Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE STANDARD

AS 1177

Issued 11-1-70
Revised

NONDESTRUCTIVE INSPECTION STANDARDS FOR BOLTS AND SCREWS

1. PURPOSE: To establish the location, number, and size of imperfections which will be permitted in bolts and screws, as revealed by magnetic particle or fluorescent penetrant inspection.

2. INSPECTION STANDARDS:

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

2.1.1 Discontinuities transverse to grainflow (i.e., at an angle of more than 10 deg to the axis of the shank), such as grinding checks and quench cracks.

2.1.2 Longitudinal indications (i.e., at an angle of 10 deg or less to the axis of the shank) due to imperfections other than seams, forming laps, and nonmetallic inclusions.

2.2 Magnetic Particle Inspection: Parts inspected by magnetic particle inspection shall be considered acceptable if longitudinal indications (i.e., at an angle of 10 deg or less to the axis of the shank) of seams, forming laps, and nonmetallic inclusions parallel to the grainflow are within the following limits, provided that the separation between indications is not less than 1/16 in. in all directions:

2.2.1 Sides of Heads: 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 1/32 in. or the equivalent of the basic thread height (See Table I), whichever is less.

2.2.2 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.

2.2.3 Threads: There shall be no indications of cracks, seams, or rolling laps in threads as shown by Figs. 1, 2, and 3 except that indications of slight laps as shown by Figs. 4 and 5 will be permitted.

2.2.4 Top of Head and End of Stem: The number of indications is not restricted but the depth of any individual shall not exceed 0.010 in., as shown by sectioning representative samples. No indication, except those of 2.2.1, shall break over an edge.

2.3 Fluorescent Penetrant Inspection: Parts inspected by fluorescent penetrant inspection shall be considered acceptable if longitudinal indications (i.e., at an angle of 10 deg or less to the axis of the shank) of seams and forming laps parallel to the grainflow are within the following limits, provided that the separation between indications is not less than 1/16 in. in all directions:

2.3.1 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 1/32 in. or the equivalent of the basic thread height (See Table I), whichever is less.

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2.3.2 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.

2.3.3 Threads: There shall be no indications of cracks, seams, or rolling laps in threads as shown by Figs. 1, 2 and 3 except that indications of slight laps as shown by Figs. 4 and 5 will be permitted.

2.3.4 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 in., as shown by sectioning representative samples. No indication, except those of 2.3.1, shall break over an edge.

3. INSPECTION PROCEDURES:

3.1 Magnetic Particle Inspection: Shall be conducted in accordance with the latest issue of AMS 2640; any method may be used but resolution of disputed rejections shall be based upon the wet, residual, black oxide suspension method using amperages shown in 3.1.1 and 3.1.2.

3.1.1 Circular Magnetization: 800 - 1000 amp per sq in. of contact area, passed through the part longitudinally.

3.1.2 Longitudinal Magnetization: Sufficient to produce 5000 amp-turns per inch of shank diameter with the part placed in a standard solenoid of appropriate size.

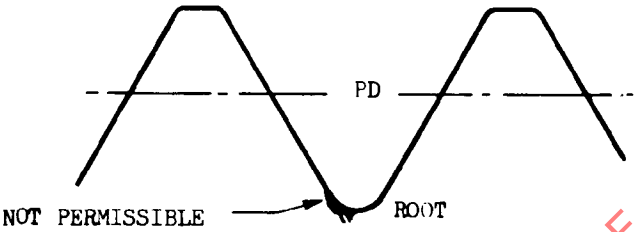
3.2 Fluorescent Penetrant Inspection: Shall be conducted in accordance with the latest issue of AMS 2645.

TABLE I

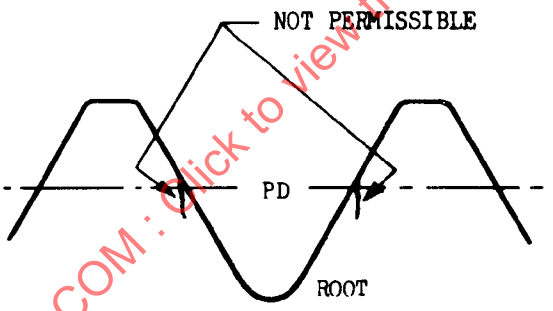
Unified (UN), and Controlled Root Radius (UNJ) Threads

Threads Per Inch	*Basic Thd Height Inch (Ref)	Threads Per Inch	*Basic Thd Height Inch (Ref)
80	0.0081	20	0.0325
72	0.0090	18	0.0361
64	0.0102	16	0.0406
56	0.0116	14	0.0464
48	0.0135	13	0.0500
44	0.0148	12	0.0541
40	0.0162	11	0.0590
36	0.0180	10	0.0650
32	0.0203	9	0.0722
28	0.0232	8	0.0812
24	0.0271		

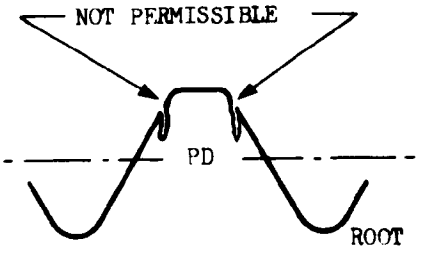
*Basic thread height is defined as being equivalent to 0.650 times the pitch.



ROLLED THREAD
FIGURE 1



ROLLED THREAD
FIGURE 2



ROLLED THREAD
FIGURE 3