SAE Aerospace
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AEROSPACE RECOMMENDED PRACTICE

SAE ARP953 | REV. B

Issued 1966-11
Revised 1996-05
Reaffirmed 2012-11

Superseding ARP953A

Stress Dome in Fasteners

RATIONALE

ARP953B has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

   This document establishes limits or parameters for designing bolt heads with proper control of flowlines to assure sufficient strength to resist stresses induced by static or dynamic loads without being affected by lightening and lockwire holes.

2. REFERENCES:

   There are no referenced publications specified herein.

3. DESIGN CONSIDERATIONS:

3.1 Heads may be cold or hot upset at a temperature compatible with the material being worked prior to heat treatment.

3.2 The grain flow between the head and shank shall flow smoothly around the fillet radius and be unbroken, as shown by Figures 1 and 2.

3.3 To assure retention of good grain flow, the amount of metal to be removed per surface, for removal of contamination or decarburization, shall be within the limits specified in the applicable AMS specification.

3.4 Height of bolt head should be such as to assure enough metal for flowlines to contour smoothly and evenly so that the stress dome is not flattened or compressed.

3.5 If center lightening holes are used, the bottom of the hole shall not encroach into the stress dome area. These holes may either be forged or drilled with flat or angular bottoms, depending upon the part manufacturer's process, as specified on the part drawing. Lockwire holes also shall not encroach in the stress dome area.

3.6 Figures 1, 2, and 3 depict the flowline configurations which are acceptable and unacceptable. Sections are through major diameter of shank.

a. Figure 1 shows a smooth unbroken grain flow pattern. This is the preferable condition.
b. Figure 2 shows the maximum acceptable cutting of grain flow and minimum stress dome height.
c. Figure 3 shows excessive cutting of grain flow in the shank, fillet, and bearing surface. This is not acceptable.

4. INSPECTION:

4.1 To determine whether or not the parts are in accordance with flowline requirements, the following method may be used.

4.1.1 Section the specimen parts and macroetch or microetch to determine the flowline pattern. A suitable etching solution may be used. A 10X magnification may be used to show conformance, or non-conformance, with the flowline patterns in the figures.

PREPARED BY COMMITTEE E-25,
GENERAL STANDARDS FOR AEROSPACE PROPULSION SYSTEMS

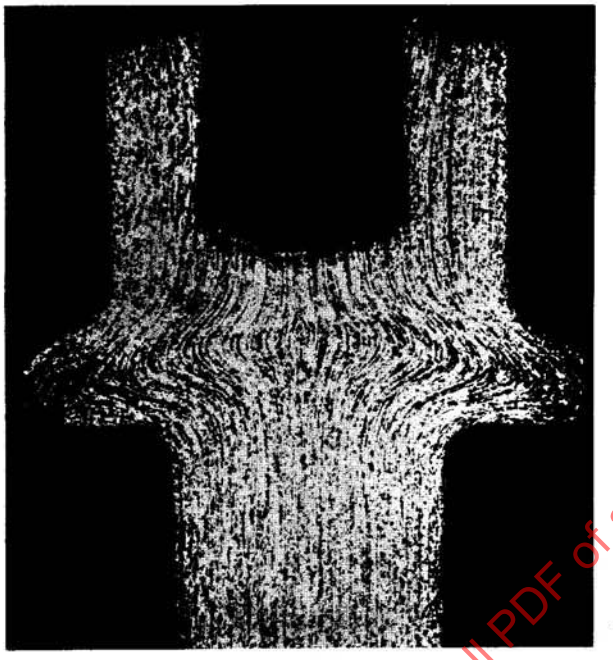

FIGURE 1 - Preferable

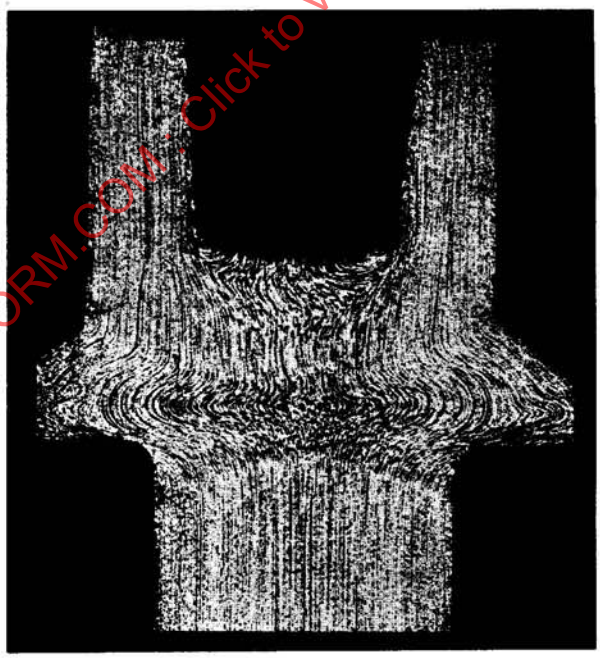

FIGURE 2 - Minimum Acceptable