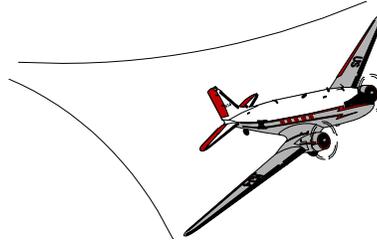


SPECIAL AIRWORTHINESS INFORMATION BULLETIN

Aircraft Certification Service
Washington, DC

www.faa.gov/certification/aircraft

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U.S. Department
of Transportation

**Federal Aviation
Administration**

CE-05-02
October 18, 2004

Introduction

This Special Airworthiness Information Bulletin advises you, registered owners and operators of **airplanes that have rigid tubing routing flammable fluids such as fuel and oil to indicating gauges**, of possible safety issues. A review of **service difficulty reports shows numerous incidents of rigid line installations leaking flammable fluids**.

Background

Many general aviation aircraft utilize rigid tubing to route fluids from engine and airframe systems to direct pressure indicating gauges in the cockpit. Portions of these tubing installations are behind the instrument panel where space is limited and access to inspect is difficult.

Rigid tubing has typically been made of aluminum alloy or corrosion-resistant steel and copper in older aircraft. Service history shows that rigid tubing is susceptible to cracking and leaking due to vibration, improper installation techniques, and damage.

Copper tubing used for routing fluids to the cockpit has been replaced with aluminum alloy or corrosion-resistant steel due to copper's high fatigue factor. Copper becomes hard and brittle (work-hardened) from vibration creating a condition susceptible to cracking. Maintenance personnel should be extra diligent during inspection of any copper line for signs of cracks or leakage.

Recommendation

Inspections of any rigid tubing are required as part of any annual and/or 100-hour inspection program. Inspection should include checking for leaks, cracks, improper installation, and damage to lines. Maintenance personnel are encouraged to follow the manufacturer's maintenance instructions on inspection and maintenance of rigid tubing installations.

Specifications for doing these routine inspections are as follows:

- Maintenance personnel should check routing of all rigid tubing for clearance to structure and other plumbing and wiring installations. In no case should you use rigid tubing to support wiring or other plumbing components.
- Proper support clamping is important to protect rigid tubing from excessive vibration. If the manufacturer does not recommend clamp spacing requirements, refer to Advisory Circular (AC) 43.13-1B, paragraph 8-31 for recommended clamp spacing distances.
- Installations should never have a straight length of rigid tubing between two rigid mounted fittings. Incorporate at least one bend between such fittings to absorb strain caused by vibration and temperature changes. Specifically, this can be a problem in the engine compartment where engine vibration is greatest.

- Improper bending of rigid tubing is a common cause of cracking due to stress. Bend tubing carefully to avoid excessive flattening, kinking or wrinkling. A small amount of flattening in the bend is acceptable but do not exceed 75-percent of the outside diameter. Excessive flattening will cause fatigue failure of the tube. You may find minimum bend radii values in Advisory Circular (AC) 43.13-1B, Table 9-2, if the manufacturer's maintenance instructions do not provide minimum specifications.

- You should take care when tightening tubing fittings. Improper torque can create stress cracking at the flare resulting in leaking or failure of the tube assembly. You may find proper torque values for both aluminum-alloy and corrosion-resistance steel tubing in AC 43.13-1B, Table 9-2. Any crack or deformation in the flare area is unacceptable and cause for rejection.

- Minor dents or nicks in aluminum-alloy

tubing may be repaired, if they are less than 10-percent of the wall thickness of the tubing. To do this repair, burnish with hand tools. Replace any tube when damage is greater than 10-percent or splice in a new section of tubing of the same size and material. A dent of less than 20-percent of the tube diameter is acceptable unless it is located in the heel of a bend.

- Corrosion can also cause failure of rigid tubing. Pitting due to corrosion creates areas where cracks can form. Properly remove and treat minor surface corrosion. If you find excessive pitting, repair or replace the tube assembly, as necessary.

For Further Information Contact

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