

MIL-F-18240D

25 February 1972

Superseding

MIL-F-18240C (ASG)

17 November 1967

MILITARY SPECIFICATION

FASTENER, EXTERNALLY THREADED, 250°F SELF-LOCKING ELEMENT FOR

This specification is mandatory for use by all Departments
and Agencies of the Department of Defense

1. SCOPE

1.1 This specification covers the self-locking element to be used
in externally threaded fasteners, such as bolts and screws, to be used in applica-
tions where the temperatures will not exceed 250°F.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invi-
tation for bids or request for proposal, form a part of this specification to the
extent specified herein:

SPECIFICATIONS

Military

MIL-H-3982

Hardware (Fasteners and Related Items)
Packaging and Packing for Shipment and
Storage of

STANDARDS

Military

MIL-STD-105

Sampling Procedures and Tables for
Inspection by Attributes

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STANDARDSMilitary (Cont'd)

| | |
|---------------------------|---|
| MIL-STD-1312 | Fastener, Test Methods |
| MS15891 | Fasteners, Threaded Externally, Self-Locking, Aerospace Vehicles and Equipment Design and Usage Limitations for |
| MS26531 | Vibration Test Rig |
| AN3 thru 20 | Bolt, Machine, Aircraft |
| AN315 | Nut, Plain, Airframe |
| AN121501 thru AN121525 | Nut - Plain |

(When requesting applicable documents, refer to both title and number. Copies of unclassified documents may be obtained from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120. Requests for copies of classified documents should be addressed to the Naval Publications and Forms Center, via the cognizant Government representative.)

2.2 Other publications - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Aerospace Standards Committee

| | |
|------------------|---|
| NAS 600 thru 602 | Screw, Machine, Aircraft, Pan Head, Phillips Recess, Full Threaded, Alloy Steel |
|------------------|---|

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NAS 1316

Bolt, Hex Head, Close Tolerance,
160,000 PSI Tensile

(Copies of NAS publications may be obtained from National Standards Association, 1321 14th Street, N.W., Washington, D.C. 20005.)

3. REQUIREMENTS

3.1 Qualification - The self-locking elements incorporated in fasteners furnished under this specification shall be an element design which has been subjected to and which has passed the qualification tests specified herein, and which has been listed on or approved for listing on the applicable Qualified Products Lists.

* In addition, the retention of qualified products list shall be dependent on a periodic verification of continued compliance with the requirements of this specification (see 4.4.3.1).

3.2 Performance - The performance characteristics and dimensions of the bolts and screws, with the self-locking elements incorporated therein, shall conform to the requirements of the applicable drawings, the supplementary specifications, and the additional requirements specified in this specification. (For definition of "supplementary specifications," see 6.5.1.)

3.3 Torque - The bolt or screw, with the self-locking element incorporated therein, shall withstand the torque test specified in 4.6.3.

3.4 Vibration - The bolt or screw, with the self-locking element incorporated therein, shall withstand the vibration test specified in 4.6.7.

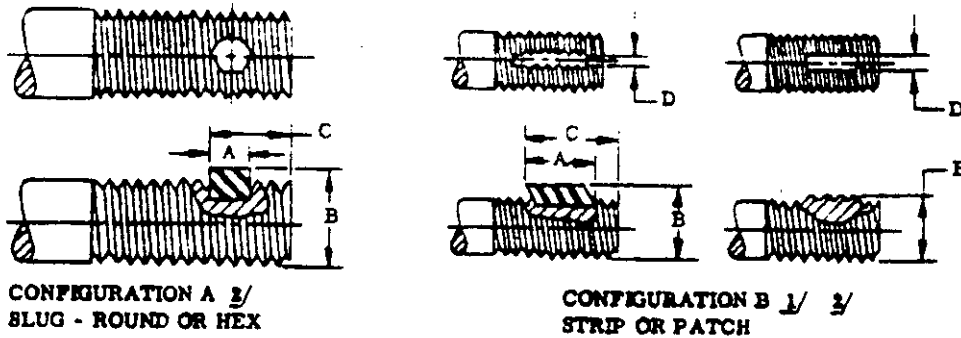
3.5 Dimensions - The self-locking element shall be within the dimensional limitations of MS15981 and if the element design is to be of a configuration illustrated by figure 1, it shall be dimensionally in accordance with figure 1.

3.6 Workmanship - Workmanship shall be consistent with high-grade commercial practice.

4. QUALITY ASSURANCE PROVISIONS

4.1 General - The sampling, inspection, and test procedures of this specification and the applicable supplementary bolt or screw specifications shall apply.

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| GOVERNMENT DESIGNATION $\frac{5}{8}$ | NOMINAL THREAD SIZE $\frac{4}{8}$ | CONFIGURATION | A | | B | | C | | D MIN | PREVIOUS $\frac{3}{8}$ GOVERNMENT DESIGNATION |
|--|--|-----------------|------|------|------|------|------|------|----------|---|
| | | | MAX | MIN | MAX | MIN | MAX | MIN | | |
| 04 | 4 | A | .106 | .053 | .118 | .108 | .161 | .121 | .025 | 1, 35, 51 2, 40, 22 |
| | | B | .250 | .099 | | | .285 | .185 | | |
| 06 | 6 | A | .106 | .066 | .141 | .131 | .184 | .144 | .030 | 3, 53, 36 4, 41, 23 |
| | | B | .281 | .125 | | | .359 | .222 | | |
| 08 | 8 | A | .124 | .084 | .167 | .157 | .192 | .152 | .030 | 5, 6, 52, 34 7, 42, 24 |
| | | B | .344 | .125 | | | .406 | .234 | | |
| 10 | 10 | A | .124 | .084 | .193 | .183 | .208 | .150 | .030 | 8, 47, 37 9, 43, 25 |
| | | B | .344 | .125 | | | .406 | .234 | | |
| 40 | 1/4 | A | .144 | .089 | .253 | .243 | .231 | .191 | .025 | 10, 38, 39 11, 44, 26 |
| | | B | .375 | .142 | | | .437 | .267 | | |
| 50 | 5/16 | A | .188 | .130 | .315 | .305 | .278 | .222 | .025 | 12, 13, 54, 50 14, 45, 27 |
| | | B | .437 | .166 | | | .500 | .312 | | |
| 60 | 3/8 | A | .166 | .146 | .378 | .368 | .284 | .230 | .035 | 15, 16, 17, 48 55, 31, 28 |
| | | B | .500 | .166 | | | .563 | .312 | | |
| 70 | 7/16 | A | .186 | .148 | .440 | .430 | .301 | .261 | .035 | 18, 19 32, 46, 29 |
| | | B | .562 | .200 | | | .637 | .375 | | |
| 80 | 1/2 | A | .186 | .146 | .503 | .493 | .301 | .261 | .035 | 20, 21, 49 33, 30 |
| | | B $\frac{1}{2}$ | .609 | .200 | | | .684 | .375 | | |

- $\frac{1}{2}$ 1/2 INCH SIZE MAY HAVE TWO LOCKING ELEMENTS 90° APART.
- $\frac{2}{2}$ CONFIGURATION OF LOCKING ELEMENT OPTIONAL IF WITHIN DIMENSIONAL LIMITS "A" AND "B".
- $\frac{3}{2}$ GOVERNMENT DESIGNATION OF REV. B (8 DEC. 1961) AND AMENDMENT -1 (2 NOV. 1965).
- $\frac{4}{2}$ SEE 6.4.1.
- $\frac{5}{2}$ SEE 6.4.1.1 AND 6.4.1.2.

FIGURE 1. Elements, self-locking 250°F

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4.2 Responsibility for inspection - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any other commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.3 Classification of inspection - The examination and testing of the bolts and screws, incorporating the self-locking element, shall be classified as follows:

- (a) Qualification inspection (4.4)
- (b) Quality conformance inspection (4.5)

4.4 Qualification inspection

4.4.1 Sampling instructions - The qualification inspection samples shall consist of 60 bolts or screws, as applicable, with the self-locking element incorporated therein, as specified in table I, for each diameter upon which qualification is desired. All nuts necessary for inspections specified herein shall be furnished by the manufacturer. These nuts shall conform to table II. Samples shall be identified as required and forwarded to the activity designated in the letter of authorization from the activity responsible for qualification (see 6.4).

4.4.2 Qualification inspection by the Government will be limited to the bolts or screws shown in table I. Qualification inspection will be authorized only upon presentation of certified test reports to the activity responsible for qualification indicating that the bolts or screws of the diameters to be tested have met or will meet, the requirements of this specification. These test reports shall include actual results of all tests specified by this specification. When these test reports are submitted, a drawing shall be submitted which shows the location, size, material, method of attachment, and protrusion of the self-locking element for each diameter upon which qualification is desired. A manufacturer's designation shall be submitted for the locking element to be used in each diameter of bolt or screw.

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Table I. Length and diameter of bolts and screws required for qualification inspection

| Basic part No. | Length dash No. | Basic part No. | Length dash No. |
|----------------|-----------------|----------------|-----------------|
| NAS 600 | 12P | AN8 | 20 |
| NAS 601 | 12P | AN9 | 21 |
| NAS 602 | 12P | AN10 | 21 |
| AN3 | 15 | AN12 | 22 |
| AN4 | 16 | AN14 | 23 |
| AN5 | 16 | NAS 1316 | 22W |
| AN6 | 17 | AN18 | 25 |
| AN7 | 17 | AN20 | 27 |

Table II. Dimensions of nuts required for tests (inches)

| Thread size | Maximum across flats | Nut thickness ±.010 | 90-degree csink dia. ±.010 |
|------------------|----------------------|------------------------|----------------------------------|
| No. 4-40 UNC-3B | 0.250 | 0.203 | 0.132 |
| No. 6-32 UNC-3B | .312 | .250 | .168 |
| No. 8-32 UNC-3B | .344 | .250 | .194 |
| No. 10-32 UNF-3B | .375 | .250 | .220 |
| 1/4 -28 UNF-3B | .437 | .281 | .281 |
| 5/16-24 UNF-3B | .500 | .328 | .344 |
| 3/8 -24 UNF-3B | .562 | .328 | .406 |
| 7/16-20 UNF-3B | .688 | .375 | .468 |
| 1/2 -20 UNF-3B | .750 | .375 | .531 |
| 9/16-18 UNF-3B | .875 | .422 | .593 |
| 5/8 -18 UNF-3B | .937 | .468 | .656 |
| 3/4 -16 UNF-3B | 1.062 | .625 | .781 |
| 7/8 -14 UNF-3B | 1.250 | .656 | .906 |
| 1 -12 UNF-3B | 1.437 | .750 | 1.031 |
| 1-1/8 -12 UNF-3B | 1.625 | .812 | 1.156 |
| 1-1/4 -12 UNF-3B | 1.812 | .875 | 1.281 |

NOTE: For thread size 9/16 and larger, nuts shown on AN315 may be used except for the countersink, which is to be altered to 90 degrees by 0.030 inch over OD of threads. For thread sizes 3/8 through 1, nuts shown on AN121501 through AN121525 may be used.

Material: Steel, cadmium-plated; corrosion-resistant steel, passivated; as required. (See 4.6.3 and 4.6.7.)

4.4.3 Inspection - The qualification inspection of the bolts and screws, with the self-locking element incorporated therein, shall consist of all the inspections of this specification.

4.4.3.1 Retention - The retention of qualification shall consist of periodic verification to determine compliance of the qualification requirements of the specification. The time and method of periodic verification shall be specified by the activity responsible for the qualified Products List and shall be included in the Notice of Qualification letter.

4.5 Quality conformance inspection - The bolt or screw manufacturer shall be responsible for accomplishing the quality conformance inspection specified herein and the quality conformance inspections required under the supplementary bolt or screw specifications. The procuring activity may, at its discretion, accept certification of inspections required under the supplementary bolt or screw specifications when the basic bolts or screws are manufactured at a separate facility. When milling or slotting operation is used for insertion of locking element into non-corrosive resistant bolts or screws the complete assembly shall pass the salt spray test as required by the applicable bolt, screw or plating specification.

4.5.1 Sampling - For the inspections specified herein, the sample bolts or screws shall be selected at random from each lot as specified below.

4.5.1.1 Random sample - A random sample is a specific number of items so selected that each item of the lot from which the sample is drawn has the same chance of being the first item in the sample; after the first item in the sample is drawn, each of the remaining items has the same chance of being the second item in the sample, and so on.

4.5.1.2 Lot - A lot shall consist of finished bolts or screws with self-locking elements incorporated which are of the same diameter and length, fabricated by the same process, heat treated in the same manner, and produced as one continuous run or order or part thereof.

4.5.1.3 For examination of product - Sample sizes for examination of product shall be in accordance with Inspection Level I of MIL-STD-105. The acceptance and rejection criteria shall be applied for the following Acceptable Quality Levels (AQL's) applying to the corresponding class of characteristics:

| | |
|----------------|---------------|
| <u>Major</u> | 2.5 percent |
| <u>Minor A</u> | - 4.0 percent |
| <u>Minor B</u> | - 6.5 percent |

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4.5.1.3.1 Classification of defects - All dimensional characteristics are considered defective when out of tolerance. The classification of defects for self-locking bolts and screws shall be as follows:

Major

101 Locking element missing (see applicable standard).

Minor A

201 Locking element location (see applicable standard).

202 Measurement over locking element (see applicable standard).

203 Burrs and slivers (see applicable standard).

Minor B

301 Identification of product (see applicable standard).

4.5.1.4 For maximum torque, minimum breakaway torque, and reusability - Sampling for these tests shall be in accordance with the attribute plan shown in table III. The same sample may be used throughout for these tests. The acceptance and rejection numbers shall apply to these tests taken separately, i.e., a bolt or screw may be classified as defective for maximum torque, minimum breakaway torque, or reusability.

Table III. Attribute Plan

| Lot size | Sample size | Acceptance number |
|------------------------|-------------|-------------------|
| Under 10,000 | 5 | 0 |
| 10,000 through 50,000 | 10 | 0 |
| 50,001 through 100,000 | 15 | 0 |
| Over 100,000 | 27 | 1 |

4.5.2 Inspections - The quality conformance inspections of self-locking bolts and screws shall consist of the quality conformance inspections of the applicable supplementary bolt or screw specifications and the following inspections:

| | |
|--------------------------|---------------|
| Tensile strength | (see 4.6.1.1) |
| Examination of product | (see 4.6.2) |
| Maximum torque | (see 4.6.3.1) |
| Minimum breakaway torque | (see 4.6.3.2) |
| Reusability | (see 4.6.6) |

Also, self-locking bolts and screws shall meet any of the other tests herein specified which are considered necessary by the procuring activity to determine conformance with the requirements of this specification.

4.6 Inspection methods -

4.6.1 General - The bolts or screws shall be tested as specified in the applicable supplementary bolt or screw specification, except as specified in 4.6.1.1.

4.6.1.1 Tensile strength - The tensile test shall be conducted as specified in the applicable supplementary bolt or screw specifications with the added provision that when the tensile test is conducted, the nut shall meet the dimensions of table II and shall engage the threads of bolts and screws that have grip portions, to within one to two thread pitches of the thread runout. Bolts and screws that do not have grip portions shall be engaged by the nut until the bolt or screw protrudes from the top of the nut a distance of two thread pitches, including chamfer, if any. The nuts shall be of such strength as to fail the bolts or screws.

4.6.2 Examination of product - The bolts or screws shall be examined for conformance to the applicable standard, relative to:

- Presence of locking element
- Location of locking element
- Measurement over locking element
- Presence of burrs and slivers
- Identification of product

4.6.3 Torque - The nuts used for this test shall be as specified in table II and shall assemble freely on the bolt or screw up to the self-locking device. Carbon-steel nuts shall be used with carbon-steel and alloy-steel bolts or screws. Corrosion-resistant steel nuts shall be used with corrosion-resistant steel bolts or screws. Each nut shall be screwed on and off the bolt or screw a total of 15 consecutive installations and removals. Each installation shall consist of either turning the nut until its bearing surface has traveled completely along the thread length of the effective area of the specific element design or

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at least five complete turns of the nut after the threads of the nut have initially engaged the locking device, whichever provides the greater number of turns. For quality conformance inspection on bolts or screws without sufficient thread length for X min. of MS15981, only a positive indication of torque is required for 15 installations and removals. Each removal shall consist of the same number of complete turns, in the opposite direction, as was required for installation. The torque test shall be run at a rate slow enough to yield a dependable measure of torque, and the temperature rise of the nut being tested shall not exceed 75°F. A new nut and bolt or screw shall be used for each test. For qualification, 10 of the sample bolts or screws supplied shall be used for this test:

4.6.3.1 Maximum torque - Maximum torque shall be the maximum value indicated by the torque device during the 15 installations and removals. This torque value shall not exceed the applicable value shown in table IV.

4.6.3.2 Minimum breakaway torque - Minimum breakaway torque shall be the minimum torque required to start removal of the nut from the installed position. It shall be determined at the start of the first and fifteenth removals. This value shall be not less than the applicable value shown in table IV.

4.6.4 Torque (with heat-conditioned bolts or screws) - The nuts used for this test shall be as specified in table II. The nuts shall be screwed on the bolts or screws until the bearing surface of the nut has traveled completely along the thread length of the effective area of the specific element design or at least 5 complete turns after the threads of the nuts have initially engaged the locking element, whichever provides the greater number of turns. Ten new bolts or screws shall be subjected to this test. These assemblies shall be conditioned at a temperature of $250^{\circ} \pm 10^{\circ}$ F for 3 hours. The assemblies shall then be cooled in air to room temperature for not less than 1 hour. The assemblies shall then be tested as specified in 4.6.3. Maximum locking torque readings shall be taken each installation and removal of the nut.

4.6.4.1 Maximum torque - Maximum torque shall be the maximum value indicated by the torque device during the installation and removal. This value shall not exceed 150 percent of the applicable value shown in table IV.

4.6.4.2 Minimum breakaway torque - Minimum breakaway torque shall be the minimum torque required to start removal of the nut from the installed position. It shall be determined at the start of the first removal. This torque value shall be not less than the applicable value shown in table IV.

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TABLE IV. Torque
(At room temperature in inch-pounds)

| Bolt or screw size | Maximum torque (installation or removal) | Minimum breakaway torque |
|-----------------------|--|--------------------------------|
| No. 4-40 UNC-3A | 3 | 0.5 |
| No. 6-32 UNC-3A | 6 | 1.0 |
| No. 8-32 UNC-3A | 9 | 1.5 |
| No. 10-32 UNF-3A | 13 | 2.0 |
| 1/4 -28 UNF-3A | 30 | 3.5 |
| 5/16 -24 UNF-3A | 60 | 6.5 |
| 3/8 -24 UNF-3A | 80 | 9.5 |
| 7/16 -20 UNF-3A | 100 | 14.0 |
| 1/2 -20 UNF-3A | 150 | 18.0 |
| 9/16 -18 UNF-3A | 200 | 24.0 |
| 5/8 -18 UNF-3A | 300 | 32.0 |
| 3/4 -16 UNF-3A | 400 | 50.0 |
| 7/8 -14 UNF-3A | 600 | 70.0 |
| 1 -12 UNF-3A | 800 | 92.0 |
| 1-1/8 -12 UNF-3A | 900 | 117.0 |
| 1-1/4 -12 UNF-3A | 1,000 | 143.0 |

4.6.5 Minimum breakaway torque at 250°F temperature - Using the same assemblies tested in accordance with 4.6.4, minimum breakaway torque shall be determined on the first removal cycle at temperature while the bolt or screw engagement with the nut is made according to 4.6.3, and after the fastener assembly has been preheated 1 hour at $250^{\circ} \pm 10^{\circ}\text{F}$ and held at this temperature during the test. This torque value shall be not less than the applicable requirement of table IV.

4.6.6 Reusability - The threads of the bolts or screws and nuts used in the torque tests shall show no distortion or scratches deep enough to reduce the efficiency of the threads. The threads of the bolts or screws and nuts shall remain in a serviceable condition and shall freely permit the installation with the fingers, of a new bolt or screw or nut, as applicable, up to the self-locking device.

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- * 4.6.7 Vibration - Sample nuts with bolts of the size and quantities specified in Table V shall be vibrated in accordance with MS26531 or MIL-STD-1312, Test 7. An average vibration life, for each lot of eight specimens tested to MS26531, of less than specified in Table V shall be cause for rejection. Vibration life, for each lot of five specimens tested to MIL-STD-1312 Test 7 of less than 30,000 cycles shall be cause for rejection. The vibration test may be waived at the option of the activity responsible for qualification for bolts larger than the 1/2-inch thread size, provided the bolt of 1/2-inch thread size with the same type and design of locking element has satisfactorily passed the vibration test. The vibration test is not required for elements for screw-thread sizes below 10-32.

- * 4.6.7.1 Preparation for vibration test to MS26531

- * 4.6.7.1.1 Method - The nuts shall be screwed on the bolts or screws that pass through the drilled holes in the arbor and sleeve of the test rig, as shown on sheet 5 of MS26531. The nuts shall not be tightened against the sleeve but shall be screwed on until the end of the bolt or screw extends through the nut a minimum length of two thread pitches and a maximum length of three thread pitches. The bolts or screws shall be free to rotate in the arbor and sleeve. The locking element of the bolt or screw shall be the only factor which restrains the nut from turning on the bolt or screw. The thrust load on the test arbor, including the weight of the electrical power unit, shall be 65 pounds. Reference lines shall be scribed, or other suitable markings shall be made, on both the nuts and the bolts or screws for the purpose of determining whether or not the nut turns on the bolt or screw during the vibration test.

- * 4.6.7.1.2 The tests shall be conducted in periods of running and periods of rest to permit the electrical power unit to cool. A fan or blower shall be set to direct a current of air on the test rig, in order that 20-minute runs with 10-minute rest intervals shall not develop temperatures greater than 105°F in the test specimen.

- (a) The fan or blower shall be turned off after each 20-minute running period is complete, and shall remain off until the temperature readings are taken.
- (b) A rotation of greater than 30 degrees for a nut shall be considered a failure of that element, and the end of the run period in which the element failed shall be recorded as its vibration life.

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- (c) The vibration test shall be conducted for a period equal to the average vibration life specified in table V unless a rotation of greater than 30 degrees on either side of the scribed line is observed on two or more nuts, in which instance the period may be extended to a total of 1-1/2 times the specified average life vibration requirement.

In the latter event the total time for all the bolts or screws is then recorded up until any other failure occurs on the remaining bolts or screws, and the resulting average life thereby obtained shall be not less than the average specified in table V.

Table V. Vibration Requirements

| Nut Size | Bolts Size | MS26531 | | MIL-STD-1312 test 7 | |
|----------|------------|---|---|---|--|
| | | Bolts and Nuts required (min of each) | Average Vibration life (hours) | Bolts and nuts required (min of each) | Max Assembly Torque After Bake (in.-lb.) |
| | | | | | |
| | | 250°F | | 250°F | |
| 10-32 | AN3-15A | 8 | 0.6 | 5 | 36 |
| 1/4-28 | AN4-16A | 8 | 1.0 | 5 | 60 |
| 5/16-24 | AN5-16A | 8 | 3.5 | 5 | 120 |
| 3/8-24 | AN6-17A | 8 | 6.0 | 5 | 160 |
| 7/16-20 | AN7-17A | 8 | 8.0 | 5 | 200 |
| 1/2-20 | AN8-20A | 8 | 9.5 | 5 | 300 |

4.6.7.1.3 The bolts or screws shall be considered to have failed the vibration test under the following conditions:

- (a) If any structural failure occurs in the locking element area during the average vibration time, such as a break or crack that intersects that portion of the threads that has been removed for insertion of the locking element, or falling out of the locking element, or if any nut rotates greater than 90 degrees the test shall be terminated.

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- (b) The element shall be considered to have failed when any nut can be turned completely on or off the bolt or screw with the fingers after any 20-minute run or after the completion of the average vibration time.
- (c) The element shall be considered to have failed when any nut comes completely off the bolt or screw during the average vibration time.

* 4.6.7.2 Preparation for vibration test to MIL-STD-1312, Test 7.

* 4.6.7.2.1 Accelerated vibration - The bolts or screws shall be assembled in accordance with Figure 1 of MIL-STD-1312, Test 7 with nuts and torque values as specified in Table V. The nuts shall then be removed and reinstalled to this torque four additional times before being vibrated.

* 4.6.7.3 Method - Use MIL-STD-1312, Test 7 procedure.

* 4.6.7.3.1 Determination shall be made throughout the test to guarantee that assembly is traversing the entire length of the slots in the test fixture. The test shall be run for 45,000 cycles except that it shall be stopped prior to the completion of the 45,000 cycles in the event a nut becomes disassembled from the bolt.

4.6.7.3.2 The bolts or screws shall be considered to have failed the vibration test under the following conditions:

- (a) If any structural failure occurs in the locking element area during the vibration time, such as a break or crack that intersects that portion of the threads that has been removed for insertion of the locking element or if any nut rotates greater than 360 degrees the test shall be terminated.
- (b) The element shall be considered to have failed when any nut can be turned completely on off the bolt or screw with the fingers during or after completion of 45,000 cycles.
- (c) The element shall be considered to have failed when any nut comes completely off the bolt during the 45,000 cycles.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging - Preservation and packaging shall be level A, or C, as specified (see 6.2). Unless otherwise specified by the procuring activity, unit package quantity and preservation and packaging shall be in accordance with MIL-H-3982.

5.2 Packing - Packing shall be level A, B, or C, as specified by the contract or order. Unless otherwise specified in the contract or order, fasteners shall be packed in accordance with MIL-H-3982.

5.3 Marking - In addition to any special marking required by the contract or order, the unit packages and shipping containers shall be marked in accordance with MIL-H-3982.

6. NOTES

6.1 Intended use - The self-locking elements covered by this specification are intended to be incorporated in external screw threads to provide resistance to turning due to vibration. These elements are to be used in applications where maximum temperature does not exceed 250° F. When these elements are incorporated in external threads and are used in compliance with MS15981, all the configurations of figure 1 are interchangeable. It is intended that in specifying elements in conformance with this specification the locking element shall be specified in accordance with MS15981 (i.e., a configuration should not be specified). A configuration should be specified only for non-standard parts where, because of part design or application requirements, only one configuration can be used.

6.2 Ordering data - Procurement documents should specify:

- (a) Title, number, and date of this specification.
- (b) Part number in accordance with the applicable standard (see 3.5).
- (c) Applicable level of preservation, packaging, and packing (see 5.1 and 5.2).

6.3 Use of standard and nonstandard self-locking externally threaded fasteners. - For definition of these terms, see 6.5.2 and 6.5.3)

6.3.1 Standard self-locking externally threaded fasteners. - The release for use of standard self-locking externally threaded fasteners is governed by the requirements of the weapon system or equipment general or detail specification.

6.3.2 Nonstandard self-locking externally threaded fasteners - Self-locking externally threaded fasteners, formed by incorporation of self-locking elements listed on QPL-18240 with fasteners that are in accordance with specifications and standards approved by the weapon system or equipment specification and, as assemblies, are in accordance with the acceptance tests and requirements of this specification, will be considered to have been released by the procuring activity for use for specific applications at the time the procuring activity has received notice of the specific applications and complete descriptions of the items being specified. This release for use does not constitute waiver of the other applicable requirements of the weapon system or equipment specification. The use of other nonstandard self-locking externally threaded fasteners will require prior release for use.

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6.4 Qualification - With respect to products incorporating element designs requiring qualification, awards will be made only for such products incorporating elements, the design of which, prior to the time set for opening of bids, has been tested and approved for inclusion in the applicable Qualified Products List, whether or not such element designs have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the locking element designs that they propose to incorporate in bolts or screws to be offered to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for products incorporating element designs covered by this specification. The activity responsible for the Qualified Products List is the Naval Air Systems Command, Attn: AIR-52021, Washington, D. C. 20360. However, information pertaining to qualification of products may be obtained from the Naval Air Development Center, Aero Materials Department (MAEM), Johnsville, Warminster, Pennsylvania 18974.

6.4.1 Qualification approval for locking element designs are based on testing and evaluation of element designs incorporated in 3A coarse threads for sizes smaller than No. 10 and on 3A fine threads for size No. 10 and larger. Element designs listed in figure 1 are approved for incorporation in 2A or 3A fine threads for sizes smaller than No. 10 and in 2A and 3A coarse threads for sizes No. 10 and larger if the requirements for quality conformance inspection (4.5) are met and are within the dimensional limitations of MS15981.

6.4.1.1 Qualification inspection and evaluation of configuration "A" (see figure 1) locking element designs were based on the protrusion of the element being in accordance with figure 1, dimension "B". Configuration "A" designs with protrusion of "B +0.007", and that are otherwise the same as those listed, also have qualification approval.

6.4.1.2 To identify the additional element design with the greater protrusion the additional +0.007 protrusion must be specified on the standard or drawing for the part; for nonstandard parts that require a specific configuration add a "P" to the Government designation.

Example: Locking element MIL-F-18240 Government designation of 40P, 1/4 thread with configuration "A" 0.010-inch protrusion, self-locking element.

It should be noted that fasteners with 0.003-inch and 0.010-inch protrusion elements are not universally interchangeable. A fastener with 0.003-inch protrusion can be substituted for a fastener with 0.010-inch protrusion, if all other interchangeable factors are substitutive.

- * 6.4.2 For qualification, vibration requirements as specified in MIL-F-18240 prior to Revision D can be used until 31 December 1973.

6.5 Definitions -

6.5.1 Supplementary specification(s) - In this specification "Supplementary specification(s)" refers to the bolt or screw specification(s) that contain the requirements for the bolt or screw, with the exception of the requirements for the locking element, which are covered by this specification. These supplementary specifications, as well as this specification, are to be listed as the procurement specifications on the self-locking bolt or screw drawings.

6.5.2 Standard self-locking externally threaded fastener(s) - In this specification a "standard self-locking externally threaded fastener" refers to bolts or screws that incorporate self-locking elements conforming to this specification, and locking elements specified in accordance with MS15981, and are completely described as assemblies by specifications and standards released for weapon design and construction by weapon system equipment specifications.

6.5.3 Nonstandard self-locking externally threaded fastener(s) - In this specification a "nonstandard self-locking externally threaded fastener" refers to all bolts and screws incorporated with self-locking elements, except standard self-locking externally threaded fasteners.

6.6 Marginal indicia - The margins of this specification are marked to indicate where changes, deletions, or additions to the previous issue have been made. This is done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content as written, irrespective of the marginal notations and relationship to the last previous issue.

* Custodians:

Navy - AS

Air Force - 11

Army - AV

Reviewer activities:

Navy - AS

Air Force - 11, 82

Army - AV, WC

DSA - IS

Preparing activity:

Navy - AS

Project No. 5305-1077

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