



AEROSPACE STANDARD

AS1371**REV. A**

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Superseding AS1371

Nuts, Self-Locking, Corrosion Resistant Steel
High Strength, Prevailing Torque, All Metal
800°F (427°C) Use, UNJ Thread Form

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature. This standard has been stabilized.

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Documents

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1. SCOPE:

1.1 Type:

This standard covers all-metal, self-locking, prevailing torque nuts made of corrosion resistant steel.

1.2 Application:

For use up to 800°F (427°C) where 220,000 psi (1,520 MPa) axial strength nuts with UNJ thread form are required.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this standard to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) and Aerospace Standards (AS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications:

Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pa. 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350	Standard Test Methods
AMS 2371	Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings
AMS 5525	Plate, Sheet and Strip-15Cr 26Ni 1.3Mo 2.1Ti 0.3V
AMS 5737	Steel Bars, Forgings and Mech. Tubing, Corrosion and Heat Resistant - 15Cr 26Ni 1.3 Mo 2.1Ti 0.30V Consumable Electrode Melted, 1650°F (900°C) Solution and Precipitation Heat Treated.
AMS 7477	Bolts and Screws, Steel, Corrosion and Heat Resistant, Upset Headed, Heat Treated, Roll Threaded, 1800°F (982.2°C) Solution and Precipitation Heat Treated
AMS 7478	Bolts and Screws, Steel, Corrosion and Heat Resistant, Heat Treated, Roll Threaded, 1800°F (982.2°C) Solution and Precipitation Heat Treated

2.1.2 Aerospace Standards:

AS 954	Design Data and Standardization of Thin Wall 12-Point Sockets and Box Wrenches for Aerospace Engine Use
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2.2 Government Publications:

Available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

2.2.1 Federal Specifications:

GGG-W-636 Wrenches (Box, Open End, and Combination)

2.2.2 Military Specifications:

MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, General Specification for
MIL-L-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-S-8879	Screw Threads, Controlled Radius Root with Increased Minor Diameter, General Specification for

2.2.3 Bureau of Standard Handbook: H28 - Screw Thread Standards for Federal Services.

2.3 ANSI Publications:

Available from American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.

ANSI B46.1 Surface Texture

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be a corrosion resistant steel such as AMS 5525 or AMS 5737, as specified on the drawing.

3.2 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 pressure on the bearing surface for the locking action. The locking device shall be set to meet the locking torque requirements of 3.8.3 when used with either Unified class 3A per MIL-S-7742 or MIL-S-8879 external threads.

3.3 Threads:

Nut threads shall conform to the latest issue of MIL-S-8879.

3.3.1 Thread Squareness: The bearing surface shall be square with the thread pitch diameter axis within the limits specified on the drawing. Squareness shall be determined by a method agreed upon by purchaser and vendor. The squareness requirement shall apply to the complete bearing surface of the nut. The nuts to be inspected shall permit at least 3 complete turns of engagement on the thread arbor of the gage; plating or other coating may be stripped if necessary to meet this requirement.

3.3.2 Coating Allowance: Unless otherwise specified, internal thread coating allowance shall be as specified in MIL-S-8879.

3.4 Heat Treatment & Fabrication:

Nuts shall be fabricated and heat treated to meet the requirements of this standard and of the applicable part drawing.

3.5 Oxide Removal:

The parts shall have all surfaces free from surface oxide and oxide penetration. The removal process shall produce no intergranular attack or corrosion of the blanks.

3.6 Finish:

The nuts shall be coated with a dry film lubricant as specified on the applicable drawing.

3.7 Lubrication:

The nuts may be provided with or without additional lubrication coating over the specified coating of dry film lubricant.

3.8 Performance:

Nuts shall conform to the following requirements. 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. The completed assembly shall have bolts project through the nut at least 3 turns at start of test.

- 3.8.1 Axial Strength: Not less than 4 nuts in the as-received condition and 4 nuts which have been heated to $800^{\circ}\text{F} \pm 15$ ($427^{\circ}\text{C} \pm 8^{\circ}$), held at heat for 6 hr, ± 15 min., and cooled to room temperature shall be assembled on steel bolts hardened and tempered to not lower than 44 HRC or equivalent and having threads in accordance with 3.9. Each nut-bolt assembly shall be pulled, at room temperature, in tension, axially, using a bearing plate to grip the nut. The diameter of the hole in the bearing plate shall be 0.030 - 0.034 inch (0.76 - 0.86 mm) greater than the basic major diameter of the bolt threads and the bearing plate thickness shall be not less than the major diameter of the bolt thread. Edges of the hole in the bearing plate shall be broken 0.010 - 0.015 inch (0.25 - 0.38 mm). Axial strength of the nut shall be not lower than the values specified in Table I and the nuts may exhibit yield but shall not fracture during test; test need not be run to destruction:

TABLE I

Thread Size	Axial Strength	
	lbf	(N)
0.164 -32	2,630	(11700)
0.164 -36	2,830	(12590)
0.190 -32	3,860	(17170)
0.250 -28	7,160	(31850)
0.3125-24	11,540	(51330)
0.375 -24	17,790	(79130)
0.4375-20	23,980	(106660)
0.500 -20	32,700	(145460)
0.5625-18	41,540	(184780)
0.625 -18	52,810	(234900)

- 3.8.1.1 The axial strength requirement for thread sizes not shown may be calculated from the following formula:

- 3.8.1.1.1 In U.S. Customary Units:

$$S = 0.7854 (D - 2h_b)^2 \times 220,000$$

Where:

S = Axial strength requirement in lb.

D = Max major diameter of external thread in inches.

h_b = Twice the external thread addendum in inches.

3.8.1.1.2 In SI Units:

$$S = 0.7854 (D - 2h_b)^2 \times 1,520$$

Where:

S = Axial strength requirement in N

D = Max major diameter of external thread in mm.

h_b = Twice the external thread addendum in mm.

3.8.2 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 3.8.1 and having hardness not lower than 46HRC or equivalent and surface roughness on the bearing surface of 63 microinches (1.6 μ m) or less. Nuts shall withstand 12 successive applications of the torque specified in Table II without destroying the wrenchability of the nut. Wrenches used for this test shall be open end type conforming to Federal Specification GGG-W-636, Type IV for hexagon nuts and a socket type conforming to AS 954 for double hexagon nuts. For this test only, all nuts shall be cleaned to remove all trace of any lubricant, except the specified coating of dry film lubricant. In order to reduce the loads imposed on the test bolts, it is permissible to increase the friction between the nut and bolt threads and abutting faces by stripping the dry film lubricant from these surfaces or by utilizing mechanical means to prevent nut rotation. The nut wrench pads and the dry film lubricant thereon must not be deformed to the extent that wrenchability is affected.

TABLE II

Nom. Thread Dia.	Wrench Torque lbf-in.	(N.m)
0.164	40	(4.52)
0.190	82	(9.27)
0.250	205	(23.16)
0.3125	450	(50.84)
0.375	730	(82.49)
0.4375	1,130	(127.69)
0.500	1,650	(186.45)
0.5625	2,000	(226.00)
0.625	2,750	(310.75)