# United States Department of the Interior
# Aviation Management

# TECH BULLETIN

## INSPECTION

**June 13, 2006**

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**DISTRIBUTION:** **AMD Approved Inspectors, DOI Pilots, Maintenance Contract Facilities**

**SUBJECT:** **Exhaust Muffler Inspection**

DOI fleet aircraft with reciprocating power plants have experienced problems with their exhaust systems. Although these problems may be common to the industry as a whole, we need to ensure our aircraft exhaust systems are inspected and maintained to the highest standards. Basic FAA and/or manufacturer inspection criteria may not be adequate or properly preformed. Failures with exhaust system components can and have resulted with very serious consequences such as fire, CO poisoning, and major power loss.

**Inspection Guidelines**

14 CFR 43 Appendix D – Scope and detail of item to be included in annual and 100-hour inspections, gives the following wording concerning exhaust systems: "(8) Exhaust stacks- for cracks, defects, and improper attachment."

FAA Advisory Circular 91-59 – Inspection and Care of General Aviation Aircraft Exhausts Systems, further outlines safety hazards and inspection criteria.

The applicable aircraft manufacturer inspection procedures vary detail. FAA Advisory Circular 43.13-1B, Section 3 - Exhaust Systems, has some of the best details of internal muffler failures.

**1. Safety Hazards**

AC 91-59 states that approximately 50% of exhaust system failures occurred in the exhaust gas-to-air heat exchanger resulting in carbon monoxide entering the cabin. Approximately 20% of exhaust system failures occurred in the exhaust stack pipes, manifolds, and tail pipes. **Approximately 20% of engine partial power loss and power failures resulted from internal muffler failure.**

**2. External Inspection**

A good external inspection/check of exhaust components can indicate the integrity of the system. Evidence that may indicate internal failure shall be further investigated. Check for the following:

1. Muffler and heat exchanger for general condition and leaks.
2. Leaking exhaust stack gaskets (blown gaskets).
3. Loose or broken clamp connections, attachments, and stacks.
4. Cracked or broken risers, stacks, and tail pipes.
5. Dented stacks.
6. Cracks adjacent to welded areas and stack bends.
7. Thinning of joint areas due to vibrational wear.
8. Metal pitting due to internal erosion by combustion products.
9. Improper installation, including misalignment of exhaust stacks, ball joints, and/or connections resulting in abnormal wear.
10. Supercharger assembly for cracks or wear.

Most of these items can be easily checked during 50-hour inspections for increased reliability and safety.

### 3. Internal Inspection

Many exhaust system components have internal gust welds that can deteriorate over time. A complete inspection of these components should be made at engine overhaul or when external indications such as bulges, soot stains, or thinning are observed. Such components should be inspected and repaired as necessary by a certified facility specializing in exhaust systems or replaced with new. Exhaust mufflers and heat exchangers with internal baffling can have a relatively short lifespan. This life can vary by exposure to vibrations and various fuel mixtures. Commonly the deteriorated baffling is "blown out" and has no effect on aircraft performance. Occasionally though, these pieces can obstruct the tail pipe resulting in a major power loss. The internal baffling of mufflers shall be inspected in detail at every 100-hour inspection. The removal of all necessary components to ensure a proper inspection is performed shall be accomplished. Any signs of deteriorated or deformed baffling are cause for rejection of the muffler assembly.

Please contact Guy Exon, AMD Aircraft Maintenance Specialist, 208-433-5082, with any questions you may have concerning these inspections.

/s/ Allen P. Rice
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