AEROSPACE STANDARD

AS7252™	REV. A

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Superseding AS7252

(R) Nuts, Self-Locking, Steel High Strength, All Metal 450 °F Use, UN and UNJ Thread Form

FSC 5310

RATIONALE

Add cadmium notice and introduction of sampling data including the updating of paragraphs 4.2 and 4.3 and the addition of Tables 8 through 12, addition of new paragraph 3.2 headed design, new paragraph 3.12 discontinuities and general updating.

1. SCOPE

1.1 Type

This specification covers all metal, self-locking wrenching nuts, plate nuts, shank nuts, and gang channel nuts made of a carbon or low alloy steel.

1.2 Application

For use up to approximately 450 °F where high strength nuts with UNJ thread form are required.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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https://www.sae.org/standards/content/AS7252A

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2400 Plating, Cadmium

AMS6322 Steel Bars, Forgings, and Rings 0.50Cr - 0.55Ni - 0.25Mo (0.38 - 0.43C) (SAE 8740)

AMS6370 Steel, Bars, Forgings, and Rings 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130)

AS954 Wrenches, Hand, Twelve Point, High Strength, Thin Wall

AS1310 Faster Torque for Threaded Applications, Definitions Of

AS3071 Acceptance Criteria - Magnetic Particle, Fluorescent Penetrant, and Contrast Dye Penetrant Inspection

AS7452 Bolts and Screws, Steel, Low Alloy Heat Treated, Roll Threaded

AS8879 Screw Threads - UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter

2.1.2 U.S. Government Publications

Copies of these documents are available online at http://quicksearch.dla.mil.

MIL-S-7742 Screw Threads, Standard, Optimum Selected Series: General Specification For

MIL-PRF-7808 Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

2.1.3 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

ASME B46.1 Surface Texture (Surface Roughness, Waviness, and Lay)

ASME Y14.36M Surface Texture Symbols

2.1.4 NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NASM1312 -14 Fastener Test Methods, Method 14 Stress Durability, Internally Threaded Fasteners

2.1.5 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E140 Standard Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, and Scleroscope Hardnes

ASTM E1444/E1444M Standard Practice for Magnetic Particle Testing

ASTM D3951 Commercial Packaging Standard Practice for

2.2 Definitions

Refer to AS1310 for definitions related to fastener torque.

BURR: A rough edge or ridge left on the metal due to a cutting, grinding, piercing, or blanking operation.

DEFECT: Any nonconformance of the unit of product with specified requirements.

DEFECTIVE: A unit of product which contains one or more defects.

PRODUCTION INSPECTION LOT: Shall be all finished parts of the same part number, made from a single heat of alloy, heat treated at the same time to the same specified condition, produced as one continuous run, and submitted for vendor's inspection at the same time.

ROOM TEMPERATURE: Ambient temperature (68 °F approximately).

TIGHT BURR: A burr closely compacted and binding in the periphery of a part without any loose ends and is within the dimensional limits of the part.

2.3 Unit Symbols

° - degree, angle

°F - degree Fahrenheit

in^2 - square inch

HRC - hardness, Rockwell C scale

μin Ra - microinch, roughness average

lbf - pound-force

lbf·in - pound-force inch, torque

psi - pound-force per square inch

cpm - cycles per minute

% - percent (1% = 1/100)

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be a carbon or low alloy steel, such as AMS6322 or AMS6370, as specified on the part drawing. Parts shall be hardened and tempered to meet the performance requirements of 3.7.

3.2 Design

3.2.1 Dimensions

The dimensions of finished parts, after all processing, including plating, shall conform to the part drawing.

3.2.2 Geometric Tolerances

Part features shall be within the geometric tolerance specified on the part drawing when inspected by conventional measuring methods, except bearing surface squareness shall be measured as noted in 3.4.1.

3.2.3 Surface Texture

Surface texture of finished parts, prior to plating, shall conform to the requirements as specified on the part drawing, determined in accordance with ASME B46.1. Surface texture symbols per ASME Y14.36M.

3.3 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 3.7.3 when used with either UN (MIL-S-7742) thread form, Class 3A, or UNJ (AS8879) thread form external threads. Tool marks resulting from producing the locking feature shall blend smoothly without abrupt change.

3.4 Threads

UNJ thread form and dimensions in accordance with AS8879.

3.4.1 Bearing Surface Squareness

The bearing surface shall be square (flat to concave) with the thread pitch cylinder axis within the limits specified on the part drawing. Bearing surface shall not be convex. Bearing surface squareness shall be tested using a table squareness gage and feeler gage. The squareness requirement shall apply to the complete bearing surface of the nut except that, for nonfloating plate nuts having a bearing surface exceeding 1.5 times the thread major diameter, the squareness requirement shall, unless otherwise specified on the part drawing, 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 three complete turns of engagement on the thread arbor of the squareness gage; plating or 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.

3.4.2 Plating or Coating Allowance

Internal thread plating or coating allowance shall be as specified in AS8879, unless otherwise specified on the part drawing.

3.5 Plating

Nuts shall be cadmium plated in accordance with AMS2400.

3.6 Lubrication

The nuts may be provided with a wax type coating which will prevent nut-bolt seizure at initial installation provided such treatment is applicable to all production nuts of the same part number.

3.7 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.

3.7.1 Axial Tensile Strength

Not less than four nuts in the as-received condition and four nuts which have been heated to 450 °F ± 15 °F, held at heat 6 hours ± 0.25 hour, and cooled to room temperature shall be assembled on alloy steel bolts hardened and tempered to not lower than 40 HRC, and having AS8879 threads. Each nut-bolt assembly shall be tested at room temperature in axial tension, using a bearing plate to grip the nut. The diameter of the hole in the bearing plate shall be 0.030 to 0.034 inches 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 to 0.015 inches. Axial tensile strength of the nut shall be not lower than the load values specified in Table 1 and the nuts shall not crack during test; tests need not be run to destruction. The axial tensile load shall be applied to the nut slowly at a rate equivalent to:

$$\text{Load, lbf / min} = D^2 \times 78{,}000 \quad \text{(Eq. 1)}$$

where:

D = Nominal major diameter of thread

Table 1 - Axial tensile load

Nut Thread Size	Axial Tensile Load at Room Temperature lbf minimum /1/
0.1120-40UNJC-3B	795
0.1120-48UNJF-3B	907
0.1380-32UNJC-3B	1,190
0.1380-40UNJF-3B	1,400
0.1640-32UNJC-3B	1,914
0.1640-36UNJF-3B	2,056
0.1900-32UNJF-3B	2,805
0.2500-28UNJF-3B	5,210
0.3125-24UNJF-3B	8,389
0.3750-24UNJF-3B	12,940
0.4375-20UNJF-3B	17,440
0.5000-20UNJF-3B	23,780
0.5625-18UNJF-3B	30,210
0.6250-18UNJF-3B	38,410

/1/ Requirements above apply to companion bolts with UNJ threads to Class 3A tolerance. Area upon which stress for axial tensile load requirements is based on the area at 0.75H thread depth and calculated from the following equation:

$$A = 0.7854[D - (1.5H)]^2 = 0.7854[D - (1.2990 / n)]^2 \quad \text{(Eq. 2)}$$

where:

A = Area at 0.75H thread depth, in^2

H = Height of sharp V-thread = (cos 30°)/n, inch

n = Number of thread pitches per inch

D = Major diameter, maximum, inch

Load requirements for axial strength load is based on 160,000 psi stress as shown in Equation 3:

$$\text{Axial tensile load} = 160{,}000 \text{ psi} \times A, \text{ lbf} \quad \text{(Eq. 3)}$$

For sizes not shown, axial tensile strength loads for nuts shall be based upon the respective bolt stress area using the above equations and 160,000 psi stress.

3.7.1.1 Shank Nuts

Nuts with shanks designed to be flared at assembly (see Figure 1) shall be tested as in 3.7.1 except that the hole in the bearing plate shall be 0.004 to 0.008 inches 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 shank nut bearing surface-to-shank maximum fillet.

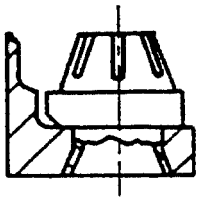


Figure 1 - Flange assembly, flared shank nut

3.7.2 Wrench Torque

This test is applicable to wrenching nuts with a hexagon or double hexagon wrenching feature. For this test only, all nuts shall be cleaned to remove all trace of any lubricant, wax, or anti-seize coating or compound. At least three 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 as in 3.7.1 and having hardness not lower than 40 HRC, and surface roughness of 63 microinch Ra. Nuts shall withstand 12 successive applications of the torque specified in Table 2 without destroying the wrenchability of the nut. Wrenches used for this test shall be the open-end or socket type. conforming to AS954 for double hexagon nuts.

Table 2 - Wrench torque

Nominal Thread Diameter inch	Wrench Torque Minimum lbf·in
0.1120	14
0.1380	30
0.1640	40
0.1900	82
0.2500	205
0.3125	450
0.3750	730
0.4375	1,130
0.5000	1,650
0.5625	2,000
0.6250	2,750

3.7.3 Locking Feature Torques

The locking feature torques shall be measured and recorded for not less than 10 new nuts, selected at random from the lot, for each of the tests required in 3.7.5. Loading, and conditioning for the five-cycle test of 3.7.5.2, shall be in accordance with 3.7.3.1. Test bolts shall conform to 3.8 or shall be equivalent threaded parts. Test fixtures shall conform to 3.7.3.1.2. Tests shall be conducted at room temperature. The end of the bolt shall extend within 1.5 to 3 thread turns through the top of the nut at the start of the test. The 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 the test shall not exceed 74 °F. The maximum self-locking torque and minimum breakaway torque (see AS1310) shall not exceed the values in Table 3 as required by the reusability tests in 3.7.5.

Table 3 - Locking feature torques

Nominal Thread Size	Minimum Breakaway Torque lbf·in /1/	Minimum Breakaway Torque lbf·in /2/	Maximum Self-Locking Torque lbf·in /3/	Maximum Self-Locking Torque lbf·in /4/
0.1120-40	0.5	1	4	8
0.1120-48	0.5	1	4	8
0.1380-32	1	2	7	14
0.1380-40	1	2	7	14
0.1640-32	1.5	3	11	22
0.1640-36	1.5	3	11	22
0.1900-32	2	4	15	30
0.2500-28	3.5	7	30	60
0.3125-24	6.5	13	60	120
0.3750-24	9.5	19	80	160
0.4375-20	14	28	100	200
0.5000-20	18	36	150	300
0.5625-18	24	48	200	400
0.6250-18	32	64	300	600

/1/ Minimum breakaway torque for 12-cycle, room temperature as received test; 5-cycle, loaded and conditioned test; permanent set test.

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

/3/ Maximum self-locking torque for 12-cycle, room temperature as received test; single-cycle, loaded, room temperature test; permanent set test.

NOTE: 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 of two thread pitches, including chamfer, protrudes through the top of nut.

/4/ Maximum self-locking torque at removal for 5-cycle, loaded and conditioned test.

3.7.3.1 Loading and Conditioning

Nut-bolt assemblies shall be lubricated in accordance with 3.10 and loaded in axial tension to 90,000 psi at room temperature on a spacer-type fixture in accordance with 3.7.3.1.2. Loading shall be determined by elongation measurement of the bolt at room temperature. Allow assembly to remain stressed at room temperature for not less than 1 hour, remeasure, and adjust to 90,000 psi. The loaded assemblies shall then be heated in a furnace to 450 °F ± 15 °F, held at heat for 6 hours ± 0.25 hour, removed from furnace, cooled to room temperature, and unloaded by loosening nut one-half turn and record break loose torque. Breakaway and self-locking torques shall be measured and recorded as the nut is removed from the bolt. In 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.

3.7.3.1.1 Loading

The correct elongation for bolts to load the nuts to 90,000 psi axial tensile stress in the bolt shall be determined by using a modulus of elasticity of 29,500,000 psi. Stress area of the bolt shall be the area at the maximum minor (root) diameter of the external thread. The elongation of bolts shall be 0.0030508L, where L = bushing length as in Figure 2.

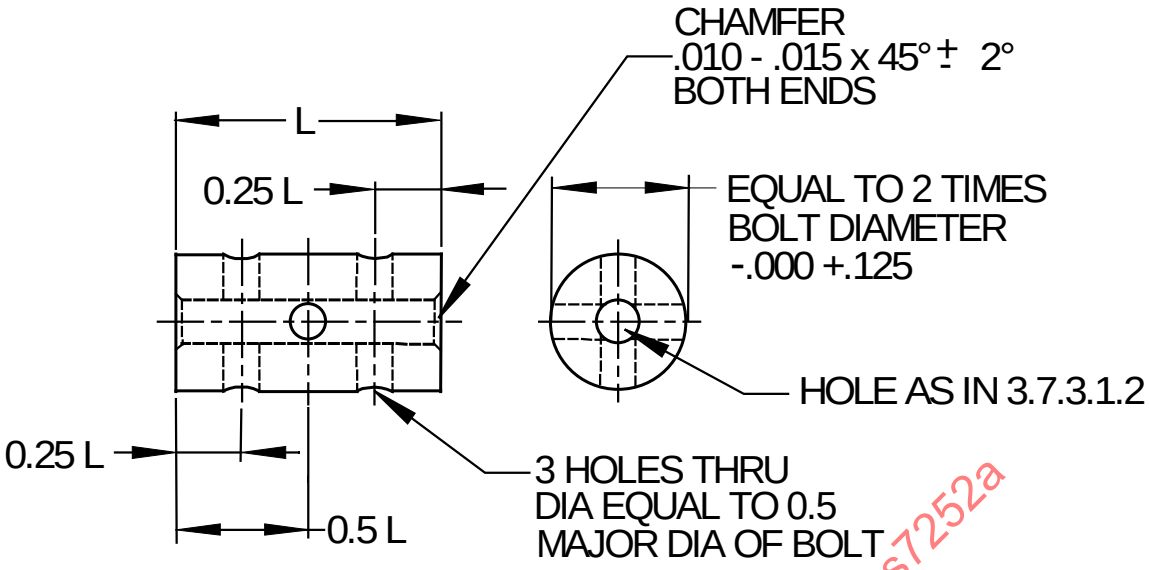


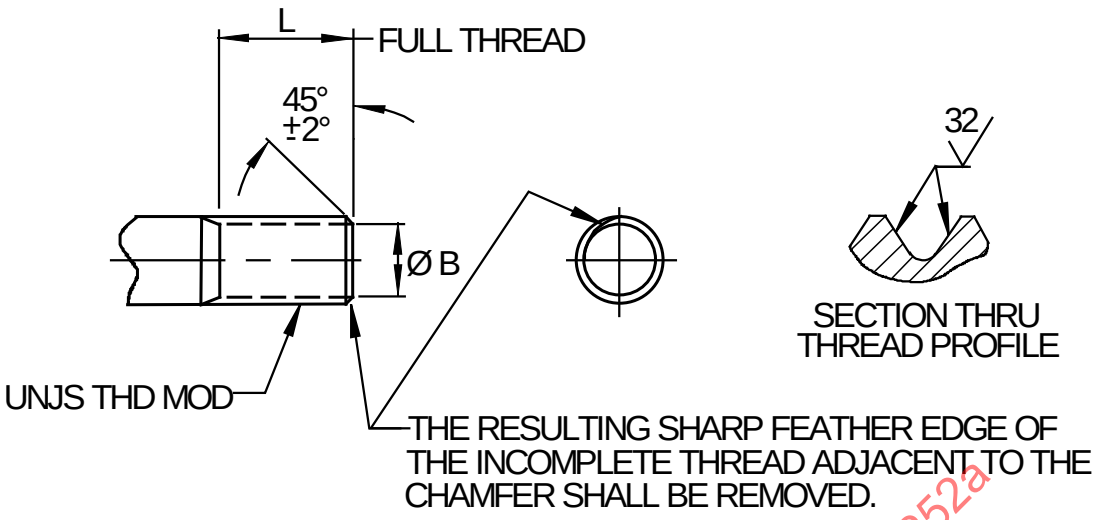
Figure 2 - Spacer-type fixture

3.7.3.1.2 Fixture

The spacer-type fixture shall be made of AMS6322 steel. The diameter of the bolt hole in the fixture shall be 0.030 to 0.034 inches greater than the maximum major diameter of the bolt thread (see Figure 2). Fixture may be counter-bored 0.004 to 0.008 inches greater than the maximum allowable shank diameter of shank nuts to permit the spacer to seat onto the bearing surface of the nut. Suggested length of fixture shall be as specified in Table 7.

3.7.4 Permanent Set

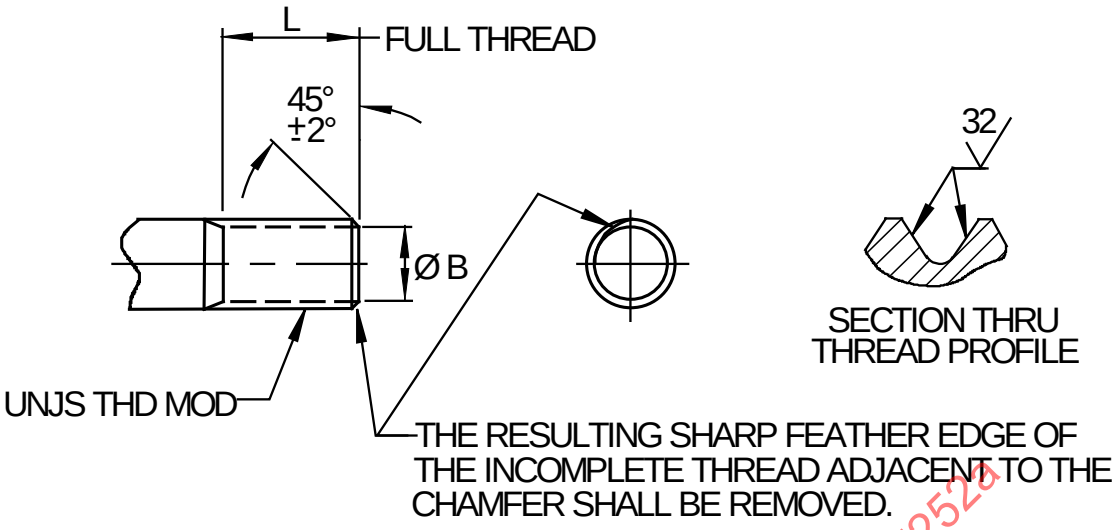
At least three nuts shall be assembled on a maximum mandrel (see Figure 3) so that the mandrel projects through the nut at not less than three thread turns. Nuts shall then be removed from the maximum mandrel and assembled on a minimum mandrel (see Figure 4) in the same manner. Tests shall be conducted at room temperature with no axial stress; breakaway and self-locking torques shall be measured and recorded. The nuts shall not exceed the maximum self-locking torque of Table 3, Column (3), during the installation or removal cycle on the maximum mandrel and shall not be less than the minimum breakaway torque of Table 3, Column (1), at the start of the removal cycle on the minimum mandrel.



Nominal Thread Size	Major Diameter Modified	Pitch Diameter	Minor Diameter Max	Helix Tolerance	Half Angle Tolerance ±	B	L Min
0.1120-40	0.1069 - 0.1094	0.0949 - 0.0953	0.0827	0.0002	0° 20'	0.063 - 0.083	0.224
0.1120-48	0.1075 - 0.1098	0.0977 - 0.0981	0.0876	0.0002	0° 30'	0.068 - 0.088	0.224
0.1380-32	0.1320 - 0.1350	0.1167 - 0.1171	0.1013	0.0003	0° 15'	0.082 - 0.101	0.276
0.1380-40	0.1329 - 0.1354	0.1209 - 0.1213	0.1087	0.0002	0° 15'	0.089 - 0.109	0.276
0.1640-32	0.1580 - 0.1610	0.1427 - 0.1431	0.1273	0.0003	0° 15'	0.108 - 0.127	0.328
0.1640-36	0.1585 - 0.1612	0.1451 - 0.1455	0.1315	0.0002	0° 15'	0.112 - 0.132	0.328
0.1900-32	0.1840 - 0.1870	0.1687 - 0.1691	0.1533	0.0003	0° 15'	0.134 - 0.153	0.380
0.2500-28	0.2435 - 0.2468	0.2257 - 0.2261	0.2081	0.0003	0° 15'	0.189 - 0.208	0.500
0.3125-24	0.3053 - 0.3089	0.2843 - 0.2847	0.2637	0.0003	0° 15'	0.244 - 0.264	0.625
0.3750-24	0.3678 - 0.3714	0.3467 - 0.3471	0.3261	0.0003	0° 15'	0.307 - 0.326	0.750
0.4375-20	0.4294 - 0.4334	0.4038 - 0.4042	0.3789	0.0003	0° 15'	0.360 - 0.379	0.875
0.5000-20	0.4919 - 0.4960	0.4663 - 0.4667	0.4414	0.0003	0° 15'	0.422 - 0.441	1.000
0.5625-18	0.5538 - 0.5582	0.5251 - 0.5255	0.4974	0.0003	0° 10'	0.478 - 0.497	1.125
0.6250-18	0.6163 - 0.6206	0.5876 - 0.5880	0.5599	0.0003	0° 10'	0.541 - 0.560	1.250

Dimensions in inches.
Surface roughness: in microinches Ra per ASME B46.1.
Bolts or studs shall conform to AS7471 except threads may be formed by any method provided above dimensional and surface finish requirements are met.
Screw threads: AS8879 except as otherwise specified in the above table.
Surface texture symbols per ASME Y14.36M.
Helix tolerance is allowable axial variation in helix between any two thread pitches not farther apart than the basic length of engagement and is the total width of tolerance zone, parallel to thread axis, within which the actual helical path (positive and negative) must lie.

Figure 3 - Maximum mandrel test fixture



Nominal Thread Size	Major Diameter Modified	Pitch Diameter	Minor Diameter Max	Helix Tolerance	Half Angle Tolerance ±	B	L Min
0.1120-40	0.1065 - 0.1069	0.0935 - 0.0939	0.0795	0.0002	0° 20'	0.061 - 0.081	0.224
0.1120-48	0.1071 - 0.1075	0.0963 - 0.0967	0.0847	0.0002	0° 30'	0.066 - 0.086	0.224
0.1380-32	0.1316 - 0.1320	0.1152 - 0.1156	0.0976	0.0003	0° 15'	0.080 - 0.100	0.276
0.1380-40	0.1325 - 0.1329	0.1194 - 0.1198	0.1054	0.0002	0° 15'	0.087 - 0.107	0.276
0.1640-32	0.1576 - 0.1580	0.1411 - 0.1439	0.1235	0.0003	0° 15'	0.106 - 0.126	0.328
0.1640-36	0.1581 - 0.1585	0.1435 - 0.1439	0.1279	0.0002	0° 15'	0.110 - 0.130	0.328
0.1900-32	0.1836 - 0.1840	0.1670 - 0.1674	0.1494	0.0003	0° 15'	0.132 - 0.152	0.380
0.2500-28	0.2431 - 0.2435	0.2239 - 0.2243	0.2037	0.0003	0° 15'	0.186 - 0.206	0.500
0.3125-24	0.3049 - 0.3053	0.2823 - 0.2827	0.2586	0.0003	0° 15'	0.241 - 0.261	0.625
0.3750-24	0.3674 - 0.3678	0.3446 - 0.3450	0.3209	0.0003	0° 15'	0.304 - 0.324	0.750
0.4375-20	0.4290 - 0.4294	0.4015 - 0.4019	0.3730	0.0003	0° 15'	0.356 - 0.376	0.875
0.5000-20	0.4915 - 0.4919	0.4639 - 0.4643	0.4354	0.0003	0° 15'	0.419 - 0.439	1.000
0.5625-18	0.5534 - 0.5538	0.5226 - 0.5230	0.4909	0.0003	0° 10'	0.474 - 0.494	1.125
0.6250-18	0.6159 - 0.6163	0.5850 - 0.5854	0.5533	0.0003	0° 10'	0.537 - 0.557	1.250

Dimensions in inches.
Surface roughness: in microinches Ra per ASME B46.1.
Helix tolerance is allowable axial variation in helix between any two thread pitches not farther apart than the basic length of engagement and is the total width of tolerance zone, parallel to thread axis, within which the actual helical path (positive and negative) must lie.

Figure 4 - Minimum mandrel test fixture

3.7.5 Reusability

Nuts shall be assembled on test bolts conforming to 3.8 and tested in accordance with 3.7.3 as modified in 3.7.5.1, 3.7.5.2, and 3.7.5.3. After testing, bolt threads to remain serviceable and permit a new nut to asemble freely with the fingers, up to the self-locking device.

3.7.5.1 Twelve-Cycle, Room Temperature, as Received Test

The nuts shall be installed and removed from the bolts 12 consecutive times, using the same nut and bolt; breakaway and self-locking torques shall be measured and recorded. With the exception of the first installation, the nuts shall not exceed the maximum locking torque of Table 3, Column (3), during the installation or removal cycle and shall not be less than the minimum breakaway torque of Table 3, Column (1).

3.7.5.2 Five-Cycle, Loaded and Conditioned Test

Conditioning cycles shall be performed in accordance with 3.7.3.1. The nuts shall be completely removed from the bolt after each cycle of conditioning. The conditioning test shall be run five consecutive cycles, using the same nut, bolt, and spacer; breakaway and self-locking torques shall be measured and recorded. The maximum self-locking torque and the minimum breakaway torque for each cycle shall not exceed the limits specified in Table 3, Columns (4) and (1), respectively. The minimum self-locking torque on installation shall not be lower than the values in Table 3, Column (1).

3.7.5.3 Single-Cycle, Loaded, Room Temperature Test

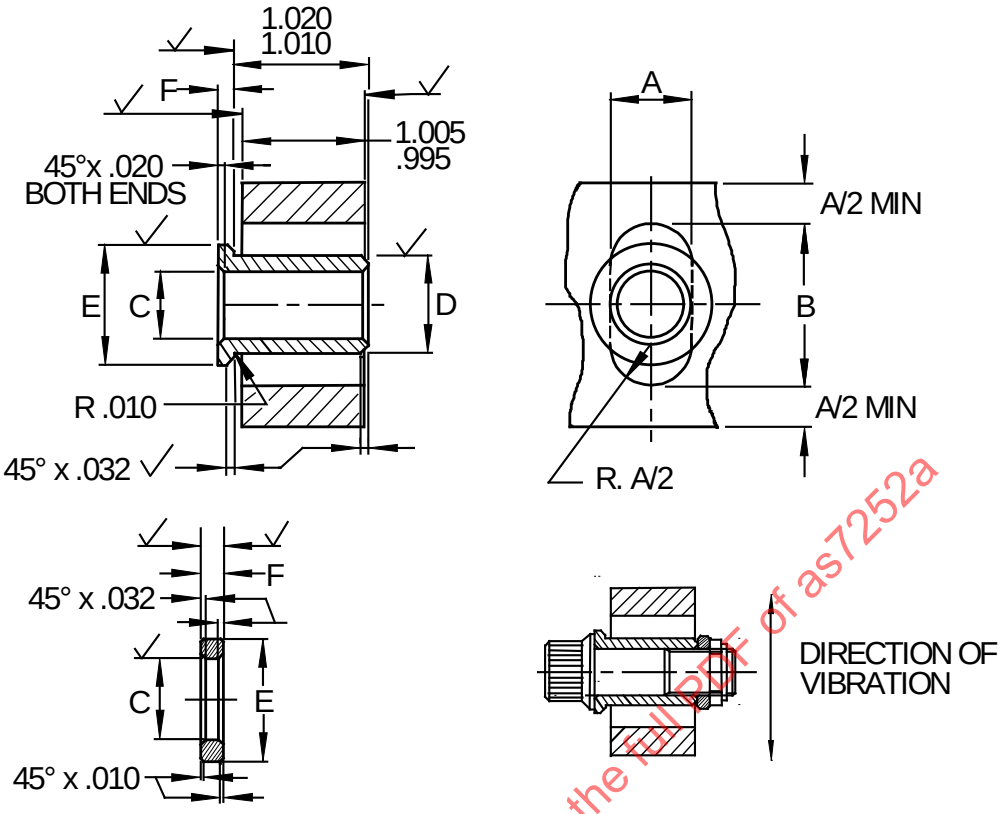
Nuts shall be assembled and loaded to one-half (50%) of the torques listed in Table 2. The nut shall be completely removed from the bolt; breakaway and self-locking torques shall be measured and recorded; and the nuts shall not exceed the maximum self-locking torque of Table 3, Column (3), during the installation or removal cycle and shall not be less than the minimum breakaway torque of Table 3, Column (2).

3.7.6 Vibration Test

Ten nuts of the type to be tested, for the sizes listed in Table 4, shall be installed on a test bolt conforming to 3.8 and on a test fixture as in 3.7.3.1.2. The assembly torque values shall be as specified in Table 4. 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. 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 450 °F ± 15 °F for 6 hours ± 0.25 hour and cooled to room temperature; 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 five unbaked nuts shall be assembled on the vibration test fixture (see Figure 5) on test bolts and vibration tested at room temperature. Assemblies shall be vibrated 30,000 cycles at a frequency of 1,750 to 1,800 cpm and an amplitude of 0.435 to 0.464 inches. 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.

Table 4 - Assembly torque for vibration test

Nominal Thread Size	Assembly Torque lbf·in
0.1640-32	22
0.1640-36	22
0.1900-32	30
0.2500-28	60
0.3125-24	120
0.3750-24	160
0.4375-20	200
0.5000-20	300
0.5625-18	400
0.6250-18	600



Nut Size	A + 0.004 - 0.000	B + 0.004 - 0.000	C + 0.004 - 0.000	D + 0.004 - 0.000	E + 0.010 - 0.000	F + 0.004 - 0.000	Min Bolt Length Ref /1/
0.1640	0.301	1.044	0.172	0.294	0.520	0.121	1.625
0.1900	0.326	1.069	0.198	0.320	0.545	0.121	1.625
0.2500	0.498	1.243	0.263	0.493	0.745	0.161	1.781
0.3125	0.623	1.368	0.326	0.618	0.870	0.161	1.844
0.3750	0.748	1.493	0.388	0.743	0.995	0.161	1.938
0.4375	0.873	1.618	0.450	0.868	1.195	0.186	2.031
0.5000	0.998	1.743	0.513	0.988	1.370	0.186	2.125
0.5625	1.123	1.868	0.576	1.113	1.545	0.211	2.250
0.6250	1.248	1.993	0.638	1.238	1.695	0.211	2.312

Material: Steel. Hardness: 40 - 45 HRC.
Surface roughness: Surfaces marked √ to be 32 microinches Ra per ASME B46.1.
Dimensions in inches, unless otherwise specified.
Tolerances linear dimensions: ±0.010. Angular dimensions: ±5°.
/1/ Min bolt length calculated to provide 3 pitches protruding through AS3477 nut for Max grip of test fixture bushing and spacer and then rounded to 0.031 increment.

Figure 5 - Vibration test fixture

3.7.7 Flarability

At least three shank nuts shall be tested for flarability. The shank of shank nuts shall not crack when flared with a 60 degree included angle conical tool to a diameter equal to 120% of the maximum allowable shank diameter, unless otherwise specified on the part drawing.

3.7.8 Push-Out

This requirement is applicable only to gang channel nuts, floating plate nuts, and nonfloating 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 nominal major diameter of the nut thread. The plate bolt hole at maximum material condition (MMC) shall be positioned within 0.010 inch radius relative to the nut thread minor diameter at MMC. 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 5, unless otherwise specified on the part drawing. With the push-out stud or device hemispherical end inserted against the base of the nut thread, the push-out load specified in Table 5 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 axially with the threaded element of more than 0.030 inch 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 5 - Push-out load and rivet hole size and location

Nominal Thread Diameter inch	Rivet Hole Diameter inch	Hole Location (Distance From Nut Thread Axis) inch	Push-Out Load, minimum lbf
0.1120	0.093 - 0.103	0.334 - 0.354	40
0.1380	0.093 - 0.103	0.334 - 0.354	60
0.1640	0.093 - 0.103	0.334 - 0.354	80
0.1900	0.093 - 0.103	0.334 - 0.354	100
0.2500	0.093 - 0.103	0.490 - 0.510	125
0.3125	0.125 - 0.135	0.490 - 0.510	125
0.3750	0.125 - 0.135	0.490 - 0.510	125
0.4375	0.125 - 0.135	0.552 - 0.572	125
0.5000	0.125 - 0.135	0.615 - 0.635	125
0.5625	0.125 - 0.135	0.678 - 0.698	125
0.6250	0.125 - 0.135	0.740 - 0.760	125

3.7.9 Torque-Out

This requirement is applicable only to gang channel nut assemblies, floating plate nuts, and nonfloating nuts. At least five nuts shall be prepared as in 3.7.8 and subjected to the torque-out loads in Table 6, first in the clockwise direction and then in the counterclockwise direction. The diameter of the torque stud shall have 0.010 inch maximum diametral clearance 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 retainer plate. 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 6 - Torque-out load

Nominal Thread Diameter inch	Torque-Out Load, minimum lbf·in
0.1120	20
0.1380	30
0.1640	45
0.1900	60
0.2500	100
0.3125	160
0.3750	240
0.4375	350
0.5000	450
0.5625	600
0.6250	900

3.7.10 Stress Embrittlement Test

This requirement is applicable only to nuts 0.1900 inch nominal thread diameter and larger with hardness of 39 HRC or higher. Ten nuts or 10%, whichever is less, shall be selected from each production inspection lot and tested in accordance with NASM1312-14. The test load shall be 75 to 80% of the axial tensile load specified in Table 1. The duration of the test shall be 48 hours.

3.8 Test Bolts

Except as specified in 3.6.1, test bolts shall conform to AS7452 and shall have threads conforming to the requirements of AS8879. All test bolts shall be plated in accordance with AMS2400. See Table 7 for bolt length information.

Table 7 - Suggested test bolts and fixture lengths

Nominal Thread Diameter inch	Reference /1/ Bolt Length inch	Reference Fixture Length inch	Reference Bolt Elongation inch	Reference /2/ Part No.
0.1120	1.000	0.735 - 0.765	0.0023	–
0.1380	1.500	1.109 - 1.139	0.0034	MS9930-22
0.1640	2.000	1.569 - 1.599	0.0048	MS9931-31
0.1900	2.500	2.010 - 2.040	0.0062	MS9932-34
0.2500	2.500	1.941 - 1.971	0.0060	MS9933-34
0.3125	2.500	1.845 - 1.875	0.0057	MS9934-32
0.3750	2.500	1.823 - 1.853	0.0056	MS9935-30
0.4375	2.500	1.718 - 1.748	0.0053	MS9936-29
0.5000	2.500	1.621 - 1.651	0.0050	MS9937-27
0.5625	2.500	1.518 - 1.548	0.0047	MS9938-26
0.6250	2.500	1.433 - 1.463	0.0044	MS9525-23

/1/ Minimum bolt length shall be nominal fixture length plus part length plus 3 pitches.
/2/ Reference part numbers are bolts having UNJF threads.

3.9 Uncoated Nuts

Uncoated nuts that have threads with an allowance for coating at assembly shall be plated for test purposes as in 3.5. Uncoated nuts permanently attached to brackets or other similar parts shall be tested with bolts plated in accordance with AMS2400 to a thickness of 0.0002 to 0.0005 inches. Plated bolts shall meet the requirements of 3.8 before plating.

3.10 Test Lubrication

Bolt threads shall be lubricated with MIL-PRF-7808 oil before each installation of the nut.

3.11 Quality

Parts shall be uniform in quality and condition, clean, sound, smooth, and free from burrs and foreign materials, and from imperfections detrimental to their performance.

3.12 Magnetic Particle Testing

Discontinuites shall be evaluated by magnetic particle inspection in accordance with ASTM E1444/E1444M. Nuts identified as having indications such as laps, seams or inclusions, shall be sectioned and depths measured. Depths of discontinuities shall conform to AS3071. The presence of cracks is not permitted and is cause for rejection.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of parts shall supply all parts for vendor tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that parts conform to the requirements of this specification.

4.2 Classification of Tests

The inspection and testing of parts shall be classified as follows:

a. Acceptance Tests

b. Qualification Tests

4.2.1 Acceptance Tests

Tests classified as acceptance or routine control tests are listed in Table 9.

4.2.2 Qualification Tests

Tests to determine conformance to all technical requirements of this specification are listed in Table 8.

4.3 Sampling

4.3.1 Acceptance Tests

Acceptance tests shall be performed on each inspection lot.

4.3.1.1 Material

Sampling for material composition on each heat shall be in accordance with AMS6322, AMS6370, or as specified on part drawing

4.3.1.2 Nondestructive Tests, Visual and Dimensional

A random sample shall be selected from each inspection lot, the size of the sample to be as specified in Table 11. The classification of defects for nuts will be as specified in Table 10. Defects not classified in Table 10 shall be classified as Minor B defects. All dimensional characteristics are considered defective when out of tolerance.

4.3.1.3 Destructive Tests

A random sample shall be selected from each inspection lot, the size of the sample shall be as specified in Table 12. The sample nuts may be selected from those that have been subjected to and passed the nondestructive tests.

4.3.2 Qualification Tests

The qualification test samples shall consist of the applicable number of nuts for each thread size to be tested as specified in Table 8.

4.4 Reports

4.4.1 The vendor shall furnish with, or prior to, the first shipment of parts of each part number a report of test data showing that the parts conform to all technical requirements of this document and the part drawing.

4.4.2 The vendor of parts shall furnish with each production inspection lot shipment a report stating that the chemical composition of the parts conform to the applicable material specification, and showing the results of tests to determine conformance to the acceptance tests, and where applicable the flareability requirements of this document. This report shall include the purchase order number, production lot number, AS7252A, contractor or direct supplier of material, part number, nominal size, and quantity.

4.5 Rejected Lots

If a production inspection lot is rejected, the vendor of parts shall perform corrective action to screen out or rework the defective parts, resubmit for acceptance tests inspection as in 4.2.1, or scrap the entire lot. Resubmitted lots shall be clearly identified as reinspected lots.

5. PREPARATION FOR DELIVERY

5.1 Packaging and Identification

5.1.1 Packaging shall be in accordance with ASTM D3951

5.1.2 Parts having different part numbers shall be packed in separate containers.

5.1.3 Each container of parts shall be marked to show not less than the following information:

NUTS, SELF-LOCKING, STEEL
AS7252A
PART NUMBER
PURCHASE ORDER NUMBER
QUANTITY
MANUFACTURER'S IDENTIFICATION

6. ACKNOWLEDGMENT

A vendor shall mention AS7252 in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Parts not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.