AEROSPACE STANDARD

AS5270™	REV. A
Issued 2013-09	
Revised 2020-08	
Superseding AS5270	

(R) Bolts, Screws and Studs, Nickel Alloy, UNS N07718
Work-Strengthened, Tensile Strength 220 ksi
Procurement Specification

FSC 5306

RATIONALE

Most paragraphs have been modified, AS6416 added. Paragraphs 3.7.2.6.2 and 3.7.2.6.3 added, all figures have been redrawn for clarity.

1. SCOPE

1.1 Type

This procurement specification covers bolts, screws, and studs made from a work-strengthened corrosion and heat resistant, age hardenable nickel base alloy of the type identified under the Unified Numbering System as UNS N07718. The following properties are covered:

220 ksi minimum ultimate tensile strength at room temperature
180 ksi minimum ultimate tensile strength at 900 °F
114 ksi tension to 11.4 ksi tension fatigue at room temperature

1.2 Application

Primarily for aerospace propulsion systems applications where a good combination of tensile strength, fatigue strength, resistance to relaxation, and shear strength is required for use up to approximately 900 °F.

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 take necessary precautionary measures to ensure the health and safety of all personnel involved.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
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For more information on this standard, visit
https://www.sae.org/standards/content/AS5270A/

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.

AMS2750 Pyrometry

AMS5662 Nickel Alloy, Corrosion and Heat-Resistant, Bars, Forgings, and Rings, 52.5Ni - 19Cr - 3.0Mo - 5.1Cb (Nb) - 0.90Ti - 0.50Al - 18Fe, Consumable Electrode or Vacuum Induction Melted, 1775 °F (968 °C) Solution Heat Treated, Precipitation-Hardenable

AMS5962 Nickel Alloy, Corrosion and Heat-Resistant, Round Bars and Wire, 52.5Ni - 19Cr - 3.0Mo - 5.1Cb - 0.90Ti - 0.50Al - 18Fe, Consumable Electrode or Vacuum Induction Melted, 1775 °F (968 °C) Solution Treated and Work Strengthened, Precipitation Hardenable

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 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 D3951 Standard Practice for Commercial Packaging

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

ASTM E21 Standard Test Methods for Elevated Temperature Tension of Metallic Materials

ASTM E112 Standard Test Methods for Determining Average Grain Size

ASTM E1417/E1417M Standard Practice for Liquid Penetrant Examination

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.

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

NASM1312-11 Fastener Test Methods, Method 11, Tension Fatigue

NASM1312-18 Fastener Test Methods, Method 18, Elevated Temperature Tensile Strength

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)

2.2 Definitions

Refer to AS6416.

2.3 Unit Symbols

°	degree, angle
°C	degree, Celsius
°F	degree, Fahrenheit
HRC	hardness Rockwell C scale
lbf	pounds force
%	percent (1% = 1/100)
sp gr	specific gravity
ksi	kips (1000 pounds) per square inch

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be AMS5962 or AMS5662 heading stock sufficiently cold worked to meet the mechanical property requirements of this specification.

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 Screw 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 are permissible 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

3.3.1.1 Bolts and Screws

Heads shall be formed by hot or cold forging; machined heads are not permitted, except lightening holes and wrenching recess may be forged or machined. Flash or chip clearance in machined recesses shall not cause recess dimensions to exceed the specified limits.

3.3.1.2 Studs

Blanks may be machined from bar stock. The smaller diameter or nut end of blanks for stepped studs may be reduced as necessary; the larger diameter or stud end may be upset. For shoulder studs and double ended bolts, material shall be swaged so that flow lines follow approximate configuration of shoulder and transverse axis of flow lines occur at approximate center of shoulder.

3.3.2 Heat Treatment

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

3.3.2.1 Heating Equipment

Furnaces may be any type ensuring uniform temperature throughout the blanks being heated and shall be equipped with, and operated by, automatic temperature controllers. Pyrometry shall be in accordance with AMS2750. The heating medium or atmosphere shall cause no surface hardening.

3.3.2.2 Precipitation Heat Treatment

After heading (extruding, upsetting, and swaging) as applicable, the blanks shall be precipitation heat treated by heating to 1325 °F ± 15 °F in a controlled atmosphere, holding at heat for 8 hours ± 0.25 hour, furnace cooling at 100 °F ± 15 °F per hour to 1150 °F ± 15 °F, holding at 1150 °F ± 15 °F for 8 hours ± 0.25 hour and cooling at a rate equivalent to air cool. Instead of the 100 °F per hour cooling rate to1150 °F ± 15 °F the blanks maybe furnace cooled at any rate provided the time at 1150 °F ± 15 °F is adjusted to give a total precipitation heat treatment time of approximately 18 hours.

3.3.3 Oxide Removal

Prior to cold working the underhead fillet radius and rolling the threads, 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. 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 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. In configurations having an undercut connected with the fillet radius, the cold rolling 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. 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 fillet arc, starting at the point of tangency of the fillet radius and the shouldered surface of the unthreaded shank, the shank diameter on full shank close tolerance bolts shall not exceed its maximum diameter limit after cold rolling the head to shank fillet radius.

3.3.5 Thread Rolling

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

3.3.6 Cleaning

Parts, before finishing, shall be cleaned in one of the following solutions for the time and temperature shown and then throughly rinced:

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

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

c. One volume of nitric acid (sp gr 1.42) and 4 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 Product Marking

Unless otherwise specified, 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 inch maximum, with rounded root form on depressed characters.

3.5 Plating

Where required, surfaces shall be plated or coated as specified by the part drawing; plating or coating thickness shall determined in accordance with the requirements of the plating or coating specification.

3.6 Mechanical Properties

Parts shall conform to the requirements of 3.6.1, 3.6.2, and 3.6.3. Threaded members of gripping fixtures for tensile and fatigue tests shall be of sufficient size and strength to develop the full strength of the part without stripping the thread.

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

a. Ultimate Tensile Strength at Room Temperature MIL-STD-1312-8 in accordance with NASM1312-8

b. Ultimate Tensile Strength at 900 °F MIL-STD-1312-18 in accordance with NASM1312-18

c. Fatigue Strength at Room Temperature MIL-STD-1312-11 in accordance with NASM1312-11

3.6.1 Ultimate Tensile Strength at Room Temperature

3.6.1.1 Finished Parts

Tension studs and tension bolts, such as hexagon, double hexagon, and spline drive heads, 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. 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; screws need not be tested to failure, however the maximum tensile load achieved shall be measured and recorded. 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 minimum pitch diameter or having an undercut, parts shall have an ultimate tensile strength not lower than 220 ksi; for such parts, the diameter of the area on which stress is based shall be the actual measured minimum diameter of the part. Tension fasteners with either standard hexagon, double hexagon, or spline drive type 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.

3.6.1.2 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 4.5.7. Such specimens shall meet the following requirements:

a. Ultimate Tensile Strength 220 ksi

b. Yield Strength at 0.2% Offset, minimum 200 ksi

c. Elongation in 4D, minimum 8%

d. Reduction of Area, minimum 15%

3.6.2 Ultimate Tensile Strength at 900 °F

3.6.2.1 Finished Parts

Tension bolts and studs heated to 900 °F ± 5 °F, held at heat for 30 minutes before testing, and tested at 900 °F ± 5 °F, shall have an ultimate tensile load not lower than the value 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. 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 minimum pitch diameter or having an undercut, parts shall have an ultimate tensile strength not lower than 180 ksi; for such parts, the diameter of the area on which stress is based shall be the actual measured minimum diameter of the part. Tension fasteners with either standard hexagon, double hexagon, or spline drive type 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. Screws, such as 100 degree flush head, pan head, and fillister head, are not required to be tested for tensile strength at 900 °F.

3.6.2.2 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 E21 on specimens as in 4.5.7, such specimens shall meet the following requirements when heated to 900 °F ± 5 °F, held at heat for not less than 30 minutes before testing, and tested at 900 °F ± 5 °F:

a. Ultimate Tensile Strength, minimum 180 ksi

b. Yield Strength at 0.2% Offset, minimum 150 ksi

c. Elongation in 4D, minimum 10%

d. Reduction of Area, minimum 15%

3.6.2.3 Fatigue Strength

Finished tension bolts and studs tested in tension-tension fatigue at room temperature with maximum load as specified in Table 2A and minimum load equal to 10% of maximum load shall have average life of not less than 65000 cycles with no part having life less than 45000 cycles. Tests need not be run beyond 130000 cycles. Life of parts which do not fail in less than 130000 cycles shall be taken as 130000 cycles for purposes of computing average life. If the shank diameter of the bolt or stud is less than the minimum pitch diameter of the thread, bolts and studs shall withstand fatigue testing as above using loads sufficient to produce a maximum stress of 114.4 ksi and a minimum stress of 11.44 ksi. The above requirements apply to tension studs and tension bolts, such as hexagon, double hexagon and spline drive heads per design parameters specified in AS1132, 0.1900 inch and larger in nominal thread size, having a head-to-shank fillet radius equal to or larger than that specified inAS1132 , and not having an undercut; for all parts to which the above requirements do not apply, fatigue test requirements shall be as specified on the part drawing.

3.7 Quality

Parts shall be uniform in quality and condition, free from burrs (tight burrs may be acceptable if part performance is not affected), foreign materials, and from imperfections detrimental to the usage of the part.

3.7.1 Macroscopic Examination, Headed Blank

A specimen cut from a headed blank shall be etched in a suitable etchant and examined at a magnification of 20X to determine conformance to the requirements of 3.7.1.1 and 3.7.1.2.

3.7.1.1 Flow Lines

After heading and prior to heat treatment, examination of an etched section taken longitudinally through the blank 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 generally follow the head contour.

3.7.1.2 Internal Defects

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

3.7.2 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 a magnification not lower than 100X to determine conformance to the requirements of 3.7.2.1, 3.7.2.2, 3.7.2.3, 3.7.2.4, 3.7.2.5, and at 200X magnificationto determine conformance to the requirements of 3.7.2.6.

3.7.2.1 Flow Lines

Examination of a longitudinal section through the threaded portion of the shank shall show evidence that the threads were rolled. See Figure 2.

3.7.2.2 Internal Defects

Examination of longitudinal sections of the head and shank shall reveal no cracks, laps, or porosity. Thread imperfections shall conform to the requirements of 3.7.2.6.

3.7.2.3 Microstructure

Parts may have distorted grain structure indicative of cold worked material free from recrystallization in areas other than the head.

3.7.2.4 Grain Size

The grain size shall exhibit an average grain size of ASTM No. 5 or finer. Up to 20% of the cross section of the product may have an average grain size of ASTM No. 3 to 5, determined by the intercept method of ASTM E112, due to the presence of non recrystallized grains.

3.7.2.5 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 and during rolling of threads. In case of dispute over results of the microscopic examination, microhardness testing shall be used as a referee method; a Vickers hardness reading of an unrolled surface which exceeds the reading in the core by more than 30 points shall be evidence of nonconformance to this requirement.

3.7.2.6 Threads

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

3.7.2.6.2 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).

3.7.2.6.3 Single Lap on Thread Profile

Shall conform to the following:

a. Thread Flank Above the Pitch Diameter: 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 toward the crest and generally parallel to the flank (see Figure 4). The lap depth shall not exceed the limit specified in Table 1 for the applicable thread pitch. A lap extending toward the root is not permissible (see Figure 5).

b. 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.

c. Thread Flank Below the Pitch Diameter: A lap along the thread flank below the pitch diameter, regardless of direction it extends, is not permissible (see Figure 6).

d. 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 the limit specified in 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 one-half of the difference between the minimum major diameter and actual major diameter as measured on the part.

3.7.3 Fluorescent Penetrant Inspection

Prior to any required plating or coating, parts shall be subject to a 100% 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.

3.7.3.1 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 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 nonmetallic 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 and forming laps 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 is not less than 0.062 inch in all directions.

3.7.3.2.2 Sides of Head or Shoulder

There shall be not more than three indications per head or shoulder. 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.

3.7.3.2.3 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.

3.7.3.2.4 Threads

There shall be no indications, except as permitted in 3.7.2.6.

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 inch as shown by sectioning representative samples. No indication, except those of 3.7.3.2.2, 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.

4.4 Classification of Tests

Acceptance tests which are to be performed on each production inspection lot. A summary of acceptance tests is specified in Table 3.

4.5 Acceptance Test Sampling

4.5.1 Material

Sampling for material composition on each heat shall be in accordance with AMS5962 or AMS5662.

4.5.2 Non-Destructive Tests - 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 4. The classification of dimensional characteristics shall be as specified in Table 5. All dimensional characteristics are considered defective when out of tolerance.

4.5.3 Fluorescent Penetrant Inspection

All parts to be tested by Fluorescent Penetrant Inspection.

4.5.4 Macroscopic Examination

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

4.5.5 Destructive Tests

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

4.5.6 Acceptance Quality

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

4.5.7 Test Specimens

Specimens for tensile 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.

4.6 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 room temperature ultimate tensile property, and fatigue strength requirements, and stating that the parts conform to the other technical requirements of this specification. This report shall include the purchase order number, AS5270 and revision number, lot number, contractor or other direct supplier of material, part number, nominal size, and quantity.

4.7 Rejected Lots

If a production inspection lot is rejected, the vendor of parts shall perform corrective action to screen out or rework the defective parts, resubmit for acceptance tests inspection as in Table 3 or scrap the entire lot. Resubmitted lots shall be clearly identified as re-inspected 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:

FASTENERS, UNS N07718, 220 ksi, 900 °F AS5270A
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. ACKNOWLEDGMENT

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

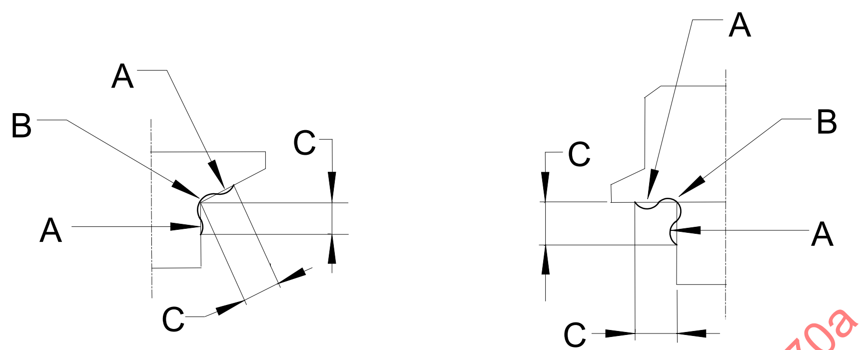
7. REJECTIONS

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

8. NOTES

8.1 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 Inch
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

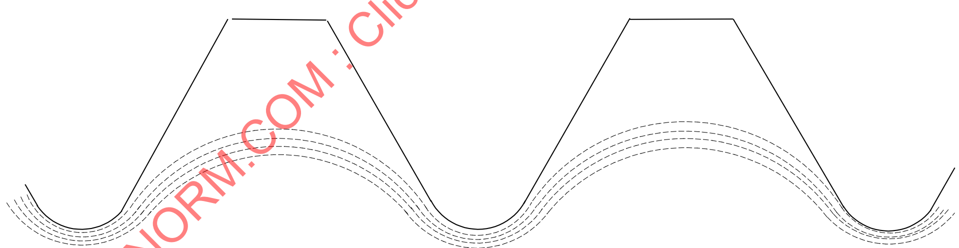


Figure 2 - Flow lines, rolled thread

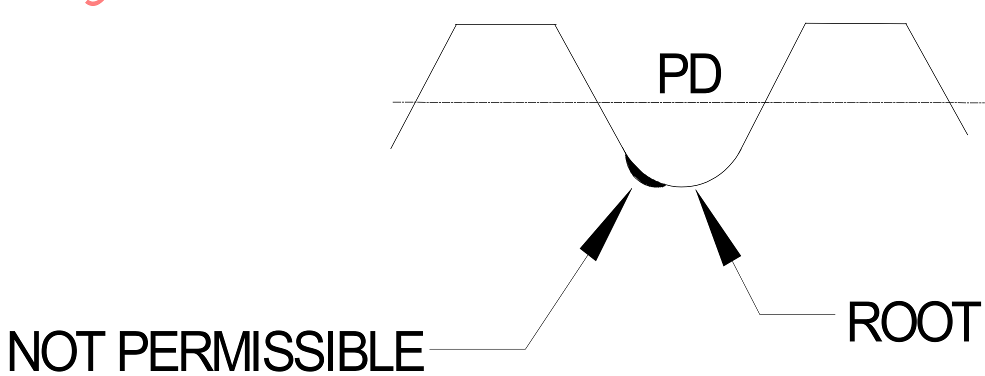


Figure 3 - Root defects, rolled thread

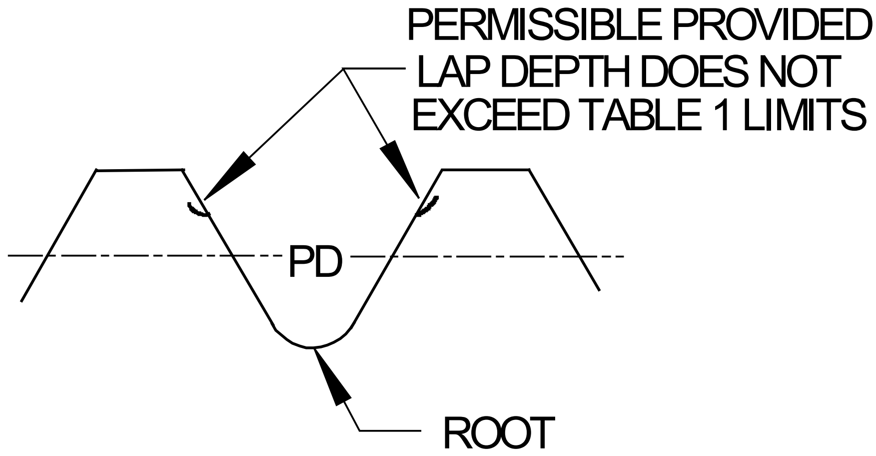


Figure 4 - Laps above pitch diameter extending towards crest, rolled thread

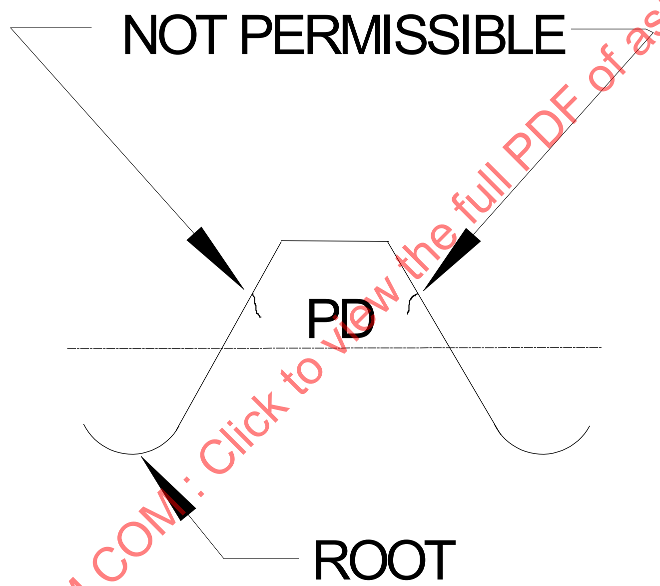


Figure 5 - Laps above pd extending toward root, rolled thread

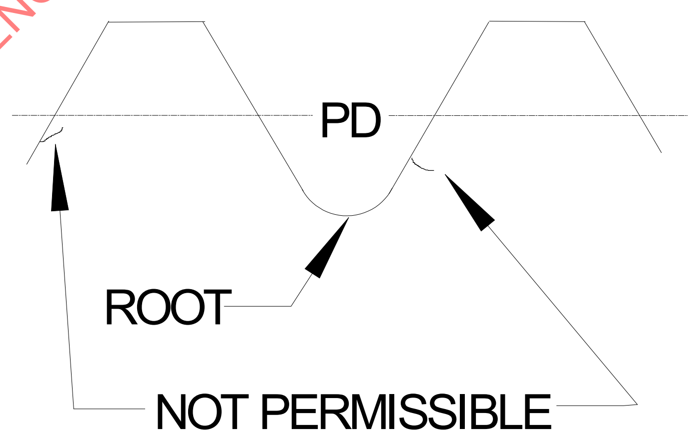
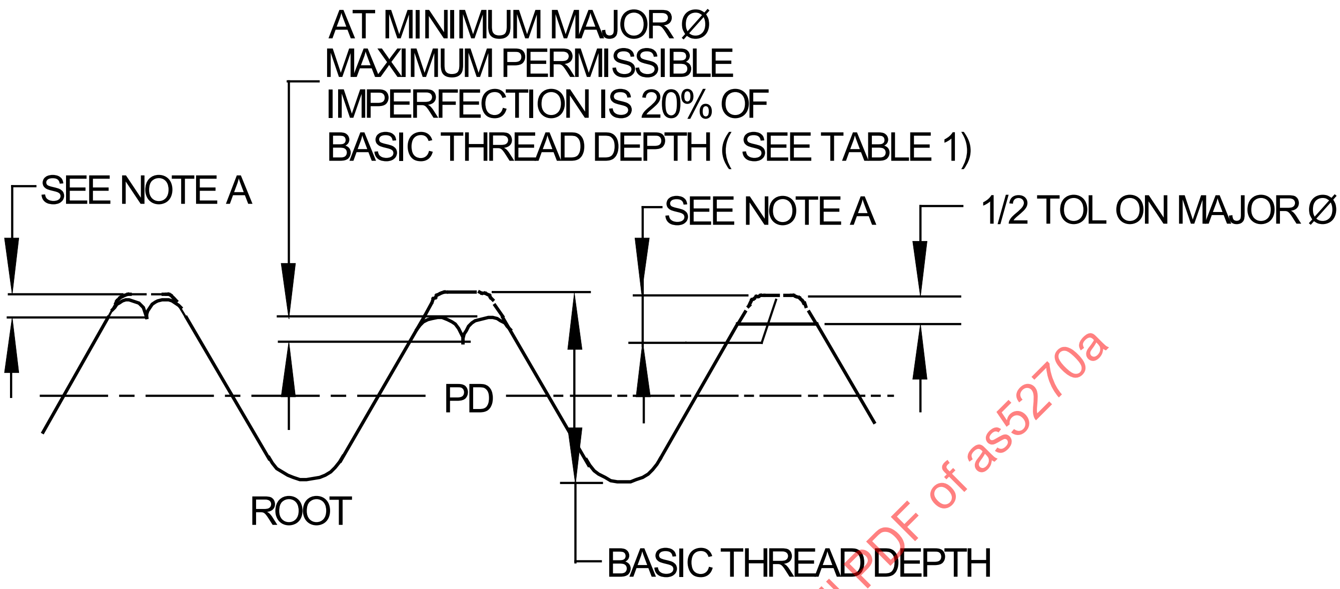


Figure 6 - Lap; below pd in any direction, rolled thread



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 ext 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	0.0577	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:

$$\text{Ext thd depth} = 2H/3 = (2/3)(\cos 30°)/n = 0.57735/n$$

$$\text{Lap Depth} = 0.2(2H/3) = 0.2(2/3)(\cos 30°)/n = 0.11547/n$$