

# **AEROSTAR SERVICE BULLETIN #137**

**DATE OF ISSUE:** July 1, 2003

**SUBJECT:** 10 Gallon Aluminum Fuel Cylinders

**PROBLEM:** There exists the potential for 10 gallon aluminum fuel cylinders to rupture when exposed to high heat in the event an onboard fire occurs. Such a rupture would result in an explosion and large fire due to a BLEVE (Boiling Liquid Expanding Vapor Explosion).

**DISCUSSION:** Since the first hot air balloons were Type Certified in late 1967 and early 1968, two types of fuel cylinders have been used almost exclusively: 10 gallon aluminum, and various sizes of stainless steel. During the past 35 years, uncontrollable fires have occurred which have resulted in explosions. All of these explosions have been associated with the 10 gallon aluminum cylinder. As flame impinges on the portion of the tank that is in the vapor region, rapid heating of the metal occurs. Heat applied to the liquid portion of the tank remains cooler as the liquid fuel absorbs heat and offsets it with rapid vaporization of the liquid fuel. No such cooling takes place in the vapor region of the tank. Since aluminum has a relatively low melting temperature and an even lower temperature at which softening occurs, the wall of the cylinder begins to thin as the metal softens. A blister or bulge occurs and as the metal continues to thin, a point is reached where the pressure relief device value (375 PSI opening and 325 PSI closing) is higher than the remaining strength of the cylinder wall. At that point, the bulged area will split or rupture. With a large tear in the wall of the cylinder, the remaining fuel vaporizes rapidly. No stainless steel fuel cylinders, to Aerostar's knowledge, have exhibited this characteristic since their introduction into ballooning in the early 1960's.

**CORRECTIVE ACTION:** Remove all 10 gallon aluminum fuel cylinders from service immediately.

**PROCEDURE:** (**OWNER**) 10 gallon aluminum fuel cylinders may be replaced directly with 15 gallon tanks and in some cases, other combinations of stainless steel fuel cylinders. Initial installation of such fuel cylinders must be accomplished by a repair station or properly FAA certified and qualified individuals.

(**REPAIR STATION or FAA certified personnel**) This change is from one approved fuel configuration to another approved fuel configuration. The change must ensure that the new fuel configuration meets the aircraft type design. Contact Aerostar customer service (phone 605-331-3500, fax 605-331-3520 or mail@aerostar.com) with the system information and the proposed fuel configuration to obtain copies of type design drawings that illustrate the approved configurations. Additionally, the change in the weight and balance information should be properly noted in the flight manual weight and balance (page 4-3).

**COMPLIANCE:** This service bulletin must be complied with within the next 10 hours of flight time or next annual inspection, which ever occurs first. During any flights that are conducted prior to compliance, extreme care must be exercised to ensure that, as always, power line contact is avoided as well as the potential for in flight or ground onboard fire. Refueling procedures to eliminate the fire hazard must also be exercised. In the event that the pilot in command feels that such conditions are unavoidable, the service bulletin should be complied with prior to flights under those conditions. Failure to comply with this service bulletin could result in severe injury or death.