U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: USE OF SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) CLASS H11 BOLTS
Date: 7/8/87
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Change:

1. PURPOSE. This Advisory Circular (AC) provides guidance on the use of Society of Automotive Engineers (SAE) Class H11 bolts in primary structure on all aircraft, including gliders and manned free balloons, and on aircraft engines and propellers.

2. RELATED FAR SECTIONS. This guidance is provided for showing compliance with the requirements of Sections 21.21, 23.603, 25.603, 27.603, 29.603, 33.15, and 35.17 of the Federal Aviation Regulations (FAR).

3. BACKGROUND. The service history of H11 bolts used in primary structure indicates a higher than normal failure rate. These failures are attributed to stress corrosion cracking and may become a safety problem. H11 bolts and companion nuts are more sensitive to environmental influence than bolts made from other materials. The use of H11 bolts in primary structure is therefore discouraged and should not be considered for use on new type design aircraft. There are other fasteners available which have demonstrated satisfactory service experience. Inconel 718 and stainless steel bolts are examples of acceptable substitutes.

4. GENERAL CONSIDERATIONS.

a. H11 bolts and nuts should be replaced with a different type of bolt and nut of equivalent strength and fatigue rating, if any of the following conditions exist:

(1) The bolts are exposed to high temperature (above 250° F) and possible simultaneous exposure to hydraulic fluids.

(2) The bolts are exposed to a corrosive environment such as moisture, salt air, exhaust gases, etc., at ambient temperature.

(3) The bolts are used primarily in tension application with a high sustained tensile stress, in any environment continually exposed to weather.

(4) The bolts are used in any application, including both tension or shear, in which a single failure could be catastrophic.

(5) The bolts are used in any application which requires frequent inspections of the bolts.

(6) The bolt service history indicates a need for frequent replacement.

b. H11 bolts, when used, should be completely encapsulated against environmental effects. Since encapsulation is not a complete or certain solution to avoid stress corrosion cracking in H11 bolts, encapsulation should be used only with discretion based on factors such as the specific environment, the maintenance requirements in the immediate area, and the inspection requirements for the bolts and adjacent structural members. Where complete encapsulation is not practical, a substitute material for H11 bolts should be used.

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