



AEROSPACE STANDARD

AS3071™

REV. C

Issued	1971-10
Reaffirmed	2004-07
Revised	2018-10

Superseding AS3071B

Acceptance Criteria - Magnetic Particle, Fluorescent Penetrant,
and Contrast Dye Penetrant Inspection

RATIONALE

All figures updated to show requirements in more clarity, Specs updated, Para 3.1.1 magnification changed from X10 to X100, Headings for table 2 corrected to show correct callout.

SCOPE

1.1 Purpose

To establish the acceptance criteria for discontinuities as revealed by magnetic particle or liquid penetrant examination of aircraft utility parts as in 1.2.

1.2 Application

Primarily for use on aerospace propulsion system parts, such as pins, couplings, and fluid fittings. These criteria may be applied to any applicable item, except that the requirements of AS1177 shall apply to bolts, screws and studs, and AS5447 shall apply to nuts, both free-running and self-locking nuts. Discontinuities revealed by non-destructive test methods other than those in 1.1 shall have the acceptance criteria specified on the part standard or drawing.

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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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.

AS1177 Nondestructive Inspection Standards for Bolt and Screws

AS5447 Acceptance Criteria for Nuts - Magnetic Particle, Fluorescent Penetrant, and Visible Penetrant Examination

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 E1417/E1417M Liquid Penetrant Examination

ASTM E1418 Visible Penetrant Examination Using the Water-Washable Process

ASTM E1444/E1444M Magnetic Particle Examination

2.2 Definitions

For the purposes of this standard the following definitions apply:

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

INDICATION: An indication is visual evidence of a discontinuity, as revealed by magnetic particle or liquid penetrant examination.

RATEABLE INDICATION: Any discontinuity, regardless of location, with a depth greater than 0.0005 inch.

NON-RATEABLE INDICATION: Any discontinuity, regardless of location, with a depth less than or equal to 0.0005 inch.

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

CRACK: A crystalline fracture passing through or across grain boundaries without inclusion of foreign elements. Cracks are normally caused by over-stressing the metal during forming, or during heat treatment.

COLD SHUT: A cold shut is a portion of a part that is partially separated from the main body of metal by oxide, or by the failure of two streams of metal to unite.

SEAM: Open surface imperfection that is narrow and continuous, usually straight, running generally parallel to the bar axis. Seams are generally inherent in the bar from which the part is formed.

LAP: A surface imperfection appearing as a seam or crack, caused by folding of the material during operations as forming, forging, rolling, or drawing.

INCLUSION: Nonmetallic particles inherent in the material when it was made. These particles may be isolated or distributed in the form of longitudinal stringers.

GRINDING CHECK: Fine thermal cracks that develop from overheating of the area being ground. Such cracks are generally at right angles to the direction of grinding but may appear as a complete network.

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.

LAMINATIONS: Found only in plate steel, and are thin flat discontinuities seen only at the edge of the plate.

PIPE: A discontinuity in the center of a rolled bar. It is caused by internal cavities in the ingot formed during solidification and which have become elongated or stretched in the rolling operations.

POROSITY: Is the lack of soundness, usually in the form of gas holes or shrinkage voids that have the character of gas holes.

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

3. TECHNICAL REQUIREMENTS

3.1 General Indications

Where this standard is specified as the acceptance criteria for nondestructive examination of discontinuities, it shall apply in support of ASTM E1444/E1444M for magnetic particle examination, ASTM E1417/E1417M for fluorescent penetrant examination, and ASTM E1418 for visible penetrant examination.

3.1.1 Indications in themselves shall not be cause for rejection. Representative samples shall be taken from those parts having indications and examined metallurgically at 100X magnification to determine if the discontinuities are outside the limits permitted for rateable indications.

3.1.2 Parts shall be uniform in quality and condition, and free from imperfections detrimental to their performance. The requirements in the following paragraphs shall be applicable as indicated in Table 1.

Table 1 - Acceptance criteria for type of part

Applicable Paragraph	3.2	3.3	3.4	3.5	3.6
Parts made from castings (a)	X		X	X	
Parts made from bar, rod, or forgings (b)	X	X	X		
Fluid fittings (c)	X	X	X	X	
Pins	X				X
Bolts and screws	See AS1177				
Nuts	See AS5447				

Note: (a) For other than fluid fittings.

(b) For other than pins.

(c) Including but not limited to caps, tees, elbows, plugs and sleeves.

3.2 Acceptance Criteria

Unless otherwise specified, parts with rateable or non-rateable indications shall show no indications of cracks, cold shuts, laminations, machining tears, pipes, or grinding checks. Parts with non-rateable indications are acceptable. Parts shall show no rateable indications of seams, laps, or metallic inclusions except as allowed in 3.3 through 3.6 or laps as related to the applicable manufacturing process.

3.2.1 External Thread Discontinuities

3.2.1.1 Root defects such as laps, notches, slivers, folds, roughness, and oxide scale are not permissible, see Figure 1.