → DIRTY PINK APPROX 80% DRY THREADS 6 & 7 BUILD-UP OF LOCTITE NUT PLATE: DID NOT EXAMINE
	13	0	5.0	5.0	0	3.0	3.0	3.5	3.5		**3.3**	13NP 1ST 4 THREADS → CAKED ON LOCTITE THREADS 9, 10 &11 → PATCHES OF LOCTITE NUT PLATE: TINY SPORADIC CHUNKS OF LOCTITE
	14	0	7.0	7.0	0	4.0	4.0	3.5	2.5		**3.5**	14NP: 1ST 3 THREADS → EXCESSIVE WHITE CRYSTALLINE TO DRY TRANSLUCENT PINK REMAINING THREADS → NO INDICATION OF LOCTITE NUT PLATE: ALL THREADS CRUSTY PASTE TO DIRTY PASTE LOCTITE
	15	0	6.5	6.5	0	3.0	2.5	2.0	2.0		**2.4**	15NP: 1ST 6 THREADS → TRANSLUCENT PINK BUILD UP THREADS 5 & 6 BUILD-UP → "SKIRT" NUT PLATE: MINOR INDICATIONS OF TRANSLUCENT SALMON DRIED LOCTITE
	16	0	6.5	6.5	0	4.0	4.0	3.5	3.5		**3.8**	16NP: 1ST 2 THREADS HAVE BUILT-UP CLEAR TO AMBER LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE* **Application Date/Time: 11/13/09, 11:30 AM**
*** Locking torque reduced to 0 in-lbs.** **Torque Test Date/Time: 11/16/09, 11:35 AM**

LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												REMAINING THREADS ARE WET PINK TRANSLUCENT NUT PLATE: TRANSLUCENT PINK TO SALMON IN COUNTERBORE NO INDICATIONS OF LOCTITE IN THREADS
	AVE			**5.4**		**3.6**	**3.5**	**3.2**	**3.0**			

NESC TEST 1B – OPEN NUTPLATES - LOCTITE 078
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE* **Application Date/Time: 11/13/09, 11:30 AM**
*** Locking torque reduced to 0 in-lbs.** **Torque Test Date/Time: 11/16/09, 11:35 AM**

LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 50% (17µl)	1	0	5.0	5.0	0	2.5	2.5	2.5	2.0		**2.4**	1NP: 1ST 6 THREADS → WET PINK GEL 6TH THREAD → HEAVY PATCH "SKIRT" APPEARANCE WET PINK GEL NUT PLATE: SPORADIC SALMON COLOR LOCTITE
	2	0	6.0	6.0	0	3.0	2.0	1.5	1.5		**2.0**	2NP: 1ST 7 THREADS → WET PINK GEL 7TH THREAD → HEAVY "SKIRT" APPEARANCE REMAINING THREADS TRANSLUCENT WET FILM NUT PLATE: SPORADIC SALMON COLOR LOCTITE
	3	0	5.0	5.0	0	4.5	3.0	3.0	3.0		**3.4**	3NP: 1ST 7 THREADS → WET PINK GEL 7TH THREAD → HEAVY "SKIRT" APPEARANCE REMAINING THREADS TRANSLUCENT WET FILM NUT PLATE: SPORADIC BITS OF CLEAR TRANSLUCENT LOCTITE
	4	0	5.5	5.5	0	3.0	2.5	2.0	2.0		**2.4**	4NP: 1ST 6 THREADS → WET PINK GEL THREADS 3 & 4 → HAD ADDITIONAL PATCH MATERIAL 6TH THREAD → HEAVY PATCH "SKIRT" APPEARANCE PINK GEL NUT PLATE: ¾ OF EXIT THREAD PASTE TO CRUST LOCTITE
	5	0	6.0	6.0	0	2.5	2.5	2.5	2.5		**2.5**	5NP: 1ST 7 THREADS → WET PINK GEL 7TH THREAD HEAVY "SKIRT" APPEARANCE REMAINING THREADS TRANSLUCENT WET NUT PLATE: ALL THREADS MORE THAN SPORADIC PASTE LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE* **Application Date/Time: 11/13/09, 11:30 AM**
*** Locking torque reduced to 0 in-lbs.** **Torque Test Date/Time: 11/16/09, 11:35 AM**

LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	6	0	6.0	6.0	0	2.5	2.0	2.0	2.0		**2.1**	6NP: 1ST 7 THREADS → WET PINK GEL 7TH THREAD → HEAVY "SKIRT" APPEARANCE REMAINING THREADS TRANSLUCENT WET NUT PLATE: 1ST AND LAST THREAD → PASTE TO PINK COLOR LOCTITE
	7	0	5.5	5.5	0	2.5	2.5	2.0	2.0		**2.3**	7NP: ALL THREADS → WET TRANSLUCENT FILM NUT PLATE: COUNTERBORE & THREADS → PINK SALMON COAT ON NUT ELEMENT & FAYING SURFACE
	8	0	4.5	4.5	0	3.0	3.0	2.0	2.0		**2.5**	8NP: ALL THREADS → WET TRANSLUCENT FILM NUT PLATE: COUNTERBORE & THREADS → PINK SALMON COAT ON NUT ELEMENT & FAYING SURFACE
	9	0	2.5	2.5	0	1.5	1.5	1.5	1.5	1.5	**1.5**	9NP: NO INDICATION OF CURED LOCTITE TRACES OF WET LOCTITE IN THREAD ROOTS NUT PLATE: ALL THREADS AMBER DRIED LOCTITE
	10	0	3.5	3.5	0	1.5	1.5	2.0	1.5	1.625	**1.6**	10NP: NO INDICATION OF CURED LOCTITE TRACES OF WET LOCTITE IN THREAD ROOTS NUT PLATE: ALL THREADS HAVE AN AMBER DRIED LOCTITE
	11	0	6.5	6.5	0	5.0	4.5	5.0	4.5	4.75	**4.8**	11NP: 1ST 6 THREADS → PINK WET CAKED UP LOCTITE ESPECIALLY IN THE 6TH THREAD NUT PLATE: SPORADIC INDICATIONS OF TRANSLUCENT PINK LOCTITE
	12	0	6.0	6.0	0	3.5	4.0	4.0	2.5	3.5	**3.5**	12NP: THREADS 5 & 6 BUILT UP PINK-CLEAR LOCTITE ROOT OF ALL THREADS APPEAR WET NUT PLATE: LAST 2 THREADS OPAQUE WHITE CRYSTALLINE LOCTITE
	13	0	4.5	4.5	0	2.0	2.0	1.5	1.5	1.75	**1.8**	13NP: 11TH THREAD SMALL SALMON –CLEAR PATCH NUT PLATE: ALL THREADS SALMON-CLEAR

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE* **Application Date/Time: 11/13/09, 11:30 AM**
*** Locking torque reduced to 0 in-lbs.** **Torque Test Date/Time: 11/16/09, 11:35 AM**

LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	14	0	6.0	6.0	0	5.5	6.5	7.0	6.0	6.25	**6.3**	14NP: 2ND THREAD APPROX 35% WHITE CRYSTALLINE LOCTITE NUT PLATE: 7TH THREAD → SALMON-CLEAR LOCTITE
	15	0	3.0	3.0	0	1.0	1.0	1.0	1.0	1	**1.0**	15NP: NO INDICATION OF CURED LOCTITE TRACES OF WET LOCTITE IN THREAD ROOTS NUT PLATE: 7TH THREAD → SALMON-CLEAR LOCTITE
	16	0	6.5	6.5	0	4.5	4.5	5.0	6.0	5	**5.0**	16NP: 1ST 6 THREADS → PINK-CLEAR BUILD-UP OF LOCTITE REMAINING THREADS WET-PINK LOCTITE IN THREAD ROOTS NUT PLATE: SPORADIC INDICATION OF CURED PINK-CLEAR LOCTITE
	AVE			**5.1**		**3.0**	**2.8**	**2.8**	**2.6**			

NESC TEST 1B – OPEN NUTPLATES - LOCTITE 078
125% (45µl)) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MS21060 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
NUT-PLATE 125% (45µl on bolt)	1	0	5.5	5.5	0	4.5	4.0	3.0	3.0	3.6	**3.6**	1NP: 1ST 5 THREADS → WET PINK TRANSLUCENT LOCTITE IN THREAD ROOTS 6TH & 7TH THREADS → WET PINK TRANSLUCENT LOCTITE FILLED UP TO MAJOR DIAMETER IN THREAD ROOTS 7TH , 8TH & 9TH THREADS → WET PINK TRANSLUCENT GEL PATCH REMAINING THREADS → LIGHT CLEAR WET PINK FILM IN THREAD ROOTS NUT PLATE: WET CLEAR RED LOCTITE LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	2	0	2.5	2.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	2NP: ALL THREADS → EVEN DISTRIBUTION OF WET CLEAR **RED** LOCTITE IN THREAD ROOTS NUT PLATE: SPORADIC CLEAR ORANGE GEL LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	3	0	4.5	4.5	0	1.5	1.5	1.0	1.0	1.3	**1.3**	3NP: ALL THREADS → EVEN DISTRIBUTION OF WET CLEAR **RED** LOCTITE IN THREAD ROOTS 6TH THRU 12TH THREADS & SHANK→ BUILD-UP OF PINK TRANSLUCENT PATCH NUT PLATE: SPORADIC CLEAR ORANGE GEL LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MS21060 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	6.0	6.0	0	5.0	4.0	3.5	3.0	3.9	**3.9**	4NP: 1ST 5 THREADS → PINK TRANSLUCENT WET GEL IN THREAD ROOTS 6TH & 7TH THREADS → PINK TRANSLUCENT GEL FILLED IN THREAD ROOTS NUT PLATE: SPORADIC CLEAR ORANGE GEL LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	5	0	7.0	7.0	0	3.0	3.0	3.0	2.5	2.9	**2.9**	5NP: 1ST 5 THREADS → WET PINK TRANSLUCENT LOCTITE IN THREAD ROOTS 6TH THRU 7TH THREADS → WET PINK TRANSLUCENT LOCTITE FILLED UP TO MAJOR DIAMETER IN THREAD ROOTS REMAINING THREADS → LIGHT CLEAR WET PINK FILM IN THREAD ROOTS NUT PLATE: CLEAR WET FILM IN ALL THREADS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	6	0	5.0	5.0	0	3.0	2.5	2.0	2.0	2.4	**2.4**	6NP: 1ST 5 THREADS → WET PINK TRANSLUCENT IN THREAD ROOTS UP TO MAJOR DIAMETER 6TH & 7TH THREADS → BUILD-UP OF WET PINK TRANSLUCENT LOCTITE GEL REMAINING THREADS → LIGHT CLEAR WET PINK FILM IN THREAD ROOTS NUT PLATE: CLEAR WET FILM IN ALL THREADS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MS21060 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	0	6.0	6.0	0	3.5	3.0	2.5	2.0	2.8	**2.8**	7NP: 1ST 5 THREADS → WET PINK TRANSLUCENT LOCTITE IN THREAD ROOTS 6TH & 7TH THREADS → WET PINK TRANSLUCENT LOCTITE FILLED UP TO MAJOR DIAMETER IN THREAD ROOTS 7TH , 8TH & 9TH THREADS → WET PINK TRANSLUCENT GEL PATCH REMAINING THREADS → LIGHT CLEAR WET PINK FILM IN THREAD ROOTS NUT PLATE: SOME INDICATIONS OF CLEAR LOCTITE FIBERS IN THREADS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	8	0	6.5	6.5	0	4.0	4.0	3.5	3.5	3.8	**3.8**	8NP: ALL THREADS → EVEN DISTRIBUTION OF WET CLEAR **RED** LOCTITE IN THREAD ROOTS 6TH THRU 12TH THREADS & SHANK→ BUILD-UP OF PINK TRANSLUCENT PATCH NUT PLATE: CLEAR WET ORANGE GEL IN THREAD ROOTS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	9	0	4.5	4.5	0	3.0	3.0	2.0	2.0	2.5	**2.5**	9NP: ALL THREADS → EVEN DISTRIBUTION OF WET CLEAR **RED** LOCTITE IN THREAD ROOTS 6TH THRU 12TH THREADS & SHANK→ BUILD-UP OF PINK TRANSLUCENT PATCH NUT PLATE: SOME INDICATIONS OF CLEAR LOCTITE FIBERS IN THREADS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MS21060 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	**BREAKAWAY TORQUE (IN-LBS)**			**DYNAMIC RUN OFF TORQUE (IN-LBS)**							**OBSERVATIONS**
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	10	0	2.5	2.5	0	1.0	1.0	1.0	1.0	1.0	**1.0**	10NP: ALL THREADS → CLEAR WET PINK LOCTITE IN THREAD ROOTS NUT PLATE: ALL THREADS → SPORADIC PINK TRANSLUCENT COAT LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	11	0	4.0	4.0	0	2.5	2.5	3.0	3.0	2.8	**2.8**	11NP: ALL THREADS → CLEAR WET PINK LOCTITE IN THREAD ROOTS NUT PLATE: ALL THREADS → SPORADIC WET PINK TRANSLUCENT GEL WITH FIBERS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	12	0	6.0	6.0	0	4.0	3.0	3.0	3.0	3.3	**3.3**	12NP: ALL THREADS → EVEN DISTRIBUTION OF WET CLEAR **RED** LOCTITE IN THREAD ROOTS 6^{TH} THRU 12^{TH} THREADS & SHANK→ BUILD-UP OF PINK TRANSLUCENT PATCH NUT PLATE: SOME INDICATIONS OF CLEAR ORANGE GEL SPORADIC IN THREAD ROOTS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	13	0	5.5	5.5	0	2.0	2.0	2.0	1.5	1.9	**1.9**	13NP: ALL THREADS → CLEAR WET PINK LOCTITE IN THREAD ROOTS NUT PLATE: ALL THREADS → SPORADIC WET PINK TRANSLUCENT GEL WITH FIBERS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MS21060 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	**BREAKAWAY TORQUE (IN-LBS)**			**DYNAMIC RUN OFF TORQUE (IN-LBS)**							**OBSERVATIONS**
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	14	0	4.5	4.5	0	2.5	3.5	4.0	5.0	3.8	**3.8**	14NP: ALL THREADS → CLEAR WET PINK LOCTITE IN THREAD ROOTS NUT PLATE: MOST THREADS → WET PINK TRANSLUCENT COAT
	15	0	7.0	7.0	0	4.0	3.5	3.5	3.0	3.5	**3.5**	15NP: 1ST 5 THREADS → TRANSLUCENT PINK LOCTITE FILLED IN THREAD ROOTS 6TH THREAD → BUILD-UP OF PINK TRANSLUCENT BEYOND MAJOR DIAMETER 7 THRU 12 THREADS → CLEAR WET PINK FILM OF LOCTITE IN THREAD ROOTS NUT PLATE: ALL THREADS → INDICATIONS OF PINK TRANSLUCENT FIBERS IN THREAD ROOTS LOCTITE HAS SEEPED OUT EVERYWHERE BETWEEN THE NUT ELEMENT AND NUT PLATE CAGE
	16	0	3.5	3.5	0	3.0	1.5	1.5	1.5	1.9	**1.9**	16NP: ALL THREADS → CLEAR WET PINK FILM OF LOCTITE IN THREAD ROOTS NUT PLATE: ALL THREADS → SALMON TRANSLUCENT COAT
		AVE		**5.0**		**3.0**	**2.7**	**2.5**	**2.4**	**2.6**		

NESC TEST 1B – OPEN INSERTS- LOCTITE 078
100% (35µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS ***
LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 100% (35µl)	1	0	9.0	9.0	0	7.5	5.5	4.0	4.5		**5.4**	1I: 1st 7 THREADS → TRACES OF WHITE CRYSTALLINE CRUSTY LOCTITE THREADS 8 & 9 → PINK-CLEAR LOCTITE INSERT: OPAQUE PASTE LOCTITE ON MAJORITY OF THREADS
	2	0	9.5	9.5	0	5.5	4.0	3.5	2.0		**3.8**	2I: 8TH THREAD → PINK-CLEAR LOCTITE INSERT: OPAQUE PASTE LOCTITE ON MAJORITY OF THREADS
	3	0	9.5	9.5	0	4.5	3.5	2.5	2.5		**3.3**	3I: 11TH THREAD → EXCESSIVELY BUILD-UP PINK- CLEAR LOCTITE IN THREAD ROOT INSERT: 1ST 3 THREADS → BUILD-UP PINK CLEAR LOCTITE LAST THREAD → DRIED CLEAR SLIVER OF LOCTITE
	4	0	3.5	3.5	0	2.0	2.0	1.5	1.5		**1.8**	4I: ALL THREADS → WET CLEAR FILM IN THREAD ROOTS INSERT: 1ST 3 THREADS → BUILD-UP PINK CLEAR LOCTITE LAST THREAD → DRIED CLEAR SLIVER OF LOCTITE
	5	0	9.0	9.0	0	7.5	5.0	5.0	5.0		**5.6**	5I: 1ST 5 THREADS → SMALL AMOUNTS OF DRIED LOCTITE THREADS 6, 7&8 → BUILD-UP SALMON TRANSLUCENT LOCTITE INSERT: SPORADIC TRACES OF WHITE CRYSTALLINE CLEAR LOCTITE
	6	0	9.0	9.0	0	8.5	5.5	5.5	6.0		**6.4**	6I: 1ST 7 THREADS → WHITE CRYSTALLINE IN APPEARANCE A BIG CHUNK OF WHITE SALMON CRYSTALLINE FELL OFF DURING REMOVAL INSERT: WHITE CRYSTALLINE CLEAR LOCTITE IN ALL THREADS
	7	0	9.5	9.5	0	7.0	6.5	6.0	5.5		**6.3**	7I: 1ST 7 THREADS → WHITE CRYSTALLINE LOCTITE 8TH & 9TH THREADS → BIG DARK SALMON BUILD UP OF LOCTITE INSERT: WHITE CRYSTALLINE CLEAR LOCTITE IN ALL THREADS
	8	0	6.0	6.0	0	2.5	2.0	2.0	2.0		**2.1**	8I: ALL THREADS → CLEAR WET FILM IN THREAD ROOTS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS ***
LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												INSERT: 1ST 3 THREADS → BUILD-UP PINK CLEAR LOCTITE LAST THREAD DRIED CLEAR SLIVER OF LOCTITE
	9	0	10.0	10.0	0	8.5	6.5	6.0	6.0		**6.8**	9I: ALL THREADS → PINK TRANSLUCENT IN THREAD ROOTS INSERT: COUNTERBORE AND 1ST 3 THREADS → TRANSLUCENT SALMON LOCTITE COAT EXIT THREAD → CRUSTY AMBER INDICATIONS
	10	0	12.0	12.0	0	7.0	5.0	5.0	4.0		**5.3**	10I: ALL THREADS → TRANSLUCENT PINK IN THREAD ROOTS INSERT: COUNTERBORE AND 1ST 3 THREADS → TRANSLUCENT SALMON LOCTITE COAT LAST 2 THREADS (EXIT END) CRUSTY AMBER INDICATIONS
	11	0	10.0	10.0	0	6.0	5.5	5.0	4.5		**5.3**	11I: THREADS 2 THRU 6 → TRANSLUCENT AMBER LOCTITE 7 & 8 THREADS → OPAQUE PINK PASTE LOCTITE
	12	0	10.0	10.0	0	7.5	5.5	5.5	5.5		**6.0**	12I: ALL THREAD → TRANSLUCENT PINK LOCTITE IN THREAD ROOTS INSERT: 1ST 3 THREADS → COATED WITH TRANSLUCENT SALMON LOCTITE LAST THREAD DRIED SALMON LOCTITE OTHER THREADS HAVE SPORADIC DRIED LOCTITE
	13	0	12.0	12.0	0	7.0	6.0	5.0	6.0		**6.0**	13I: 1ST 4 THREADS → WHITE CRYSTALLINE CRUSTY LOCTITE 5TH & 6TH THREADS → WHITE TO PINK CRYSTALLINE DRIED LOCTITE INSERT: 1ST 3 THREADS → OPAQUE WHITE PASTE DRY LOCTITE
	14	0	11.0	11.0	0	6.0	4.5	4.0	4.0		**4.6**	14I: ALL THREAD → TRANSLUCENT PINK LOCTITE IN THREAD ROOTS INSERT: 1ST 3 THREADS → COATED WITH TRANSLUCENT SALMON LOCTITE LAST 2 THREADS BROWN CRUSTY
	15	0	11.0	11.0	0	6.0	4.5	3.5	3.5		**4.4**	15I: 1ST 3 THREADS → WHITE CRYSTALLINE CRUSTY LOCTITE 4TH & 5TH THREADS → BROWN CRUSTY LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS ***
LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												6TH & 7TH THREADS BUILD UP OF BROWN-PINK-AMBER DRY LOCTITE INSERT: SPORADIC BROWN PASTE TO BROWN CRUSTY LOCTITE
	16	0	10.5	10.5	0	6.0	5.0	5.0	4.5		**5.1**	16I: 1ST 3 THREADS → OPAQUE WHITE PASTE DRY LOCTITE 4, 5 & 6TH THREADS → CRUSTY BROWN LOCTITE 7 & 8TH THREADS → DRY AMBER "DRESS" (LOCTITE BUILD UP) INSERT: ALL THREADS HAVE SPORADIC OPAQUE PASTE DRY LOCTITE
	AVE			**9.5**		**6.2**	**4.8**	**4.3**	**4.2**			

NESC TEST 1B – OPEN INSERTS- LOCTITE 078
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS ***
LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 50% (17µl)	1	0	11.5	11.5	0	5.5	4.0	3.0	3.0		**3.9**	1I: ALL THREAD ROOTS TRANSLUCENT PINK LOCTITE FILM INSERT: 1ST 2 THREADS SALMON DRY LOCTITE COAT EXIT THREAD OPAQUE DRY LOCTITE
	2	0	11.0	11.0	0	5.0	2.5	2.0	2.0		**2.9**	2I: ALL THREAD ROOTS TRANSLUCENT PINK LOCTITE FILM INSERT: 1ST 2 THREADS TRANSLUCENT SALMON DRY LOCTITE
	3	0	11.5	11.5	0	6.0	4.5	4.5	4.0		**4.8**	3I: 1ST 3 THREADS WHITE CRYSTALLINE CRUSTY DRY LOCTITE 5, 6 & 7 THREADS CRUSTY CRYSTALLINE BROWN 8 & 9 SALMON-BROWN DRY BUILD-UP LOCTITE INSERT: SPORADIC DRY LOCTITE IN HEX CORNERS
	4	0	11.0	11.0	0	5.0	2.5	2.0	1.5		**2.8**	4I: 6TH THREAD WHITE CRYSTALLINE CRUSTY BROWN LOCTITE 7 & 8 THREADS SALMON TO BROWN BUILD-UP LOCTITE INSERT: 1ST 2 THREADS OPAQUE SALMON CRUSTY LOCTITE SPORADIC DRY LOCTITE IN HEX CORNERS
	5	0	12.5	12.5	0	5.0	3.5	2.5	2.5		**3.4**	5I: ALL THREAD ROOTS TRANSLUCENT PINK LOCTITE FILM INSERT: 1ST 3 THREADS TRANSLUCENT SALMON LOCTITE COAT
	6	0	12.0	12.0	0	6.0	3.5	3.0	3.5		**4.0**	6I: 1ST 3 THREADS WHITE CRYSTALLINE CRUSTY DRY LOCTITE 5, 6 & 7 THREADS CRUSTY CRYSTALLINE BROWN 8 & 9 SALMON-BROWN DRY BUILD-UP LOCTITE INSERT: LOWER THREADS "SHINY" PASTE LOCTITE
	7	0	10.5	10.5	0	5.5	4.0	3.5	2.5		**3.9**	7I: 1ST 2 THREADS DRY OPAQUE CRUSTY LOCTITE 3, 4, 5 & 6 THREADS BROWN & WHITE CRYSTALLINE CRUSTY LOCTITE 7 & 8 THREADS BUILT UP DRY AMBER-BROWN SALMON LOCTITE INSERT: OPAQUE CRUSTY INDICATIONS OF LOCTITE

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS ***
LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	8	0	12.0	12.0	0	7.5	6.0	6.5	6.5		**6.6**	8I: ALL THREAD ROOTS TRANSLUCENT PINK LOCTITE FILM INSERT: 1ST 2 THREADS SALMON DRY LOCTITE COAT EXIT THREAD OPAQUE DRY LOCTITE
	9	0	8.5	8.5	0	5.5	4.5	4.0	4.5		**4.6**	9I: 7 & 8 THREAD WHITE CRYSTALLINE CAKED ON LOCTITE 1ST 6 THREADS AND 11 & 12TH LOOK DRY INSERT: LAST 3 THREADS ON EXIT SIDE WHITE PASTE
	10	0	3.0	3.0	0	1.5	1.5	1.5	1.5		**1.5**	10I: NO INDICATION OF LOCTITE INSERT: 1ST 3 THREADS BUILD-UP SALMON DRY LOCTITE REMAINING THREADS CLEAR DRY SPORADIC LOCTITE
	11	0	4.0	4.0	0	2.0	2.0	1.5	1.5		**1.8**	11I: NO INDICATION OF LOCTITE INSERT: 1ST 3 THREADS BUILD-UP SALMON DRY LOCTITE REMAINING THREADS CLEAR DRY SPORADIC LOCTITE
	12	0	8.5	8.5	0	6.5	5.5	4.5	4.0		**5.1**	12I: 1ST 6 THREADS WHITE CRYSTALLINE DRY LOCTITE 7&8 THREADS PINK-CLEAR LOCTITE BUILD-UP INSERT: LAST 3 THREADS WHITE CRYSTALLINE CLEAR SPORADIC LOCTITE
	13	0	9.0	9.0	0	7.0	5.5	4.0	3.5		**5.0**	13I: 1ST 6 THREADS → DRY LIGHTLY COATED LOCTITE 7TH THREAD WHITE CRYSTALLINE BUILD-UP INSERT: LAST 3 THREADS CLEAR TO WHITE CRYSTALLINE LOCTITE SPORADIC LOCTITE
	14	0	7.5	7.5	0	7.0	4.5	4.5	5.0		**5.3**	14I: 1ST 6 THREADS WHITE CRYSTALLINE DRY LOCTITE 7, 8, 9 THREADS BUILD UP OF DARK SALMON LOCTITE INSERT: LAST 3 THREADS WHITE CRYSTALLINE CLEAR SPORADIC LOCTITE
	15	0	4.0	4.0	0	2.0	2.0	1.5	2.0		**1.9**	15I: NO INDICATION OF LOCTITE INSERT: 1ST 3 THREADS PINK-CLEAR FILM OF LOCTITE LAST 3 THREADS → SPORADIC PINK-CLEAR LOCTITE
	16	0	2.0	2.0	0	5.0	5.5	.5	.5		**2.9**	16I: 1ST 7 THREADS WHITE CRYSTALLINE DRY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS ***
LLC 078 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												INSERT: SPORADIC INDICATIONS OF WHITE CRYSTALLINE PASTE LOCTITE INSERT BACKED OUT, THEREFORE NO READING COULD BE TAKEN
	AVE			**8.7**		**5.1**	**3.8**	**3.1**	**3.0**			

NESC TEST 1B – OPEN INSERTS- LOCTITE 078
125% (45µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
INSERT 125% (45µl on bolt)	1	0	6.5	6.5	0	4.5	4.0	3.0	2.0	3.4	**3.4**	1I: 1ST 6 THREADS → DRY LOCTITE AT BOTTOM OF THREAD ROOTS REMAINING THREADS → WET CLEAR FILM OF LOCTITE INSERT: LAST 4 THREADS → SALMON TRANSLUCENT COAT
	2	0	3.0	3.0	0	2.0	2.0	1.5	1.5	1.8	**1.8**	2I: ALL THREADS → ORANGE CLEAR LOCTITE IN THREAD ROOTS INSERT: LAST 3 THREADS → SALMON TRANSLUCENT COAT + SPORADIC LOCTITE FIBERS REMAINING
	3	0	3.5	3.5	0	2.0	2.0	2.0	1.5	1.9	**1.9**	3I: ALL THREADS → LIGHT CLEAR TO PINK FILM OF LOCTITE IN THREAD ROOTS INSERT: LAST 3 THREADS → SALMON TRANSLUCENT COAT + SPORADIC LOCTITE FIBERS REMAINING
	4	0	8.0	8.0	0	3.5	3.0	3.0	2.0	2.9	**2.9**	4I: 1ST 7 THREADS → DRY LOCTITE AT BOTTOM OF THREAD ROOTS 8 THRU 12 THREADS → WET PINK GEL FILLED IN THREAD ROOTS INSERT: LAST 3 THREADS → SALMON TRANSLUCENT COAT + SPORADIC LOCTITE FIBERS REMAINING
	5	0	6.5	6.5	0	3.0	2.5	2.0	2.0	2.4	**2.4**	5I: 1ST 7 THREADS → DRY LOCTITE AT BOTTOM OF THREAD ROOTS 8 THRU 12 THREADS → WET PINK GEL FILLED IN THREAD ROOTS INSERT: LAST 3 THREADS → SALMON TRANSLUCENT COAT + SPORADIC WHITE CRYSTALLINE LOCTITE POWDER

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	6	0	3.5	3.5	0	2.0	2.0	1.5	1.5	1.8	**1.8**	6I: 1ST 7 THREADS → LIGHT CLEAR FILM OF LOCTITE IN THREAD ROOTS 8 THRU 12 THREADS → CLEAR PINK FILM IN THREAD ROOTS INSERT: LAST 3 THREADS → SALMON TRANSLUCENT COAT + SPORADIC WHITE CRYSTALLINE LOCTITE POWDER
	7	0	3.5	3.5	0	2.0	2.0	2.0	1.5	1.9	**1.9**	7I: 1ST 4 THREADS → LIGHT CLEAR FILM OF LOCTITE IN THREAD ROOTS 5 THRU 12 THREADS → CLEAR PINK FILM IN THREAD ROOTS INSERT: LAST 3 THREADS → SALMON TRANSLUCENT COAT + SPORADIC WHITE CRYSTALLINE LOCTITE POWDER
	8	0	4.0	4.0	0	2.0	2.0	2.0	2.0	2.0	**2.0**	8I: ALL THREADS → ORANGE CLEAR LOCTITE IN THREAD ROOTS INSERT: LAST 3 THREADS → SALMON TRANSLUCENT COAT + HEAVIER CONCENTRATION OF WHITE CRYSTALLINE LOCTITE POWDER
	9	0	9.0	9.0	0	8.0	8.0	12.0	12.0	10.0	**10.0**	9I: 1ST 5 THREADS → PINK CRYSTALLINE LOCTITE 6TH & 7TH THREADS → PINK TRANSLUCENT COAT/BUILD-UP 8 THRU 12 THREADS → WET CLEAR ORANGE FILM IN THREAD ROOTS INSERT: SPORADIC ORANGE GEL IN ALL THREADS
	10	0	6.5	6.5	0	3.5	3.5	3.0	3.0	3.3	**3.3**	10I: ALL THREADS → ORANGE CLEAR LOCTITE IN THREAD ROOTS INSERT: ALL THREADS TRANSLUCENT SALMON LOCTITE COAT

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	11	0	6.5	6.5	0	4.5	5.0	8.0	9.0	6.6	**6.6**	11I: 9I: 1ST 5 THREADS → PINK CRYSTALLINE LOCTITE 6TH & 7TH THREADS → PINK TRANSLUCENT COAT/BUILD-UP 8 THRU 12 THREADS → WET CLEAR ORANGE FILM IN THREAD ROOTS INSERT: ALL THREADS → SPORADIC SALMON GEL
	12	0	9.0	9.0	0	6.5	6.5	7.0	6.5	6.6	**6.6**	12I: 1ST 3 THREADS → WHITE CRYSTALLINE LOCTITE 4TH, 5TH, & 6TH THREADS → PINK CRYSTALLINE LOCTITE 7 THREAD → BUILD-UP OF PINK TRANSLUCENT COAT 8 THRU 12 THREADS → CLEAR PINK FILM IN THREAD ROOTS INSERT: SALMON GEL WITH WHITE CRYSTALLINE FIBERS
	13	0	8.5	8.5	0	7.0	8.0	9.5	12.0	9.1	**9.1**	13I: 1ST THREAD → WHITE CRYSTALLINE LOCTITE 2 THRU 5 THREADS → PINK CRYSTALLINE LOCTITE 6TH & 7TH THREADS → TRANSLUCENT PINK PASTE BUILD-UP 8 THRU 12 THREADS → CLEAR ORANGE FILM IN THREAD ROOTS INSERT: 1ST 2 THREADS → WHITE CRYSTALLINE LOCTITE LAST 2 THREADS → SALMON CRYSTALLINE LOCTITE
	14	0	6.0	6.0	0	2.5	2.5	2.0	2.0	2.3	**2.3**	14I: 10I: ALL THREADS → ORANGE CLEAR LOCTITE IN THREAD ROOTS INSERT: 1ST 2 THREADS SALMON TRANSLUCENT COAT REMAINING THREADS → SPORADIC INDICATIONS OF SALMON GEL
	15	0	10.5	10.5	0	10.0	8.0	9.0	12.0	9.8	**9.8**	15I: 1ST 5 THREADS → PINK CRYSTALLINE IN THREAD ROOTS 6TH & 7TH THREADS → BUILD-UP OF PINK CRYSTALLINE IN THREAD ROOTS UP TO THE MAJOR DIAMETER 8TH & 9TH THREADS → PINK TRANSLUCENT COAT INSERT: SPORADIC OPAQUE PASTE TO CLEAR DRY FIBERS

LOCTITE LOT NUMBER: L39DAA7124 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	**BREAKAWAY TORQUE (IN-LBS)**			**DYNAMIC RUN OFF TORQUE (IN-LBS)**							**OBSERVATIONS**
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	16	0	11.5	11.5	0	12.0	12.0	7.5	7.0	9.6	**9.6**	16I: ALL THREADS → CLEAR ORANGE FILM IN THREAD ROOTS INSERT: EXIT THREAD → WHITE TO PINK CRYSTALLINE FIBERS 1ST 2 THREADS → SALMON TRANSLUCENT COAT REMAINING THREADS → SPORADIC SALMON TRANSLUCENT FIBERS
		AVE		**6.6**		**4.7**	**4.6**	**4.7**	**4.8**	**4.7**		

NESC TEST 1B – OPEN NUTPLATES - LOCTITE 242
100% (35 µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
NUTPLATES, LLC 242, 100% APPLIED TO BOLT

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN NUT-PLATE 100% (35µl)	1	0	9.5		0	5.0	4.5	4.5	4.0		**4.5**	1NP: 1ST 4 THREADS WHITE BABY BLUE CRYSTALLINE POWDER LOCTITE THREADS 5, 6 & 7 TRANSLUCENT BLUE LAST THREADS BLUE GEL THREAD TO SHANK BLUE-GREEN TRANSLUCENT COAT NUT PLATE: BLUE CRUST LOCTITE ON CENTER THREADS
	2	0	12.0		0	9.0	8.0	6.0	5.0		**7.0**	2NP: 1ST 3 THREADS → NO INDICATION OF LOCTITE THREADS 4 & 5 WHITE BABY BLUE CRYSTALLINE (DRY) LOCTITE 6 THRU 10 BLUE GEL SHANK BLUE-GREEN TRANSLUCENT COAT NUT PLATE: ALMOST COMPLETELY CLEAN LITTLE TO NO INDICATION OF LOCTITE
	3	0	18.0		0	8.0	8.0	8.0	6.0		**7.5**	3NP: 1ST 3 THREADS DRY TO TRANSLUCENT WITH SOME INDICATIONS OF WET LOCTITE 4, 5 & 6 WHITE BABY BLUE & BLUE-GREEN CRUSTY LOCTITE 7, 8 9, 10 & 11 BLUE GEL LOCTITE IN THREAD ROOTS NUT PLATE: ALMOST COMPLETELY CLEAN LITTLE TO NO INDICATION OF LOCTITE
	4	0	14.0		0	7.0	4.0	3.0	3.0		**4.3**	4NP: 1ST 4 THREADS DRY WITH NO INDICATION OF LOCTITE 5, 6, 7 & 8 BLUE-GREEN BUILD UP OF LOCTITE 9 & 10 BLUE GEL 11 & 12 WET LOOK BUILD UP OF BLUE-GREEN TRANSLUCENT COAT ON SHANK NUT PLATE: ALMOST COMPLETELY CLEAN LITTLE TO NO INDICATION OF LOCTITE

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
NUTPLATES, LLC 242, 100% APPLIED TO BOLT

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0	11.0		0	5.0	5.0	4.0	3.0		**4.3**	5NP: 1ST 6 THREADS NO INDICATION OF LOCTITE BUT HAS A VISUAL INDICATION OF A "WET" LOOK BLUE-GREEN TRANSLUCENT COAT ON SHANK NUT PLATE: BLUE CRUST ON EXIT THREAD BLUE-GREEN COAT ON COUNTERBORE
	6	0	14.0		0	8.0	6.0	5.0	4.0		**5.8**	6NP: 1ST 3 THREADS WET LOCTITE 4, 5 & 6 BLUE-GREEN CRUSTY LOCTITE NUT PLATE: SPORADIC BLUE TRANSLUCENT COAT LOCTITE ON THREADS
	7	0	11.0		0	3.0	4.0	3.0	3.0		**3.3**	7NP: 2ND THREAD BLUE CRUSTY LOCTITE 3, 4 & 5 THREADS BLUE GEL IN THREAD TOOTS 7TH THREAD BLUE GEL BUILD UP LAST THREAD AND SHANK BLUE-GREEN TRANSLUCENT COAT NUT PLATE: 2.5 EXIT THREADS BLUE TRANSLUCENT COAT
	8	0	14.0		0	9.0	9.0	8.0	6.0		**8.0**	8NP: 1ST THREAD DRY CLEAR 2 & 3 BLUE TO BLUE-GREEN CRUST 4 THRU 12 THREADS BLUE-GREEN PASTE COAT NUT PLATE: LAST THREAD CRUSTY BLUE
	9	0	14.0		0	9.0	8.0	6.0	5.0		**7.0**	9NP: 1ST 3 THREADS LIGHT FILM OF WET TRANSLUCENT LOCTITE 4, 5, & 6 THREADS WHITE BABY BLUE CRYSTALLINE (DRY) LOCTITE 7 THRU 12 THREADS BLUE GEL THREAD TO SHANK BLUE PASTE COAT NUT PLATE: SPORADIC BLUE GEL IN COUNTERBORE EXIT THREAD SPORADIC BLUE-GREEN CRYSTALLINE (DRY) LOCTITE
	10	0	16.0		0	8.0	8.0	5.0	5.0		**6.5**	10NP: 1ST 2 THREADS CLEAR WET NUT PLATE: DID NOT EXAMINE
	11	0	12.0		0	7.0	7.0	5.0	4.0		**5.8**	11NP: DID NOT EXAMINE THE REMAINDER OF THE PARTS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
NUTPLATES, LLC 242, 100% APPLIED TO BOLT

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												SINCE THE LOCTITE CONTINUED TO CURE BEFORE THEY COULD BE EXAMINED NUT PLATE: DID NOT EXAMINE
	12	0	9.0		0	3.0	3.0	3.0	3.0		**3.0**	NOT EXAMINED
	13	0	12.0		0	6.0	5.0	5.0	4.0		**5.0**	NOT EXAMINED
	14	0	9.0		0	3.0	3.0	2.0	2.0		**2.5**	NOT EXAMINED
	15	0	11.0		0	5.0	4.0	3.5	4.0		**4.1**	NOT EXAMINED
	16	0	14.0		0	9.5	9.5	8.5	6.0		**8.4**	NOT EXAMINED
	AVE		**12.5**			**6.5**	**6.0**	**5.0**	**4.2**			

NESC TEST 1B – OPEN NUTPLATES - LOCTITE 242
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
NUTPLATES, LLC 242, 100% APPLIED TO BOLT

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN NUT-PLATE 50% (17µl)	1	0	8.0		0	3.5	3.0	3.0	3.0		**3.1**	1NP: 1ST 5 THREADS → WET TRANSLUCENT FILM OF LOCTITE 6 THRU 12 THREADS → BABY BLUE PASTE IN THREAD ROOTS SHANK: BLUE-GREEN TRANSLUCENT COAT OF LOCTITE NUT PLATE: FLAKING DRY BLUE CRYSTALLINE LOCTITE IN THREADS
	2	0	7.0		0	3.0	3.0	2.5	3.0		**2.9**	2NP: 1ST 5 THREADS → WET TRANSLUCENT FILM OF LOCTITE 6 THRU 12 THREADS → BABY BLUE PASTE IN THREAD ROOTS SHANK: BLUE-GREEN TRANSLUCENT COAT OF LOCTITE NUT PLATE: BLUE GEL TO CRUST LOCTITE IN NUT ELEMENT SURFACE
	3	0	11.0		0	7.0	6.5	4.0	2.5		**5.0**	3NP: 1ST 2 THREADS → WET TRANSLUCENT FILM OF LOCTITE 3RD & 4TH THREADS → WHITE TO BABY BLUE CRYSTALLINE DRY & FLAKING 5 THRU 11 BABY BLUE PASTE IN THREAD ROOTS 12 THREAD & SHANK: BLUE-GREEN TRANSLUCENT PATCH NUT PLATE: BLUE GEL TO CRUST LOCTITE IN NUT ELEMENT SURFACE
	4	0	16.0		0	9.0	9.0	6.0	6.0		**7.5**	4NP: 1ST 3 THREADS → WET TRANSLUCENT FILM OF LOCTITE 4TH THREAD → WHITE TO BABY BLUE CRYSTALLINE DRY LOCTITE 5TH & 6TH THREADS → DRY BLUE GEL 7 THRU 11 THREADS → BLUE PASTE IN THREAD ROOTS 12 THREAD & SHANK: BLUE-GREEN TRANSLUCENT PATCH NUT PLATE: SOME BLUE GEL ON NUT ELEMENT SURFACE

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
NUTPLATES, LLC 242, 100% APPLIED TO BOLT

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0	9.0		0	4.0	3.0	2.5	2.0		**2.9**	5NP: 1ST 4 THREADS → WET TRANSLUCENT FILM OF LOCTITE 5 THRU 9 THREADS → BLUE-GREEN GEL TO PASTE TEXTURE OF LOCTITE 10 THRU 12 & SHANK → BLUE-GREEN TRANSLUCENT COAT OF LOCTITE NUT PLATE: SPORADIC BLUE CRUST IN THREADS
	6	0	10.0		0	4.0	4.0	3.0	2.5		**3.4**	6NP: 1ST 5 THREADS → WET TRANSLUCENT FILM OF LOCTITE 6 THRU 11 BLUE PASTE TO GEL LOCTITE IN THREAD ROOTS 12TH THREAD & SHANK → BLUE-GREEN TRANSLUCENT PATCH OF LOCTITE NUT PLATE: 4 TO 5 THREADS OF DRY/FLAKING BABY BLUE LOCTITE IN THREAD ROOTS
	7	0	13.0		0	8.5	7.0	6.0	5.0		**6.6**	7NP: 1ST 4 THREADS → WHITE TO BABY BLUE CRYSTALLINE LOCTITE 5 TO 8 THREADS → BLUE-GREEN PASTE TO GEL LOCTITE 9 THRU 11 THREADS → YELLOW GREEN PASTE TO GEL LOCTITE 12 THREAD & SHANK → BLUE TRANSLUCENT PATCH OF LOCTITE NUT PLATE: SMALL SPORADIC FLAKES OF DRY CRYSTALLINE LOCTITE
	8	0	9.0		0	3.5	2.5	2.5	2.5		**2.8**	8NP: 1ST 2 THREADS → NO INDICATION OF LOCTITE 3RD, 4TH & 5TH THREADS → MINUTE AMOUNT OF WET BLUE PASTE IN THREAD ROOTS 6 THRU 10 THREADS → BABY BLUE PASTE OF LOCTITE FILLED IN THREAD ROOTS 11, 12 THREADS & SHANK → BLUE-GREEN TRANSLUCENT LOCTITE COAT NUT PLATE: 4 TO 5 THREADS OF DRY/FLAKING BABY BLUE LOCTITE IN THREAD ROOTS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
NUTPLATES, LLC 242, 100% APPLIED TO BOLT

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	9	0	12.0		0	6.5	4.5	4.5	3.5		**4.8**	9NP: 1ST 2 THREADS → NO INDICATIONS OF LOCTITE (DRY) 3RD THREAD → WHITE TO BABY BLUE CRYSTALLINE (DRY) LOCTITE 4, 5 & 6 THREAD → CRUSTY BLUE TO BLUE-GREEN GEL 7 THRU 10 THREADS → BLUE PASTE IN THREAD ROOTS SHANK: BLUE GEL LOCTITE NUT PLATE: SMALL SPORADIC BLUE-GREEN FLUORESCENT FLAKES OF LOCTITE
	10	0	11.0		0	4.0	4.0	3.5	3.0		**3.6**	10NP: 1ST 2 THREADS → NO INDICATION OF LOCTITE (DRY) 3 THRU 6 THREADS → INCREASING AMOUNT OF WHITE CRYSTALLINE LOCTITE IN THREAD ROOTS 7 THRU 11 THREADS → BLUE-GREEN PASTE 12TH THREAD AND SHANK: TRANSLUCENT BLUE-GREEN COAT NUT PLATE: 1ST THREAD HAS A BABY BLUE COAT
	11	0	12.0		0	8.0	7.0	7.0	4.0		**6.5**	11NP: 1ST THREAD → NO INDICATION OF LOCTITE 2ND THREAD → WHITE BLUE CRYSTALLINE DRY LOCTITE 3 THRU 8 BUILD UP OF BLUE-GREEN PASTE-GEL IN THREAD ROOTS SHANK: BLUE-GREEN TRANSLUCENT COAT NUT PLATE: LITTLE EVIDENCE OF LOCTITE ON ALL BOLT THREADS
	12	0	10.0		0	4.0	3.5	3.0	3.0		**3.4**	12NP: 1ST 5 THREADS → CLEAR WET FILM OF LOCTITE 6 THRU 11 THREADS → BABY BLUE PASTE IN THREAD ROOTS 12 THREAD & SHANK: BLUE-GREEN TRANSLUCENT COAT OF LOCTITE NUT PLATE: BABY BLUE PASTE FILLED IN THREAD ROOTS

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
NUTPLATES, LLC 242, 100% APPLIED TO BOLT

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	13	0	13.0		0	11.0	3.5	3.5	3.5		**5.4**	13NP: 1ST 5 THREADS → CLEAR WET FILM OF LOCTITE 6 THRU 11 THREADS → BABY BLUE PASTE IN THREAD ROOTS 12 THREAD & SHANK: BLUE-GREEN TRANSLUCENT COAT OF LOCTITE NUT PLATE: CRUSTY BLUE ON EXIT THREAD LARGE PIECE OF BLUE-GREEN LOCTITE IN COUNTERBORE
	14	0	12.5		0	6.0	6.5	5.5	4.0		**5.5**	14NP: 1ST 2 THREADS ARE DRY WITH NO INDICATION OF LOCTITE 3RD, 4TH & 5TH THREADS → WHITE TO BABY BLUE CRYSTALLINE LOCTITE 6 THRU 8 THREADS → BABY BLUE PASTE-GEL IN THREAD ROOTS WHICH SLOWLY TURNS CLEAR 9 THRU 12 CLEAR FILM OF LOCTITE SHANK: BLUE-GREEN COAT NUT PLATE: NO EVIDENCE OF LOCTITE
	15	0	15.0		0	7.0	7.0	5.5	4.5		**6.0**	15NP: 1ST 2 THREADS ARE DRY WITH NO INDICATION OF LOCTITE 3RD, 4TH, & 5TH THREADS → WHITE TO BABY BLUE CRYSTALLINE LOCTITE 6 THRU 8 THREADS → BABY BLUE PASTE-GEL IN THREAD ROOTS WHICH SLOWLY TURNS CLEAR 9 THRU 12 CLEAR FILM OF LOCTITE SHANK: BLUE-GREEN COAT NUT PLATE: NO EVIDENCE OF LOCTITE

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
NUTPLATES, LLC 242, 100% APPLIED TO BOLT

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	16	0	15.0		0	8.5	7.5	7.0	5.0		**7.0**	16NP: 1ST 2 THREADS ARE DRY WITH NO INDICATION OF LOCTITE 3RD, 4TH, & 5TH THREADS → WHITE TO BABY BLUE CRYSTALLINE LOCTITE 6 THRU 8 THREADS → BABY BLUE PASTE-GEL IN THREAD ROOTS WHICH SLOWLY TURNS CLEAR 9 THRU 12 CLEAR FILM OF LOCTITE SHANK: BLUE-GREEN COAT NUT PLATE: VERY LITTLE INDICATION OF LOCTITE SOME SPORADIC SIGNS OF LOCTITE
	AVE		**11.5**			**6.1**	**5.1**	**4.3**	**3.6**			

NESC TEST 1B – OPEN NUTPLATES - LOCTITE 242
125% (45 µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN NUTPLATES, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN DOME NUT-PLATE 125% (45µl)	1	0	12.5	12.5	0	7.0	7.0	4.5	4.0		**5.6**	1NP: 1ST 2 THREADS → DRY 3RD & 4TH THREADS → BLUE-GREEN CRUST 5 THRU 12 THREADS → OPAQUE BABY BLUE LOCTITE FILLED IN THREAD ROOTS SHANK: OPAQUE BABY BLUE COAT NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	2	0	14.0	14.0	0	5.0	6.0	5.5	4.5		**5.3**	2NP: 1ST 2 THREADS → DRY 3RD & 4TH THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 5 THRU 12 THREADS → OPAQUE BABY BLUE LOCTITE FILLED IN THREAD ROOTS SHANK: OPAQUE BABY BLUE COAT NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	3	0	10.0	10.0	0	4.0	4.5	4.0	3.0		**3.9**	3NP: 1ST 2 THREADS → DRY 3RD & 4TH THREADS → BLUE-GREEN CRUST 5 THRU 12 THREADS → OPAQUE BABY BLUE LOCTITE FILLED IN THREAD ROOTS SHANK: OPAQUE BABY BLUE COAT NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN NUTPLATES, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0	12.0	12.0	0	5.0	3.5	3.0	3.0		**3.6**	4NP: 1ST THREAD → SOME INDICATION OF WHITE CRYSTALLINE LOCTITE 2ND 3RD & 4TH THREADS → DRY 5TH, 6TH, & 7TH THREADS → OPAQUE BLUE-GREEN WET GEL 8 THRU 12 THREADS → OPAQUE BABY BLUE WET COAT SHANK: OPAQUE BABY BLUE COAT NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	5	2.0	17.5	17.5	0	8.5	9.0	7.0	5.0		**7.4**	5NP: 1ST 3 THREADS → DRY 4TH, 5TH & 6TH THREADS → BLUE-GREEN TO WHITE CRYSTALLINE CRUST LOCTITE 7 THRU 12 THREADS → OPAQUE BLUE TO BLUE-GREEN WET PASTE SHANK: BLUE TO CLEAR GREEN COAT OF LOCTITE NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	6	.5	17.0	17.0	0	8.0	8.0	6.0	5.0		**6.8**	6NP: 1ST 3 THREADS → DRY 4TH, 5TH & 6TH THREADS → WHITE TO BABY BLUE CRYSTALLINE LOCTITE 7 THRU 10 THREADS → BUILD-UP OF OPAQUE BABY BLUE WET PASTE SHANK: BABY BLUE WET COAT NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN NUTPLATES, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	7	1.0	15.5	15.5	0	8.5	8.0	5.5	4.5		**6.6**	7NP: 1ST 2 THREADS → WET CLEAR FILM 3RD & 4TH THREADS → WHITE CRYSTALLINE TO BABY BLUE & GREEN FIBERS 5 THRU 12 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS SHANK: TRANSLUCENT BLUE-GREEN COAT NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	8	.5	11.0	11.0	0	3.5	3.5	3.5	2.5		**3.3**	8NP: 1ST 2 THREADS → OPAQUE WET BABY BLUE WET PASTE IN THREAD ROOTS 3 thru 7 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 8 THRU 12 SPORADIC BUILD-UP OF BABY BLUE WET LOCTITE NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	9	.5	9.0	9.0	0	5.0	5.5	4.5	2.0		**4.3**	9NP: 1ST 4 THREADS → CLEAR WET WITH SOME INDICATIONS OF BLUE-GREEN LOCTITE 5 THRU 7 THREADS → CLEAR BLUE-GREEN LOCTITE GEL 8 THRU 12 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	10	2.0	17.0	17.0	0	8.0	8.0	6.0	4.5		**6.6**	10NP: 1ST 2 THREADS → DRY 3RD & 4TH THREADS → CRUSTY BLUE LOCTITE 5 THRU 12 THREADS → OPAQUE BABY BLUE WET LOCTITE IN THREAD ROOTS SHANK: TRANSLUCENT BLUE-GREEN COAT NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN NUTPLATES, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	11	3.0	18.0	18.0	0	7.0	8.0	7.5	5.5		**7.0**	11NP: 1ST 3 THREADS → DRY 4TH & 5TH THREADS → WHITE CRYSTALLINE TO BLUE-GREEN FIBERS 6TH THREAD → BLUE CRYSTALLINE TO BLUE GEL LOCTITE 7 THRU 12 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	12	2.5	15.0	15.0	0	8.0	8.0	7.0	6.0		**7.3**	12NP:1ST 3 THREADS → DRY 4TH & 5TH THREADS → WHITE CRYSTALLINE TO BLUE-GREEN FIBERS 6TH THREAD → BLUE CRYSTALLINE TO BLUE GEL LOCTITE 7 THRU 12 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	13	2.0	14.0	14.0	0	7.5	8.0	7.0	6.5		**7.3**	13NP: 1ST 3 THREADS → DRY 4TH & 5TH THREADS → WHITE CRYSTALLINE TO BLUE-GREEN FIBERS 6TH THREAD → BLUE CRYSTALLINE TO BLUE GEL LOCTITE 7 THRU 12 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN NUTPLATES, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	14	2.0	10.5	10.5	0	4.0	4.5	5.5	4.5		**4.6**	14NP: 1ST 2 THREADS → CLEAR WET FILM OF LOCTITE 3 THRU 10 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS UP TO MAJOR DIAMETER 11TH & 12TH THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	15	1.0	10.0	10.0	0	5.5	6.5	5.0	4.0		**5.3**	15NP:1ST 2 THREADS → OPAQUE WET BABY BLUE WET PASTE IN THREAD ROOTS 3 thru 7 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 8 THRU 12 SPORADIC BUILD-UP OF BABY BLUE WET LOCTITE NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	16	2.0	11.0	11.0	0	4.0	3.5	4.5	3.5		**3.9**	16NP: 1ST 2 THREADS → OPAQUE WET BABY BLUE WET PASTE IN THREAD ROOTS 3 thru 7 THREADS → OPAQUE BABY BLUE WET PASTE IN THREAD ROOTS 8 THRU 12 SPORADIC BUILD-UP OF BABY BLUE WET LOCTITE NUT PLATE: SOME INDICATIONS OF BABY BLUE LOCTITE FIBERS, GEL TO DRY
	AVE			**13.4**		**6.5**	**6.3**	**5.4**	**4.3**			

** Values noted in this column are not the traditional breakaway torque. The low torque values were caused by excessive Loctite migrating between the nut element and base plate. The values drop to zero, then builds up to the static breakaway torques noted

NESC TEST 1B - OPEN INSERTS- LOCTITE 242
100% (35µl) ON BOLTS ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS
Inserts reworked to remove self lock

INSERT LLC 242 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN INSERT 100% (35µl)	1	0	14.0	14.0	0	8.5	4.5	4.5	3.5		**5.3**	1I: 180 DEGREE LOCTITE PATCH ON THREAD SURFACE NEAR SHANK 1ST 6 THREADS BLUE WET-FLUORESCENT LOCTITE IN THREAD ROOTS 7, 8, 9, 10 &11 BLUE GEL LOCTITE IN THREAD ROOTS DOES NOT GO BEYOND MAJOR THREAD DIAMETER INSERT: 1ST 3 THREADS COATED WITH BABY BLUE FLUORESCENT LOCTITE LAST 2 THREADS WHITE BABY BLUE DRIED BROKEN LOCTITE
	2	0	13.0	13.0	0	4.5	4.5	4.0	4.0		**4.3**	2I: 1ST 4 THREADS BLUE WET FLUORESCENT LOCTITE IN THREAD ROOT REMAINING THREADS HAVE BLUE GEL IN THREAD ROOTS INSERT: 1ST 3 THREADS COATED WITH BABY BLUE FLUORESCENT LOCTITE LAST 2 THREADS WHITE BABY BLUE DRIED BROKEN LOCTITE
	3	0	16.0	16.0	0	11.0	10.0	9.0	4.0		**8.5**	3I: 1ST 7 THREADS WHITE BABY BLUE CRYSTALLINE DRY POWDER LOCTITE 8, 9, 10, & 11 BLUE GEL LOCTITE SKIRT INSERT: SOME BABY BLUE FLORESCENT COAT IN COUNTERBORE REMAINING THREADS SHOW NO INDICATION OF LOCTITE
	4	0	13.0	13.0	0	9.0	4.0	2.5	2.0		**4.4**	4I: 1ST 1.5 THREADS BLUE GEL LOCTITE THREADS 2 THRU 7 WHITE TO BABY BLUE CRYSTALLINE LOCTITE POWDER THREADS 8 & 9 BLUE GEL SKIRT INSERT: COUNTERBORE AND 1ST THREAD BLUE GEL LOCTITE

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS
Inserts reworked to remove self lock

INSERT LLC 242 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0	18.0	18.0	0	14.0	9.0	7.0	6.0		**9.0**	5I: 1ST 8 THREADS WHITE TO BABY BLUE CRYSTALLINE LOCTITE POWDER 9, 10, & 11 FLORESCENT BLUE-GREEN GEL LOCTITE ABOVE MAJOR DIAMETER INSERT: DARK PASTE YELLOW LOCTITE IN COUNTERBORE 1ST 2 THREADS WHITE BABY BLUE CRYSTALLINE POWDER (DRY) LOCTITE EXIT THREADS DARK BLUE CRUST
	6	0	15.0	15.0	0	11.0	5.0	4.0	3.0		**5.8**	6I: 1ST THREAD BLUE WET 2ND TO 6TH THREADS WHITE BABY BLUE CRYSTALLINE POWDER LOCTITE 7, 8, &9 BLUE GEL IN THREAD ROOT INSERT: COUNTERBORE & 1ST THREAD BLUE-GREEN GEL LAST 3 THREADS SPORADIC WHITE BABY BLUE CRYSTALLINE (DRY) LOCTITE EXIT THREAD BLUE-GREEN GEL
	7	0	14.0	14.0	0	9.0	5.0	4.0	3.0		**5.3**	7I: THREADS 10, 11 & 12 BLUE-GREEN GEL LOCTITE DRESS THREADS 1 THRU 9 NO INDICATION OF LOCTITE INSERT: ALL THREADS WHITE TO BABY BLUE CRYSTALLINE LOCTITE POWDER COUNTERBORE & 1ST THREAD BLUE GEL COAT
	8	0	18.0	18.0	0	11.0	5.0	4.0	3.0		**5.8**	8I: 1ST 8 THREADS WHITE BABY BLUE CRYSTALLINE POWDER LOCTITE 9TH, 10TH & 11TH THREADS → BLUE-GREEN GEL BUILD-UP INSERT: CRUSTY BLUE-GREEN LOCTITE ON MOST THREADS NOTHING IN COUNTERBORE
	9	0	15.0	15.0	0	10.0	6.0	4.0	3.0		**5.8**	9I: 1ST FIVE THREADS WHITE CRYSTALLINE POWDER LOCTITE FROM THREAD 6 THRU 10 WET BLUE IN THREAD ROOT

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS
Inserts reworked to remove self lock

INSERT LLC 242 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												NOT ABOVE MAJOR DIAMETER INSERT: SPORADIC BABY BLUE DRY CRYSTALLINE POWDER LOCTITE COUNTERBORE AREA BUILD UP OF BLUE PASTE LOCTITE
	10	0	10.0	10.0	0	4.0	3.0	3.0	4.0		**3.5**	NOT EXAMINED
	11	0	9.0	9.0	0	4.0	4.0	4.0	3.0		**3.8**	NOT EXAMINED
	12	0	9.0	9.0	0	3.5	3.5	3.0	3.0		**3.3**	NOT EXAMINED
	13	0	13.0	13.0	0	11.0	10.0	6.0	5.5		**8.1**	NOT EXAMINED
	14	0	15.0	15.0	0	10.0	5.0	4.5	4.0		**5.9**	14I: NO EVIDENCE OF LOCTITE ON SURFACE THE 2 PROTRUDING THREADS DARK BLUE GEL LOCTITE 3, 4, 5 & 6 THREADS WHITE CRYSTALLINE POWDER LOCTITE 7, 8 & 9 BLUE GEL SKIRT INSERT: BLUE GEL LOCTITE IN INSERT COUNTERBORE WHITE TO BABY BLUE CRYSTALLINE LOCTITE SPORADIC IN REMAINING THREADS
	15	0	17.0	17.0	0	12.0	7.0	4.0	3.5		**6.6**	15I: 1ST 6.5 THREADS WHITE CRYSTALLINE POWDER BABY BLUE LOCTITE 7 & 8 BLUE GEL LOCTITE FORMING A DRESS INSERT: WHITE BABY BLUE CRYSTALLINE POWDER IN THREADS BLUE GEL LOCTITE IN COUNTERBORE
	16	0	15.0	15.0	0	10.0	5.0	4.0	3.5		**5.6**	16I: 1ST 6.5 THREADS WHITE CRYSTALLINE POWDER BABY BLUE LOCTITE NO EVIDENCE OF LOCTITE ON REMAINING THREADS INSERT: 7, 8 & 9TH THREADS HAVE BLUE GEL LOCTITE IN ROOT
		AVE		**14.0**		**8.9**	**5.7**	**4.5**	**3.6**			

NESC TEST 1B - OPEN INSERTS- LOCTITE 242
50% (17µl) ON BOLTS ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS
Inserts reworked to remove self lock

INSERT LLC 242 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN INSERT 50% (17µl)	1	0	14.0	14.0	0	6.0	3.5	3.5	3.0		**4.0**	1I: THREADS 1 THRU 12 → BABY BLUE PASTE IN THREAD ROOTS INSERT: ALL THREADS → BABY BLUE DRY
	2	0	14.0	14.0	0	6.0	5.0	3.0	3.0		**4.3**	2I: 1ST 6 THREADS → WHITE TO BLUE CRYSTALLINE DRY (POWDER) LOCTITE 7 THRU 12 THREADS → BROWN TO BLUE-GREEN PASTE TO WET GEL INSERT: LAST TWO THREADS TRANSLUCENT FIBERS
	3	0	18.0	18.0	0	10.0	6.0	3.5	3.0		**5.6**	3I: 1ST 6 THREADS → WHITE TO BLUE CRYSTALLINE DRY (POWDER) LOCTITE 7 THRU 12 THREADS → BROWN TO BLUE-GREEN PASTE TO WET GEL INSERT: NO EVIDENCE OF LOCTITE
	4	0	18.0	18.0	0	11.0	6.0	4.0	3.0		**6.0**	4I: 1ST 6 THREADS → WHITE TO BABY BLUE CRYSTALLINE POWDER 7TH THREAD → BLUE-GREEN PASTE GEL 8TH THREAD → BROWN PASTE 9 THRU 12 BARE INSERT: NO EVIDENCE OF LOCTITE
	5	0	14.0	14.0	0	8.0	4.5	4.0	3.5		**5.0**	5I: 1ST 5 THREADS → CLEAR WET FILM 6 THRU 10 THREADS → LIGHT WET BROWN PASTE IN THREAD ROOTS 11 & 12 THREADS → BARE INSERT: MISSED

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS
Inserts reworked to remove self lock

INSERT LLC 242 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	6	0	12.0	12.0	0	5.0	3.5	3.5	3.5		**3.9**	6I: 1ST 3 THREADS → DRY TO CLEAR WET FILM 4 THRU 9 THREADS → WET BLUE-GREEN PASTE IN THREAD ROOTS 10 THRU 12 NO EVIDENCE OF LOCTITE INSERT: DRY BABY BLUE CLEAR COAT OF LOCTITE ON MAJORITY OF THREADS
	7	0	12.0	12.0	0	6.0	4.0	3.5	3.5		**4.3**	7I: 1ST 3 THREADS → DRY TO CLEAR WET FILM 4 THRU 9 THREADS → WET LIGHT BROWN PASTE IN THREAD ROOTS 10 THRU 12 NO EVIDENCE OF LOCTITE INSERT: DRY BABY BLUE CLEAR COAT OF LOCTITE ON MAJORITY OF THREADS
	8	0	14.0	14.0	0	10.0	4.5	4.0	2.0		**5.1**	8I: 1ST 2 THREADS DRY 3RD 4TH & 5TH THREAD → WHITE TO BABY BLUE CRYSTALLINE POWDER 6 THRU 8 THREAD DRY 9 THRU 11 → LIGHT BROWN PASTE BUILD UP OF LOCTITE 12 THREAD → BARE INSERT: SMALL AMOUNT OF SPORADIC TRANSLUCENT SLIVERS OF DRY LOCTITE
	9	0	12.0	12.0	0	9.0	7.0	5.0	4.0		**6.3**	9I: 1ST 9 THREADS → WHITE TO BABY BLUE CRYSTALLINE LOCTITE 10TH, 11TH & 12TH THREADS → BLUE-GREEN GEL INSERT: SMALL AMOUNT OF SPORADIC TRANSLUCENT SLIVERS OF DRY LOCTITE

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS
Inserts reworked to remove self lock

INSERT LLC 242 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	10	0	10.0	10.0	0	3.0	2.5	2.5	2.5		**2.6**	10I: 1ST 6 THREADS → NO EVIDENCE OF LOCTITE 7TH & 8TH THREADS → SOME SLIGHT BUILD-UP OF LOCTITE 9 THRU 12 THREADS → BABY BLUE PASTE OF LOCTITE FILLED IN THREAD ROOTS INSERT: DRY BABY BLUE CLEAR COAT OF LOCTITE ON MAJORITY OF THREADS
	11	0	14.0	14.0	0	6.0	5.5	5.0	4.0		**5.1**	11I: 1ST 6 THREADS → WHITE TO BABY BLUE CRYSTALLINE POWDER 7TH THRU 12TH THREADS → WET BABY BLUE PASTE/GEL INSERT: SPORADIC WHITE TO BABY BLUE CRYSTALLINE POWDER EXIT THREAD → BLUE-GREEN GEL
	12	0	11.0	11.0	0	9.0	5.5	4.0	3.5		**5.5**	12I: 1ST 2 THREADS → BARE DRY 3RD, 4TH & 5TH THREADS → WHITE TO BABY BLUE CRYSTALLINE POWDER 7 THRU 11 THREADS → WET BLUE-GREEN PASTE/GEL INSERT: SPORADIC WHITE TO BABY BLUE CRYSTALLINE POWDER EXIT THREAD → BLUE-GREEN GEL
	13	0	11.0	11.0	0	8.0	5.5	4.0	3.5		**5.3**	13I: 1ST 4 THREADS → SPORADIC WHITE TO BABY BLUE CRYSTALLINE POWDER 5 THRU 12 CLEAR BLUE-GREEN GEL INSERT: SMALL AMOUNT OF SPORADIC TRANSLUCENT SLIVERS OF LOCTITE

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD115-2002-0003 INSERTS
Inserts reworked to remove self lock

INSERT LLC 242 100% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	14	0	14.0	14.0	0	7.0	5.5	4.0	3.0		**4.9**	14I: 1ST 6 THREADS → SPORADIC CLEAR LIGHT GREEN DRY LOCTITE 7 THRU 9 THREADS → CHUNKS OF BLUE-GREEN PASTE BUILD-UP 10 THRU 12 BARE INSERT: BLUE-GREEN SLIVERS OF CRYSTALLINE LOCTITE
	15	0	12.0	12.0	0	5.0	4.0	4.0	3.5		**4.1**	15I: 1ST 5 THREADS → WET CLEAR LOCTITE 6 THRU 11 BLUE-GREEN PASTE IN THREAD ROOTS 12 BARE INSERT: BLUE GEL MIXED WITH BABY BLUE CRYSTALLINE POWDER ON ALL THREADS
	16	0	13.0	13.0	0	8.0	5.5	5.0	4.5		**5.8**	16I: 1ST 5 THREADS → MINUTE AMOUNTS OF LOCTITE, 7 & 8 THREADS → WET LOCTITE 9 THRU 11THD → BLUE-GREEN BUILD UP OF LOCTITE, 12 THREAD → BARE INSERT: 1ST 3 THREADS → BABY BLUE COAT REMAINING THREADS → SPORADIC SLIVERS OF DRY LOCTITE
		AVE		**13.3**		**7.3**	**4.9**	**3.9**	**3.3**			

NESC TEST 1B – OPEN INSERTS - LOCTITE 242
125% (45 µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN INSERTS, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN DOME INSERTS 125% (45µl)	1	0	15.0	15.0	0	6.0	5.5	5.0	5.0		**5.4**	1I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE COLORED LOCTITE IN THE ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE FIBERS IN MOST TO THE THREADS EXCEPT THE 1ST THREAD APPEARS BABY BLUE WET PASTE THE COUNTERBORE IN THE INSERT IS FILLED WITH BABY BLUE WET PASTE LOCTITE
	2	0	10.0	10.0	0	4.0	3.5	3.5	3.0		**3.5**	2I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE FIBERS IN MOST TO THE THREADS EXCEPT THE 1ST THREAD APPEARS BABY BLUE WET PASTE THE COUNTERBORE IN THE INSERT IS FILLED WITH BABY BLUE WET PASTE LOCTITE
	3	0	15.0	15.0	0	5.0	4.5	4.0	3.5		**4.3**	3I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE FIBERS IN MOST TO THE THREADS EXCEPT THE 1ST THREAD APPEARS BABY BLUE WET PASTE THE COUNTERBORE IN THE INSERT IS FILLED WITH BABY BLUE WET PASTE LOCTITE
	4	0	21.0	21.0	0	14.0	9.0	6.0	6.0		**8.8**	4I: WHITE BABY BLUE LOCTITE IN THREADS 3, 4, & 5 THE 6TH THREAD HAS A BUILT UP SKIRT OF BABY BLUE WET PASTE LOCTITE INSERT: SMALL INDICATIONS OF LOCTITE. MOST OF THE LOCTITE WAS ON THE BOLT

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN INSERTS, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0	12.0	12.0	0	3.5	3.0	3.0	3.0		**3.1**	5I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE COLORED LOCTITE IN THREAD ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE FIBERS IN MOST TO THE THREADS EXCEPT THE 1ST THREAD APPEARS BABY BLUE WET PASTE THE COUNTERBORE IN THE INSERT IS FILLED WITH BABY BLUE WET PASTE LOCTITE
	6	0	23.0	23.0	0	11.0	8.0	7.0	6.0		**8.0**	6I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE FIBERS IN MOST TO THE THREADS EXCEPT THE 1ST THREAD APPEARS BABY BLUE WET PASTE THE COUNTERBORE IN THE INSERT IS FILLED WITH BABY BLUE WET PASTE LOCTITE
	7	0	16.0	16.0	0	6.0	5.0	4.0	4.0		**4.8**	7I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE FIBERS IN MOST TO THE THREADS EXCEPT THE 1ST THREAD APPEARS BABY BLUE WET PASTE THE COUNTERBORE IN THE INSERT IS FILLED WITH BABY BLUE WET PASTE LOCTITE
	8	0	10.0	10.0	0	4.0	3.5	3.5	3.5		**3.6**	8I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE LOCTITE IN THE ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE FIBERS IN MOST TO THE THREADS EXCEPT THE 1ST THREAD APPEARS BABY BLUE WET PASTE
	9	0	20.0	20.0	0	11.0	9.0	6.0	5.0		**7.8**	9I: WHITE BABY BLUE CRYSTALLINE LOCTITE IN THREADS 3, 4 & 5 THE 6TH THREAD HAS A BUILT UP SKIRT OF BABY BLUE WET PASTE LOCTITE INSERT: BABY BLUE FIBERS IN MOST TO THE THREADS EXCEPT THE 1ST THREAD APPEARS BABY BLUE WET PASTE
	10	0	17.0	17.0	0	5.0	5.0	5.0	4.0		**4.8**	10I: WHITE BABY BLUE CRYSTALLINE LOCTITE IN THREADS 3, 4

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN INSERTS, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												& 5 THE 6TH THREAD HAS A BUILT UP SKIRT OF BABY BLUE WET PASTE LOCTITE INSERT: BABY BLUE DRY CRYSTALLINE LOCTITE FIBERS IN INSERT THREADS
	11	0	19.0	19.0	0	13.0	9.0	8.0	8.0		**9.5**	11I: WHITE BABY BLUE CRYSTALLINE LOCTITE IN THREADS 3, 4 & 5 THE 6TH THREAD HAS A BUILT UP SKIRT OF BABY BLUE WET PASTE LOCTITE INSERT: BABY BLUE WET GEL IN COUNTER BORE AND 1ST TWO THREADS
	12	0	18.0	18.0	0	9.0	8.0	7.0	6.0		**7.5**	12I: WHITE BABY BLUE CRYSTALLINE LOCTITE IN THREADS 3, 4 & 5 THE 6TH THREAD HAS A BUILT UP SKIRT OF BABY BLUE WET PASTE LOCTITE INSERT: BLUE-GREEN GEL IN COUNTER BORE SOME INDICATIONS OF BABY BLUE DRY FIBER IN THREADS
	13	0	17.0	17.0	0	12.0	8.0	8.0	7.0		**8.8**	13I: WHITE BABY BLUE CRYSTALLINE FIBERS IN 1ST FIVE THREADS 6 & 7TH THREADS BABY BLUE WET PASTE BUILD UP → DRESS 9 & 10 A SECOND BABY BLUE WET PASTE DRESS INSERT: SPORADIC DRY WHITE BABY BLUE CRYSTALLINE FIBERS
	14	0	11.0	11.0	0	3.0	3.0	3.0	2.5		**2.9**	14I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE WET COAT IN COUNTERBORE AND FIRST 2.5 THREADS
	15	0	20.0	20.0	0	9.0	7.0	6.0	6.0		**7.0**	15I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS OF ALL 12 THREADS.

LOCTITE LOT NUMBER: L39GAA7846 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MD114- NUTPLATE MOD*
LOCKING FEATURE REWORKED TO ZERO AND DOME OPENED.
OPEN INSERTS, LLC 242, 125% APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
												BUILD UP OF BABY BLUE WET PASTE ON 8TH AND 9TH THREADS INSERT: BABY BLUE WET PASTE COAT IN COUNTERBORE AND 1ST THREAD 2ND AND 3RD THREAD HAVE DRY BABY BLUE FIBERS THE REMAINING THREADS SHOW INDICATIONS OF DRY CRYSTALLINE FIBERS PEELING
	16	0	20.0	20.0	0	11.0	8.0	8.0	6.0		**8.3**	16I: EVEN DISTRIBUTION OF BABY BLUE WET PASTE LOCTITE IN THREAD ROOTS OF ALL 12 THREADS. INSERT: BABY BLUE WET PASTE IN COUNTERBORE 1ST TWO THREADS HAVE BABY BLUE DRY CRYSTALLINE FIBERS
	AVE		**16.5**			**7.9**	**6.2**	**5.4**	**4.9**			

NESC TEST 1B – OPEN NUTPLATES - LOCTITE 290
100% (35 µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
***** Locking torque reduced to 0 in-lbs.**
NUTPLATES, LLC 290 APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN NUT-PLATE 100% (35µl)	1	0	23.0	23.0	0	22.0	20.0	18.0	11.0		**17.8**	1NP: 1ST 3 THREADS → CLEAR GEL 4, 5, & 6 → CLEAR GREEN DRY GEL IN THREAD ROOTS 7, 8, & 9 THREADS → PATCH (30% COVERAGE) OF CLEAR GREEN COAT OF LOCTITE ON ONE SIDE 10 THRU 12 NO EVIDENCE OF LOCTITE NUT PLATE: BROWN-GREEN CRUST AT EXIST THREAD SPORADIC CLEAR GREEN GEL IN REMAINING THREADS
	2	0	15.0	15.0	0	14.0	10.0	9.0	8.0		**10.3**	2NP: 1ST 6 THREADS → THIN LAYER OF CLEAR GREEN GEL IN THREAD ROOTS 7 THRU 12 CLEAR WET FILM OF LOCTITE NUT PLATE: LAST 3 THREADS → CLEAR GREEN CRUST
	3	0	23.0	23.0	0	22.0	17.0	11.0	7.0		**14.3**	3NP: 1ST 3 THREADS → CLEAR GREEN CRYSTALLINE 4 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: LAST 3 THREADS → CLEAR GREEN CRUST
	4	0	18.0	18.0	0	18.0	13.0	7.0	4.0		**10.5**	4NP: 1ST 3 THREADS → WET CLEAR FILM OF LOCTITE 4, 5, & 6 CLEAR GREEN CRYSTALLINE 7 THRU 12 THREADS → WET CLEAR FILM OF LOCTITE NUT PLATE: LAST 3 THREADS → CLEAR GREEN CRUST
	5	0	26.0	26.0	0	26.0	26.0	20.5	13.0		**21.4**	5NP: 1ST 3 THREADS GREEN TRANSLUCENT GEL IN THREAD ROOTS 4TH & 5TH THREADS → BUILD-UP OF GREEN TRANSLUCENT GEL 6 THRU 12 THREADS → WET CLEAR FILM OF LOCTITE NUT PLATE: LAST 3 THREADS → TRANSLUCENT GREEN GEL TO CLEAR GREEN CRUST

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
*** Locking torque reduced to 0 in-lbs.**
NUTPLATES, LLC 290 APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	6	0	20.0	20.0	0	19.0	15.0	11.0	9.0		**13.5**	6NP: 1ST 2 THREADS → CLEAR LIME GREEN LOCTITE IN THREAD ROOTS 3, 4, 5, & 6 THREADS → CLEAR GREEN CRYSTALLINE LOCTITE 7 THRU 12 THREADS → NO INDICATIONS OF LOCTITE NUT PLATE: LAST 2 THREADS → CLEAR GREEN CRUST
	7	0	19.0	19.0	0	18.0	17.0	11.0	6.0		**13.0**	7NP: 1ST 6 THREADS → CLEAR LIME GREEN TO GREEN CRYSTALLINE IN THREAD ROOTS 7 THRU 12 CLEAR WET FILM OF LOCTITE NUT PLATE: TRANSLUCENT SLIVERS OF DRY LOCTITE
	8	0	19.0	19.0	0	19.0	15.0	10.0	9.0		**13.3**	8NP: 1ST 3 THREADS → CLEAR LIME GREEN TO GREEN LOCTITE IN THREAD ROOTS 4, 5, &6 THREADS → CLEAR GREEN CRYSTALLINE BUILD UP IN THREAD ROOTS 7 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: SLIGHT INDICATIONS OF YELLOW GREEN LOCTITE PLUS A FEW SLIVERS OF TRANSLUCENT DRY LOCTITE
	9	0	19.0	19.0	0	20.0	15.0	8.0	5.0		**12.0**	9NP: 1ST 5 THREADS → CLEAR LIME GREEN TO GREEN CRYSTALLINE LOCTITE IN THREAD ROOTS 6 THRU 12 CLEAR WET FILM OF LOCTITE NUT PLATE: EXIT THREAD CRUSTY GREEN LOCTITE WITH SOME SLIVERS OF TRANSLUCENT (NO COLOR) LOCTITE IN OTHER THREADS
	10	0	22.0	22.0	0	22.0	18.0	13.0	10.0		**15.8**	10NP: 1ST 6 THREADS → CLEAR GREEN CRYSTALLINE LOCTITE IN THREAD ROOTS 7 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: SOME INDICATION (SLIVERS) OF CLEAR GREEN LOCTITE

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003-XX BOLT WITH MS21060-3 NUTPLATE*
***** Locking torque reduced to 0 in-lbs.**
NUTPLATES, LLC 290 APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	11	0	19.0	19.0	0	17.0	14.0	11.0	5.0		**11.8**	11NP: 1ST 6 THREADS → CLEAR GREEN CRYSTALLINE LOCTITE IN THREAD ROOTS 7 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: LAST 2 THREADS → CLEAR GREEN CRYSTALLINE LOCTITE SOME INDICATIONS OF LOCTITE IN REMAINING THREADS
	12	0	22.0	22.0	0	22.0	22.0	15.0	12.0		**17.8**	12NP: 1ST 6 THREADS → CLEAR GREEN CRYSTALLINE LOCTITE IN THREAD ROOTS 7 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: A FEW SLIVERS OF CLEAR GREEN DRY LOCTITE
	13	0	22.0	22.0	0	22.0	15.0	11.0	8.0		**14.0**	13NP: 1ST 6 THREADS → CLEAR GREEN CRYSTALLINE LOCTITE IN THREAD ROOTS 7 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: VERY FEW INDICATIONS OF LOCTITE
	14	0	19.0	19.0	0	17.0	15.0	11.0	7.0		**12.5**	14NP: 1ST 6 THREADS → CLEAR GREEN CRYSTALLINE LOCTITE IN THREAD ROOTS 7TH & 8TH THREADS → CLEAR GREEN BUILD UP (COAT) OF LOCTITE 9 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: A FEW SLIVERS OF CLEAR GREEN DRY LOCTITE
	15	0	19.0	19.0	0	18.0	12.0	9.0	5.0		**11.0**	15NP: 10NP: 1ST 6 THREADS → MINIMAL AMOUNT OF CLEAR GREEN CRYSTALLINE LOCTITE IN THREAD ROOTS 7 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE NUT PLATE: A FEW SLIVERS OF CLEAR GREEN DRY LOCTITE
	16	Did not test-Loose nutplate										
	AVE		**20.3**	**20.3**		**19.7**	**16.3**	**20.7**	**7.9**			

NESC TEST 1B – OPEN INSERTS - LOCTITE 290
100% (35 µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** Locking torque reduced to 0 in-lbs.**
NUTPLATES, LLC 290 APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN INSERT 100% (35µl)	1	0	23.0		0	23.0	23.0	23.0	21.0		**22.5**	1I: 1ST 4 THREADS → CLEAR 5 THRU 8 THREADS → CLEAR GREEN GEL TO PASTE IN THREAD ROOT 9 & 10 THREADS → GREEN GEL BUILD-UP INSERT: CRUSTY GREEN BROWN LOCTITE SPORADIC THROUGH OUT ALL THREADS
	2	0	23.0		0	21.0	22.0	22.0	22.0		**21.8**	2I: LAST 2 THREADS → WHITE CRYSTALLINE POWDER TO TRANSLUCENT REMAINING THREADS → SPORADIC CLEAR GREEN CRYSTALLINE INSERT: WHITE CRYSTALLINE POWDER THROUGH OUT ALL THREADS
	3	0	23.0		0	23.0	23.0	22.0	22.0		**22.5**	3I: 1ST 7 THREADS CLEAR GREEN IN THREAD ROOTS 8 THRU 10 THREADS → CLEAR GREEN BUILD-UP ABOVE MAJOR INSERT: LITTLE EVIDENCE OF LOCTITE
	4	0	23.0		0	23.0	23.0	23.0	22.0		**22.8**	4I: 1ST THREAD→ WHITE CRYSTALLINE POWDER 2ND THREAD → BLUE-GREEN PASTE 3 THRU 12 THREADS → SPORADIC CLEAR GREEN WET GEL INSERT: WHITE CRYSTALLINE TO GREEN TRANSLUCENT COAT
	5	0	23.0		0	23.0	23.0	23.0	23.0		**23.0**	5I: 1ST 7 THREADS → CLEAR GREEN LOCTITE IN THREAD ROOTS REMAINING THREADS → CLEAR WET FILM INSERT: BUILD-UP OF CLEAR LIME GREEN LOCTITE IN COUNTERBORE AREA

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** Locking torque reduced to 0 in-lbs.**
NUTPLATES, LLC 290 APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	6	0	23.0		0	23.0	23.0	23.0	20.0		**22.3**	6I: 1ST 7 THREADS → CLEAR GREEN LOCTITE IN THREAD ROOTS REMAINING THREADS → CLEAR WET FILM INSERT: BUILD-UP OF CLEAR LIME GREEN LOCTITE IN COUNTERBORE AREA SLIVERS OF GREEN TRANSLUCENT FIBERS THROUGHOUT THREADS
	7	0	23.0		0	23.0	23.0	22.0	22.0		**22.5**	7I: 1ST 7 THREADS → CLEAR GREEN LOCTITE IN THREAD ROOTS REMAINING THREADS → CLEAR WET FILM INSERT: COUNTERBORE + FIRST THREAD → CLEAR GREEN LOCTITE SOME INDICATIONS OF CLEAR GREEN LOCTITE
	8	0	12.0		0	10.0	11.0	13.0	14.0		**12.0**	NOT EXAMINED
	9	0	22.0**		0	23.0	14.0	11.0	8.0		**14.0**	9I: INSERT CAME OUT WHILE TRYING TO REMOVE BOLT GREEN CRYSTALLINE CANDY STRUCTURE ON EXIT THREAD INSERT: N/A TAPPED HOLE WAS FULL OF A WHITE CRYSTALLINE COAT
	10	0	23.0**		0	15.0	9.0	3.0	0		**6.8**	9I: INSERT CAME OUT WHILE TRYING TO REMOVE BOLT GREEN CRYSTALLINE CANDY STRUCTURE ON EXIT THREAD INSERT: N/A TAPPED HOLE WAS FULL OF A WHITE CRYSTALLINE COAT
	11	0	23.0		0	23.0	9.0	7.0	1.0		**10.0**	11I: INSERT CAME OUT WHILE TRYING TO REMOVE BOLT EVIDENCE OF CLEAR GREEN LOCTITE ON EXTERNAL INSERT THREADS EXPOSED BOLT THREADS LOOK DRY WITH NO EVIDENCE OF LOCTITE INSERT: TAPPED HOLE HAD SPORADIC CLEAR BLUE-GREEN LOCTITE IN THREADS

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** Locking torque reduced to 0 in-lbs.**
NUTPLATES, LLC 290 APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	12	0	11.0		0	9.0	11.0	11.0	12.0		**10.8**	12I: 1ST THREAD → WHITE CRYSTALLINE POWDER 2ND & 3RD BLUE-GREEN CRYSTALLINE LOCTITE IN THREAD ROOTS 4TH THREAD → BUILD-UP OF BLUE-GREEN CRYSTALLINE ABOVE THREAD ROOT 5 THRU 8 THREADS → CLEAR GREEN GEL 9TH THREAD → CLEAR LIME GREEN WET LOCTITE 10, 11, & 12 THREADS → CLEAR WET FILM OF LOCTITE INSERT: COUNTERBORE AND 1ST THREAD CLEAR GREEN LOCTITE 2ND & 3RD THREADS → WHITE CRYSTALLINE POWDER LAST 2 THREADS → CRUSTY BROWN-GREEN IN THREADS
	13	0	23.0		0	23.0	18.0	8.0	2.0		**12.8**	13I: INSERT CAME OUT WHILE TRYING TO REMOVE BOLT GREEN CRYSTALLINE CANDY STRUCTURE ON EXIT BOLT THREADS LAST 3 INSERT EXTERNAL THREADS → WHITE DRY CRYSTALLINE POWDER INSERT: N/A TAPPED THREADS → WHITE TO A LIGHT GREEN DRY CRYSTALLINE COAT ON ALL THREADS
	14	0	23.0**		0	15.0	7.0	6.0	3.0		**7.8**	14I: INSERT CAME OUT WHILE TRYING TO REMOVE BOLT CLEAR TO CLOUDY BLUE-GREEN ON BOLT EXIT THREADS INSERT: THREADS → FULL OF WHITE CRYSTALLINE POWDER LOCTITE TAPPED HOLE → BUILD UP OF WHITE CRYSTALLINE CLOTH LIKE LOCTITE ON ALL THREAD ROOTS

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** Locking torque reduced to 0 in-lbs.**
NUTPLATES, LLC 290 APPLIED TO BOLT **CURE TIME: 72 HOURS**

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	15	0	23.0		0	23.0	23.0	23.0	23.0		**23.0**	15I: 1ST 2 THREADS → EVIDENCE OF WHITE TO LIGHT BLUE-GREEN CRYSTALLINE LOCTITE 3 THRU 7 THREADS → CLEAR BROWN GREEN CRYSTALLINE IN THREAD ROOTS 8 & 9 THREADS → CLEAR GREEN CRYSTALLINE COAT 10, 11 &12 THREADS → CLEAR WET FILM OF LOCTITE INSERT: THREADS → BEIGE TONES TO WHITE CRYSTALLINE CLOTH LIKE IN APPEARANCE
	16	0	19.0		0	21.0	22.0	16.0	4.0		**15.8**	16I: N/A INSERT CAME OUT WHILE TRYING TO REMOVE BOLT NO EVIDENCE OF LOCTITE ON EXPOSED THREADS INSERT: N/A TAPPED HOLE: WHITE CRYSTALLINE DRY LOCTITE ON TAPPED THREADS
	17	0	23.0		0	23.0	23.0	23.0	23.0		**23.0**	17I: 1ST 7 THREADS → CLEAR "BROWN" CRYSTALLINE LOCTITE 8 & 9 THREADS → BUILD-UP OF CLEAR GREEN CRUSTY LOCTITE INSERT: LAST 3 EXIT THREADS CRUSTY CLEAR BROWN GREEN LOCTITE
	AVE		**24.2**			**20.2**	**18.1**	**16.4**	**14.2**			
	Note: The torque test for these specimens was different from other Loctite types. The torque continued to rise while the bolt was rotating without feeling any noticeable static breakaway torque. On noted specimens (**), the prevailing torque oscillated 5 to 10 degrees during bolt rotation. The maximum torques achieved is recorded.											

NESC TEST 1B – OPEN NUTPLATES- LOCTITE 290
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD114-5011-0004 NUTPLATE (OPENED)*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN NUT-PLATE 50% (17µl on bolt)	1	0		24.0	24.0	0	23.0	21.5	14.0	11.0	**17.4**	1NP: 1ST 2 THREADS → WHITE TO LIME GREEN CRYSTALLINE LOCTITE 3, 4, & 5 THREADS → GREEN CRYSTALLINE LOCTITE 6 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE SHANK: CLEAR GREEN COAT OF LOCTITE NUT PLATE: SPORADIC INDICATIONS OF GREEN GEL FIBERS
	2	0	11.0	25.0	25.0	0	26.0	25.0	16.0	14.0	**20.3**	2NP: 1ST 2 THREADS → WHITE CRYSTALLINE LOCTITE 3RD & 4TH THREADS → LIME GREEN CRYSTALLINE LOCTITE 5 THRU 10 THREADS → CLEAR WET GREEN FILM IN THREAD ROOTS 11, 12 & SHANK → CLEAR GREEN GEL COAT OF LOCTITE NUT PLATE: SPORADIC INDICATIONS OF GREEN GEL FIBERS
	3	0	2.0	28.0	28.0	0	39.0	45.0	36.0	25.0	**36.3**	3NP: 1ST THREAD → NO INDICATION OF LOCTITE 2ND & 3RD THREADS → WHITE TO LIME GREEN MIX CRYSTALLINE OF LOCTITE 4TH & 5TH THREADS → BROWN GREEN CRYSTALLINE LOCTITE 6 THRU 12 THREADS → CLEAR WET GREEN FILM IN THREAD ROOTS SHANK: CLEAR GREEN LOCTITE PATCH NUT PLATE: SPORADIC INDICATIONS OF GREEN GEL FIBERS

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD114-5011-0004 NUTPLATE (OPENED)*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	4	0		32.0	32.0	0	32.0	36.0	31.0	23.0	**30.5**	4NP: 1ST 3 THREADS → WHITE TO GREEN CRYSTALLINE LOCTITE 4TH & 5TH THREADS → GREEN CRYSTALLINE LOCTITE 6 THRU 12 THREADS → CLEAR WET GREEN FILM LOCTITE IN THREAD ROOTS NUT PLATE: INDICATIONS OF TRANSLUCENT GREEN FIBERS
	5	0		22.0	22.0	0	22.0	31.0	27.0	25.0	**26.3**	5NP: 1ST 3 THREADS → WHITE CRYSTALLINE LOCTITE 4TH & 5TH FOREST GREEN CRYSTALLINE LOCTITE 6 THRU 12 THREADS → NO OTHER INDICATIONS OF LOCTITE NUT PLATE: SPORADIC INDICATIONS OF GREEN GEL FIBERS
	6	0	11.0	32.0	32.0	0	32.0	44.0	40.0	30.0	**36.5**	6NP 1ST 2 THREADS → FOREST GREEN CRYSTALLINE LOCTITE 3rd & 4th THREADS → WHITE CRYSTALLINE LOCTITE 5TH & 6TH THREADS → BROWN GREEN CRYSTALLINE LOCTITE 7 THRU 12 THREADS NO INDICATIONS OF LOCTITE SHANK: CLEAR GREEN COAT NUT PLATE: SPORADIC INDICATIONS OF GREEN GEL FIBERS
	7	0	7.5	31.0	31.0	0	39.0	38.0	38.0	31.0	**36.5**	7NP: 1ST THREAD → NO INDICATIONS OF LOCTITE 2ND, 3RD, &4TH THREADS → WHITE CRYSTALLINE POWDER OF LOCTITE 5TH & 6TH THREADS → CLEAR GREEN CRYSTALLINE 7 THRU 12 THREADS → WET CLEAR FILM OF LOCTITE NUT PLATE: SPORADIC INDICATIONS OF GREEN GEL FIBERS
	8	0	6.0	9.0	9.0	0	9.0	11.0	17.0	31.0	**17.0**	8NP: 1ST 3 THREADS → WHITE CRYSTALLINE LOCTITE 4 THRU 12 THREADS → CLEAR WET FILM OF LOCTITE 12TH THREAD & SHANK → LIME GREEN PATCH OF LOCTITE NUT PLATE: SPORADIC INDICATIONS OF GREEN GEL FIBERS

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD114-5011-0004 NUTPLATE (OPENED)*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	9	0	8.5	- -	8.5	0	23.0	24.0	23.0	21.0	**22.8**	9NP: 1ST 3 THREADS → WHITE TO GREEN CRYSTALLINE LOCTITE 4 THRU 12 THREADS CLEAR WET FILM OF LOCTITE SHANK: CLEAR GREEN COAT NUT PLATE: SPORADIC INDICATIONS OF DRY TRANSLUCENT FIBERS ON THREADS
	10	0	7.0	24.0	24.0	0	39.0	41.0	35.0	26.0	**35.3**	10NP: 1ST 2 THREADS → WHITE CRYSTALLINE LOCTITE 3RD & 4TH THREADS → GREEN CRYSTALLINE LOCTITE 5 THRU 12 THREADS → WET CLEAR GREEN LOCTITE IN THREAD ROOTS SHANK CLEAR GREEN PATCH NUT PLATE: SPORADIC INDICATIONS OF DRY TRANSLUCENT FIBERS ON THREADS
	11	0	6.0	27.0	27.0	0	28.0	24.0	19.0	16.0	**21.8**	11NP: 1 THRU 6 THREADS → WHITE TO BROWN GREEN CRYSTALLINE LOCTITE 7 THRU 12 CLEAR WET GREEN LOCTITE IN THREAD ROOTS SHANK: CLEAR GREEN PATCH NUT PLATE: SPORADIC INDICATIONS OF DRY TRANSLUCENT FIBERS ON THREADS
	12	0	7.5	25.0	25.0	0	31.0	30.0	27.0	21.0	**27.3**	12NP: 1ST THREAD → WHITE CRYSTALLINE LOCTITE 2ND, 3RD& 4TH THREADS → BROWN GREEN CRYSTALLINE LOCTITE 5 THRU 12 THREADS → CLEAR WET GREEN LOCTITE IN THREAD ROOTS NUT PLATE: SPORADIC INDICATIONS OF DRY TRANSLUCENT FIBERS ON THREADS

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD114-5011-0004 NUTPLATE (OPENED)*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	13	0	2.0	29.0	29.0	0	36.0	34.0	24.0	21.0	**28.8**	13NP: 1ST THREAD → MINIMAL WHITE CRYSTALLINE LOCTITE 2ND, 3RD& 4TH THREADS → MINIMAL BROWN GREEN CRYSTALLINE LOCTITE 5 THRU 12 THREADS → MINIMAL CLEAR WET GREEN LOCTITE IN THREAD ROOTS NUT PLATE: SPORADIC INDICATIONS OF DRY TRANSLUCENT FIBERS ON THREADS
	14	0	2.0	24.0	24.0	0	32.0	30.0	23.0	18.0	**25.8**	14NP: 1ST 4 THREADS → TRANSLUCENT LIME GREEN FIBER 5 THRU 12 THREADS → CLEAR WET FILM IN THREAD ROOTS NUT PLATE: CLEAR GREEN SLEEVE IN DRILLED HOLE SPORADIC INDICATIONS OF DRY TRANSLUCENT FIBERS ON THREADS
	15	0	9.0	24.0	24.0	0	30.0	23.0	17.0	16.0	**21.5**	15NP: 1ST 3 THREADS → WHITE TO GREEN CRYSTALLINE LOCTITE 4 THRU 12 THREADS DRY, NO INDICATION OF LOCTITE SHANK: CLEAR GREEN COAT NUT PLATE: SPORADIC INDICATIONS OF DRY TRANSLUCENT FIBERS ON THREADS
	16	0	0	15.0	15.0	0	19.0	20.0	16.0	12.0	**16.8**	16NP: 1ST 2 THREADS → WHITE CRYSTALLINE LOCTITE 3RD & 4TH THREADS → GREEN CRYSTALLINE LOCTITE 5 THRU 12 THREADS → WET CLEAR GREEN LOCTITE IN THREAD ROOTS SHANK CLEAR GREEN PATCH NUT PLATE: SPORADIC INDICATIONS OF DRY TRANSLUCENT FIBERS ON THREADS

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD114-5011-0004 NUTPLATE (OPENED)*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**
Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
		AVE			**23.7**		**28.8**	**29.8**	**25.2**	**21.3**	**26.3**	

* Initial Breakaway
** Continues to increase for approximately 70°, and levels off (or drops off some), then again increases to values at 90°.
NOTE: Nut element rotates until * initial breakaway.

NESC TEST 1B – OPEN INSERTS- LOCTITE 290
50% (17µl) ON BOLT ONLY

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
OPEN INSERT 50% (17µl on bolt)	1	0		48.0	48.0	0	49.0	43.0	39.0	33.0	**41.0**	1I: 1ST 5 THREADS → WHITE CRYSTALLINE DRY 6TH & 7TH THREADS → CLEAR BROWN CRYSTALLINE 8TH & 9TH THREADS → BUILD UP OF CLEAR GREEN DRY INSERT: THREADS → GREEN BROWN CRYSTALLINE FIBERS
	2	0		36.0	36.0	0	38.0	34.0	29.0	22.0	**30.8**	2I: 1ST 3 THREADS → MINUTE AMOUNT OF WHITE CRYSTALLINE DRY LOCTITE 4TH THRU 7TH THREADS → CLEAR BROWN CRYSTALLINE 8TH & 9TH THREADS → BUILD UP OF CLEAR GREEN DRY INSERT: THREADS → GREEN BROWN CRYSTALLINE FIBERS
	3	0		39.0	39.0	0	44.0	39.0	28.0	26.0	**34.3**	3I: 1ST 5 THREADS → WHITE CRYSTALLINE DRY 6TH & 7TH THREADS → CLEAR BROWN CRYSTALLINE 8TH & 9TH THREADS → BUILD UP OF CLEAR GREEN DRY INSERT: SPORADIC OPAQUE GREEN BROWN PASTE IN THREAD ROOTS
	4	0		28.0	28.0	0	22.0	25.0	30.0	33.0	**27.5**	4I: INSERT DISENGAGED INSERT: N/A

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	5	0		42.0	42.0	0	44.0	43.0	30.0	28.0	**36.3**	5I: 1ST 2 THREADS → WHITE CRYSTALLINE POWDER 3RD & 4TH THREADS → CLEAR GREEN CRYSTALLINE 5 THRU 7 THREADS → FILLED CLEAR GREEN LOCTITE IN THREAD ROOTS 8TH THREAD → BUILD-UP OF CLEAR GREEN CRYSTALLINE ABOVE MAJOR DIAMETER THE BUILD-UP APPEARS TO BE DUE TO LOCTITE FROM INSERT COUNTERBORE INSERT: VERY LITTLE INDICATION OF LOCTITE
	6	0		39.0	39.0	0	42.0	27.0	22.0	21.0	**28.0**	6I: 1ST 2 THREADS → WHITE CRYSTALLINE POWDER 3RD & 4TH THREADS → CLEAR GREEN CRYSTALLINE 5 THRU 7 THREADS → FILLED CLEAR GREEN LOCTITE IN THREAD ROOTS 8TH THREAD → BUILD-UP OF CLEAR GREEN CRYSTALLINE ABOVE MAJOR DIAMETER THE BUILD-UP APPEARS TO BE DUE TO LOCTITE IN INSERT COUNTERBORE INSERT: SPORADIC OPAQUE GREEN-BROWN PASTE IN THREAD ROOTS
	7	0		11.0	11.0	0	12.0	13.0	13.0	13.0	**12.8**	7I: 1ST THREAD → WHITE CRYSTALLINE LOCTITE POWDER REMAINING THREADS → DRY WITH NO EVIDENCE OF LOCTITE (SEE INSERT) INSERT: ALL THREADS WHITE CRYSTALLINE LOCTITE

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	8	0		41.0	41.0	0	46.0	39.0	37.0	32.0	**38.5**	8I: 1I: 1ST 5 THREADS → WHITE CRYSTALLINE DRY 6TH & 7TH THREADS → CLEAR BROWN CRYSTALLINE 8TH & 9TH THREADS → BUILD UP OF CLEAR GREEN DRY INSERT: SPORADIC WHITE TO GREEN-BROWN PASTE FIBERS DOWN THRU INSERT THREADS
	9	0	13.0	41.0	41.0	0	47.0	46.0	40.0	39.0	**43.0**	9I: 1ST 3 THREADS → MINUTE DRY WHITE CRYSTALLINE LOCTITE 4TH THRU 6TH THREADS → GREEN-BROWN CRYSTALLINE LOCTITE 7TH & 8TH THREADS → GREEN CRYSTALLINE LOCTITE BUILD-UP INSERT: SPORADIC OPAQUE GREEN-BROWN PASTE IN THREAD ROOTS
	10	0		46.0	46.0	0	48.0	38.0	31.0	28.0	**36.3**	10I:1ST 5 THREADS → WHITE CRYSTALLINE DRY 6TH & 7TH THREADS → CLEAR BROWN CRYSTALLINE 8TH & 9TH THREADS → BUILD UP OF CLEAR GREEN DRY INSERT: THREADS → GREEN-BROWN CRYSTALLINE FIBERS
	11	0		39.0	39.0	0	37.0	25.0	20.0	15.0	**24.3**	11I: 1ST 5 THREADS → WHITE CRYSTALLINE DRY 6TH & 7TH THREADS → CLEAR BROWN CRYSTALLINE 8TH & 9TH THREADS → BUILD UP OF CLEAR GREEN DRY INSERT: VERY LITTLE INDICATION OF LOCTITE
	12	0	12.0	41.0	41.0	0	46.0	37.0	29.0	22.0	**33.5**	12I: 1ST 4 THREADS → WHITE CRYSTALLINE LOCTITE 5TH & 6TH THREADS → GREEN-BROWN CRYSTALLINE LOCTITE REMAINING THREADS → DRY TO NO LOCTITE INSERT: MOST THREADS → WHITE CRYSTALLINE

LOCTITE LOT NUMBER: L39AA67007 **APPLICATOR SETTING: SEE TABLE**
NAS1003 BOLT/MD115-2002-0003 INSERT*
*** LOCKING FEATURE REWORKED TO 0 IN-LBS**

Application Date/Time: 12/18/09
Torque Test Date/Time: 12/21/09
Cure Time: Approx. 72 hours

LOCTITE VOLUME SETTING	SPECI-MEN NO.	BREAKAWAY TORQUE (IN-LBS)			DYNAMIC RUN OFF TORQUE (IN-LBS)							OBSERVATIONS
		(1) STATIC RESIDUAL (AFTER REWORK)	(2) STATIC BREAK AWAY (AFTER CURE)	NET	(3) DYNAMIC RESIDUAL (AFTER REWORK)	(4) AFTER CURE					(5") AVE NET	
						90°	180°	270°	360°	AVE		
	13	0		21.0	21.0	0	18.0	17.0	17.0	16.0	**17.0**	13I: 1ST 4 THREADS → CLEAR GREEN-BROWN PASTE 5TH & 6TH THREADS → GREEN BUILD-UP IN THREAD ROOTS 8TH THREAD INSERT: LAST 3 EXIT THREADS → WHITE CRYSTALLINE LOCTITE
	14	0	12.0	22.0	22.0	0	21.0	27.0	34.0	33.0	**28.8**	14I: 1ST 2 THREADS → CLEAR GREEN CRYSTALLINE LOCTITE 3RD THRU 7TH THREADS → CLEAR GREEN FILM IN THREAD ROOTS 8TH THRU 12TH DRY INSERT: LAST 3 EXIT THREADS → WHITE CRYSTALLINE LOCTITE
	15	0		42.0	42.0	0	45.0	32.0	26.0	23.0	**31.5**	15I: 1ST 7 THREADS → OPAQUE TO CLEAR GREEN LOCTITE IN THREAD ROOTS 8TH THREAD → LAST 3 EXIT THREADS → WHITE CRYSTALLINE LOCTITE INSERT: INDICATIONS OF GREEN-BROWN OPAQUE PASTE
	16	0		30.0	30.0	0	29.0	29.0	19.0	15.0	**23.0**	16I: 1ST 3 THREADS → CLEAR WET GREEN LOCTITE IN THREAD ROOTS 8TH THREAD BUILD-UP OF CLEAR GREEN CRYSTALLINE LOCTITE INSERT: LAST 3 EXIT THREADS → WHITE CRYSTALLINE LOCTITE
	17	0		40.0	40.0	0	41.0	33.0	26.0	24.0	**31.0**	NOT EXAMINED
	AVE			**35.6**		**37.0**	**32.2**	**27.6**	**24.9**	**30.4**		

* No defined static breakaway, except specimen numbers. 9, 12 and 14. Torque continues to increase as bolt rotates, levels off (or increases or decreases) throughout 360° rotation.

SPECIAL BLIND INSERT TEST- LOCTITE RECOMMENDATION FOR BLIND APPLICATIONS

Fill void area with Loctite. Install bolt until Loctite fills thread engaged area and begins to appear in the insert counterbore area. Cure time 72 hours.

LOCTITE LOT NUMBER: Loctite 242, Lot No. L39AA67007 **NAS1003 BOLT/MD115-2002-0003 INSERT***
Loctite 078, Lot No. L39DAA7124

- **LOCKING FEATURE REWORKED TO 0 IN-LBS**
- **Cure Time: Approx. 72 hours**

LOCTITE	SPECI-MEN NO.	**BREAKAWAY TORQUE (IN-LBS)**		**DYNAMIC RUN OFF TORQUE (IN-LBS)**						
		STATIC RESIDUAL (AFTER REWORK)	STATIC BREAK AWAY (AFTER CURE)	DYNAMIC RESIDUAL (AFTER REWORK)	AFTER CURE					
					90°	180°	270°	360°	**AVE**	
078	1	0	4.5	0	2.5	2.5	2.0	2.0	**2.3**	
	2	0	7.5	0	3.5	3.0	2.5	2.5	**2.9**	
	3	0	8.0	0	2.5	2.5	2.5	2.5	**2.5**	
	4	0	9.0	0	6.0	5.0	5.0	5.0	**5.3**	
	AVERAGE		**7.3**		**3.6**	**3.3**	**3.0**	**3.0**		
242	1	0	22.0	0	19.5	12.0	11.5	10.0	**13.3**	
	2	0	15.0	0	11.0	6.0	6.0	6.0	**7.3**	
	3	0	19.5	0	10.0	8.0	8.0	9.0	**8.8**	
	4	0	22.0	0	16.0	9.0	9.0	8.0	**10.5**	
	AVERAGE		**19.6**		**14.1**	**8.8**	**8.6**	**8.3**		

APPENDIX B - PHASE II

APPENDIX B1 - PHASE II TEST PROCEDURES

MATERIALS

TABLE B1 - MATERIALS - DIRECT VERIFICATION - PHASES IIA, IIB, AND IIC

PART NUMBER	DESCRIPTION	QUANTITY
NAS1003-7A	Hex bolt, 0.1900-32 UNJF-3A thread	80
MD114-5020-0301	Nutplate, except with locking feature removed	80
Micropipette Range: 5 to 50 µL	Applicator, manufactured by VWR Scientific Products	
Loctite 242	Per MIL-S-46163A	1
Loctite primer T	Loctite primer 7471	2
Torque Wrenches	Sturtevant	
Cotton Swab		As required
Acetone		As required
CRES Spiral Bristle Brush		As required
Kimwipes® or Terry Cloth		As required

PHASE IIA TEST PROCEDURE

1. Phase IIA Test Procedure - Develop average Loctite breakaway torque with no preload

   1.1 Obtain forty (40) MD114-5020-0301 self-locking nutplates and fabricate four (4) Figure B1 nutplate assemblies.

   1.2 Cycle anchor nut threads with a NAS1003 bolt until self-locking feature of nut element is reduced to zero in-lb. A Besly Express roll tap may also be used. Do not reuse bolts that were used to cycle anchor nuts in the following tests.

   1.3 Obtain forty (40) NAS1003-7A bolts

   1.4 Clean threads of all bolts and nut plates with terry cloth, “Kimwipes” or cotton swab soaked with Acetone.

   1.5 Apply Primer T on both external and internal threads to achieve full thread coverage. Allow primer to dry for 15 minutes minimum.

   1.7 Apply Loctite 242 on external threads per application method adopted in sensitivity test #1. Record Loctite lot number and applicator setting.

   1.8 Install 40 bolts into 40 nutplates until two (2) threads minimum protrudes beyond the nut element without bottoming out on blind side (no preload).

   Note: Install bolts within five (5) minutes after application of Loctite.

   Note: Install bolts incrementally to ensure consistent cure time

1.9 Allow specimens to cure for 72 hours.

1.10 Secure Figure B1 assembly in a vice and use torque wrench to apply clockwise torque to ten (10) bolts.

1.11 Record initial static clockwise break-loose torque and the dynamic counter clockwise prevailing torque at 90°, 180°, 270° and 360°.

1.12 Calculate and record the average counter clockwise dynamic prevailing torque of the four readings for each bolt

1.13 Calculate and record the average clockwise static break-loose torque for the ten (10) bolts

1.14 Calculate and record 50% of the average static break-loose torque. This will be used as the verification torque.

1.15 Secure Figure B1 assembly in a vice and use torque wrench to apply clockwise torque equal to verification torque value (calculated in 3.1.11) to the bolts. Hold verification torque for two (2) seconds.

Note: Stop test if bolt fails to maintain hold verification torque and discuss next step with the NESC working group.

1.16 Repeat step 1.15 except repeat verification torque three (3) times.

1.17 Repeat step 1.15 except repeat verification torque five (5) times.

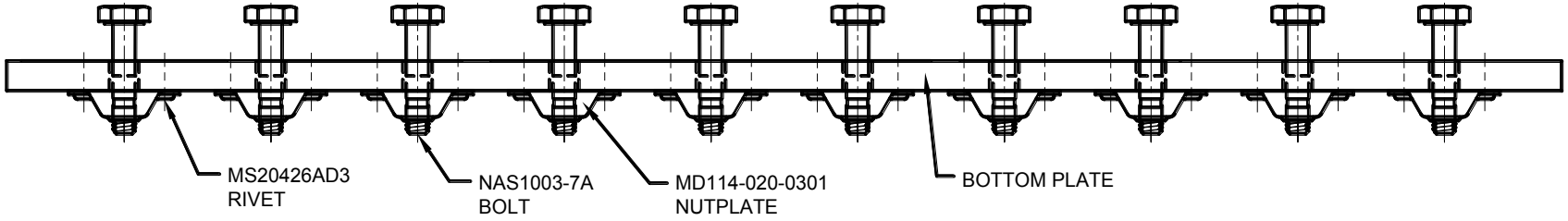

FIGURE B1 - PHASE IIA TEST FIXTURE

PHASE IIB TEST PROCEDURE

2. Phase IIB Test Procedure - Develop actual break-loose torque after preload prior to Loctite cure. (See Figures B2 and B3 for test fixture)

   2.1 Obtain ten (10) MD114-5020-0301 self-locking anchor nut-plates.

   2.2 Cycle anchor nut threads with a NAS1003 bolt until self-locking feature of nut element is reduced to zero in-lb. A Besly Express roll tap may also be used. Do not reuse bolts to cycle anchor nuts in the following tests.

   2.3 Obtain ten (10) NAS1003-7A bolts.

   2.4 Clean threads of all bolts and nut plates with terry cloth, "Kimwipes" or cotton swab soaked with Acetone.

   2.5 Apply Primer T on both external and internal threads to achieve full thread coverage.

   2.6 Allow primer to dry for 15 minutes minimum.

   2.7 Apply Loctite 242 on both external threads using micropipette set at 17 micro liters (50% coverage)

   2.8 Tighten bolt into anchor nut to 35 in-lb. (tighten as soon as possible after Loctite application)

   2.9 After 2 minutes, check and record break-loose torque value in the clockwise direction.

   2.10 Calculate average break-loose torque increase of the ten specimens. See Table B7

   2.11 Disassemble and clean bolts and anchor nuts with Acetone.

   2.12 Discuss results with NESC Team 3.

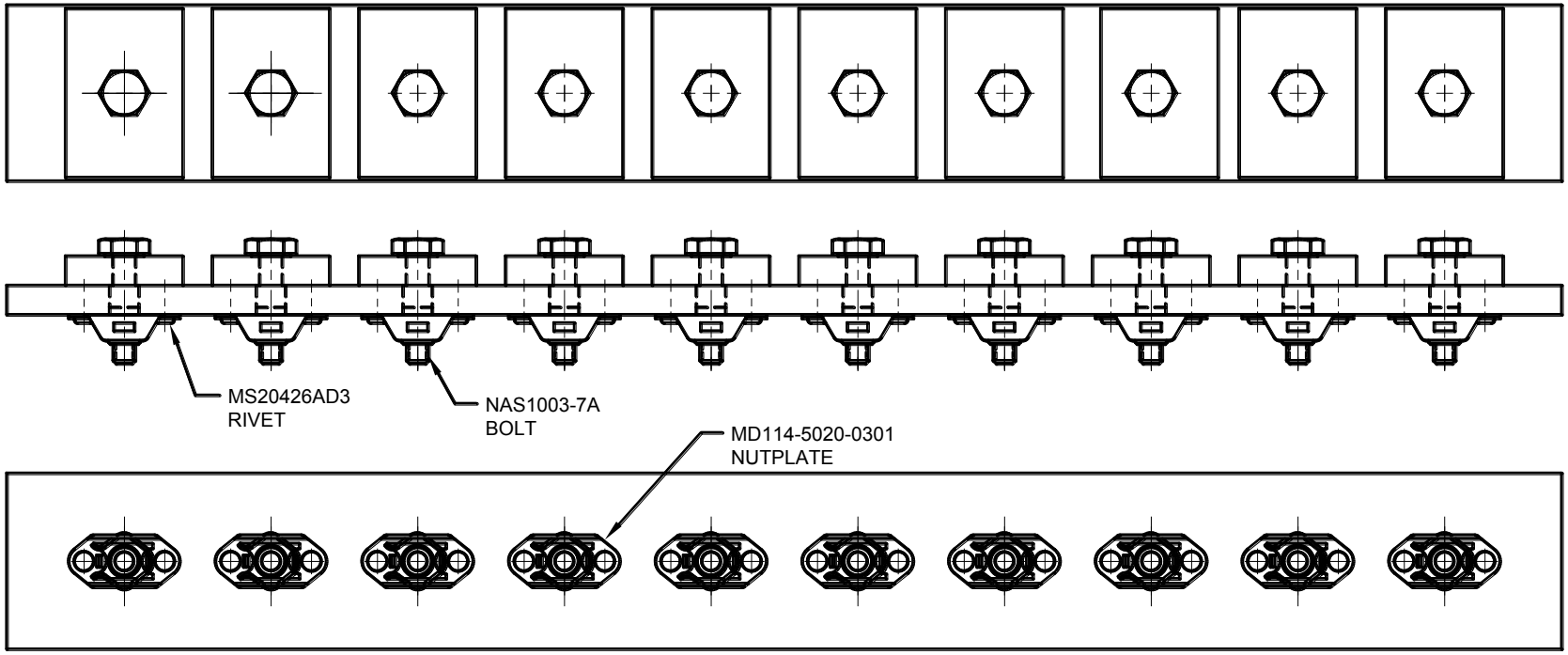

FIGURE B2 - PHASE IIB TEST FIXTURE

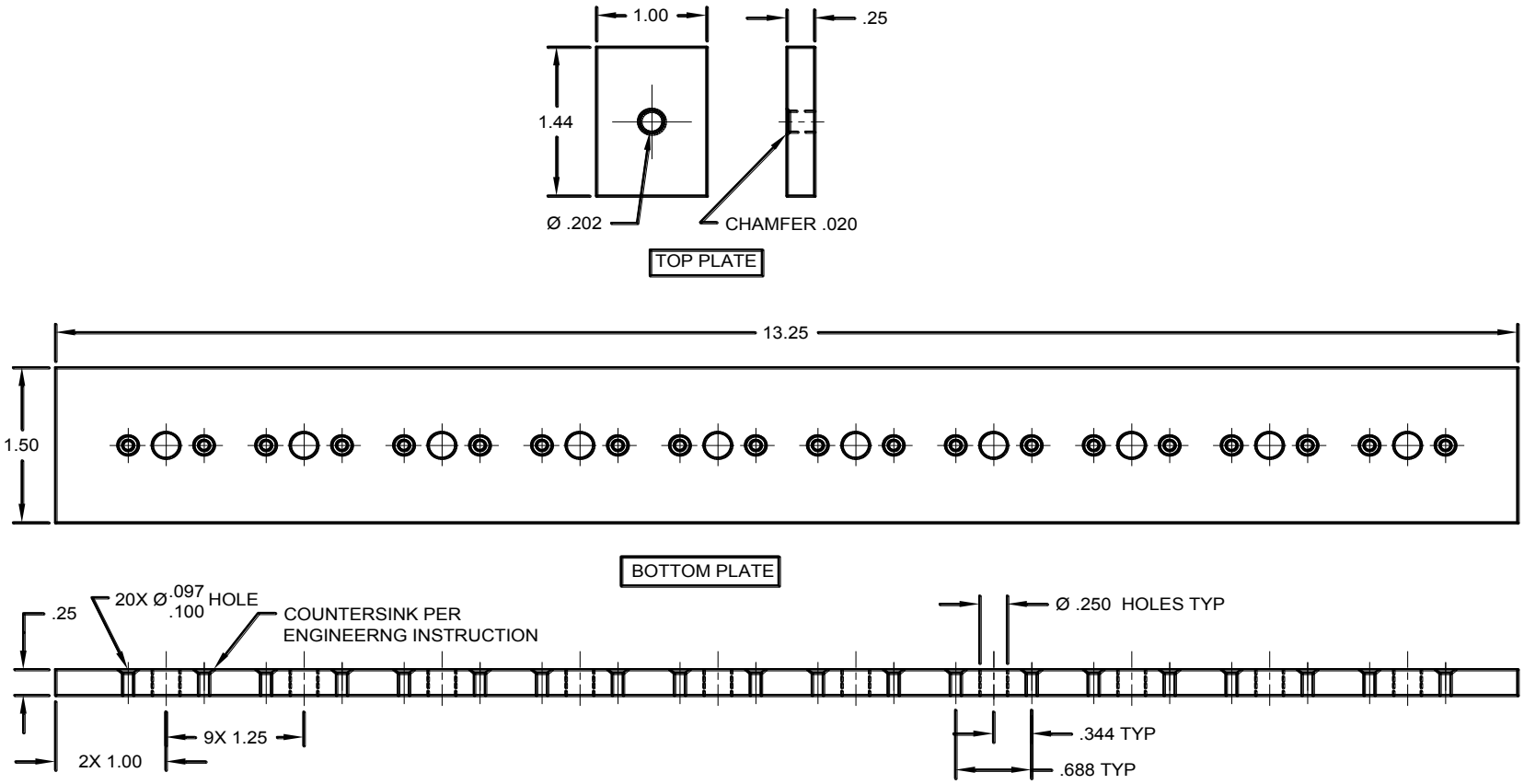

FIGURE B3 - PHASE IIB FIXTURE DETAILS

Top Plate: 40 Required

Bottom Plate: 4 Required

Material: 2024-T351 Aluminum Alloy

PHASE IIC TEST PROCEDURE

3. Perform Direct Verification Test after cure
    3.1 Obtain ten (10) MD114-5020-0301 anchor nuts and NAS1003-7A bolts from Phase IIB test
    3.2 Clean threads of all bolts and nut plates with terry cloth, “Kimwipes” or cotton swab soaked with Acetone
    3.3 Apply Primer T on both external and internal threads to achieve full thread coverage
    3.4 Allow primer to dry for 15 minutes minimum
    3.5 Apply Loctite 242 on both external threads using micropipette set at 17 microliters (50% coverage)
    3.6 Tighten bolt into anchor nut to 36 in-lb (tighten within five minutes after Loctite application)
    3.7 Torque stripe bolt head to top plate
    3.8 Allow specimen to cure 72 hours
    3.9 Apply 36 in-lb plus 50% of average torque calculated in Phase IIA for Loctite 242 plus the average torque increase calculated in 3.4.11 of Phase IIB
    3.10 Hold at this torque value for two (2) seconds
    3.11 Note any movement or relaxation. See Tables B9 and B10.
    3.12 Discuss results with NESC Team 3

PHASE IID TEST PROCEDURES

4. Perform vibration test per NASM25027 and NASM1312-7.
    4.1 Obtain materials per Table B2

TABLE B2 - MATERIALS - VIBRATION TESTING - PHASE IID

PART NUMBER	DESCRIPTION	QUANTITY
NASM1312-7 Test Blocks	For .190 fastener size	2
NASM1312-7 Spool	For .190 fastener size	10
NASM1312-7 Washer	For .190 fastener size	10
NAS1003-19A	Hex bolt, 0.1900-32 UNJF-3A thread	20
MD114-5020-0301	Nutplate, except with locking feature removed	20
Micropipette Range: 5 to 50 µL	Applicator, Manufactured by VWR Scientific Products	
Loctite 242	Per MIL-S-46163A	1
Loctite Primer T	Loctite Primer 7471	2
Torque Wrenches	Sturtevant	
Cotton Swab		As required
Acetone		As required
CRES Spiral Bristle Brush		As required
Kimwipes® or Terry Cloth		As required

4.2 Initial preparation

4.2.1 Wear out locking feature from nut element to zero in-lb.

4.2.2 Inspect thread form using class 3 Go-No-Go gage.

4.2.3 Remove nut element from anchor nut assembly.

4.3 Vibration test procedure

4.3.1 Prepare test blocks for 0.1900-32 anchor nut element as shown in Figures B4 and B5.

- Test block #1:

  - NAS1003-19A hex head bolts, 5 required.

  - MD114-5020-0301 anchor nut element (.063 counterbore depth), 5 required.

  - Identify mated assemblies.

- Test block #2: (Same as block #1)

4.3.2 Clean both internal threads of nut elements and external threads of the bolt with Acetone.

4.3.3 Apply primer T on internal and external threads only.

4.3.4 Allow primer to dry a minimum of 15 minutes.

4.3.5 Install bolts thru sleeve and washer in NASM1312-7 test block.

4.3.6 Apply Loctite 242 to bolt threads using a micropipette set at 17µL (50% volume) and assemble within five minutes of Loctite application.

- In test block #1: Secure MD114-5020-0301 nut element and install NAS1003-19A bolt to 36 in-lb per NASM25027

  - Allow 72 hours for Loctite cure

- In test block #2: Secure MD114-5020-0301 nut element and install NAS1003-19A bolt to 36 in-lb. per NASM25027

  - Allow 72 hours for Loctite cure.

  - Apply 36 in-lb plus 50% of the average breakaway torque determined in "Direct Verification Test" for Loctite 242

  - Maintain this torque for two (2) seconds. (Note any bolt movement.)

4.3.7 Torque stripe nut to bolt thread and bolt head to spool.

4.3.8 Mount block #1 and #2 on vibration test fixture.

4.3.9 Vibration test per NASM1312-7 (30,000 cycles)

4.3.10 Examine and record fastener rotation every 5000 cycles

4.3.11 Unseat bolt to remove preload and record break-loose torque; maintain mated assembly identification

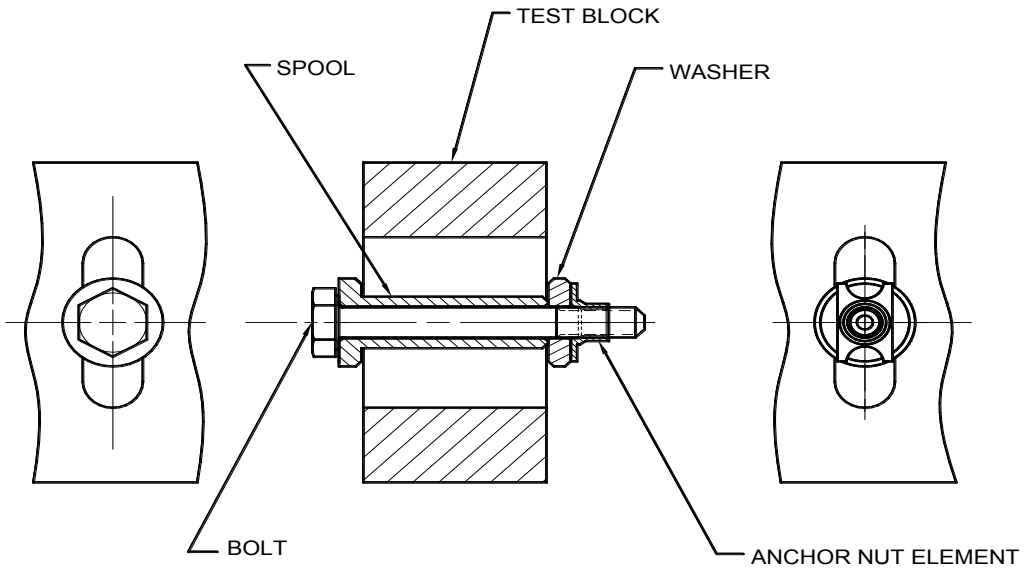

FIGURE B4 - NASM1312-7 TEST ASSEMBLY

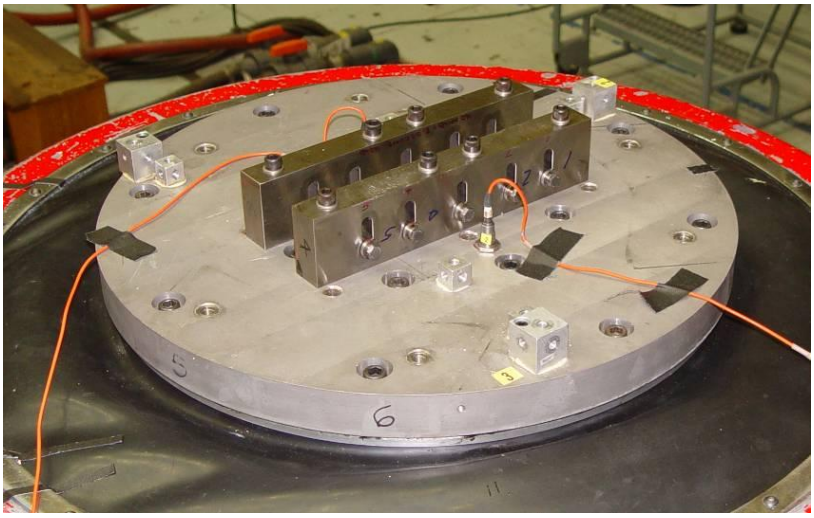

FIGURE B5 - VIBRATION TEST FIXTURE

APPENDIX B2 - TEST DATA SHEETS

TABLE B3 - PHASE IIA: BREAK-LOOSE AND PREVAILING TORQUE; 17 µL ON BOLT ONLY; 48 HOURS CURE

SPECIMEN NUMBER	CLOCKWISE BREAK-LOOSE TORQUE (IN-LB)	PREVAILING TORQUE (CCW) (IN-LB)					REMARKS
		90°	180°	270°	360°	AVERAGE	
1B48	7.5	9.5	10.0	7.0	6.5	8.2	
2B48	7.0	8.0	8.0	13.0	14.0	10.8	(1)
3B48	7.0	6.5	6.5	5.0	5.0	5.8	(2)
4B48	7.5	6.5	5.5	4.5	4.5	5.3	
5B48	7.5	6.5	6.5	5.5	5.5	6.0	
6B48	8.0	6.0	6.0	5.0	4.0	5.3	
7B48	8.0	6.5	6.5	5.0	5.0	5.8	
8B48	7.5	5.0	5.0	4.5	3.5	4.5	
9B48	6.5	7.5	7.0	6.0	6.0	6.6	
10B48	6.0	6.5	6.0	4.5	3.5	5.1	
11B48	7.5	6.5	6.5	5.0	4.5	5.6	
12B48	7.5	7.0	7.0	5.5	5.0	6.1	
13B48	8.0	6.0	6.0	5.0	4.5	5.4	
14B48	7.0	6.0	5.5	4.5	4.5	5.1	
15B48	7.0	8.5	8.0	9.5	13.0	9.8	
16B48	8.0	6.5	6.5	5.0	4.5	5.6	
17B48	7.0	5.5	5.5	3.5	3.5	4.5	
18B48	9.0	6.0	6.0	5.0	5.5	5.6	
19B48	8.0	7.0	6.5	6.5	5.0	6.3	
20B48	6.5	3.0	3.0	2.5	2.5	2.8	
AVERAGE	7.4	6.5	6.4	5.6	5.5		

(1) Bolt removed after test and examined for Loctite cure. Loctite on thread engaged area blue and slightly wet. (See Figure 2)

(2) Bolt installed further into nut plate to expose Loctite in thread engaged area. Loctite found to be fully cured. (See Figure 3)

Observation: Loctite cures in the thread engaged area, but the uncured Loctite in open areas migrates to the thread engaged area during bolt removal and blue (uncured) Loctite overlaps white (cured) Loctite.

TABLE B4 - PHASE IIA: BREAK-LOOSE TORQUE; 25 µL ON NUT THREADS ONLY; 48 HOURS CURE

SPECIMEN NUMBER	CLOCKWISE BREAK-LOOSE TORQUE (IN-LB)	PREVAILING TORQUE (CCW) (IN-LB)					REMARKS (1)
		90°	180°	270°	360°	AVERAGE	
1	7.0	9.5	9.0	5.5	6.0	7.4	
2	6.5	5.5	7.0	8.0	9.0	7.2	
3	7.0	6.0	5.5	5.0	5.5	5.8	
4	6.5	5.0	4.0	4.0	4.0	4.7	
5	7.0	7.0	6.5	4.5	4.5	5.9	
6	6.5	9.0	8.0	6.0	7.5	7.4	
7	6.5	6.0	6.5	8.0	8.0	7.0	
8	7.0	6.0	6.0	3.5	3.0	5.1	
9	7.5	6.0	6.0	7.0	7.0	6.7	
10	7.5	6.5	6.5	6.0	6.0	6.5	
AVERAGE	6.9	6.7	6.5	5.8	6.1	6.4	

(1) Did not perform 2 seconds torque resistance test

TABLE B5 - PHASE IIA: BREAK-LOOSE TORQUE; 35 µL ON BOLT AND 25 µL ON NUT; 48 HOURS CURE

SPECIMEN NUMBER	CLOCKWISE BREAK-LOOSE TORQUE (IN-LB)	PREVAILING TORQUE (CCW) (IN-LB)					REMARKS
		90°	180°	270°	360°	AVERAGE	
1	7.0	12.0	14.0	14.0	16.0	12.6	
2	7.0	7.0	6.0	6.5	5.0	6.3	
3	8.0	8.5	9.5	11.0	11.0	9.6	
4	7.5	8.0	10.0	12.0	10.0	9.5	
5	7.5	9.0	9.0	9.0	9.0	8.7	
6	8.5	12.0	12.0	14.0	15.0	12.3	
7	8.0	8.0	7.0	6.0	5.0	6.8	
8	7.5	6.0	7.0	7.0	7.0	6.9	
9	8.0	11.0	11.0	8.0	7.0	9.0	
10	8.0	7.0	7.0	7.0	6.0	7.0	
AVERAGE	7.7	8.9	9.3	9.5	9.1	8.9	

TABLE B6 - PHASE IIA: 2 SECONDS TORQUE RESISTANCE TEST @ 4 IN-LB; 17 µL ON BOLT THREADS ONLY; 48 HOURS CURE

SPECIMEN NUMBER	NUMBER OF VERIFICATION TESTS	OBSERVATIONS	CLOCKWISE BREAK-LOOSE AFTER TEST (IN-LB)	REMARKS
11	1	NM	6.0	
12	1	NM	5.5	
13	1	NM	4.5	
14	1	NM	7.5	
15	1	NM	5.5	
16	1	NM	6.0	
17	1	NM	5.0	
18	1	Moved within 2 sec		
19	1	Moved within 2 sec		
20	1	NM	5.0	
		AVERAGE	5.6	

TABLE B7 - PHASE IIA: BREAK-LOOSE AND PREVAILING TORQUE; 25 µL ON NUT ONLY; 72 HOURS CURE

SPECIMEN NUMBER	CLOCKWISE BREAK-LOOSE TORQUE (IN-LB)	PREVAILING TORQUE (CCW) (IN-LB)				
		90°	180°	270°	360°	AVERAGE
1N72	9.0	7.0	7.0	5.0	5.0	6.0
2N72	9.0	8.0	8.0	8.5	10.0	8.6
3N72	8.5	7.0	8.0	9.0	10.0	8.5
4N72	8.0	8.5	8.5	8.0	7.5	8.1
5N72	9.5	8.0	8.0	7.0	6.5	7.4
6N72	7.5	6.0	5.5	4.5	3.5	4.9
7N72	8.5	7.0	6.5	5.5	7.0	6.5
8N72	8.5	7.5	7.0	5.0	5.0	6.1
9N72	9.0	7.0	7.0	5.5	5.5	6.3
10N72	8.5	7.0	6.5	6.5	7.0	6.8
AVERAGE	8.6	7.3	7.2	6.5	6.7	6.9

Average Break-Loose Torque from Specimens 1N72 through 10N72 = 8.6 in-lb
Verification Test Torque = 4.0 in-lb (50% of average breakaway)

TABLE B8 - PHASE IIA: BREAK-LOOSE AND PREVAILING TORQUE; 35 µL ON BOLT AND 25 µL ON NUT; 72 HOURS CURE

SPECIMEN NUMBER	CLOCKWISE BREAK-LOOSE TORQUE (IN-LB)	PREVAILING TORQUE (CCW) (IN-LB)				
		90°	180°	270°	360°	AVERAGE
1BN72	7.5	8.0	8.0	9.5	11.0	9.1
2BN72	8.0	7.5	7.5	7.0	7.0	7.3
3BN72	8.5	8.5	9.5	17.0	18.0	13.3
4BN72	8.0	6.5	6.5	5.0	5.0	5.8
5BN72	8.0	7.0	6.0	4.0	4.0	5.3
6BN72	8.0	7.5	7.0	7.0	8.0	7.4
7BN72	8.0	5.0	4.5	4.0	4.0	4.4
8BN72	7.0	9.5	13.0	14.0	15.0	12.9
9BN72	8.0	7.0	6.5	7.0	7.0	6.9
10BN72	7.0	5.5	3.0	3.0	3.0	3.6
AVERAGE	7.8	7.2	7.15	7.75	8.2	7.6

Average Break-Loose Torque from Specimens 1BN72 through 10BN72 = 7.8 in-lb
Verification Test Torque = 4.0 in-lb (50% of average breakaway)

TABLE B9 - PHASE IIA: 2 SECONDS TORQUE RESISTANCE TEST AT 4.0 IN-LB; 25 µL ON NUT ONLY; 72 HOURS CURE

SPECIMEN NUMBER	NUMBER OF VERIFICATION TESTS	OBSERVATIONS -- VERIFICATION TEST 1 CYCLE	CW BREAK-LOOSE TORQUE (IN-LB) TEST #1	OBSERVATIONS -- VERIFICATION TEST 3 CYCLES	CW BREAK-LOOSE TORQUE (IN-LB) 3 CYCLES	OBSERVATIONS -- VERIFICATION TEST 5 CYCLES	CW BREAK-LOOSE TORQUE (IN-LB) 5 CYCLES
11N72	1	NM	6.5	N/A	N/A	N/A	N/A
12N72	1	NM	6.0				
13N72	1	NM	7.0				
14N72	1	NM	4.5				
15N72	1	NM	7.0				
16N72	1	NM	6.5				
17N72	1	NM	5.5				
18N72	1	NM	6.5				
19N72	1	NM	6.0				
20N72	1	NM	8.0				
21N72	3	NM	NM	NM	7.5		
22N72	3	NM	NM	NM	8.5		
23N72	3	NM	NM	NM	6.0		
24N72	3	NM	NM	NM	7.0		
25N72	3	NM	NM	NM	7.5		
26N72	3	NM	NM	NM	6.0		
27N72	3	NM	NM	NM	6.0		
28N72	3	NM	NM	NM	6.5		
29N72	3	NM	NM	NM	8.0		
30N72	3	NM	NM	NM	8.5		
31N72	5	NM	NM	NM	NM	NM	6.5
32N72	5	NM	NM	NM	NM	NM	6.5
33N72	5	NM	NM	NM	NM	NM	4.5
34N72	5	NM	NM	NM	NM	NM	6.5
35N72	5	NM	NM	NM	NM	NM	6.5
36N72	5	NM	NM	NM	NM	NM	6.0
37N72	5	NM	NM	NM	NM	NM	6.0
38N72	5	NM	NM	NM	NM	NM	5.0
39N72	5	NM	NM	NM	NM	NM	8.0
40N72	5	NM	NM	NM	NM	NM	7.5

TABLE B10 - PHASE IIA: 2 SECONDS TORQUE RESISTANCE TEST AT 4.0 IN-LB; 35 µL ON BOLT AND 25 µL ON NUT; 72 HOURS CURE

SPECIMEN NUMBER	NUMBER OF VERIFICATION TESTS	OBSERVATIONS -- VERIFICATION TEST 1 CYCLE	CW BREAK-LOOSE TORQUE (IN-LB) TEST #1	OBSERVATIONS -- VERIFICATION TEST 3 CYCLES	CW BREAK-LOOSE TORQUE (IN-LB) 3 CYCLES	OBSERVATIONS -- VERIFICATION TEST 5 CYCLES	OBSERVATION -- VERIFICATION TEST 10 CYCLES	CW BREAK-LOOSE TORQUE (IN-LB) 10 CYCLES
11BN72	1	DID NOT TEST ONE CYCLE	DID NOT TEST	N/A	N/A	N/A	N/A	N/A
12BN72	1							
13BN72	1							
14BN72	1							
15BN72	1							
16BN72	1							
17BN72	1							
18BN72	1							
19BN72	1							
20BN72	1							
21BN72	3	NM	NM	NM	6.5			
22BN72	3	NM	NM	NM	7.0			
23BN72	3	NM	NM	NM	6.5			
24BN72	3	NM	NM	NM	7.5			
25BN72	3	NM	NM	NM	7.5			
26BN72	3	NM	NM	NM	7.5			
27BN72	3	NM	NM	NM	7.0			
28BN72	3	NM	NM	NM	7.5			
29BN72	3	NM	NM	NM	6.0			
30BN72	3	NM	NM	NM	7.5			
31BN72	5	NM	NM	NM	NM	NM	NM	8.5
32BN72	5	NM	NM	NM	NM	NM	NM	4.5
33BN72	5	NM	NM	NM	NM	NM	NM	8.0
34BN72	5	NM	NM	NM	NM	NM	Moved @ 10	5.0
35BN72	5	NM	NM	NM	NM	NM	NM	6.5
36BN72	5	NM	NM	NM	NM	NM	NM	6.5
37BN72	5	NM	NM	NM	NM	NM	Moved @ 8	5.0
38BN72	5	NM	NM	NM	NM	NM	NN	8.0
39BN72	5	NM	NM	NM	NM	NM	NM	7.5
40BN72	5	NM	NM	NM	NM	NM	NM	7.0

TABLE B11 - PHASE IIB: DELTA TORQUE TEST DATA; 35 µL ON BOLT; 72 HOURS

BREAK-LOOSE TORQUE –AFTER SEATING TO 35 IN-LB INSTALLATION TORQUE			
SPECIMEN NUMBER	INSTALLATION TORQUE (IN-LB)	CLOCKWISE BREAK-LOOSE TORQUE AFTER 2 MINUTES (IN-LB)	DELTA TORQUE BREAK-LOOSE MINUS INSTALLATION
1	35	34	-1
2	35	34	-1
3	35	35	0
4	35	33	-2
5	35	34	-1
6	35	33	-2
7	35	33	-2
8	35	34	-1
9	35	34	-1
10	35	34	-1
AVERAGE DELTA TORQUE			-1

TABLE B12 - PHASE IIC: DIRECT VERIFICATION TEST DATA (TRIAL); 2 SECONDS HOLD AT 39 IN-LB (35 IN-LB INSTALLATION TORQUE + 4.0 IN-LB); 72 HOURS CURE

LOCTITE APPLICATION AREA	SPECIMEN NUMBER	INSTALLATION TORQUE (IN-LB)	RESULTS AFTER 2 SECONDS HOLD (1)	CW BREAK-LOOSE TORQUE AFTER 2 SECONDS HOLD (IN-LB)	OBSERVATIONS
25 µL ON NUT THREADS	N1 (2)	35	NM	41	Loctite applied to nut squeezes out of nut element during bolt installation. No Loctite found in hole of bottom sheet.
	N2 (2)		NM	43	
	N3 (2)		NM	41	
	N4 (2)		NM	49	
	N5 (2)		38		
	N6		35		
	N7		36		
	N8		36		
	N9		35		
	N10		36		
35µL ON BOLT AND 25 µL ON NUT THREADS	BN1	35	38		Loctite found on bolt shank and in the hole of bottom plate. Uncured Loctite covers white (cured) Loctite during bolt removal..
	BN2		38		
	BN3		36		
	BN4		38		
	BN5		36		
	BN6		39		
	BN7		NM	42	
	BN8		38		
	BN9		46		
	BN10		36		

(1) NM denotes no movement after 2 seconds
Numerals denote break-loose torque (in-lb) prior to 2 seconds hold

(2) N1 thru N5 had washers (AN960-3, alloy steel, cadmium plated) under bolt head.

TABLE B13 - PHASE IIC: NO WASHER UNDER BOLT HEAD; 2 SECONDS HOLD AT 40 IN-LB (36 IN-LB INSTALLATION TORQUE + 4.0 IN-LB); 72 HOURS CURE

LOCTITE APPLICATION AREA	SPECIMEN NUMBER	INSTALLATION TORQUE (IN-LB)	RESULTS AFTER 2 SECONDS HOLD (1)	CLOCKWISE BREAK-LOOSE TORQUE AFTER 2 SECONDS HOLD (IN-LB)	OBSERVATIONS
BOLT THREADS 35 µL	B1	36	NM	39	Loctite applied to bolt threads found on bolt shank and in the hole of bottom plate. Uncured Loctite covers white (cured Loctite) during removal.
	B2		36		
	B3		NM	37	
	B4		38		
	B5		39		
	B6		37		
	B7		38		
	B8		NM	39	
	B9		36		
	B10		37		
NUT THREADS 25 µL	N1	36	35		Loctite applied to nut squeezes out of nut element during bolt installation. No Loctite found in hole of bottom sheet.
	N2		35		
	N3		35		
	N4		34		
	N5		33		
	N6		36		
	N7		34		
	N8		37		
	N9		37		
	N10		38		
BOLT AND THREADS 35 µL ON BOLT AND 25 µL ON NUT	BN1	36	37		Combination of above two conditions
	BN2		34		
	BN3		39		
	BN4		NM	38	
	BN5		39		
	BN6		NM	38	
	BN7		40		
	BN8		37		
	BN9		35		
	BN10		NM	48	

(1) NM denotes no movement after 2 seconds
Numerals denote break-loose torque (in-lb) prior to 2 seconds hold

TABLE B14 - PHASE IIC: WITH WASHER UNDER BOLT HEAD; 2 SECONDS HOLD AT 40 IN-LB (36 IN-LB INSTALLATION TORQUE + 4.0 IN-LB); 72 HOURS CURE

LOCTITE 242 APPLICATION AREA		SPECIMEN NUMBER	INSTALLATION TORQUE (IN-LBS)	RESULTS AFTER 2 SECONDS HOLD (1)	CLOCK-WISE BREAK-LOOSE TORQUE AFTER 2 SECONDS HOLD (IN-LBS)	OBSER-VATIONS
BOLT AND NUT THREADS 35 µL ON BOLT AND 25 µL ON NUT	(2) ST116-3C WASHER UNDER BOLT	BN11	36	39		Average Break-Loose Torque=43.8
		BN12		NM	45	
		BN13		NM	45	
		BN14		NM	45	
		BN15		NM	43	
		BN16		NM	46	
		BN17		NM	41	
		BN18		NM	42	
		BN19		NM	43	
		BN20		NM	44	
	(3) AN960-3 WASHER UNDER BOLT	BN21	36	NM	42	Average Break-Loose Torque=44.6
		BN22		NM	43	
		BN23		NM	46	
		BN24		NM	47	
		BN25		NM	45	
		BN26		NM	44	
		BN27		NM	41	
		BN28		NM	46	
		BN29		(4)		
		BN30		NM	47	

(1) NM denotes no movement after 2 seconds
Numerals denote break-loose torque (in-lb) prior to 2 seconds hold

(2) ST116-3C is an A286 washer with a countersink. Passivated finish

(3) AN960-3 is an alloy steel washer with cadmium plate.

(4) Invalid, could not install fastener due to thread interference.

TABLE B15 - PHASE IIC: WITH WASHER UNDER BOLT HEAD; 2 SECONDS HOLD AT 40 IN-LBS (36 IN-LBS INSTALLATION TORQUE + 4.0 IN-LBS); 72 HOURS CURE

APPLICATION AREA	WASHER UNDER BOLT	SPECIMEN NUMBER	INSTALLATION TORQUE (IN-LBS)	RESULTS AFTER 2 SECONDS HOLD (1)	CLOCKWISE BREAK-LOOSE TORQUE AFTER 2 SECONDS HOLD (IN-LBS)	OBSERVATIONS
NUT ONLY 25 µL	ST116-3C	N11	36	NM	46	Average Break-Loose Torque=45.9
		N12		NM	46	
		N13		NM	45	
		N14		NM	47	
		N15		NM	44	
		N16		NM	47	
		N17		NM	45	
		N18		NM	46	
		N19		NM	45	
		N20		NM	48	
BOLT ONLY 35 µL	ST116-3C	B11	36	NM	46	Average Break-Loose Torque=46.1
		B12		NM	46	
		B13		NM	47	
		B14		NM	46	
		B15		NM	48	
		B16		NM	46	
		B17		NM	45	
		B18		NM	48	
		B19		NM	47	
		B20		NM	42	
BOLT ONLY 20 µL	ST116-3C	B21	36	NM	44	Average Break-Loose Torque=45.0
		B22		NM	43	
		B23		NM	46	
		B24		NM	46	
		B25		NM	45	
		B26		NM	44	
		B27		NM	46	
		B28		NM	46	
		B29		NM	45	
		B30		NM	45	

TABLE B16 - PHASE IIC: MISCELLANEOUS TEST; CLOCKWISE BREAK-LOOSE TORQUE 72 HOURS AFTER INSTALLATION (NO LOCTITE)

LOCTITE 242 APPLICATION AREA	SPECIMEN NUMBER	INSTALLATION TORQUE (IN-LB)	CW BREAK-LOOSE TORQUE 72 HOURS AFTER INSTALLATION TORQUE OF 36 IN-LB (IN-LB)	REMARKS
NONE	1	36	35	No washer used under bolt head. Break-loose torque range: 31 to 36 in-lb Average = 34.7 in-lb.
	2		33	
	3		35	
	4		36	
	5		35	
	6		36	
	7		31	
	8		35	
	9		35	
	10		36	
NONE	11	36	35	ST116-3C Countersunk A286 washer used under bolt head. Break-loose torque range: 35 to 37 in-lb Average = 35.7 in-lb
	12		36	
	13		35	
	14		35	
	15		36	
	16		35	
	17		37	
	18		37	
	19		35	
	20		36	

TABLE B17 - PHASE IID: NASM1312-7 VIBRATION TEST DATA; 72 HOURS CURE

LOCTITE 242: BOLT TIGHTENED TO 36 IN-LB WITH SPECIMENS NOTED "DV" AND SUBJECTED TO 40 IN-LB TORQUE (ON DIRECTION) FOR 2 SECONDS; 72 HOURS LOCTITE CURE											
LOCTITE 242 APPLICATION AREA AND VOLUME	SPECIMENS WITH 2 SECOND HOLD @ 40 IN-LB	SPECIMENS WITHOUT 2 SECOND HOLD	DEGREES OF ROTATION AFTER NOTED CYCLES						(5) BREAK-LOOSE TORQUE AFTER 30,000 CYCLES (ON DIRECTION)	(6) SECOND VIBRATION TEST AFTER UNSEATING BOLT TO REMOVE PRELOAD	(5) BREAKAWAY TORQUE (OFF DIRECTION) AFTER SECOND VIBRATION TEST (IN-LB)
			5000	10000	15000	20000	25000	30000		ROTATION AFTER 30000 CYCLES	
NUT THREADS 25 µL	DV1		0	0 (3)	0	0	0	0	Did not test	0	11
	DV2		0	0 (3)	0	0	0	0		0	8
	DV3		0	0 (3)	0	0	0	0		0	9
	DV4		0	(4)	0	0	0	0		0	8
	DV5		0	0 (3)	0	0	0	0		0	6
		6	0	0 (3)	0	0	0	0	46	0	8
		7	0	0 (3)	0	0	0	0	46	0	11
		8	0	0 (3)	0	0	0	0	45	0	8
		9	0 (3)	0	0	0	0	0	45	0	9
		10	0	0 (3)	0	0	0	0	46	0	7
(1) BOLT THREADS 35 µL	DV6			0		0		0	35	0	6.5
	DV7			0		0		0	36	0	8.0
	DV8			0		0		0	50	0	8.0
	DV9			0		0		0	40	0	8.0
	DV10			0		0		0	48	0	9.0
(2) BOLT THREADS 20 µL	DV11			0		0		0	43	0	13.0
	DV12			0		0		0	31	0	10.0
	DV13			0		0		0	35	0	9.0
	DV14			0		0		0	52	0	9.5
	DV15								36	0	8.5

Note: A new bottles of Loctite 242 and primer T were used for PHASE IID test.

(1) 35 µL volume of Loctite added to bolt threads resulted in excess Loctite migrating to AN960 washer and NASM1312-7 washer component.

(2) Due to excess Loctite noted in (1), the volume of Loctite was reduced to 20 µL on bolt thread. The Loctite was added to the upper portion of the threads near the lead.

(3) Torque stripe broken, but no movement.

(4) Very slight misalignment of torque stripe noted when viewed through a magnifying glass. Not enough movement to break Loctite bond.

(5) These recordings were not part of the original test procedure, but were added for information only.

Note: The average breakaway torque for specimens 6 through 10 was 45.6 in-lb, the average for DV6 through DV10 was 41.8 in-lb, and the average for DV11 through DV15 was 39.4 in-lb.

(6) This test was not part of the original test procedure, but was performed to see performance after breaking bond and with no preload.

APPENDIX C - CHEMICAL CLEANING PROCESS

Process Used for Chemical Cleaning of Cured LLC
Based on Battelle Formula

Equipment:

1. Standard taper glass boiling flask or resin kettle of suitable size
2. Electric heating mantle to fit boiling flask or kettle
3. Standard taper reflux condenser to fit flask or kettle
4. Ring stand w/ clamps to hold glassware
5. Source of cold water
6. Hoses to connect condenser to water and drain

Materials:

Battelle Formula epoxy remover (by weight):
88% N-methyl pyrrolidinone
8% water
2% sodium anthraquinone sulfonate (critical corrosion inhibitor for metals; not necessary for glass)
1% Triton X-100 or equivalent nonionic surfactant
1% citric acid (dihydrate is typical)

Procedure:

1. Place parts in boiler.
2. Fill boiler no more than half-full with Battelle formula (parts MUST BE completely submerged).
3. Open water valve to fill condenser, and adjust to a slow flow.
4. Power up heating mantle.
5. Allow to boil gently, under reflux for a minimum of 4 hours (overnight is better).
6. Disconnect power, allow apparatus to cool.
7. Shut off water valve.
8. Pour off liquid, save for future use.
9. Rinse flask contents with tap water.
10. Final rinse with D.I. water.
11. Dry using any suitable method.
12. Inspect – any residual resin should come off with gentle persuasion (razor blade, wire brush, Scotchbrite, etc.).

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14. ABSTRACT

The use of adhesive locking features or liquid locking compounds as a means of providing a secondary locking feature has been used on NASA programs since the Apollo program. Long-term use of Loctite became inevitable in cases where removal and replacement of worn hardware was not cost effective and Loctite was assumed to be fully cured and working. The NASA Engineering & Safety Center and United Space Alliance recognized the need for more extensive testing of Loctite grades to better understand their capabilities and limitations as a secondary locking feature. These tests, identified as Phase I, were designed to identify processing sensitivities, to determine proper cure time, the correct primer to use on aerospace nutplate, insert and bolt materials such as A286 and MP35N, and the minimum amount of Loctite that is required to achieve optimum breakaway torque values. This report documents the test program used to investigate the viability of such a direct verification method.

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