Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 7250E
Superseding AMS 7250D
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NUTS, SELF-LOCKING, STEEL, CORROSION AND HEAT RESISTANT
High Strength, All Metal
1200° F(650° C) Use, Unified (MIL-S-7742) Thread Form

1. SCOPE:

1.1 Type: This specification covers all-metal, self-locking nuts, plate nuts, and gang channel nuts made of a corrosion and heat resistant steel.

1.2 Application: For use up to 1200° F (650° C) where high strength nuts with Unified (MIL-S-7742) thread form are required for use with 0.003 in. (0.08 mm) reduced pitch diameter bolts.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification 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 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock
AMS 2410 - Silver Plating, Nickel Strike, High Bake
AMS 2411 - Silver Plating, High Temperature Application
AMS 5732 - Steel Bars, Forgings, Tubing, and Rings, Corrosion and Heat Resistant, 15Cr - 25.5Ni - 1.3Mo - 2.1Ti - 0.006B - 0.30V, Consumable Electrode Melted, 1800°F (982°C) Solution and Precipitation Heat Treated
AMS 5737 - Steel Bars, Forgings, and Tubing, Corrosion and Heat Resistant, 15Cr - 25.5Ni - 1.3Mo - 2.1Ti - 0.006B - 0.30V, Consumable Electrode Melted, 1650°F (899°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

2.2 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Federal Specifications:

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

2.2.2 Federal Standards:

FED-STD-H28 - Screw Thread Standards for Federal Services

2.2.3 Military Specifications:

MIL-S-7742 - Screw Threads, Standard, Optimum Selected Series; General Specification for
MIL-L-7808 - Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

2.2.4 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

2.3 ANSI Publications: Available from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

ANSI B46.1 - Surface Texture

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a corrosion and heat resistant steel, such as AMS 5732 or AMS 5737, as specified.

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 3.6.3 when mated with external threads that meet the requirements of 3.7. Tool marks shall blend smoothly without abrupt change.

3.3 Threads: Unless otherwise specified, threads shall conform to MIL-S-7742 on the finished product. Except as noted in 3.3.2, there shall be no anti-seizure allowance on the nut thread to provide a clearance fit.

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 except that, for non-floating plate nuts having a bearing surface exceeding 1.5 times the thread major diameter, the squareness requirement shall, unless otherwise specified, apply only to the portion of the bearing surface of the nut contained within a diameter equal to 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 or other coating 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.

3.3.2 Plating or Coating Allowance: Internal thread plating or coating allowance shall be as specified in MIL-S-7742, unless otherwise specified.

3.4 Finish: Nuts shall be silver plated in accordance with AMS 2411, unless otherwise specified. On nuts with thread sizes 0.250 in. (6.35 mm) and larger, the plating thickness shall be not less than 0.0002 in. (5μm) 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. (4.83 mm) and smaller shall show complete plate coverage on the threads. Plating on other surfaces shall be 0.0003 - 0.0006 in. (8 - 15 μm) thick.

3.5 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 of the same part number.

3.6 Performance: Nuts shall conform to the following requirements; 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, unless otherwise specified:

3.6.1 Axial Strength: Not less than 4 nuts in the as-received condition and 4 nuts which have been heated to 1200° F ± 15° (650° C ± 8), held at heat for 6 hr ± 0.25, and cooled to room temperature shall be assembled on alloy steel bolts hardened and tempered to not lower than 40 HRC or equivalent and having threads in accordance with 3.7. 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 in. (0.76 - 0.86 mm) 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. Edges of the hole in the bearing plate shall be broken 0.010 - 0.015 in. (0.25 - 0.38 mm). Axial strength of the nut shall be not lower than the values specified in Table I and the nuts shall not crack during test; tests need not be run to destruction.

TABLE I

Nominal Thread Size	Axial Strength lb	(N)
0.112 -40	795	(3,536)
0.112 -48	906	(4,030)
0.138 -32	1,190	(5,293)
0.138 -40	1,400	(6,227)
0.164 -32	1,915	(8,518)
0.164 -36	2,060	(9,163)
0.190 -32	2,800	(12,450)
0.250 -28	5,220	(23,220)
0.3125-24	8,380	(37,270)
0.375 -24	12,940	(57,560)
0.4375-20	17,440	(77,570)
0.500 -20	23,780	(105,800)
0.5625-18	30,210	(134,400)
0.625 -18	38,400	(170,800)

3.6.1.1 The axial strength requirement for thread sizes not shown may be calculated from the following equation:

3.6.1.1.1 In Inch/Pound Units:

$$S = 0.7854 (D - 2h_b)^2 \times 160,000$$

where, S = Axial strength requirement in lb
D = Max major diameter of external thread in in.
h_b = Twice the external thread addendum in in.

3.6.1.1.2 In SI Units:

$$S = 0.7854 (D - 2h_b)^2 \times 1103$$

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

3.6.1.2 Clinch Nuts: Nuts with shanks designed to be flared at assembly (See Fig. 1) shall be tested as in 3.6.1 except that the hole in the bearing plate shall be 0.004 - 0.008 in. (0.10 - 0.20 mm) greater than the maximum allowable shank diameter. It is not necessary to flare the shank for this test. The bearing plate hole shall be chamfered sufficiently to clear the clinch nut bearing surface-to-shank maximum fillet.

3.6.2 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 3.6.1 and having hardness not lower than 40 HRC or equivalent and surface texture on the bearing surface of 63 microinches (1.6 μm) or smoother. 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 GGG-W-636, Type IV, for hexagon nuts and socket type conforming to AS 954 for double hexagon nuts. This test shall be applicable only to nuts which 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.

TABLE II

Nominal Thread Diameter		Wrench Torque	
Inch	(Millimetres)	lb-in.	(N·m)
0.112	(2.84)	14	(1.58)
0.138	(3.51)	30	(3.39)
0.164	(4.17)	40	(4.52)
0.190	(4.83)	82	(9.27)
0.250	(6.35)	205	(23.16)
0.3125	(7.94)	450	(50.75)
0.375	(9.52)	730	(82.49)
0.4375	(11.11)	1130	(127.69)
0.500	(12.70)	1650	(186.45)
0.5625	(14.29)	2000	(226.00)
0.625	(15.88)	2750	(310.75)

3.6.3 Self-Locking Torque: The self-locking torque shall be measured for not less than 10 new nuts, selected at random from the lot, for each of the tests required in 3.6.5. Loading, and conditioning for the five-cycle test of 3.6.5.2, shall be in accordance with 3.6.3.1. Test bolts shall conform to 3.7 or shall be equivalent threaded parts. Test fixtures shall conform to 3.6.3.1.2. Tests shall be conducted at room temperature. The end of the bolt shall extend from the nut a minimum of 1.5 turns at the start of the test. Tests shall be run in such a manner that a dependable measure of torque will be obtained. The increase in temperature of the nuts during the test shall not exceed 75 F (42 C) degrees. The maximum locking torque and minimum breakaway torque shall not exceed the values specified in Table III as required by the reusability tests in 3.6.5. The maximum locking torque is the highest locking torque encountered in any installation or removal cycle with the nut in motion and no load on the base of the nut. The breakaway torque is that torque required to start nut or bolt rotation from a fixed position during a removal cycle with no load on the base of the nut.

TABLE III

Nominal Thread Size	Minimum Breakaway Torque (1)	Minimum Breakaway Torque (2)	Maximum Locking Torque (3)	Maximum Locking Torque (4)
0.112 -40	8 oz-in.	16 oz-in.	4 lb-in.	8 lb-in.
0.112 -48	8 oz-in.	16 oz-in.	4 lb-in.	8 lb-in.
0.138 -32	16 oz-in.	32 oz-in.	7 lb-in.	14 lb-in.
0.138 -40	16 oz-in.	32 oz-in.	7 lb-in.	14 lb-in.
0.164 -32	24 oz-in.	48 oz-in.	11 lb-in.	22 lb-in.
0.164 -36	24 oz-in.	48 oz-in.	11 lb-in.	22 lb-in.
0.190 -32	32 oz-in.	4 lb-in.	15 lb-in.	30 lb-in.
0.250 -28	3.5 lb-in.	7 lb-in.	30 lb-in.	60 lb-in.
0.3125-24	6.5 lb-in.	13 lb-in.	60 lb-in.	120 lb-in.
0.375 -24	9.5 lb-in.	19 lb-in.	80 lb-in.	160 lb-in.
0.4375-20	14.0 lb-in.	28 lb-in.	100 lb-in.	200 lb-in.
0.500 -20	18.0 lb-in.	36 lb-in.	150 lb-in.	300 lb-in.
0.5625-18	24.0 lb-in.	48 lb-in.	200 lb-in.	400 lb-in.
0.625 -18	32.0 lb-in.	64 lb-in.	300 lb-in.	600 lb-in.

TABLE III (SI)

Nominal Thread Size	Minimum Breakaway Torque (1)	Minimum Breakaway Torque (2)	Maximum Locking Torque (3)	Maximum Locking Torque (4)
0.112 -40	0.06 N.m	0.12 N.m	0.45 N·m	0.90 N·m
0.112 -48	0.06 N.m	0.12 N.m	0.45 N·m	0.90 N·m
0.138 -32	0.11 N.m	0.22 N.m	0.79 N·m	1.58 N·m
0.138 -40	0.11 N.m	0.22 N.m	0.79 N·m	1.58 N·m
0.164 -32	0.17 N.m	0.34 N.m	1.24 N·m	2.49 N·m
0.164 -36	0.17 N.m	0.34 N.m	1.24 N·m	2.49 N·m
0.190 -32	0.23 N.m	0.46 N.m	1.70 N·m	3.39 N·m
0.250 -28	0.40 N.m	0.80 N.m	3.39 N·m	6.78 N·m
0.3125-24	0.73 N.m	1.46 N.m	6.78 N·m	13.56 N·m
0.375 -24	1.07 N.m	2.14 N.m	9.04 N·m	18.08 N·m
0.4375-20	1.58 N.m	3.16 N.m	11.30 N·m	22.60 N·m
0.500 -20	2.03 N.m	4.06 N.m	16.95 N·m	33.90 N·m
0.5625-18	2.71 N.m	5.42 N.m	22.60 N·m	45.20 N·m
0.625 -18	3.62 N.m	7.24 N.m	33.90 N·m	67.80 N·m

(1) Minimum breakaway torque for 12-cycle, room-temperature test; 5-cycle, loaded, rated-temperature test; and permanent set test.

(2) Minimum breakaway torque for single-cycle, loaded, room temperature test.

(3) Maximum locking torque for 12-cycle, room-temperature test; single-cycle, loaded, room-temperature test; and permanent set test. For the permanent set test, 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 a minimum length of two pitches, including chamfer, protrudes through the nut.

(4) Maximum for removal for 5-cycle, loaded, rated-temperature test only.

3.6.3.1 Loading and Conditioning: Nut bolt assemblies shall be lubricated in accordance with 3.9 and axially loaded to 75,000 psi (517 MPa) at room temperature in a spacer-type fixture in accordance with 3.6.3.1.2. Loading shall be determined by elongation measurement of the bolt at room temperature. Bolt lengths conforming to 3.7 shall be used. Allow assembly to remain stressed at room temperature for not less than 1 hr, remeasure, and adjust loading to 75,000 psi (517 MPa). The assemblies shall then be heated in a furnace to 1200°F ± 15° (650°C ± 8), held at heat for 6 hr ± 0.25, removed, cooled to room temperature, and unloaded by backing off nut one-half turn. Breakaway 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.

3.6.3.1.1 Loading: The correct elongation for bolts to load the nuts to 75,000 psi (517 MPa) shall be determined by using a modulus of elasticity of 29,500,000 psi (203.4 GPa). Stress area of the bolt shall be based on the basic (maximum) 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.

3.6.3.1.2 Fixture: The spacer-type fixture shall be made of AMS 5732 steel. The diameter of the bolt hole in the fixture shall be 0.030 - 0.034 in. (0.76 - 0.86 mm) greater than the basic major diameter of the bolt thread (See Fig. 2). Fixture may be counter-bored 0.004 - 0.008 in. (0.10 - 0.20 mm) greater than the maximum allowable shank diameter of clinch nuts to permit the spacer to seat onto the bearing surface of the nut. Length of fixture shall be as specified in Table VII.

3.6.4 Permanent Set: At least three nuts shall be assembled on a maximum mandrel (See Fig. 3) so that the mandrel projects through the nut not less than three turns. Nuts shall then be removed from the maximum mandrel and assembled on a minimum mandrel (See Fig. 4) in the same manner. Tests shall be conducted at room temperature with no axial stress. The nuts shall not exceed the maximum locking torque of Table III during the installation or removal cycle on the maximum mandrel and shall not show less than the minimum breakaway torque of Table III at the start of the removal cycle on the minimum mandrel.

3.6.5 Reusability: Nuts shall be assembled on test bolts conforming to 3.7 and tested in accordance with 3.6.3 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, with the fingers, up to the self-locking device.

3.6.5.1 Twelve-Cycle, Room-Temperature Test: The nuts shall be installed and removed from the bolts 12 consecutive times, using the same nut and bolt. With the exception of the first installation, the nuts shall not exceed the maximum locking torque of Table III, Column (3), during the installation or removal cycle and shall show not less than the minimum breakaway torque of Table III, Column (1).

3.6.5.2 Five-Cycle, Loaded, Rated-Temperature Test: Conditioning cycles shall be performed in accordance with 3.6.3.1. The nuts shall be completely removed from the bolt after each cycle of conditioning. The conditioning test shall be run for five consecutive cycles, using the same nut, bolt, and spacer. The maximum locking torque and the minimum breakaway torque for each cycle shall not exceed the limits specified in Table III, Columns (4) and (1), respectively. The minimum locking torque on installation shall not be lower than the values in Table III, Column (1).

3.6.5.3 Single-Cycle, Loaded, Room-Temperature Test: Nuts shall be assembled and seated to one-half (50%) of the torques listed in Table II. The nut shall be completely removed from the bolt and the nuts shall not exceed the maximum locking torque of Table III, Column (3), during the installation or removal cycle and shall show not less than the minimum breakaway torque of Table III, Column (2).

3.6.6 Vibration: Ten nuts of the type to be tested for the sizes listed below shall be installed on a test bolt conforming to 3.7 on a test fixture as in 3.6.3.1.2. The assembly torque values shall be as specified in Table IV. For sizes not shown, the torque shall be as agreed upon by purchaser and vendor. Testing of nuts other than hexagon or double hexagon wrenching types shall be as agreed upon by purchaser and vendor.

TABLE IV

Nominal Thread Size	Assembly Torque lb-in.	(N·m)
0.164 -32	22	(2.49)
0.164 -36	22	(2.49)
0.190 -32	30	(3.39)
0.250 -28	60	(6.78)
0.3125-24	120	(13.56)
0.375 -24	160	(18.08)
0.4375-20	200	(22.60)
0.500 -20	300	(33.90)
0.5625-18	400	(45.20)
0.625 -18	600	(67.80)

Five nuts shall be removed from the test bolts and reinstalled four additional times to the torque values specified for the thread size. The other five assembled nuts shall be baked at 1200° F ±15° (650°C ±8) for 6 hr ± 0.25 and air cooled; these nuts shall then be removed and reinstalled four additional times to the torque values specified for the thread size. The five baked nuts and the five unbaked nuts shall be assembled on the vibration test fixture (See Fig. 5) on test bolts and vibration tested at room temperature. The assemblies shall be vibrated 15,000 cycles at a frequency of 1750 - 1800 cpm (29.2 - 20.0 Hz) and an amplitude of 0.435 - 0.465 in. (11.05 - 11.81 mm). The assembly shall traverse the entire length of the slots in the test fixture. Reference lines shall be scribed, or other suitable markings made, to determine the amount the nut turns on the test bolt during vibration test. The relative rotation between any nut and bolt shall be not greater than 360 degrees. The nuts shall not have developed any cracks or broken segments, as shown by examination at 10X magnification. Multipiece floating plate nuts shall have the nut element removed from the retainer for this test. Fixed anchor nuts may have the lugs removed.

3.6.7 Flarability: The shank of clinch nuts shall not crack when flared with a 60-deg included angle conical tool to a diameter equal to 120% of the maximum allowable shank diameter, unless otherwise specified.

3.6.8 Push-Out: This requirement is applicable only to gang channel nuts, floating plate nuts, and non-floating plate nuts. At least five nuts shall be screwed or clamped to a steel plate or plates 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 within 0.010 in. (0.25 mm) radius of true position in relation to the nut minor diameter when the nut is at basic position. 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 in Table V, unless otherwise specified. With the push-out stud or device hemispherical end inserted against the base of the nut thread, the push-out load specified in Table V 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. (0.76 mm) 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.

TABLE V

Nominal Thread Diameter Inch	Rivet Hole Diameter Inch	Hole Location (Distance From Nut Thread Axis) Inch	Push-Out Load Lb, min
0.112	0.093 - 0.103	0.334 - 0.354	40
0.138	0.093 - 0.103	0.334 - 0.354	60
0.164	0.093 - 0.103	0.334 - 0.354	80
0.190	0.093 - 0.103	0.334 - 0.354	100
0.250	0.093 - 0.103	0.490 - 0.510	125
0.3125	0.125 - 0.135	0.490 - 0.510	125
0.375	0.125 - 0.135	0.490 - 0.510	125
0.4375	0.125 - 0.135	0.552 - 0.572	125
0.500	0.125 - 0.135	0.615 - 0.635	125
0.5625	0.125 - 0.135	0.678 - 0.698	125
0.625	0.125 - 0.135	0.740 - 0.760	125

TABLE V (SI)

Nominal Thread Diameter Millimetres	Rivet Hole Diameter Millimetres	Hole Location (Distance From Nut Thread Axis) Millimetres	Push-Out Load N, min
2.84	2.36 - 2.62	8.48 - 8.99	178
3.51	2.36 - 2.62	8.48 - 8.99	267
4.17	2.36 - 2.62	8.48 - 8.99	356
4.83	2.36 - 2.62	8.48 - 8.99	445
6.35	2.36 - 2.62	12.45 - 12.95	556
7.94	3.18 - 3.43	12.45 - 12.95	556
9.52	3.18 - 3.43	12.45 - 12.95	556
11.11	3.18 - 3.43	14.02 - 14.53	556
12.70	3.18 - 3.43	15.62 - 16.13	556
14.29	3.18 - 3.43	17.22 - 17.73	556
15.88	3.18 - 3.43	18.80 - 19.30	556

3.6.9 Torque-Out: This requirement is applicable only to gang channel nut assemblies, floating plate nuts, and non-floating plate nuts. At least 5 nuts shall be prepared as in 3.6.8 and subjected to the torque-out values in Table VI, first in the clockwise direction and then in the counterclockwise direction. The diameter of the torque stud shall have a maximum diametral clearance of 0.010 in. (0.25 mm) in the test plate. The torque stud shall be provided with a shoulder to seat against the base of the nut element and may incorporate a suitable bushing. Reverse loading may be accomplished by use of a check nut assembled onto the stud threads that protrude through the top of the nut. This test shall be performed with no axial load on the bearing surface of the nut. The nut assembly shall withstand the applied torque without cracking, rupture, or being deformed sufficiently to prevent normal use of the nut. Nuts used in push-out test shall be used for this test.

TABLE VI

Nominal Thread Diameter		Torque-Out Load, min	
Inch	(Millimetres)	lb-in.	(N·m)
0.112	(2.84)	20	(2.26)
0.138	(3.51)	30	(3.39)
0.164	(4.17)	45	(5.08)
0.190	(4.83)	60	(6.78)
0.250	(6.35)	100	(11.30)
0.3125	(7.94)	160	(18.08)
0.375	(9.52)	240	(27.12)
0.4375	(11.11)	350	(39.55)
0.500	(12.70)	450	(50.85)
0.5625	(14.29)	600	(67.80)
0.625	(15.88)	900	(101.70)

3.7 Test Bolts: Except as specified in 3.6.1, test bolts shall conform to AMS 7477 or AMS 7478. All test bolts 0.190 in. (4.83 mm) and larger in diameter shall have threads reduced 0.003 in. (0.08 mm) from Class 3A limits of MIL-S-7742 or Part I of FED-STD-H28 on the major, minor, and pitch diameters. All test bolts smaller than 0.190 in. (4.83 mm) in diameter shall have Class 2A tolerances. All test bolts, including those specified in 3.6.1, shall have lengths as shown in Table VII.

TABLE VII

Nominal Thread Diameter Inch	Nominal Bolt Length Inches	Fixture Length Inches	Required Bolt Elongation Inch	Reference Part No. (1)
0.112	1.000	0.735 - 0.765	0.0019	---
0.138	1.500	1.109 - 1.139	0.0029	MS9177-22
0.164	2.000	1.569 - 1.599	0.0040	MS9178-28
0.190	2.500	2.010 - 2.040	0.0051	MS9033-32
0.250	2.500	1.941 - 1.971	0.0050	MS9034-32
0.3125	2.500	1.845 - 1.875	0.0047	MS9035-30
0.375	2.500	1.823 - 1.853	0.0046	MS9036-28
0.4375	2.500	1.718 - 1.748	0.0044	MS9037-27
0.500	2.500	1.621 - 1.651	0.0042	MS9038-25
0.5625	2.500	1.518 - 1.548	0.0039	MS9224-24
0.625	2.500	1.433 - 1.463	0.0037	---

TABLE VII (SI)

Nominal Thread Diameter Millimetres	Nominal Bolt Length Millimetres	Fixture Length Millimetres	Required Bolt Elongation Millimetres	Reference Part No. (1)
2.84	25.40	18.67 - 19.43	0.048	---
3.51	38.10	28.17 - 28.93	0.074	MS9177-22
4.17	50.80	39.85 - 40.61	0.102	MS9178-28
4.83	63.50	51.05 - 51.82	0.130	MS9033-32
6.35	63.50	49.30 - 50.06	0.127	MS9034-32
7.94	63.50	46.86 - 47.62	0.119	MS9035-30
9.52	63.50	46.30 - 47.07	0.117	MS9036-28
11.11	63.50	43.64 - 44.40	0.112	MS9037-27
12.70	63.50	41.17 - 41.94	0.107	MS9038-25
14.29	63.50	38.56 - 39.32	0.099	MS9224-24
15.88	63.50	36.40 - 37.16	0.094	---

(1) Reference part numbers are for bolts having UNF threads.

3.8 Uncoated Nuts: Uncoated nuts that have threads overcut for coating at assembly shall be plated for test purposes as in 3.4. Uncoated nuts permanently attached to brackets or other similar parts shall be checked with bolts plated in accordance with AMS 2410 or AMS 2411 and having plate thickness of 0.0003 - 0.0006 in. (8 - 15 μm). Plated bolts shall meet the requirements of 3.7 before plating.

3.9 Test Lubrication: Bolt threads shall be lubricated with MIL-L-7808 oil before each installation of the nut.

3.10 Quality: Nuts shall be uniform in quality and condition, clean, sound, and free from fins, burrs, cracks, and other imperfections detrimental to their performance. Nuts shall also be free of tool marks except squeeze tool marks as permitted by 3.2.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of nuts shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the nuts conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), single-cycle, loaded, room-temperature locking torque (3.6.5.3), and flarability (3.6.7) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed on the first-article shipment of a type and size of nut to a purchaser and when purchaser deems confirmatory testing to be required.

4.3 Sampling: Shall be as follows:

4.3.1 For Acceptance Tests:

4.3.1.1 Material: In accordance with AMS 2371.

4.3.1.2 Performance: As specified herein.

4.3.2 For Preproduction Tests: As specified herein or as agreed upon by purchaser and vendor.

4.4 Reports:

4.4.1 The vendor of nuts shall furnish with, or prior to, the first shipment of nuts of each type and material three copies of a report of test data showing that the nuts conform to the technical requirements of this specification.

4.4.2 The vendor of nuts shall furnish with each shipment three copies of a report stating that the composition of the nuts conforms to the requirements of the applicable material specification and showing the results of tests to determine conformance to the other acceptance test requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter if any, this specification number and its revision letter, contractor or other direct supplier of material, part number, and quantity.

4.5 Resampling and Retesting: If any nut used in the above tests fails to meet the specified requirements, disposition of the nuts may be based on the results of testing three additional nuts for each original nonconforming nut. Failure of any retest nut to meet the specified requirements shall be cause for rejection of the nuts represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 Nuts of each different part number shall be packed in separate containers.

5.1.2 Each container shall be marked to show not less than the following information:

NUTS, SELF-LOCKING, STEEL, CORROSION AND HEAT RESISTANT
AMS 7250E
PART NUMBER _____
PURCHASE ORDER NUMBER _____
QUANTITY _____
MANUFACTURER'S IDENTIFICATION _____

5.1.3 Containers of nuts shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the nuts to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.1.4 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.1.1 and 5.1.3 will be acceptable if it meets the requirements of Level C.

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

7. REJECTIONS: Nuts not conforming to this specification or to authorized modifications will be subject to rejection.

8. NOTES:

8.1 Marginal Indicia: The phi (Ø) symbol is used to indicate technical changes from the previous issue of this specification.

8.2 For direct U.S. Military procurement, purchase documents should specify not less than the following:

Title, number, and date of this specification
Part number or type and size of nuts desired
Quantity of nuts desired
Applicable level of packaging (See 5.1.4).

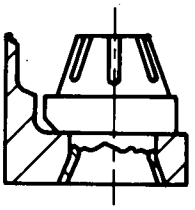
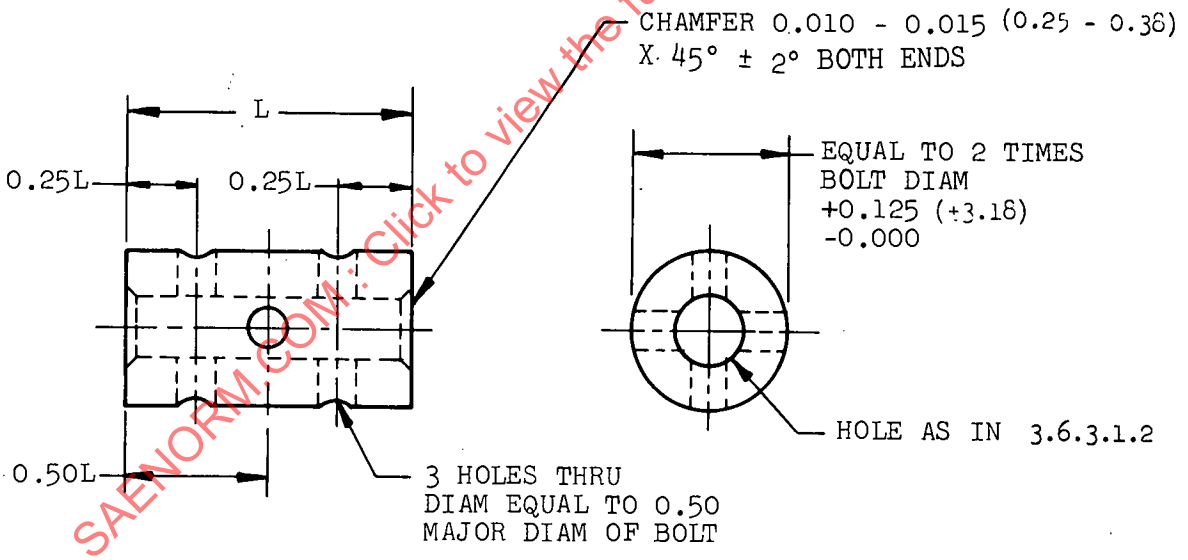
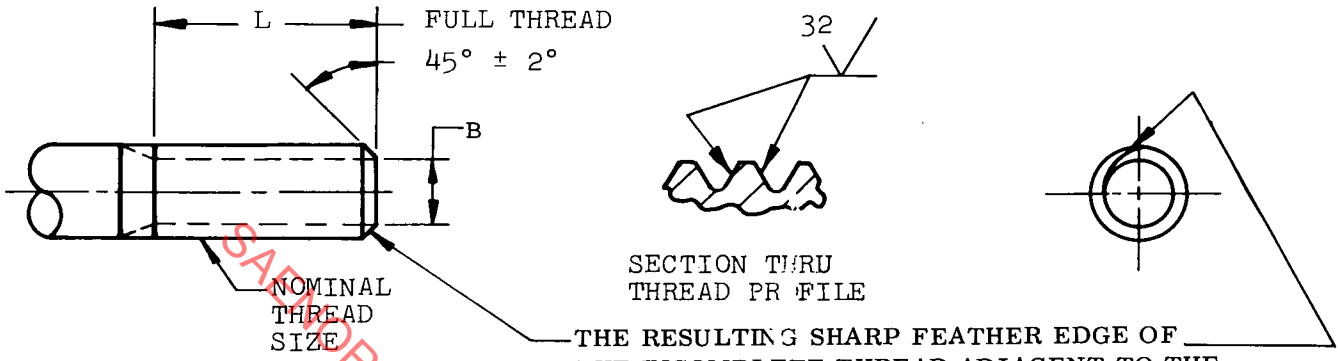


FIGURE 1



DIMENSIONS ARE IN INCHES (MILLIMETRES)

FIGURE 2

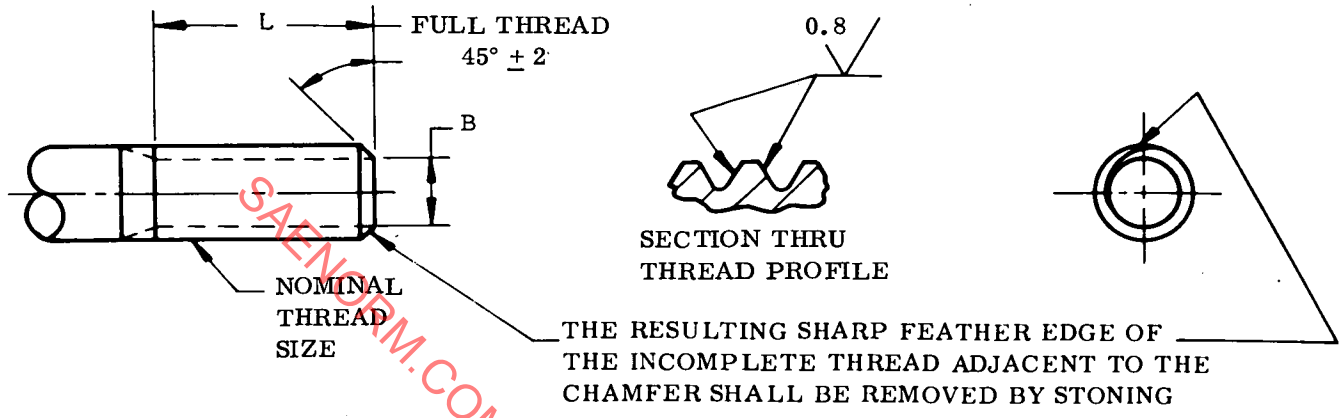


Nominal Thread Size	Major Diameter Inch	Pitch Diameter Inch	Minor Diameter Inch, max	Lead Error Tolerance Inch	Half Angle Tolerance plus and minus	"B" Inch	Length "L" in., min
0.112 -40	0.1061-0.1086	0.0941-0.0945	0.0824	0.0002	0°20'	0.062-0.082	0.224
0.112 -48	0.1068-0.1091	0.0970-0.0974	0.0873	0.0002	0°30'	0.067-0.087	0.224
0.138 -32	0.1312-0.1342	0.1159-0.1163	0.1011	0.0003	0°15'	0.081-0.101	0.276
0.138 -40	0.1321-0.1346	0.1201-0.1205	0.1084	0.0002	0°15'	0.088-0.108	0.276
0.164 -32	0.1571-0.1601	0.1418-0.1422	0.1270	0.0003	0°15'	0.107-0.127	0.328
0.164 -36	0.1577-0.1604	0.1443-0.1447	0.1312	0.0002	0°15'	0.111-0.131	0.328
ø 0.190 -32	0.1810-0.1840	0.1657-0.1661	0.1509	0.0003	0°15'	0.131-0.151	0.380
0.250 -28	0.2405-0.2438	0.2227-0.2231	0.2058	0.0003	0°15'	0.186-0.206	0.500
0.3125-24	0.3023-0.3059	0.2813-0.2817	0.2614	0.0003	0°15'	0.241-0.261	0.625
0.375 -24	0.3648-0.3684	0.3437-0.3441	0.3238	0.0003	0°15'	0.304-0.324	0.750
0.4375-20	0.4264-0.4304	0.4008-0.4012	0.3767	0.0003	0°15'	0.357-0.377	0.875
0.500 -20	0.4889-0.4930	0.4633-0.4637	0.4392	0.0003	0°15'	0.419-0.439	1.000
0.5625-18	0.5508-0.5552	0.5221-0.5225	0.4953	0.0003	0°10'	0.475-0.495	1.125
0.625 -18	0.6133-0.6176	0.5846-0.5850	0.5578	0.0003	0°10'	0.538-0.558	1.250

Surface texture is in microinches, per ANSI B46.1.
Material of mandrel to be steel having hardness not lower than 50 HRC.
Use of bolt or stud meeting requirements of this figure is optional.
Screw threads per MIL-S-7742 except as otherwise specified in table.
Tolerance on lead error is the allowable variation between any two threads (See FED-STD-H28).

MAXIMUM MANDREL TEST FIXTURE

FIGURE 3



Nominal Thread Size	Major Diameter Millimetres	Pitch Diameter Millimetres	Minor Diameter mm, max	Lead Error Tolerance Millimetre	Half Angle Tolerance plus and minus	"B" Millimetres	Length "L" mm, min
0.112 -40	2.695 - 2.758	2.391 - 2.400	2.092	0.0051	0° 20'	1.58 - 2.08	5.69
0.112 -48	2.713 - 2.771	2.464 - 2.473	2.217	0.0051	0° 30'	1.71 - 2.20	5.69
0.138 -32	3.333 - 3.408	2.944 - 2.954	2.567	0.0076	0° 15'	2.06 - 2.56	7.02
0.138 -40	3.356 - 3.418	3.051 - 3.060	2.753	0.0051	0° 15'	2.24 - 2.74	7.02
0.164 -32	3.991 - 4.066	3.602 - 3.611	3.225	0.0076	0° 15'	2.72 - 3.22	8.34
0.164 -36	4.006 - 4.074	3.666 - 3.675	3.332	0.0051	0° 15'	2.82 - 3.32	8.34
0.190 -32	4.598 - 4.673	4.209 - 4.218	3.832	0.0076	0° 15'	3.33 - 3.83	9.66
0.250 -28	6.109 - 6.192	5.657 - 5.666	5.227	0.0076	0° 15'	4.73 - 5.23	12.70
0.3125-24	7.679 - 7.769	7.146 - 7.155	6.639	0.0076	0° 15'	6.13 - 6.62	15.88
0.375 -24	9.266 - 9.357	8.730 - 8.740	8.224	0.0076	0° 15'	7.73 - 8.22	19.05
0.4375-20	10.831 - 10.932	10.181 - 10.190	9.565	0.0076	0° 15'	9.07 - 9.57	22.23
0.500 -20	12.419 - 12.522	11.768 - 11.777	11.155	0.0076	0° 15'	10.65 - 11.15	25.40
0.5625-18	13.991 - 14.102	13.262 - 13.271	12.580	0.0076	0° 10'	12.07 - 12.57	28.58
0.625 -18	15.578 - 15.687	14.849 - 14.859	14.168	0.0076	0° 10'	13.67 - 14.17	31.75

Surface texture is in μm, per ANSI B46.1.
Material of mandrel to be steel having hardness not lower than 50 HRC.
Use of bolt or stud meeting requirements of this figure is optional.
Screw threads per MIL-S-8879 except as otherwise specified in table.
Tolerance on lead error is the allowable variation between any two threads (See FED-STD-H28).

MAXIMUM MANDREL TEST FIXTURE

FIGURE 3 (SI)