SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS7470 | REV. C

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Reaffirmed 2012-11

Superseding AS7470B

Bolts and Screws, Steel, Corrosion and Moderate Heat Resistant Heat Treated, Roll Threaded

RATIONALE

AS7470C has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

1.1 Type

This procurement specification covers aircraft quality bolts and screws made from a corrosion and moderate heat resistant martensitic iron base alloy of the type identified under the Unified Numbering System as UNS S41800 and of 140 000 psi and 152 000 psi tensile strengths at room temperature.

1.2 Application

Primarily for aerospace propulsion system applications where corrosion and moderate heat resistance is required.

1.3 Safety - Hazardous Materials

While the materials, methods, applications, and process 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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http://www.sae.org/technical/standards/AS7470C

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 724-776-4970 (outside USA), www.sae.org.

AMS2750	Pyrometry
AMS5616	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings 13Cr 2.0Ni 3.0W Annealed
AS1132	Bolts, Screws and Nuts - External Wrenching UNJ Thread, Inch - Design Standard
AS3062	Bolts, Screws and Studs - Screw Threads Requirements
AS3063	Bolts, Screws and Studs - Geometric Control Requirements
AS8879	Screw Threads - UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter

2.1.2 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 E 8	Tension Testing of Metallic Materials
ASTM E 140	Standard Hardness Tables for Metals
ASTM D 3951	Commercial Packaging
ASTM E 1444	Magnetic Particle Examination

2.1.3 ASME Publication

Available from American Society of Mechanical Engineers, 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900, Tel: 973-882-1170, www.asme.org.

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

2.1.4 AIA 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
NASM1312-12	Fastener Test Methods, Plating Thickness

2.2 Definitions

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

COLD ROLLING: Forming material below the recrystallization temperature.

CRACK: Rupture in the material which may extend in any direction and which may be intercrystalline or transcrystalline in character.

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

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

DISCONTINUITY: An interruption in the normal physical structure or configuration of a part, such as a lap, seam, inclusion, crack, machining tear, or stringer.

INCLUSION: Nonmetallic particles originating from the material making process. They may exist as discrete particles or strings of particles extending longitudinally.

LAP: Surface imperfection caused by folding over metal fins or sharp corners and then rolling or forging them into the surface. The allowable lap depth shall not exceed the limit specified herein. The minimum condition that shall be rated as a lap is a fold having its length equal to or greater than three times its width with a depth of 0.0005 in when viewed at X200 magnification.

MACHINING TEAR: A pattern of short, jagged individual cracks, generally at right angles to the direction of machining, frequently the result of improperly set cutting tools, or dull cutting tools.

PRODUCTION INSPECTION LOT: Shall be all finished parts of the same part number, made from a single 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.

SEAM: Longitudinal surface imperfection in the form of an unwelded, open fold in the material.

STRINGER: A solid nonmetallic impurity in the metal bar, often the result of inclusions that have been extended during the rolling process.

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

2.3 Unit Symbols

A - ampere

°C - degree Celsius

°F - degree Fahrenheit

g - gram (mass)

cm^3 - cubic centimeter

h - hour

in - inch

in² - square inch

min - minute of time

% - percent (1% = 1/100)

lbf - pounds force

psi - pounds force per square inch

sp gr - specific gravity

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be AMS5616 steel, 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 of finished parts, after all processing, including plating, shall conform to the part drawing. Dimensions apply after plating but before coating with solid film lubricants.

3.2.2 Surface Texture

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

3.2.3 Threads

Screw thread UNJ profile and dimensions shall be in accordance with AS8879, unless otherwise specified on the part drawing.

3.2.3.1 Incomplete Threads

Incomplete threads are permissible at the chamfered end at the juncture of the unthreaded portion of the shank or adjacent to the head as specified in AS3062.

3.2.3.2 Chamfer

The entering end of the thread 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 or cold forging or machining. 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 dimension to exceed the specified limits.

3.3.2 Heat Treatment

Headed and machined blanks shall, before finishing the shank and the bearing surface of the head, cold working the head-to-shank fillet radius when specified, and rolling the threads, be heat treated as follows:

3.3.2.1 Heating Equipment

Furnaces may be any type ensuring uniform temperature throughout the parts being heated and shall be equipped with, and operated by, automatic temperature controllers and data recorders conforming to AMS2750. The heating medium or atmosphere shall cause no surface hardening by carburizing or nitriding.

3.3.2.2 Hardening

Blanks of AMS5616 shall be uniformly heated to 1750 °F ± 25 °F, held at heat for 15 to 20 min, and suitably quenched. For other steels, the temperature, time, and quenching medium shall be as agreed by purchaser and vendor.

3.3.2.3 Tempering

Hardened blanks shall be tempered by heating uniformly to a temperature necessary to produce the specified hardness and microstructure but not within the range of 700 to 1000 °F, holding at heat for not less than 1 h, and cooling.

3.3.3 Oxide Removal

Surface oxide, and oxide penetration caused by prior heat treatment, shall be removed from the full body diameter and bearing surface of the head of the heat treated blanks prior to cold working the under head fillet radius when specified and rolling the threads. The oxide removal process shall produce no intergranular attack or corrosion of the blanks. The metal removed from the bearing surface of the head and the full body diameter of the shank shall be as little as practicable to obtain a clean and smooth surface and, in no case, shall be so great as to produce more cutting of flow lines in the head-to-shank junction of forged headed parts than shown in Figure 1.

3.3.4 Cold Working of Fillet Radius

After removal of oxide as in 3.3.3, the head-to-shank fillet radius of parts having the radius complete throughout the circumference of the part shall, when specified, be cold rolled sufficiently to remove all visual evidence of grinding or tool marks. Distortion due to cold working shall conform to Figure 2, unless otherwise specified on the part drawing. It shall not raise metal more than 0.002 in above the contour at "A" or depress metal more than 0.002 in below the contour at "B" as shown in Figure 2; distorted areas shall not extend beyond "C" as shown in Figure 2. In configurations having an undercut associated 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. In addition to cold working the head-to-shank fillet radius, shouldered bolts having an unthreaded shank diameter larger than the thread major diameter and having an undercut associated 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 fillet arc, starting at the point of tangency of the fillet radius and the shouldered surface of the unthreaded shank. For parts with compound fillet radii between head and shank, cold work only the radius that blends with the head.

3.3.5 Thread Rolling

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

3.3.6 Cleaning

Parts, after finishing, shall be degreased and immersed in one of the following solutions for the time and temperature shown:

a. One volume of nitric acid (sp gr 1.42) and 9 volumes of water for not less than 20 min at room temperature.

b. One volume of nitric acid (sp gr 1.42) and 4 volumes of water for 30 to 40 min at room temperature.

c. One volume of nitric acid (sp gr 1.42) and 4 volumes of water for 10 to 15 min at 140 to 160 °F.

d. Citric acid solution containing 4 to 10 weight percent of citric acid, for a minimum of 20 min at a temperature in the range of 70 to 120 °F.

3.4 Product Marking

Each part shall be identification marked as specified by the part drawing. The markings may be formed by forging or stamping, raised or depressed not more than 0.010 in maximum, with rounded root form or depressed characters.

3.5 Plating

Where required, any protective treatment shall be as specified by the part drawing.

3.6 Mechanical Properties

Parts shall conform to the requirements of 3.6.1 and 3.6.2. Threaded members of gripping fixtures for tensile test shall be of sufficient size and strength to develop the full strength of the part without stripping the thread. The loaded portion of the shank shall have two to three full thread turns from the thread runout exposed between the loading fixtures during the 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.

3.6.1 Ultimate Tensile Strength at Room Temperature

3.6.1.1 Finished Parts

Parts having hardness not lower than 30 HRC shall have an ultimate tensile load not lower than that specified in Table 3 and shall be tested to failure, first measuring and recording the maximum tensile load achieved. Parts requiring minimum hardness not lower than 35 HRC shall have an ultimate tensile load not lower than the minimum ultimate tensile load specified in Table 3 multiplied by 1.08. If the size or shape of the part is such that failure would occur outside the threaded section but the part can be tested satisfactorily, such as parts having a shank diameter equal to or less than the thread root diameter or having an undercut, parts shall conform to only the ultimate tensile strength requirements of 3.6.1.2; for such parts, the diameter of the area on which stress is based shall be actual measured minimum diameter of the part. Tension fasteners with either standard double hexagon or hexagon type head 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 associated with an undercut or with a shank diameter less than the minimum pitch diameter of the thread, or where cold working of the fillet radius is not required and the heads are machined.

3.6.1.2 Machined Test Specimens

If the size or shape of the part is such that a tensile test can not be made on the part, tensile tests shall be conducted in accordance with ASTM E 8 on specimens prepared as in 4.4. Such specimens shall meet the requirements in Table 1:

TABLE 1 - TENSILE PROPERTIES OF TEST SPECIMENS

Minimum Hardness of Specified Range, HRC	Ultimate Tensile Strength, psi minimum	Elongation in 2 in or 4D, % minimum	Reduction of Area, % minimum
30	140 000	17	40
35	152 000	13	35

3.6.1.2.1 When permitted by purchaser, hardness test on the end of the parts may be substituted for tensile test of machined specimens.

3.6.2 Hardness

Unless otherwise specified on the part drawing, hardness shall be uniform and within the range 30 to 38 HRC, but hardness of the threaded section and of the head-to-shank fillet area when cold working of this area is specified, may be higher as a result of the cold working operations.

3.7 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.

3.7.1 Macroscopic Examination

Parts or sections of parts, as applicable, shall be etched in a solution consisting of approximately 50% hydrochloric acid (sp gr 1.19), 50% water, or other suitable etchant for sufficient time to reveal flow lines but not longer than 15 min, and then examined at a magnification of approximately 20X to determine conformance to the requirements of 3.7.1.1 and 3.7.1.2, and 3.7.1.3, except that examination for thread imperfections as specified in 3.7.1.3 should be made by microscopic examination of specimens polished and etched as in 3.7.2.

3.7.1.1 Flow Lines

3.7.1.1.1 Head-to Shank

If parts have forged heads, examination of a longitudinal section through the part shall show flow lines in the shank, head-to-shank fillet, and bearing surface which follow the contour of the part as shown in Figure 1, except that slight cutting of flow lines by the oxide removal process of 3.3.3 is permissible; excessive cutting of flow lines in the shank, head-to-shank fillet, and bearing surface, is not permissible except when an undercut is associated with the fillet radius. The head style shown in Figure 1 is for illustrative purposes only but other symmetrical head styles shall conform to the above requirements. Flow lines in upset heads on parts having special heads, such as Dee- or Tee-shaped heads or thinner than AS1132 standard heads, shall be as agreed by purchaser and vendor.

3.7.1.1.2 Threads

Flow lines in threads shall be continuous, shall follow the general thread contour, and shall be of maximum density at root of thread (see Figure 3).

3.7.1.2 Internal Defects

Examination of longitudinal sections of the head and shank and of the threads shall reveal no cracks, laps, or porosity except laps in threads as permitted in 3.7.1.3.3 and 3.7.1.3.4. The head and shank section shall extend not less than D/2 from the bearing surface of the head and the threaded section shall extend not less than D/2 beyond the thread runout where "D" is the nominal diameter of the shank after heading. If the two sections would overlap, the entire length of the part shall be sectioned and examined as a whole.

3.7.1.3 Threads

Root defects such as laps, seams, notches, slivers, folds, roughness, and oxide scale are not permissible (see Figure 4).

3.7.1.3.1 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 5 and 6).

3.7.1.3.2 There shall be no laps along the flank of the thread below the pitch diameter (see Figure 7). A single lap is permissible along the flank of the thread above the pitch diameter on either the pressure or non-pressure flank (one lap at any cross-section through the thread) provided it extends towards the crest and generally parallel to the flank (see Figure 7).

3.7.1.3.3 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 2) as measured from the thread crest when the thread major diameter is at minimum size (see Figure 8). 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 2 may be increased by one-half of the difference between the minimum major diameter and the actual major diameter as measured on the part.

3.7.2 Microscopic Examination

Specimens cut from parts shall be polished, etched in Kalling's reagent (100 cm^3 of absolute ethyl alcohol, 100 cm^3 of hydrochloric acid (sp gr 1.19), and 5 g of cupric chloride), Marble's reagent (20 cm^3 of hydrochloric acid (sp gr 1.19), 20 cm^3 of water, and 4 g of cupric sulfate pentahydrate), or other suitable etchant, and examined at not lower than 100X magnification to determine conformance to the requirements of 3.7.1.3, 3.7.2.1, and 3.7.2.2.

3.7.2.1 Microstructure

Parts shall have microstructure of tempered martensite.

3.7.2.2 Surface Hardening

Parts shall have no change in hardness from core to surface except as produced during cold working of the head-to-shank fillet radius, when specified, and during rolling of threads. Parts shall show no evidence of carburization or nitriding. In case of dispute over the results of the microscopic examination, microhardness testing in accordance with NASM1312-6 shall be used as a referee method; a Vickers hardness reading within 0.003 in of an unrolled surface which exceeds the reading in the core by more than 30 points shall be evidence of nonconformance to this requirement.

3.7.3 Magnetic Particle Inspection

Parts shall be subject to magnetic particle inspection in accordance with ASTM E 1444: any method may be used but resolution of disputed rejections shall be based upon the wet, continuous, fluorescent suspension method using amperages shown in 3.7.3.3.

3.7.3.1 The following conditions shall be cause for rejection of parts inspected.

3.7.3.1.1 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 quench cracks.

3.7.3.1.2 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.

3.7.3.2 The following conditions shall be considered acceptable on parts inspected.

3.7.3.2.1 Parts having longitudinal indications (i.e., at an angle of 10 degrees or less to the axis of the shank) of seams, forming laps, and nonmetallic inclusions parallel to the grain flow that are within the limits specified in 3.7.3.2.2 through 3.7.3.2.5 provided the separation between indications in all directions is not less than 0.062 in.

3.7.3.2.2 Sides of Head

There shall be not more than six surface or subsurface 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 in or the equivalent of the basic thread height (see Table 2), whichever is less.

3.7.3.2.3 Shank or Stem

There shall be not more than 10 subsurface and hairline surface 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.

3.7.3.2.4 Threads

There shall be no indications, except as permitted in 3.7.1.3.

3.7.3.2.5 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 in, as shown by sectioning representative samples. No indication, except those of 3.7.3.2.2, shall break over an edge.

3.7.3.3 Procedures

3.7.3.3.1 Circular Magnetization

A current of 800 to 1000 A per in^2 of contact area passed through the part longitudinally.

3.7.3.3.2 Longitudinal Magnetization

Sufficient to produce 5000 A-turns per inch of shank diameter with the part placed in a standard solenoid of appropriate size.

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 Responsibility for Compliance

The manufacturer's system for parts production shall be based on preventing product defects, rather than detecting the defects at final inspection and then requiring corrective action to be invoked. An effective manufacturing in-process control system shall be established, subject to the approval of the purchaser, and used during production of parts.

4.3 Production Acceptance Tests

The purpose of production acceptance tests is to check, as simply as possible, using a method which is inexpensive and representative of the part usage, with the uncertainty inherent in random sampling, that the parts comprising a production inspection lot satisfy the requirements of this specification.

4.3.1 Tests for all technical requirements are acceptance tests and shall be performed on each Production lot. A summary of acceptance tests is specified in Table 4.

4.4 Acceptance Test Sampling

4.4.1 Material

Sampling for material composition on each heat shall be in accordance with AMS5616.

4.4.2 Nondestructive Test - Visual and Dimensional

A random sample will be selected from each production inspection lot; the size of the sample to be as specified in Table 5. The classification of dimensional characteristics shall be as specified in Table 6. All dimensional characteristics are considered defective when out of tolerance.

4.4.3 Hardness Test (see 3.6.2)

A random sample shall be selected from each production inspection lot; the size of the sample shall be as specified in Table 7. 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 inspection lot as necessary.

4.4.4 Magnetic Particle Inspection

A random sample shall be as selected from each production inspection lot; the size of the sample shall be as specified in Table 5 and classified as in Table 6. 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 inspection lot as necessary.

4.4.5 Destructive Tests

A random sample shall be selected from each production inspection lot; the size of the sample shall be as specified in Table 7. The sample units may be selected from those that have been subjected to and passed the nondestructive tests and the magnetic particle inspection, with additional units selected at random from the production inspection lot as necessary.

4.4.6 Acceptance Quality

Of random samples tested, acceptance quality shall be based on zero defectives.

4.4.7 Test Specimens

Specimens for tensile testing of machined test specimens shall be of standard proportions in accordance with ASTM E 8 with either 0.250 in diameter at the reduced parallel gage section or smaller specimens proportional to the standard when required. 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 0.750 in and under in nominal diameter, from the center of coupons 0.800 in and under in nominal diameter or distance between parallel sides, and from mid-radius of larger parts or coupons.

4.5 Reports

The vendor of parts shall furnish with each shipment a report stating that the chemical composition of the parts conforms to the applicable material specification, showing the results of tests to determine conformance to the hardness and room temperature tensile strength requirements, and stating that the parts conform to the other technical requirements of this specification. The report shall include the purchase order number, AS7470, lot number, contractor or other direct supplier of material, part number, nominal size, and quantity.

4.6 Rejected Lots

If a production 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 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 D 3951.

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 MODERATE HEAT RESISTANT
AS7470C
PART NUMBER
LOT NUMBER
PURCHASE ORDER NUMBER
QUANTITY
MANUFACTURER'S IDENTIFICATION

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

6. ACKNOWLEDGEMENT

A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

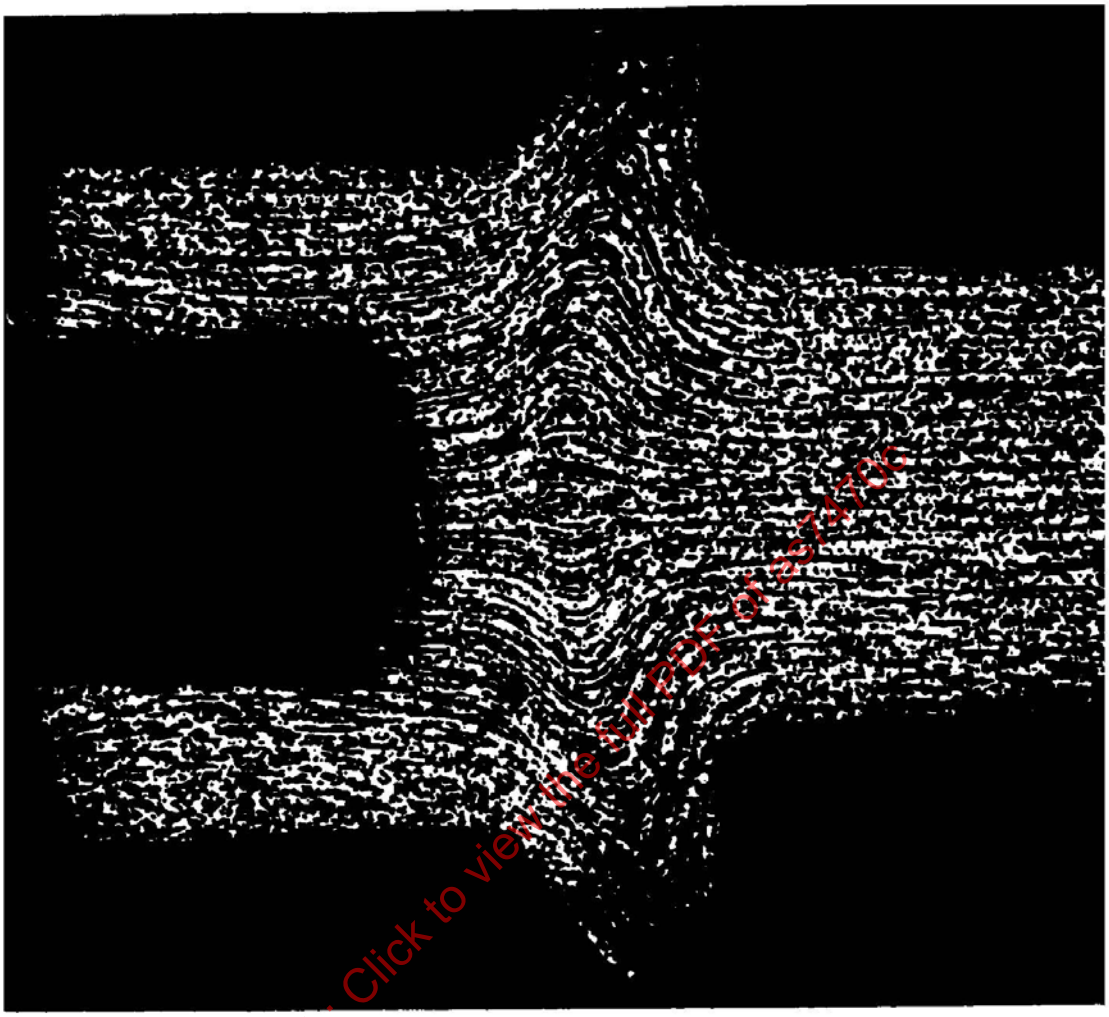
7. REJECTIONS

Parts not conforming to this specification, will be subject to rejection.

8. NOTES

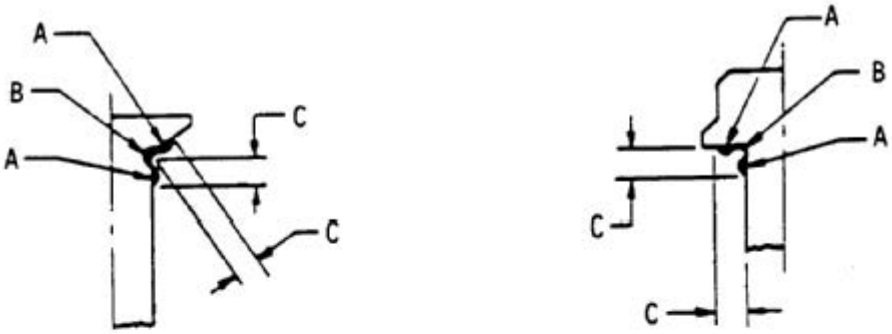
8.1 Hardness conversion tables for metals are presented in ASTM E 140.

8.2 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.



NOTE: Showing a smooth, well formed grain flow following the contour of the under head fillet radius

FIGURE 1



Nominal Bolt Diameter inch	C, maximum inch
Up to 0.3125, excl	0.062
0.3125 and 0.375	0.094
0.4375 to 0.625, incl	0.125
0.750 to 1.000, incl	0.156
Over 1.000	0.188

FIGURE 2 - Permissible Distortion From Fillet Working

FIGURE 3 – Flow Lines, Rolled Thread

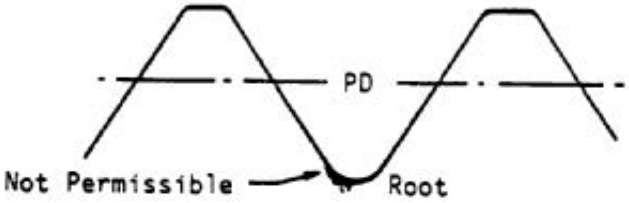


FIGURE 4 – Root Defects, Rolled Thread

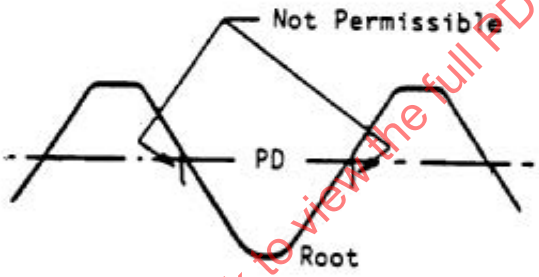


FIGURE 5 – Laps Below PD Extending Toward Root, Rolled Thread

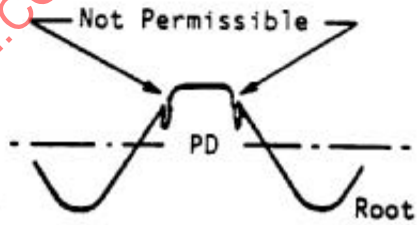


FIGURE 6 – Laps Above PD Extending Toward Root, Rolled Thread

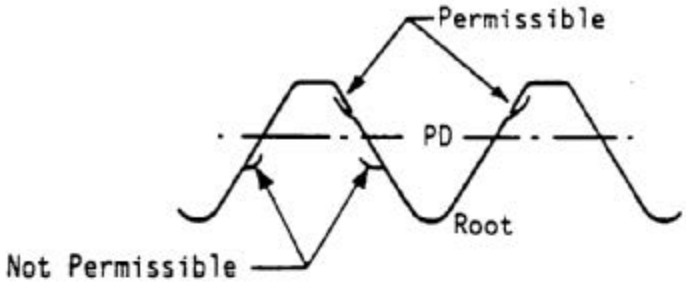
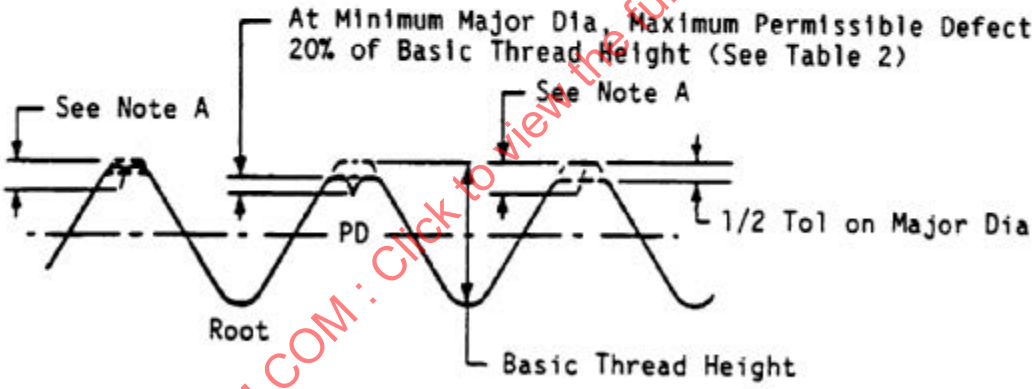


FIGURE 7 - Laps Extending Towards Crest, Rolled Thread



Note A: Depth of defect equals 20% of basic thread height plus 1/2 the difference of the actual major diameter and minimum major diameter.

FIGURE 8 - Crest Craters and Crest Laps, Rolled Thread

TABLE 2 - UNJ EXTERNAL THREAD DEPTH AT 2H/3 AND ALLOWABLE THREAD LAP DEPTH

Thread Pitches Per Inch n	UNJ Ext Thread Depth at 2H/3 inch	Allowable Thread Lap Depth 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
10	0.0677	0.0115
9	0.0642	0.0128
8	0.0722	0.0144

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:

Ext thd depth = 2H/3 = (2/3) (cos 30°)/n = 0.57735/n
Lap Depth = 0.2 (2H/3) = 0.2 (2/3) (cos 30°)/n = 0.11547/n

TABLE 3 - TEST LOADS

Thread Size	Ultimate Tensile Strength At Room Temperature Test Load lbf, minimum Standard Pitch Dia UN and UNJ Threads	Ultimate Tensile Strength at Room Temperature Test Load lbf, minimum Reduced Pitch Dia UN Threads only
0.1120-40	968	909
0.1120-48	1020	962
0.1380-32	1460	1390
0.1380-40	1570	1490
0.1640-32	2180	2090
0.1640-36	2250	2160
0.1900-32	3040	2930
0.2500-28	5430	5290
0.3125-24	8600	8420
0.3750-24	13 300	13 100
0.4375-20	18 000	17 800
0.5000-20	24 000	23 700
0.5625-18	30 500	30 100
0.6250-18	38 100	37 700
0.7500-16	55 300	54 900
0.8750-14	75 500	74 900
1.0000-12	98 400	97 800

Note 1: Requirements above apply to parts with UNC, UNF, UNJC or UNJ threads, as applicable to the sizes shown, to Class 3A tolerances, and having minimum hardness not lower than 30 HRC; requirements for reduced pitch diameter threads are based on 0.003 in reduction below standard major, pitch and minor (root) diameters. Ultimate tensile strength load is based on 140 000 psi tensile stress at room temperature. For nominal thread major diameter 0.3125 in and smaller, area upon which stress is based is 98% of the maximum pitch diameter, calculated from Equation 1: