AEROSPACE STANDARD

AS7479™	REV. E

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Revised 2021-08

Superseding AS7479D

(R) Bolts and Screws, Steel, UNS S66286 1650 °F Solution Heat Treated Precipitation Heat Treated Before Roll Threaded

FSC 5306

RATIONALE

This revision contains extensive changes throughout the document. The revisions are both editorial and technical. It also corrects an error in Table 4 sampling size for lot size 10001 to 35000.

1. SCOPE

1.1 Type

This specification covers bolts and screws made from a corrosion and heat resistant, precipitation hardenable iron base alloy of the type identified under the Unified Numbering System as UNS S66286, and of 130000 psi tensile strength at room temperature, with maximum test temperature of parts at 1200 °F.

1.2 Application

Primarily for aerospace propulsion system applications where a good combination of strength and resistance to relaxation at elevated temperatures is required.

1.3 Safety - Hazardous Materials

While the materials, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

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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For more information on this standard, visit
https://www.sae.org/standards/content/AS7479E/

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.

AMS2700 Passivation of Corrosion Resistant Steels

AMS2759/3 Heat Treatment Precipitation-Hardening, Corrosion-Resistant, Maraging, and Secondary Hardening Steel Parts

AMS5734 Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, and Tubing, 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V, Consumable Electrode Melted, 1650 °F (899 °C) Solution Heat Treated

AS1132 Bolts, Screws, and Nuts - External Wrenching, UNJ Thread, Inch - Design Standard

AS3062 Bolts, Screws, and Studs, Screw Thread Requirements

AS3063 Bolts, Screws, and Studs, Geometric Control Requirements

AS6416 Bolts, Screws, Studs, and Nuts, Definitions for Design, Testing and Procurement

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

2.1.2 AIA/NAS Publications

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

NASM1312-6 Fastener Test Methods, Method 6, Hardness

NASM1312-8 Fastener Test Methods, Method 8, Tensile Strength

NASM1312-10 Fastener Test Methods, Method 10, Stress-Rupture

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)

2.1.4 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 A380 Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems

ASTM A967 Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts

ASTM D3951 Standard Practice for Commercial Packaging

ASTM E8/E8M Standard Test Methods for Tension Testing of Metallic Materials

ASTM E112 Standard Test Methods for Determining Average Grain Size

ASTM E139 Standard Test Methods for Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials

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

ASTM E1417/E1417M Standard Practice for Liquid Penetrant Testing

2.2 Unit Symbols

°C degree Celsius

°F degree Fahrenheit

% percent (1% = 1/100)

lbf pounds force

ksi kips (1000 pounds) per square inch

sp gr specific gravity

HRC hardness, Rockwell C scale

2.3 Definitions

Definitions for terms and requirements used in this specification shall be in accordance with AS6416.

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be AMS5734 steel heading stock, unless otherwise specified on the part drawing.

3.2 Design

Finished (completely manufactured) parts shall conform to the following requirements:

3.2.1 Dimensions

The dimensions shall conform to the requirements as specified on the part drawing. Unless otherwise stated, dimensions apply after plating but before lubrication or coating with dry film lubricants.

3.2.2 Surface Texture

Surface texture of finished parts, prior to plating or coating, shall conform to the part drawing, determined in accordance with ASME B46.1.

3.2.3 Threads

Threads shall be in accordance with AS8879, unless otherwise specified on the part drawing.

3.2.3.1 Incomplete Lead and Runout Threads

Incomplete threads and runouts are permissible as specified in AS3062.

3.2.3.2 Chamfer

Bolts shall be chamfered as specified on the part drawing.

3.2.4 Geometric Tolerances

Part features shall be within the geometric tolerances specified on the part drawing and, where applicable, controlled in accordance with AS3063.

3.3 Fabrication

3.3.1 Blanks

Heads shall be formed by hot forging, cold forging, or machining. Heading stock to be hot forged shall be heated to a temperature not higher than 2100 °F. Lightening holes may be produced by any suitable method. Wrenching recesses may be forged or machined. Flash or chip clearance in machined recesses shall not cause recess dimensions to exceed the specified limits.

3.3.2 Heat Treatment

Shall conform to the technical requirements and other provisions specified in AMS2759/3 for A286, 1650 °F solution treatment and aging treatment.

3.3.2.1 Solution Heat Treatment

Headed blanks of AMS5734 shall, before finishing the shank and the bearing surface of the head, cold rolling the head-to-shank fillet radius, and rolling the threads, be solution heat treated as in 3.3.2.

3.3.2.2 Aging Treatment

After solution heat treatment as in 3.3.2.1, blanks shall be heat treated by aging as in 3.3.2.

3.3.3 Oxide Removal

Surface oxide resulting from prior heat treatment shall be removed from the full body diameter, thread roll diameter and bearing surface of the head of the solution and aged blanks prior to cold working the under head fillet radius when specified and rolling the threads by a method such as centerless grinding. The oxide removal process shall produce no intergranular attack or corrosion of the blanks.

3.3.4 Cold Rolling of Fillet Radius

After removal of oxide as in 3.3.3, the head-to-shank fillet radius of headed parts having the radius complete throughout the circumference of the part , when specified, shall be cold worked. The fillet shall be cold worked sufficiently to remove all visual evidence of grinding or tool marks. If there is no visual evidence of grinding or tool marks prior to cold working, the fillet shall still be cold worked. Distortion due to cold rolling shall conform to Figure 1, unless otherwise specified on the part drawing. It shall not raise metal more than 0.002 inch above the contour at “A” or depress metal more than 0.002 inch below the contour at “B” as shown in Figure 1; distorted areas shall not extend beyond “C” as shown in Figure 1.

3.3.4.1 Undercut Bolt Heads

In configurations having an undercut connected with the fillet radius, the cold working will be required only for 90 degrees of fillet arc, starting at the point of tangency of the fillet radius and the bearing surface of the head.

3.3.4.2 Shouldered Bolts

For shouldered bolts, having an unthreaded shank diameter larger than the thread major diameter and having an undercut connected with a fillet between the threaded shank and the shoulder of the unthreaded shank, the cold working will be required only for 90 degrees of the fillet arc, starting at the point of tangency of the fillet radius and the shouldered surface of the unthreaded shank.

3.3.4.3 Close Tolerance Bolts

The shank diameter on full shank close tolerance bolts shall not exceed its maximum diameter limit after cold working the head to shank fillet radius.

3.3.5 Thread Rolling

Threads shall be formed on the heat treated and finished blanks by a single cold rolling process after removal of oxide as in 3.3.3.

3.3.6 Cleaning

Bolts, after finishing, shall be cleaned in one of the following solutions for the time and temperature shown and then thoroughly rinsed:

a. One volume of nitric acid (sp gr 1.42) and nine volumes of water for not less than 20 minutes at room temperature.

b. One volume of nitric acid (sp gr 1.42) and four volumes of water for 30 to 40 minutes at room temperature.

c. One volume of nitric acid (sp gr 1.42) and four volumes of water for 10 to 15 minutes at 140 to 160 °F.

d. ASTM A967, ASTM A380, or AMS2700 for cleaning parts only, excluding any additional verification requirements (such as salt spray).

3.4 Plating or Coating

Where required, bolts shall be plated or dry film lubricated as specified by the part drawing.

3.5 Mechanical Properties

Bolts for tensile and stress-rupture tests shall be of sufficient size to develop the full strength of the bolt without stripping the thread. The loaded portion of the shank shall have a minimum of two to three full threads from the thread runout exposed between the loading fixtures during tensile test.

Finished parts shall be tested in accordance with the following applicable test methods:

a. Hardness: MIL-STD-1312-6 in accordance with NASM1312-6

b. Room Temperature Ultimate Tensile Strength: MIL-STD-1312-8 in accordance with NASM1312-8

c. Stress-Rupture Strength at 1200 °F: MIL-STD-1312-10 in accordance with NASM1312-10

3.5.1 Ultimate Tensile Strength at Room Temperature

3.5.1.1 Finished Parts

Tension bolts, such as hexagon, double hexagon, and spline drive head, shall have an ultimate tensile load not lower than that specified in Table 2A and shall be tested to failure in order to observe fracture location, first measuring and recording the maximum tensile load achieved. Tension fasteners with either standard double hexagon or spline drive heads having a minimum metal condition in the head equal to the design parameters specified in AS1132, shall not fracture in the head-to-shank fillet radius except when this radius is connected with an undercut or with a shank diameter less than the minimum pitch diameter of the thread. The loaded portion of the shank shall have a minimum of two to three full threads from the thread runout exposed between the loading fixtures during tensile test. Screws, such as 100 degree flush head, pan head, and fillister head, shall have an ultimate tensile load not lower than that specified in Table 2B.

3.5.1.2 Machine Test Specimens

If the size or shape of the part is such that a tensile test cannot be made on the part, tensile tests shall be conducted in accordance with ASTM E8/E8M on specimens as in 4.3.8. Specimens may be required by purchaser to perform confirmatory tests. Such specimens shall meet the following requirements:

a. Ultimate Tensile Strength, minimum: 130 ksi

b. Yield Strength at 0.2% Offset, minimum: 85 ksi

c. Elongation in 2 inches or 4D, minimum: 15%

d. Reduction of Area, minimum: 20%

3.5.2 Hardness

Shall be within the range 24 to 35 HRC (see 8.1), but hardness of the threaded section and of the head-to-shank fillet area when cold rolling of this area is specified, may be higher as a result of the cold working operations. Bolts shall not be rejected on the basis of hardness if the tensile strength properties of the part are met.

3.5.3 Stress-Rupture Strength at 1200 °F

3.5.3.1 Finished Parts

Finished parts, maintained at 1200 °F ± 3 °F while the stress rupture load specified in Table 2A is applied continuously, shall not rupture in less than 23 hours. If the shank diameter of the part is less than the maximum minor (root) diameter of the thread but the part can be tested satisfactorily, parts shall conform to the requirements of 3.5.3.1.1.

3.5.3.1.1 Parts having a shank diameter less than the maximum minor (root) diameter of the thread shall be tested as in 3.5.3.1, except that the load shall be as specified in 3.5.3.2. The diameter of the area on which stress is based shall be the actual measured minimum diameter of the part.

3.5.3.2 Machined Test Specimens

If the size or shape of the part is such that a stress-rupture test cannot be made on the part, a test specimen prepared as in 4.3.8, maintained at 1200 °F ± 3 °F while a load sufficient to produce an initial axial stress of 65 ksi is applied continuously, shall not rupture in less than 23 hours. Tests shall be conducted in accordance with ASTM E139.

3.6 Quality

Parts shall be uniform in quality and condition, free from burrs and foreign materials, and from imperfections detrimental to the usage of the parts.

3.6.1 Macroscopic Examination, Headed Blank

A specimen from a headed blank shall be etched and examined at a magnification of 20X or greater to determine conformance to the requirements of 3.6.1.1 and 3.6.1.2.

3.6.1.1 Flow Lines Head to Shank, Forged Bolts Only

After heading and prior to heat treatment, examination of an etched section taken longitudinally through the sample shall show flow lines or heat pattern in the shank, head-to-shank fillet, and bearing surface which are representative of a forging process and shall follow the head contour.

3.6.1.2 Internal Imperfections

Examination of longitudinal sections of the head and shank shall reveal no cracks, laps, or porosity, or other conditions detrimental to intended performance.

3.6.2 Microscopic Examination, Finished Parts

Specimens cut from finished parts shall be polished, etched in Kalling's reagent, Marble's reagent, or other suitable etchant, and examined at 100X magnification to determine conformance to the requirements of 3.6.2.1, 3.6.2.2, 3.6.2.3, and 200X magnification to determine conformance to the requirements of 3.6.2.4.

3.6.2.1 Internal Imperfections

Examination of longitudinal sections of the head and shank shall reveal no cracks, laps, or porosity. Thread imperfections shall conform to the requirements of 3.6.2.4.

3.6.2.2 Microstructure

Parts shall have microstructure of completely recrystallized material except in the area of the threads and the head-to-shank fillet radius.

3.6.2.3 Grain Size

Shall be ASTM No. 5 or finer as determined by comparison of the specimen with the chart in ASTM E112. Up to 25% of the area examined may exhibit a grain size as large as ASTM No. 2. Such areas shall be separated by at least 0.025 inch. Bands of fine or coarse grains are not permitted. In case of disagreement on grain size by comparison method, the intercept (Heyn) method shall be used.

3.6.2.4 Threads

3.6.2.4.1 Root imperfections such as laps, seams, notches, slivers, folds, roughness, and oxide scale are not permissible (see Figure 3).

3.6.2.4.2 Multiple laps on the flanks of threads are not permissible regardless of location. Single laps on the flanks of threads that extend toward the root are not permissible (see Figures 4, 5, and 6).

3.6.2.4.3 Single lap on thread profile shall conform to the following: A rateable lap shall have its length equal to or greater than three times its width. The minimum interpretable lap size is 0.0005 inch length or depth when viewed at 200X magnification.

3.6.2.4.4 There shall be no laps along the flank of the thread below the pitch diameter (see Figure 4). A single lap is permissible along the flank of the thread above the pitch diameter on either the pressure flank or non-pressure flank (one lap at any cross-section through the thread) provided it extends toward the crest and generally parallel to the flank (see Figure 4).

3.6.2.4.5 Crest craters, crest laps, or a crest lap in combination with a crest crater are permissible, provided that the imperfections do not extend deeper than 20% of the basic thread height (see Table 1) as measured from the thread crest when the thread major diameter is at minimum size (see Figure 7). The major diameter of the thread shall be measured prior to sectioning. As the major diameter of the thread approaches maximum size, values for depth of crest crater and crest lap imperfections listed in Table 1 may be increased by 1/2 of the difference between the minimum major diameter and the actual major diameter as measured on the part.

3.6.3 Fluorescent Penetrant Inspection

Prior to any required plating or coating, parts shall be subject to fluorescent penetrant inspection in accordance with ASTM E1417/E1417M, Type I, Sensitivity Level 2 minimum. Any discontinuity to be reviewed by a metallurgist or skilled metallographer.

3.6.3.1 The following conditions shall be cause for rejection of parts inspected:

3.6.3.1.1 Discontinuities transverse to grain flow (i.e., at an angle of more than 10 degrees to the axis of the shank), such as grinding checks and cracks.

3.6.3.1.2 Longitudinal indications (i.e., at an angle of 10 degrees or less to the axis of the shank) due to imperfections other than seams, forming laps, and non-metallic inclusions.

3.6.3.2 The following conditions shall be considered acceptable on parts inspected:

3.6.3.2.1 Sides of Head

There shall be not more than three indications per head. The length of each indication may be the full height of the surface, but no indication shall break over either edge to a depth greater than 0.031 inch or the equivalent of the 2H/3 thread depth (see Table 1), whichever is less.

3.6.3.2.2 Shank

There shall be not more than five indications. The length of any indication may be the full length of the surface, but the total length of all indications shall not exceed twice the length of the surface. No indication shall break into a fillet or over an edge.

3.6.3.2.3 Threads

There shall be no indications, except as permitted in 3.6.2.4. Rateable lap indications shall conform to 3.6.2.4.3.

3.6.3.2.4 Top of Head and End of Stem

The number of indications is not restricted but the depth of any individual indication shall not exceed 0.010 inch as shown by sectioning representative samples. No indication shall break over an edge.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

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

4.2 Acceptance Test Sampling

4.2.1 Material

Sampling for material composition on each heat shall be in accordance with AMS5734.

4.2.2 Nondestructive Tests - Visual and Dimensional

A random sample shall be taken from each production inspection lot; the size of the sample to be as specified in Table 4. The classification of dimensional characteristics shall be as specified in Table 5. All dimensional characteristics are considered non-conforming when out of tolerance.

4.2.3 Fluorescent Penetrant Inspection

A random sample shall be selected from each production inspection lot, the size of the sample shall be as specified in Table 4 and classified as in Table 5. The sample units may be selected from those that have been subjected to and passed the visual and dimensional inspection, with additional units selected at random from the production lot as necessary.

4.2.4 Macroscopic Examination

A random sample of one part shall be selected from each production inspection lot.

4.2.5 Stress-Rupture Test

A random sample of one part (or one specimen where required) shall be selected from each production inspection lot.

4.2.6 Destructive Tests

A random sample shall be selected from each production inspection lot; the size of the sample shall be as specified in Table 6. The sample units may be selected from those that have been subjected to and passed the non-destructive tests and the fluorescent penetrant inspection, with additional units selected at random from the production inspection lot as necessary.

4.2.7 Acceptance Quality

Of random samples tested, acceptance quality shall be based on zero non-conformances.

4.2.8 Test Specimens

Specimens for tensile and stress-rupture testing of machined test specimens shall be of standard proportions in accordance with ASTM E8/E8M. Specimens shall be machined from finished parts or coupons of the same lot of alloy and be processed together with the parts they represent. Specimens shall be machined from the center of parts.

4.2.8.1 A random sample of one part shall be selected from each production lot.

4.3 Reports

The vendor of parts shall furnish with each shipment a report for all tests. This report shall include the purchase order number, AS7479 and revision letter, lot number, contractor or other direct supplier of material, part number, nominal size, and quantity.

4.4 Rejected Lots

If a production lot is rejected, the vendor of parts may perform corrective action to screen out or rework the defective parts and resubmit for acceptance tests inspection as in Table 3, 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:

BOLTS (SCREWS), STEEL, CORROSION AND HEAT RESISTANT, UNS S66286
AS7479E
PART NUMBER
LOT NUMBER
PURCHASE ORDER NUMBER
QUANTITY
MANUFACTURER'S IDENTIFICATION

5.1.4 Threaded fasteners shall be protected from damage during handling, transportation, and storage.

6. ACKNOWLEDGMENT

A supplier shall mention this specification number 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.

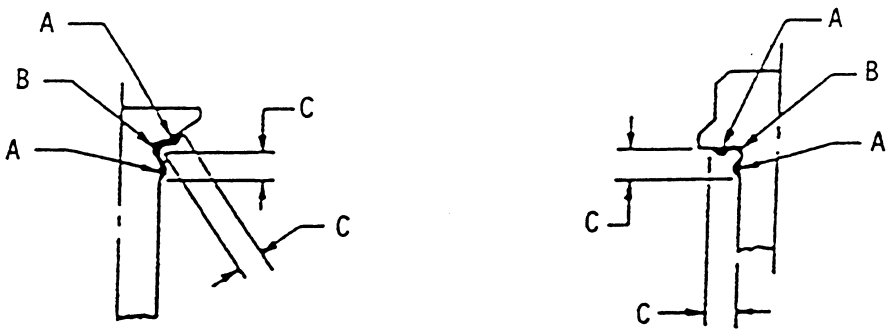
8. NOTES

8.1 Hardness Conversion Tables

Hardness conversion tables for metals are presented in ASTM E140.

8.2 Revision Indicator

A change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.



Nominal Bolt Diameter, inch	C, max inch
Up to 0.3125, excl	0.062
0.3125 & 0.375	0.094
0.4375 to 0.625, include	0.125
0.750 to 1.000, include	0.156
Over 1.000	0.188

Figure 1 - Permissible distortion from fillet working

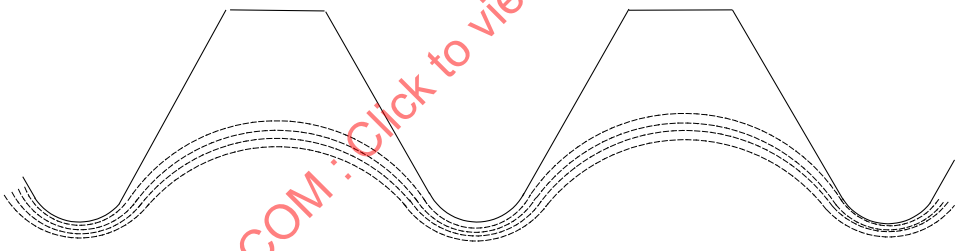


Figure 2 - Flow lines, rolled thread

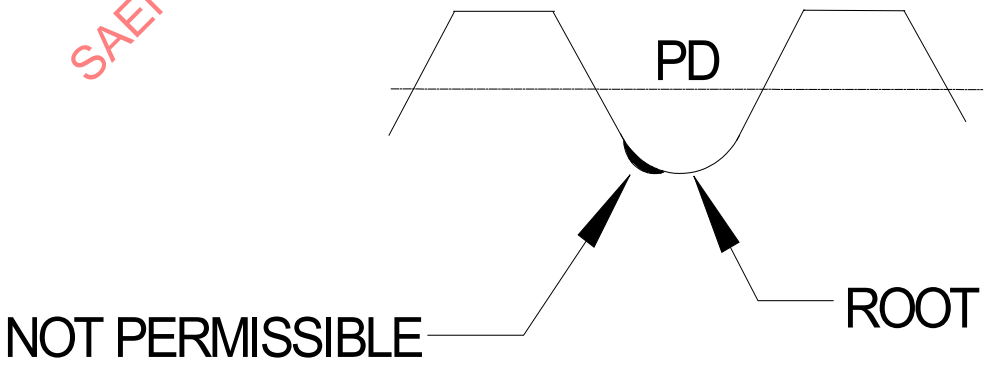


Figure 3 - Root defects, rolled thread

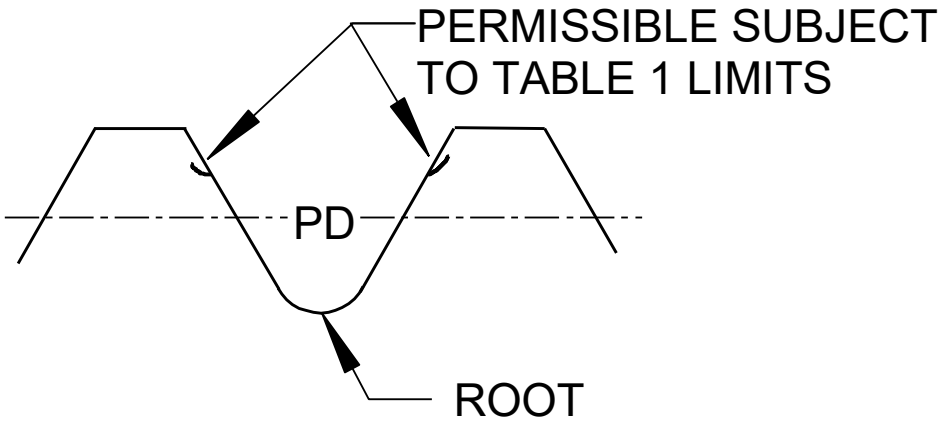


Figure 4 - Laps above pitch diameter extending towards crest, rolled thread

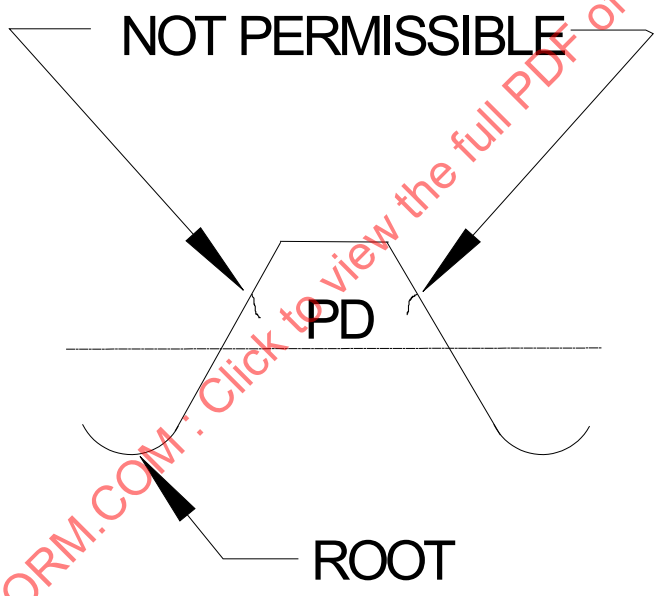


Figure 5 - Laps above PD extending toward root, rolled thread

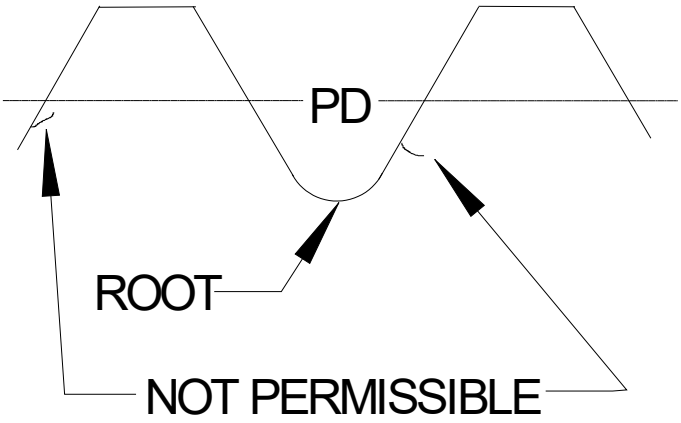
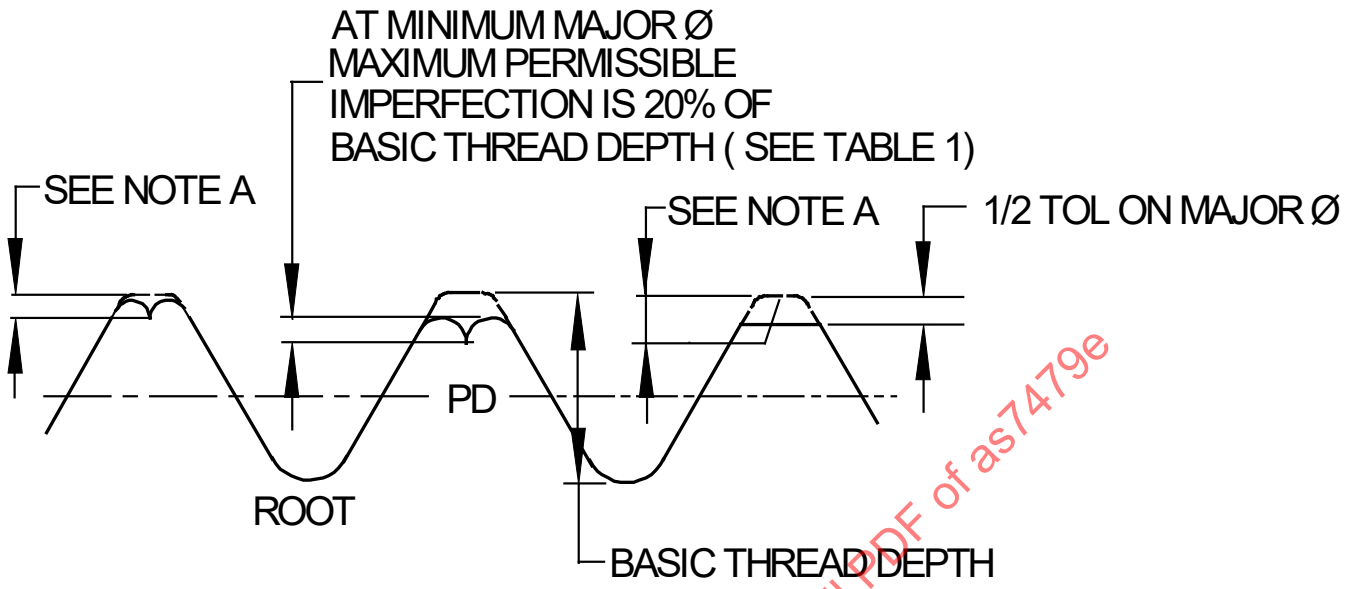


Figure 6 - Laps below PD extending in any direction, rolled thread



NOTE A
MAXIMUM DEPTH OF IMPERFECTION EQUALS 20% OF 2H/3 BASIC THREAD DEPTH PLUS 1/2 THE DIFFERENCE OF THE ACTUAL MAJOR DIAMETER AND MINIMUM MAJOR DIAMETER

Figure 7 - Crest craters and crest laps, rolled thread

Table 1 - UNJ external thread depth at 2H/3 and allowable thread lap depth

Thread Pitches Per Inch n	UNJ External Thread Depth at 2H/3 Inch	Allowable Thread Lap Depth /1/ Inch
40	0.0144	0.0029
36	0.0160	0.0032
32	0.0180	0.0036
28	0.0206	0.0041
24	0.0241	0.0048
20	0.0289	0.0058
18	0.0321	0.0064
16	0.0361	0.0072
14	0.0412	0.0082
13	0.0444	0.0089
12	0.0481	0.0096
11	0.0525	0.0105

NOTE 1: Allowable lap depth is based upon 20% of UNJ external thread depth at 2H/3 in accordance with AS8879, and is calculated as follows:

External thread depth = 2H/3 = (2/3)(cos 30 degrees)/n = 0.57735/n

Lap depth = 0.2(2H/3) = 0.2(2/3)(cos 30 degrees)/n = 0.11547/n

Table 2A - Test loads for bolts

Nominal Thread Size	Ultimate Tensile Strength Test Load, Lbf, Min Std PD UN and UNJ Threads	Ultimate Tensile Strength Test Load, Lbf, Min Red PD UN THD Only	Stress-Rupture Strength Test Load, lbf Std PD UN and UNJ Threads	Stress-Rupture Strength Test Load, lbf Red PD UN THD Only
0.1120-40	801	747	338	313
0.1120-48	873	817	381	355
0.1380-32	1210	1140	507	477
0.1380-40	1340	1270	588	556
0.1640-32	1850	1770	806	768
0.1640-36	1940	1860	862	822
0.1900-32	2640	2540	1170	1130
0.2500-28	4790	4650	2170	2110
0.3125-24	7630	7470	3490	3410
0.3750-24	11500	11300	5360	5260
0.4375-20	15600	15300	7220	7110
0.5000-20	21000	20700	9820	9690
0.5625-18	26600	26300	12500	12300
0.6250-18	33500	33200	15800	15700
0.7500-16	48800	48400	23100	22900
0.8750-14	66700	66200	31600	31400
1.0000-12	86800	86200	41100	40900

NOTE 1: Requirements above apply to parts with UNC, UNF, UNJC, or UNJF threads, as applicable to the sizes shown, to Class 3A tolerances; requirements for reduced pitch diameter threads are based on 0.003 inch reduction below standard. The diameter of the area upon which stress for ultimate tensile strength test load requirements is based is one-half of the sum of the maximum pitch diameter and the maximum minor (root) diameter for UN threads, calculated as follows:

$$\text{Std PD, } A_1 = 0.7854[d - (0.9382/n)]^2 \quad \text{(Eq. 1)}$$

$$\text{Red PD, } A_2 = 0.7854[d - (0.9782/n) - 0.003]^2 \quad \text{(Eq. 2)}$$

where:

A_1 = area at [PD max + minor dia max]/2, Std PD
A_2 = area at [(PD max - 0.003) + (minor dia max - 0.003)]/2, Red PD
d = basic (maximum) major diameter
n = number of thread pitches per inch
n = number of thread pitches per inch

Table 2A - Test loads for bolts (continued)

The diameter of the area upon which stress for stress-rupture strength test load requirements is based is at 17H/24 thread depth below the basic major diameter, calculated as follows:

$$\text{Std PD, } A_3 = 0.7854[d - (17H/12)]^2 = 0.7854[d - (1.2269/n)]^2 \quad \text{(Eq. 3)}$$

$$\text{Red PD, } A_4 = 0.7854[d - (1.2269/n) - 0.003]^2 \quad \text{(Eq. 4)}$$

where:

A_3 = area at 17H/24 thread depth below basic major diameter, std PD
A_4 = area at 17H/24 thread depth for 0.003 reduced PD
d = basic (maximum) major diameter
H = height of sharp V-thread = (cos 30°)/n
n = number of thread pitches per inch

Load requirements are based on:

A_1 x 130000 psi for bolts, ultimate tensile strength, std PD
A_2 x 130000 psi for bolts, ultimate tensile strength, red PD
A_3 x 65000 psi for bolts, stress-rupture strength, std PD
A_4 x 65000 psi for bolts, stress-rupture, red PD

NOTE 2: For sizes not shown and for parts having other than Class 3A tolerances, ultimate tensile strength test loads and stress-rupture strength test loads for parts tested as parts, not as specimens machined from parts or from coupons of the stock, shall be based upon the respective areas and stresses given in Note 1.