SAE INTERNATIONAL

AEROSPACE STANDARD

AS7473™ REV. D

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Revised 2020-08

Superseding AS7473C

Bolts and Screws, Roll Threaded Procurement Specification for

FSC5306

RATIONALE

Paragraph added to show definition for a rateable lap. Paragraphs also modified to bring into line with existing standards.

1. SCOPE

1.1 Types

This procurement specification covers bolts and screws made from carbon steels, high expansion steels, or corrosion and heat resistant steels of the type identified under the Unified Numbering System as follows:

a. UNS K00802: Carbon steel (AMS5061).

b. UNS K91505: High expansion steel (AMS5624).

c. UNS K91456: High expansion steel (AMS5625).

d. UNS S32100: Corrosion and heat resistant steel (AMS5645).

e. UNS S34700: Corrosion and heat resistant steel (AMS5646).

1.2 Application

Primarily for parts of carbon and low alloy steels, corrosion and heat resistant steel and alloys, and high expansion steels not subjected to heat treatment during manufacture. Parts of steels such as AMS5061 are generally for use where stresses are low at moderate temperatures. Parts of corrosion and heat resistant steels and alloys such as AMS5645 or AMS5646 are generally for use at elevated temperatures where stresses are low. Parts of high expansion steels such as AMS5624 or AMS5625 are generally for use at lower temperatures where expansion approaching that of aluminum and magnesium alloys is required.

1.2.1 This specification may also be used to control the manufacture, characteristics, and quality of parts subjected to heat treatment during manufacture but the stage of manufacture at which heat treatment shall be performed, the actual heat treatment, and the mechanical properties of such parts are to be specified, where required, on the part drawing.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

For more information on this standard, visit
https://www.sae.org/standards/content/AS7473D/

1.3 Safety - Hazardous Materials

While the materials, methods, 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.

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.

AMS5061	Steel, Low Carbon, Bars, and Wire, 0.08 to 0.20 C
AMS5624	Steel Bars, High Expansion, 4.5Mn - 4.0Cr - 12.5Ni (0.50-0.60C), Cold Finished
AMS5625	Steel Bars, High Expansion, 9.5Ni - 5.5Mn (0.55-0.65C), Cold Finished
AMS5645	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings, 18Cr - 10Ni - 0.40Ti (SAE 30321), Solution Heat Treated
AMS5646	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings, 18Cr - 11Ni - 0.60Cb (SAE 30347), 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 U.S. Military Specifications and Standards

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

MIL-STD-2073-1	DoD Materiel, Procedures for Development and Application of Packaging Requirements

2.1.3 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 Fastener Test Methods

NASM1312-6 Fastener Test Methods, Method 6, Hardness

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

NASM1312-12 Fastener Test Methods, Method 12, Thickness of Metallic Coatings

2.1.4 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)

2.1.5 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 E8/E8M Tension Testing of Metallic Materials

ASTM E1444/E1444M Magnetic Particle Examination

ASTM E1417/E1417M Liquid Penetrant Inspection

2.2 Definitions

Refer to AS6416.

2.3 Unit Symbols

A Ampere

°F Degree Fahrenheit

cm^3 Cubic centimeter

g Gram

in^2 Square inch

% Percent (1% = 1/100)

ksi Kips (1000 pounds) per square inch

min Minute of time

sp gr Specific gravity

HRC Hardness, Rockwell C scale

3. TECHNICAL REQUIREMENTS

3.1 Material

Unless otherwise specified on the part drawing, the material shall be as selected from Table 1 and 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 dry 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

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

3.2.3.1 Incomplete Threads

Incomplete threads 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

AMS5061, AMS5645, and AMS5646 heads shall be formed by hot forging, cold forging, or machining. AMS5624 and AMS5625 heads shall be formed by hot 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 dimensions to exceed the specified limits.

3.3.2 Oxide and Decarburization Removal

Surface oxide and oxide penetration, and decarburization resulting from prior heat treatment shall be removed from the full body diameter and bearing surface of the head prior to cold working the fillet radius when specified and rolling the threads. The oxide and decarburization removal process shall produce no intergranular attack or corrosion of the blanks.

3.3.3 Cold Working of Fillet Radius

After removal of oxide and decarburization as in 3.3.2, the head-to-shank fillet radius of headed parts having the radius complete throughout the circumference of the part shall, when specified, be cold worked 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 inch above the contour at “A” or depress metal more than 0.002 inch 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 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 Thread Rolling

Threads shall be formed on the finished blanks by a single rolling process after removal of oxide and decarburization as in 3.3.2 and after heat treatment if performed.

3.3.5 Cleaning

Parts of AMS5061, AMS5624, and AMS5625, after finishing, shall be degreased and cleaned in a suitable solvent. Parts of AMS5645 and AMS5646 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 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 additional verification requirements (such as salt spray).

3.4 Product Marking

Each part shall be identification marked as specified on the part drawing. The markings may be formed by forging or stamping, raised or depressed 0.010 inch maximum, with rounded root form on depressed characters.

3.5 Plating

Where required, any protective treatment shall be as specified on the part drawing. Thickness determined in accordance with MIL-STD-1312-12 in accordance with NASM1312-12.

3.6 Mechanical Properties

Parts shall conform, as applicable, to the requirements of 3.6.1, 3.6.2, and 3.6.3. Threaded members of gripping fixtures for tests requiring tensile loads 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 a minimum two to three full thread turns from the thread runout exposed between the loading fixtures during the test wherein tensile loading is applied. Finished parts shall be tested for the following requirements 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 For AMS5061, AMS5645, and AMS5646, mechanical properties shall be as specified on the part drawing.

3.6.2 Ultimate Tensile Strength at Room Temperature

AMS5625 finished parts 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. 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 tensile strength requirements of 3.6.2.1; for such parts, the diameter of the area on which stress is based shall be the actual measured minimum diameter of the part.

3.6.2.1 Machined 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 4.4.6. Specimens may be required by purchaser to perform confirmatory tests. Specimens shall meet the following requirements:

a. Ultimate tensile strength, minimum: 125 ksi.

b. Yield strength at 0.2% offset, minimum: 100 ksi.

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

d. Reduction of area, minimum: 20%.

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

3.6.3 Hardness

Hardness at mid-radius of unthreaded shank cross-section for AMS5624 and AMS5625 parts shall be as follows:

a. AMS5624: 27 to 38 HRC.

b. AMS5625:

1. Nominal diameter up to 1.0 inch, incl: 25 to 36 HRC.

2. Nominal diameter over 1.0 inch: 24 to 36 HRC.

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 the usage of the parts.

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) and 50% water, or other suitable etchant, for sufficient time to reveal flow lines but not longer than 15 minutes, and then be examined at a magnification of approximately 20X to determine conformance to the requirements of 3.7.1.1 and 3.7.1.2.

3.7.1.1 Flow Lines

3.7.1.1.1 Head-to-Shank

When required, after heading and prior to heat treatment, examination of an etched section taken longitudinally through the blank shall show flow lines in head-to-shank fillet and bearing surface which are representative of a forging process and shall follow the head contour. 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 upon 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 2).

3.7.1.2 Internal Imperfections

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 3.7.2.3.3 and 3.7.2.3.4.

3.7.2 Microscopic Examination

Specimens cut from parts shall be polished, etched, and examined at a magnification not lower than 100X to determine conformance to the requirements of 3.7.2.1 and 3.7.2.2, the etchant shall be 2% Nital for parts made of carbon or low alloy steels, and 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 for parts made of corrosion and heat resistant steels and alloys and at 200X magnification to determine conformance to the requirements of 3.7.2.3

3.7.2.1 Surface Hardening

Except for parts whose strength is obtained only by cold working, parts shall have no change in hardness from core to surface of the fastener 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 results of the microscopic examination, microhardness testing in accordance with MIL-STD-1312-6 in accordance with NASM1312-6 shall be used as a referee method; a Vickers hardness reading within 0.003 inch of an unrolled surface which exceeds the reading in the core by more than 30 points shall be evidence of nonconformance to this requirement. An equivalent Knoop hardness teat may be used.

3.7.2.2 Decarburization

Parts made of carbon or low alloy steels shall not be decarburized more than the following:

3.7.2.2.1 The bearing surface of the head, the head-to-shank fillet radius, the shank, and the threads shall be free from decarburization.

3.7.2.2.2 Depth of decarburization on those surfaces of the head which are the original surfaces of the bar shall be not greater than that permitted by the applicable material specification.

3.7.2.2.3 Depth of decarburization on OD of the head of cylindrical head parts made by upsetting is not restricted.

3.7.2.2.4 Depth of decarburization at any point on the surface not covered by 3.7.2.2.1, 3.7.2.2.2, or 3.7.2.2.3 shall not exceed 0.002 inch.

3.7.2.3 Threads

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

3.7.2.3.2 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 and 5).

3.7.2.3.3 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.

3.7.2.3.4 There shall be no laps along the flank of the thread below the pitch diameter (see Figure 6). A single lap is permissible along the flank of the thread above the pitch diameter on either the pressure or nonpressure flank (one lap at any cross-section through the thread), provided it extends toward the crest and is generally parallel to the flank (see Figure 6).

3.7.2.3.5 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 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.

3.7.3 Nondestructive Inspection

3.7.3.1 Parts shall be subject to nondestructive inspection in accordance with the following procedures, as applicable:

3.7.3.1.1 Magnetic Particle Inspection

Parts of magnetic material shall be inspected in accordance with ASTM E1444/E1444M; any method may be used, but resolution of disputed rejections shall be based upon the wet, continuous, fluorescent suspension method using amperages specified in 3.7.3.1.1.1 and 3.7.3.1.1.2.

3.7.3.1.1.1 Circular Magnetization

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

3.7.3.1.1.2 Longitudinal Magnetization

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

3.7.3.1.2 Fluorescent Penetrant Inspection

Parts of nonmagnetic material shall be fluorescent penetrant inspected in accordance with ASTM E 1417/E1417M; any required plating shall be removed for this inspection.

3.7.4 Nondestructive Inspection Criteria

3.7.4.1 Nonacceptable Conditions

The following conditions shall be cause for rejection of parts inspected by either magnetic particle or fluorescent penetrant inspection procedures:

3.7.4.1.1 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.

3.7.4.1.2 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 nonmetallic inclusions.

3.7.4.2 Magnetic Particle Inspection Criteria

Parts inspected by magnetic particle inspection shall be considered acceptable if 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 following limits, provided that the separation between indications in all directions is not less than 0.062 inch.

3.7.4.2.1 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 inch or the equivalent of the basic thread height (see Table 2), whichever is less.

3.7.4.2.2 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.

3.7.4.2.3 Threads

There shall be no indications, except as permitted in 3.7.2.3:

3.7.4.2.4 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, except those of 3.7.4.2.1, shall break over an edge.

3.7.4.3 Fluorescent Penetrant Inspection Criteria

Parts inspected by fluorescent penetrant inspection shall be considered acceptable if longitudinal indications (i.e., at an angle of 10 degrees or less to the axis of the shank) of seams and forming laps parallel to the grain flow are within the following limits, provided the separation between indications is not less than 0.062 inch in all directions.

3.7.4.3.1 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 basic thread height (see Table 2), whichever is less.

3.7.4.3.2 Shank or Stem

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.

3.7.4.3.3 Threads

There shall be no indications, except as permitted in 3.7.2.3.

3.7.4.3.4 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, except those of 3.7.4.3.1, 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 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 inspection lot. A summary of acceptance tests is specified in Table 4.

4.4 Acceptance Test Sampling

4.4.1 Material

In accordance with the applicable material specification.

4.4.2 Nondestructive Test - Visual and Dimensional

A random sample of parts shall be taken 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 Nondestructive Inspection

A random sample shall be 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.

4.4.4 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 nondestructive inspection, with additional units selected at random from the production inspection lot as necessary.

4.4.5 Acceptance Quality

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

4.4.6 Test Specimens

Specimens for tensile testing of machined test specimens shall be of standard proportions in accordance with ASTM E8/E8M with either 0.250 inch 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 inch and under in nominal diameter, from the center of coupons 0.800 inch and under in nominal diameter or distance between parallel sides, and from mid-radius of larger size 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 mechanical properties and stating that the parts conform to the other technical requirements. This report shall include the purchase order number, AS7473D, lot number, contractor or other direct supplier of material, part number, nominal size, and quantity.

4.6 Rejected Lots

If a production inspection 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 4. Resubmitted lots shall be clearly identified as reinspected lots.

5. PREPARATION FOR DELIVERY

5.1 Packaging and Identification

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

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

FASTENERS, ROLL THREADED
AS7473D
PART NUMBER
LOT NUMBER
PURCHASE ORDER NUMBER
QUANTITY
MANUFACTURER'S IDENTIFICATION

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

5.1.4 Containers of parts shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.

5.1.5 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-2073-1, industrial packaging, unless Level A is specified in the request for procurement.

6. ACKNOWLEDGMENT

A vendor 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

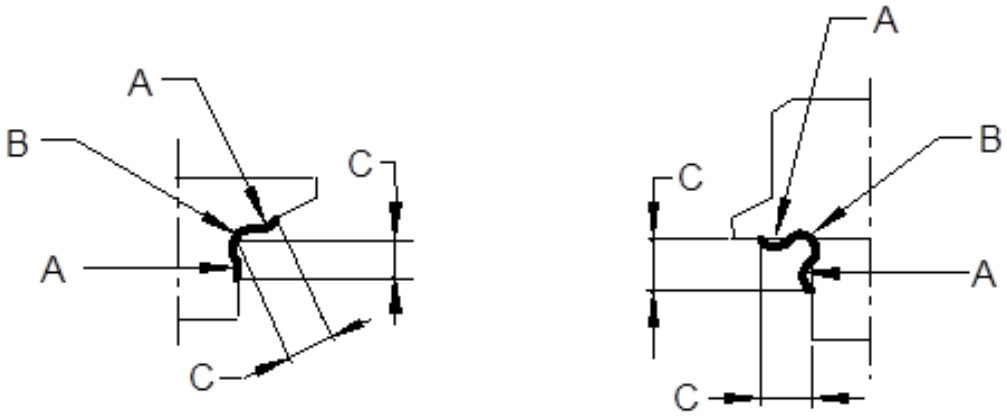
8.1 Direct U.S. Military Procurement

Purchase documents should specify the following:

Title, number, and date of this specification
Part number of parts desired
Quantity of parts desired
Level A packaging, if required (see 5.1.5)

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	C Max
Up to 0.3125	0.062
0.3125 and 0.375	0.094
0.4375 to 0.625	0.125
0.750 to 1.000	0.156
Over 1.000	0.188

Figure 1 - Permissible distortion from fillet working

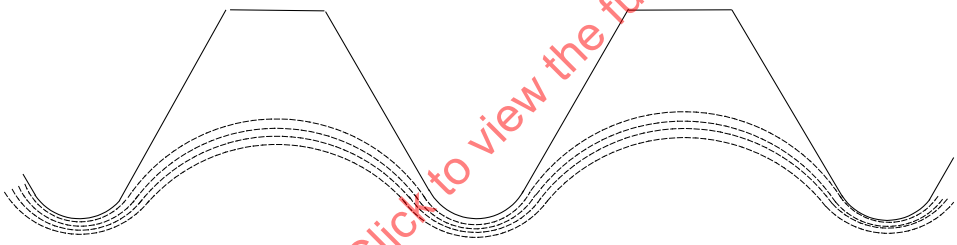


Figure 2 - Flow lines, rolled thread

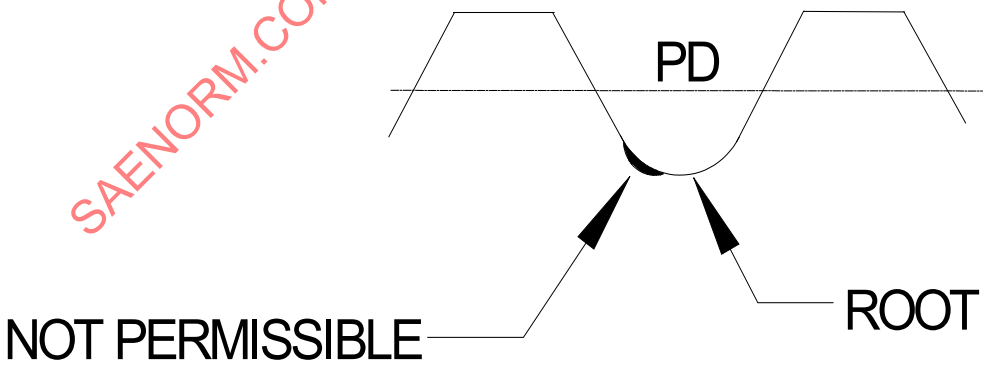


Figure 3 - Root defects, rolled thread

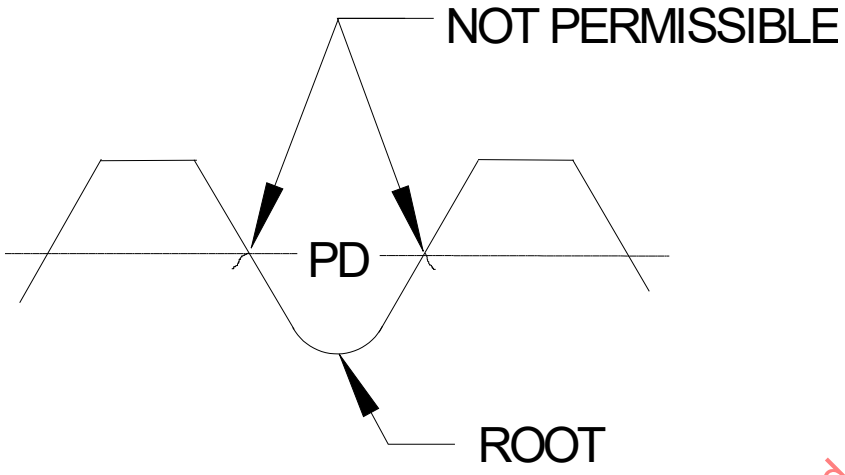


Figure 4 - Laps below PD extending toward root, rolled thread

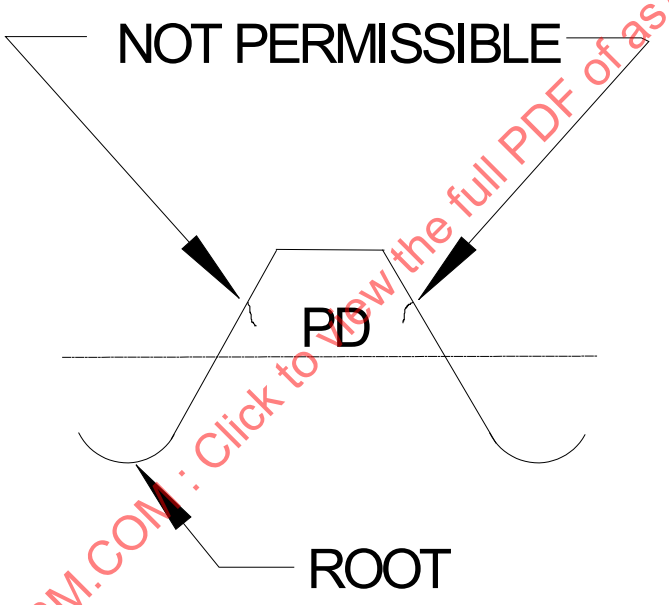


Figure 5 - Laps above PD extending toward root, rolled thread

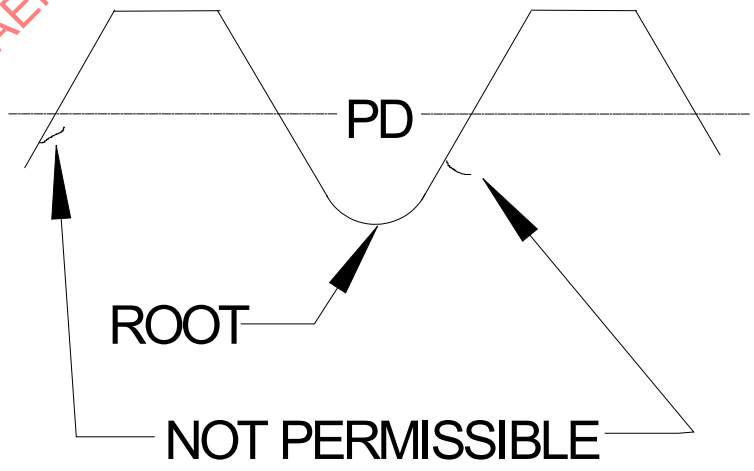
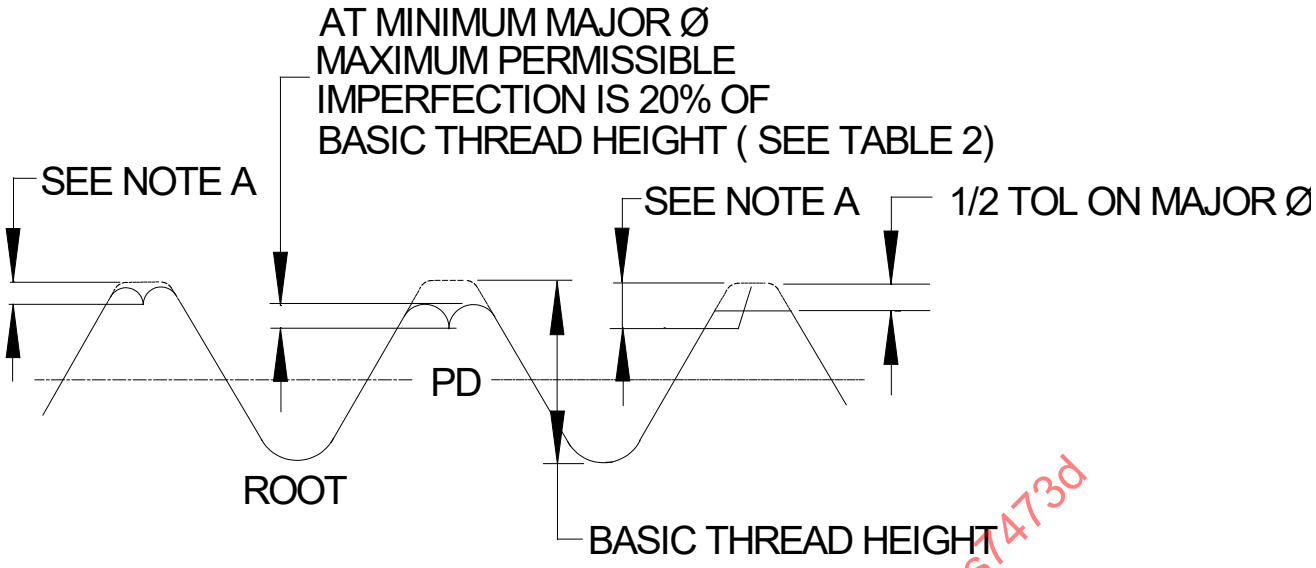


Figure 6 - Laps below PD extending in any direction, rolled thread



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 - Material

Fastener Material	Material Type
AMS5061	Carbon steel
AMS5624	Alloy steel, high expansion
AMS5625	Alloy steel, high expansion
AMS5645	Corrosion and heat resistant steel
AMS5646	Corrosion and heat resistant steel

Table 2 - Thread height

Thread Pitches per Inch n	Basic Thread Height Ref (See Note 1) Inch	20% Basic Thread Height Inch
80	0.0081	0.0016
72	0.0090	0.0018
64	0.0102	0.0020
56	0.0116	0.0023
48	0.0135	0.0027
44	0.0148	0.0030
40	0.0163	0.0033
36	0.0181	0.0036
32	0.0203	0.0041
28	0.0232	0.0046
24	0.0271	0.0054
20	0.0325	0.0065
18	0.0361	0.0072
16	0.0406	0.0081
14	0.0464	0.0093
13	0.0500	0.0100
12	0.0542	0.0108
11	0.0591	0.0118
10	0.0650	0.0130
9	0.0722	0.0144
8	0.0813	0.0163

NOTE 1: Basic thread height is defined as being equivalent to 0.650 times the pitch, where pitch equals 1/n.