

AERONAUTICAL MATERIAL SPECIFICATIONS

AMS 7472G

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

Issued 3-1-49
Revised 1-15-60

BOLTS AND SCREWS, STEEL, CORROSION RESISTANT Roll Threaded

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.
2. APPLICATION: High quality bolts and screws requiring corrosion resistance for use up to 700 F.
3. COMPOSITION:

		Check Analysis	
		Under Min	or Over Max

	Carbon	0.15 max	--	0.01
	Manganese	2.00 max	--	0.04
	Silicon	1.00 max	--	0.05
Ø	Phosphorus	0.040 max	--	0.005
	Sulfur	0.030 max	--	0.005
	Chromium	17.00 - 20.00	0.20	0.20
	Nickel	7.00 - 12.00	0.15	0.15

4. FABRICATION:

- 4.1 Blanks: Heads may be formed by cold upsetting or machining. When heads are machined, AMS 5637 steel shall be used.

- 4.1.1 The metal removed from the bearing surface of the head of upset-head parts shall be as little as practicable to obtain a clean, smooth surface.

- 4.2 Thread Rolling: Threads shall be formed on the finished blanks by a single rolling.

- 4.3 Heat Treatment: Parts, after thread rolling, shall be heated at 700 F \pm 10 for 3 hr, except that parts made from AMS 5637 steel need not be so heated.

- 4.4 Cleaning: Parts, after finishing, shall be degreased and then immersed for not less than 20 min. in a solution of 1 volume of nitric acid (sp gr 1.42) and 9 volumes of water at room temperature.

5. TECHNICAL REQUIREMENTS:

- 5.1 Flow Lines: Flow lines of upset heads shall conform to the general arrangement shown in Figure 1A, 1B, or 1C. The intersection of the longitudinal axis of the part and the approximate transverse axis of the flow lines shall be not less than D/4 in. from the bearing surface for hexagonal, round, and square head bolts and screws and not less than D/7 in. from the bearing surface for 12 point head bolts and screws where D is the nominal diameter of the shank after heading.

Section 7C of the SAE Technical Board rules provides that: "All technical reports including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no liability on the part of the Board or its Committees for infringement of patents or for any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against infringement of patents."

- 5.1.1 Examination for Internal Defects: Visual examination of a longitudinal section of a head and 1/4 in. or more of the shank, after etching in approximately equal volumes of hydrochloric acid (sp gr 1.19) and water at 160 - 180 F for 10 - 15 min., shall reveal no cracks, laps, or porosity.
- 5.2 Threads:
- 5.2.1 Flow lines at threads shall be continuous, shall follow the general thread contour, and shall be of maximum density at root of thread (see Figure 2).
- 5.2.2 Root defects such as notches, slivers, folds, roughness, or oxide scale are not permitted (see Figure 3).
- 5.2.3 Multiple laps on the sides of threads are not permissible regardless of location. Single laps on the sides of threads that extend toward the root are not permissible (see Figures 4 and 5).
- 5.2.4 A single lap is permissible along the side of the thread below the pitch diameter on the non-pressure side provided the lap does not originate closer than 20% of the basic thread height from the root and extends toward the crest and generally parallel to the side (see Figure 6). A single lap is permissible along the side of the thread above the pitch diameter on either the pressure or non-pressure side (one lap per thread) provided it extends toward the crest and generally parallel to the side (see Figure 7). Basic thread height is defined as being equivalent to 0.650 times the pitch (see Table I).
- 5.2.5 Crest craters, crest laps, or a crest lap in combination with a crest crater are permissible, provided the imperfection does not extend deeper than 20% of the basic thread height (see Table I) 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 crest crater or crest lap imperfections listed in Table I may be increased by 1/2 the difference between the minimum major diameter and the actual major diameter as measured on the part.
- 5.2.6 Slight deviations from thread contour are permissible at the crest of the thread within the major diameter limits as shown in Figure 9 and at the incomplete thread at each end of the threaded section.
- 5.2.7 Parts having holes for locking devices are permitted to have slight ovalization of the hole and the countersink and slight flattening of the crest of the thread at the countersink, provided the diameter of the hole is within specified tolerances.
- 5.2.8 Parts shall have a minimum thread run-out of one thread and a maximum of two threads. The run-out shall fair onto the shank eliminating any abrupt change in cross sectional area. Bottom and sides of threads contained in run-out shall be filleted, smooth, and devoid of abrupt tool stop marks.
- 5.2.9 All thread elements shall be within specified limits starting at a length 2 times the pitch from the end, including chamfer, and extending for the specified full thread length.

- 5.3 Straightness, Concentricity, and Squareness: For purposes of these inspections, shank and threads shall be included but shall be considered as separate elements of the bolt.
- 5.3.1 Straightness of Shank and Threads: Shank and threads shall be straight within the limits specified on the drawing for the total length (L) of the bolt under the head (see Figure 10). Visibly abrupt changes in diameter or shape of the shank and threads which might cause stress concentrations are not permissible.
- 5.3.2 Concentricity of Thread Pitch Diameter: The concentricity of thread pitch diameter in relation to shank diameter shall be within the limits specified on the drawing for a distance of not less than 1.5 times the nominal bolt diameter away from the last full thread along the shank (see Figure 11). For bolts having a shank length less than 1.5 times the nominal bolt diameter, the concentricity of the shank diameter over its full length in relation to the thread pitch diameter shall be within the limits specified on the drawing.
- 5.3.3 Concentricity of Head: The concentricity of the head in relation to the shank diameter shall be within the limits specified on the drawing for a distance of not less than 1.5 times the nominal bolt diameter away from the washer face along the shank (see Figure 12). For bolts threaded to the head and for bolts having shank length less than 1.5 times the nominal bolt diameter, concentricity of head shall be measured in relation to thread pitch diameter in lieu of shank diameter.
- 5.3.4 Squareness of Washer Face: The squareness of the washer face with the shank diameter shall be within the limits specified on the drawing for a distance of not less than 1.5 times the nominal bolt diameter away from the washer face along the shank (see Figure 12). For bolts threaded to the head and for bolts having a shank length less than 1.5 times the nominal bolt diameter, squareness of washer face shall be measured in relation to thread pitch diameter in lieu of shank diameter.
- 5.4 Tensile Strength: Parts shall be capable of meeting the following requirements when based on the area calculated from the mean of the maximum minor (nominal minor) and basic pitch diameters of the threads or from the shank diameter, whichever is smaller.
- 5.4.1 Proof Load: A load of 70,000 psi shall be applied between the full thread section and head for not less than 1 minute. After removing the load, the length shall not be increased more than 0.001 in. when stress area is based on the mean of the maximum minor (nominal minor) and basic pitch diameters, or not more than 0.002 in. when stress area is based on the shank diameter.
- 5.4.2 Ultimate: A load of not less than 125,000 psi shall be applied between the thread and head until failure. The reduction of area shall be not less than 20%.
6. QUALITY: Parts shall be uniform in quality and condition, clean, sound, smooth, and free from burrs and foreign materials and from internal and external imperfections detrimental to their performance.
- 6.1 Parts subject to fluorescent penetrant inspection shall conform to the following standards.

- 6.1.1 Discontinuities transverse to grainflow, such as pipes, grinding checks, and quench cracks, shall be cause for rejection.
- 6.1.2 Longitudinal indications of surface seams and forming laps parallel to grainflow are acceptable within the following limits, provided the separation between indications is not less than 1/16 in. in all directions.
- 6.1.2.1 Sides of Head: A maximum of 3 surface indications per head is permitted and the length of each indication may be the full height of the surface. No indication shall break over either edge to a depth greater than 1/32 in. or the equivalent of the basic thread height (see Table I), whichever is less.
- 6.1.2.2 Top of Head and End of Stem: A maximum of 3 surface indications in each area is permitted provided the length or diameter of any individual indication does not exceed 1/32 in. or the equivalent of the basic thread height (see Table I), whichever is less.
- 6.1.2.3 Shank or Stem: A maximum of 5 indications is permitted. The length of any one 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.
- 6.1.2.4 Threads: Threads shall not reveal indications of cracks, seams, pipes, or rolling laps as shown by Figures 3, 4, and 5 except that indications of slight laps as shown by Figures 6, 7, and 8 will be permitted.
7. REJECTIONS: Parts not conforming to this specification or to authorized modifications will be subject to rejection.

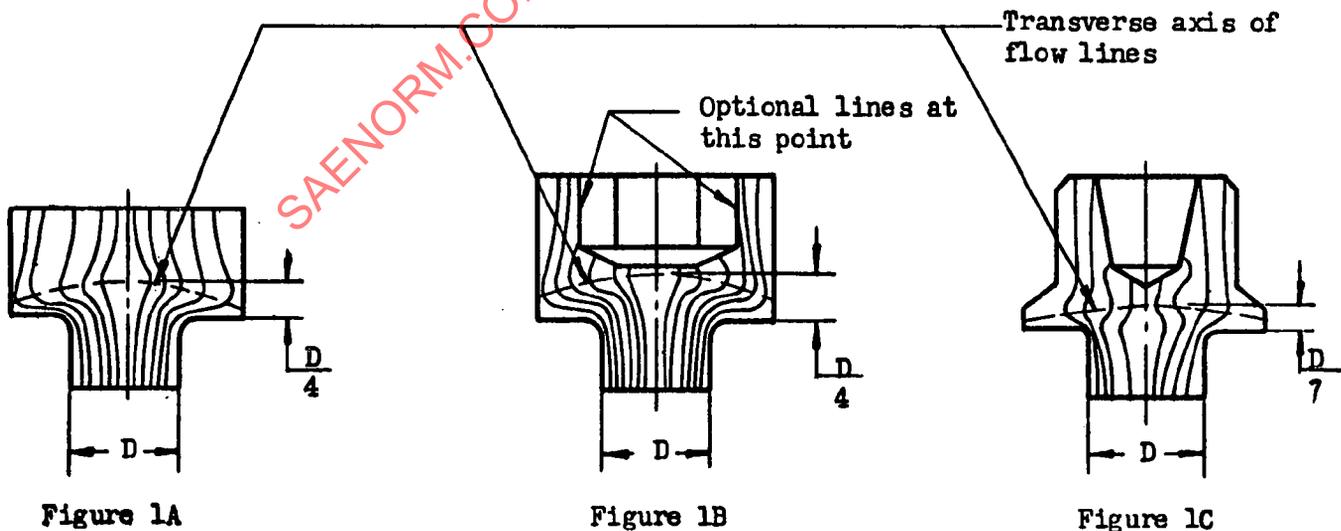




FIGURE 3
ROLLED THREAD

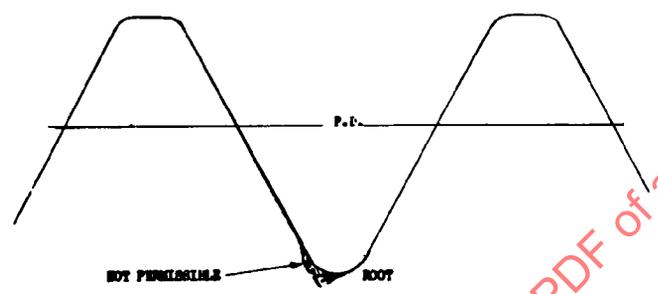


FIGURE 4
ROLLED THREAD

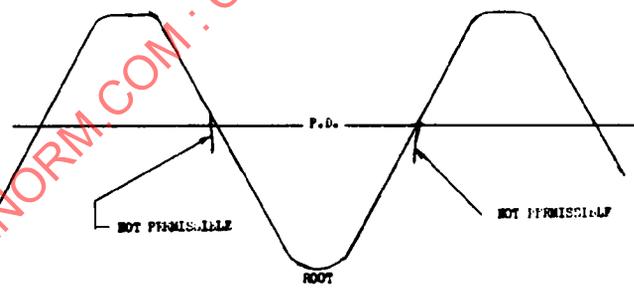


FIGURE 6
ROLLED THREAD

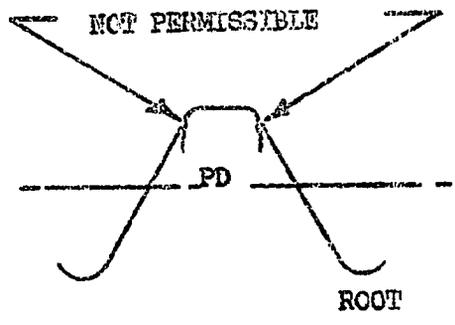
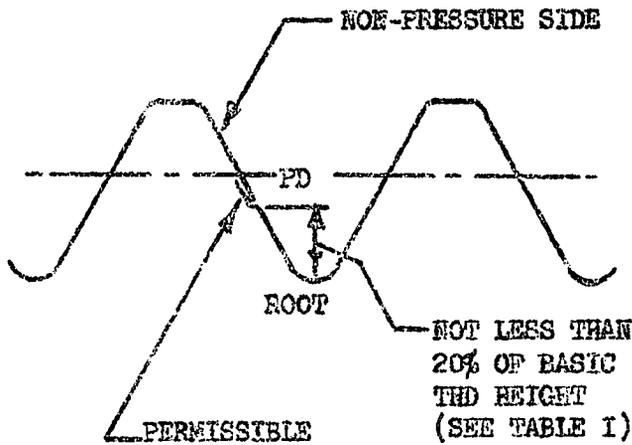
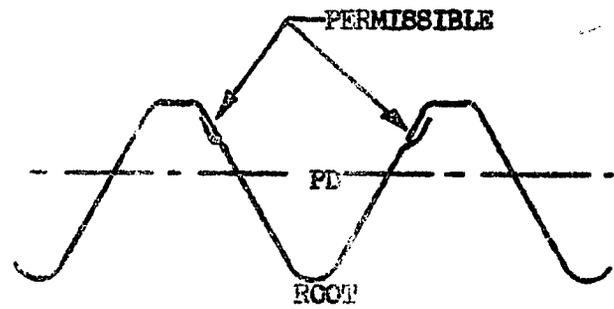


FIGURE 5
ROLLED THREAD

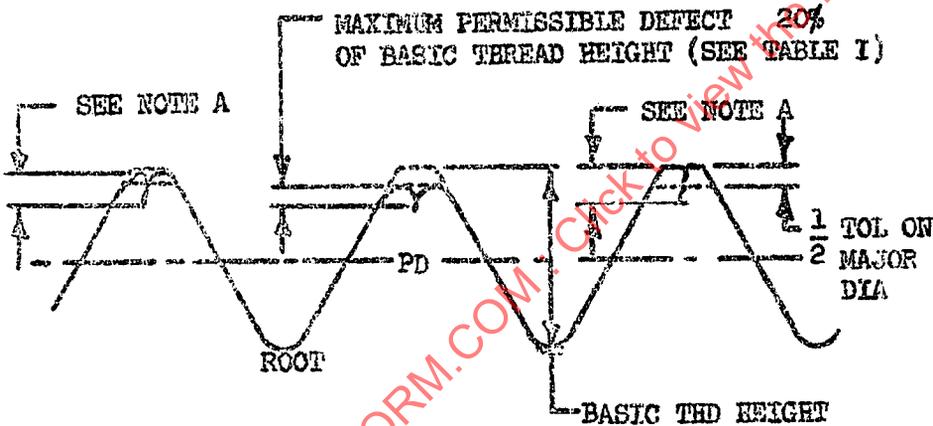
SAENORM.COM : Click to view the full PDF of ams7472g



Ø FIGURE 6
ROLLED THREAD



Ø FIGURE 7
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.

Ø FIGURE 8
ROLLED THREAD

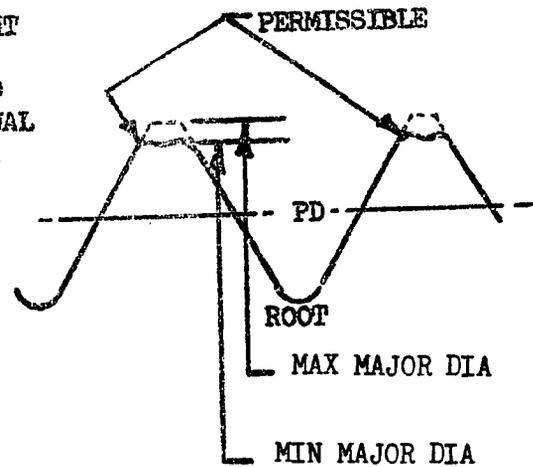


FIGURE 9
ROLLED THREAD