AEROSPACE
MATERIAL SPECIFICATIONS

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AMS 7250A

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NUTS, SELF-LOCKING, CORROSION AND HEAT RESISTANT
High Strength, Prevailing Torque, All Metal
1200 F (649 C) Use, Unified National Thread Form

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. TYPE: All-metal, self-locking prevailing torque nuts, plate nuts, and gang channel nuts for use up to ø 1200 F (649 C) and having Unified National Thread form.

3. MATERIAL: Shall be as specified on the drawing.

4., TECHNICAL REQUIREMENTS:

4.1 General:

4.1.1 Construction: Each nut shall be a self-contained unit including the self-locking device. The locking device shall not operate by means of separate movement from the installation and shall not depend on ø pressure on the washer face for the locking action. The locking device shall be set to meet locking torque requirements of 4.3.3 with external threads that meet the requirements of 4.4.

4.1.2 Threads: Unless otherwise specified on the drawing, threads shall conform to MIL-S-7742 on the ø finished product. Except as noted in 4.1.2.2, there shall be no anti-seizure allowance on the nut thread to provide a clearance fit.

4.1.2.1 Thread Squareness: The squareness of the thread pitch diameter axis to the washer face shall be within the limits specified on the drawing. Unless otherwise agreed upon by purchaser and vendor, these limits shall be measured by means of a table squareness gage in conjunction with a feeler gage, with the stud or mandrel of the gage at engagement in the locking device and turned finger ø tight. The measurement shall be made at the outer periphery of the washer face of the nut or at a diameter equal to 1.5 times the thread major diameter when the washer face diameter is larger than 1.5 times the thread major diameter. The nuts to be inspected shall permit at least 3 complete turns of engagement on the thread arbor of the gage; plating may be stripped if necessary to meet this requirement. Multipiece floating plate nuts shall have the nut element removed from the retainer for checking thread squareness.

4.1.2.2 Plating Allowance: The pitch diameter of the nut thread may be overcut by the amount shown below, to provide for the plate thickness of 4.1.3:

Pitch Diameter Tolerance Inch	Permissible Overcut Inch
Up to 0.0030, incl	0.0010
Over 0.0030 to 0.0049, incl	0.0012
Over 0.0049	0.0015

4.1.3 Finish: Unless otherwise specified on the drawing, nuts shall be silver plated in accordance with the latest issue of AMS 2410. On nuts with thread sizes 0.250 in. and larger, the plating thickness shall ø be not less than 0.0002 in. when measured on the thread pitch diameter. Microscopic measurement on a sectioned nut shall be used as a referee method. Nuts with thread sizes 0.190 in. and smaller shall show complete plate coverage on the threads. Plating on other surfaces shall be 0.0003 - 0.0006 in. thick.

4.1.4 Lubrication: The nuts may be provided with a wax-type coating which will prevent nut-bolt seizure provided such treatment is applicable to all production nuts.

4.2 Performance: Nuts shall conform to the following requirements, but testing after conditioning as in 4.3.3.1 will not be required as a routine inspection procedure. Unless otherwise specified, all tests shall be conducted on representative nuts assembled on bolts of any convenient length and on which the nuts will assemble freely, with the fingers, up to the self-locking device.

4.3 Properties:

4.3.1 Axial Strength: Not less than 4 nuts in the as-received condition and 4 nuts which have been heated to 1200 F ± 15 (648.9 C ± 8.3), held at heat for 6 hr, and cooled shall be assembled on alloy steel bolts hardened and tempered to not lower than Rockwell C 40 or equivalent and having threads in accordance with 4.4. Each nut-bolt assembly shall be pulled, at room temperature, in tension, axially, using a ø bearing plate to grip the nut. The diameter of the hole in the bearing plate shall be 0.032 in. ± 0.002 greater than the basic major diameter of the bolt thread, and the bearing plate thickness shall be not less than the major diameter of the bolt thread. Axial strength of the nut shall be not lower than the values specified below; tests need not be run to destruction:

Thread Size	Axial Strength lb
0.112 -40	795
0.112 -48	906
0.138 -32	1,190
0.138 -40	1,400
0.164 -32	1,915
0.164 -36	2,060
0.190 -32	2,800
0.250 -28	5,220
0.3125-24	8,380
0.375 -24	12,940
0.4375-20	17,440
0.500 -20	23,780
0.5625-18	30,210
0.625 -18	38,400

4.3.1.1 Clinch Nuts: Nuts with shanks designed to be flared at assembly (See Fig. 1) shall be tested as in ø 4.3.1 except that the hole in the bearing plate shall be 0.006 in. ± 0.002 greater than the maximum allowable shank diameter. It is not necessary to flare the shank for this test.

4.3.2 Wrench Torque: At least 3 nuts shall be tested at room temperature for wrench torque by assembling a nut on a bolt having sufficient strength. The nut shall be tightened against a bushing with a hole diameter as in 4.3.1 and having hardness not lower than Rockwell C 40 or equivalent and surface roughness on ø the bearing surface of 63 microinches or less. Nuts shall withstand, using a wrench of proper size, 12 successive applications of the torque specified below without destroying the wrenchability of the nut. This test shall not be applicable to nuts which do not have provisions for use of a wrench. For this test only, all nuts shall be cleaned to remove all trace of any lubricant, wax, or anti-seize coating.

Thread Size	Wrench Torque lb-in.	Torque Out Load lb-in., min
0.112 -40	14	20
0.112 -48	14	20
0.138 -32	30	30
0.138 -40	30	30
0.164 -32	40	45
0.164 -36	40	45
Ø 0.190 -32	82	60
0.250 -28	205	100
0.3125-24	450	160
0.375 -24	730	240
0.4375-20	1130	350
0.500 -20	1650	450
0.5625-18	2000	600
0.625 -18	2750	900

4.3.3 Starting Torque: The torque necessary to start a nut turning on or off a bolt shall be measured for not less than 10 nuts as received and 10 nuts after conditioning as in 4.3.3.1. Test bolts as in 4.4 shall be used. Test shall be conducted at room temperature with no axial stress and with nuts assembled on bolts Ø so that the bolts project through the nuts not less than 3 turns at start of test. Test shall be run in such a manner that a dependable measure of torque will be obtained. The increase in temperature of the nuts during test shall not exceed 75 F (42 C) degrees. Torque shall be as specified below except that after conditioning, minimum torque shall be measured only on removal:

Thread Size	Starting Torque min	max (1)	max (2)
0.112 -40	8 oz-in.	3 lb-in.	6 lb-in.
0.112 -48	8 oz-in.	3 lb-in.	6 lb-in.
0.138 -32	16 oz-in.	6 lb-in.	12 lb-in.
0.138 -40	16 oz-in.	6 lb-in.	12 lb-in.
0.164 -32	24 oz-in.	9 lb-in.	18 lb-in.
0.164 -36	24 oz-in.	9 lb-in.	18 lb-in.
0.190 -32	32 oz-in.	13 lb-in.	26 lb-in.
0.250 -28	3.5 lb-in.	30 lb-in.	60 lb-in.
0.3125-24	6.5 lb-in.	60 lb-in.	120 lb-in.
0.375 -24	9.5 lb-in.	80 lb-in.	160 lb-in.
0.4375-20	14.0 lb-in.	100 lb-in.	200 lb-in.
0.500 -20	18.0 lb-in.	150 lb-in.	300 lb-in.
0.5625-18	24.0 lb-in.	200 lb-in.	400 lb-in.
0.625 -18	32.0 lb-in.	300 lb-in.	600 lb-in.

(1) At initial installation, values may be exceeded for 20% of the parts tested when bolt first enters locking feature provided all parts are within the specified limits after one thread protrudes through the nut.

(2) Maximum for first removal after conditioning only.

4.3.3.1 Conditioning: Nut-bolt assemblies shall be axially loaded initially to 75,000 psi at room temperature in a spacer-type fixture in accordance with 4.3.3.1.2. Loading shall be determined by elongation measurement of the bolt at room temperature. Bolt and fixture lengths conforming to 4.4 shall be used. Allow assembly to remain stressed at room temperature for at least 1 hr, remeasure, and Ø adjust loading to agree with the required stress. The assemblies shall then be placed in a furnace which is at 1200 F ± 15 (648.9 C ± 8.3) for 6 hr, removed, cooled to room temperature, and unloaded by backing off nut 1/2 turn. Starting torque shall be measured at this point. In the case of wrenchable nuts, the nut shall be turned relative to the fixture; in the case of anchor or channel nuts, the bolt head shall be turned. The wrenchability of the tested nuts shall not be destroyed by the test.

4.3.3.1.1 Loading: The correct elongation for bolts to load the nuts to 75,000 psi shall be determined by using a modulus of elasticity of 29,500,000 psi. Stress area of the bolt shall be based on the basic minor diameter of the thread. The elongation of bolts for nut sizes not listed herein shall be 0.0025425L, where L = bushing length as in Fig. 2.

4.3.3.1.2 Fixture: The spacer-type fixture shall be made of AMS 5735 steel. The diameter of the bolt hole in the fixture shall be 0.032 in. ± 0.002 greater than the basic major diameter of the bolt thread (See Fig. 2). Fixture may be counterbored 0.006 in. ± 0.002 greater than the maximum allowable shank diameter of clinch nuts to permit the spacer to seat onto the bearing surface of the nut.

4.3.4 Reusability: Nuts shall be assembled on test bolts as in 4.4 and tested in accordance with 4.3.3 as modified below. After testing, nut threads shall show no distortion, galling, or scratches of such depth as to prevent reassembly of nut freely, with the fingers, up to the self-locking device. Bolt threads shall remain servicable and permit assembly of a new nut freely, up to the self-locking device, with the fingers.

4.3.4.1 As Received: Nuts shall be installed and completely removed from the bolt 12 consecutive times. Except for the first installation, the starting torque shall be not greater than the maximum, nor shall the removal torque be less than the minimum value specified in 4.3.3.

4.3.4.2 Conditioned: Conditioning cycles shall be performed in accordance with 4.3.3.1. The nuts shall be completely removed from the bolt after each cycle of conditioning. Conditioning cycle shall be run 5 consecutive times and the starting torque for each installation and removal shall be as specified in 4.3.3.

4.3.5 Vibration: Nuts shall be capable of withstanding vibration as agreed upon by purchaser and vendor.

4.3.6 Flarability: Unless otherwise specified on the drawing, the clinch nut shank shall be capable of being flared without cracking when flared with a 60 deg included angle conical tool to a diameter equal to 120% of the maximum allowable shank diameter.

4.3.7 Push Out: This requirement is applicable only to gang channel nuts, floating plate nuts, and non-floating plate nuts. The nuts shall be screwed or clamped to a steel plate of a thickness equal to or greater than the basic major diameter of the nut thread. The bolt hole in the plate shall be located concentric with the nominal position of the minor diameter of the thread in the nut within 0.010 inch. The screw or clamping head diameter shall not exceed 1.5 times the rivet hole diameter and shall employ the rivet holes or be centered over same. The rivet hole size and its location from the thread axis of the nut in gang channel nut assemblies shall be as shown below, unless otherwise specified on the drawing. With the push out stud or device hemispherical end inserted against the base of the nut thread, the push out load specified below shall be applied evenly to the nut on a line perpendicular to the mounting plane of the nut. When subjected to the push out load, the nut shall not be pushed out of the retainer of any type of plate nut or gang channel nut or effect a permanent deformation axial with the threaded element of more than 0.030 in. when measured at the thread centerline between the steel plate and the base of the nut retainer. Any deformation that will prevent a bolt from being assembled freely with the fingers is not permitted.