AIRWORTHINESS NOTICE

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The Electrostatic Charging HAZARD during Aircraft Fueling

1. Aviation fuels are good insulators and like all good insulators they become electrified by friction. Just as a comb or a bar of glass develops an electrostatic charge when rubbed, so hydrocarbon fuels develop a similar charge within the body of the fuel when pumped through pipes or hoses. Charging increases with increased flow rate, and is greatly increased when fuel is passed through a filter, such as FELT or CHAMOIS LEATHER, which are in wide use in conjunction with aircraft funnels, particularly when refueling aircraft from drums, In this type of filter the fuel passes through many fine passages between fibers which provide in turn, an extremely large surface for the generation of a static (electric) charge.

2. The Filter is by Far the Greatest Source of Static Charging During Fuel Handling

   2.1 Highly charged fuel emerging from a hose nozzle into an aircraft tank may discharge in the form of a spark, usually to some point in the tank. If the vapour, through which the spark passes in inflammable, an explosion of fire may result. Aviation Kerosene does not form flammable mixtures with air, except at temperatures above approximately 95 degrees Fahrenheit. JP-4 vapour/air mixtures are flammable over the range (approx.) - 20 degrees F. to +65 degrees F. and aviation gasoline/air mixtures between (approx.) - 50 degrees F. to + 10 degrees F.

   2.2 Bonding of the hose nozzle to the aircraft structure does not eliminate the hazard due to the charge in the fuel itself, which cannot be grounded out. Bonding does eliminate the possibility of spark discharges between metal objects which may be at greatly different potentials. Such a spark can occur in a region of flammable vapour, such as near a tank filler opening, therefore bonding is most essential here.

   2.3 The greatest electrostatic charging hazard during aircraft refueling lies in the practice of filtering (and thus charging) the fuel at the point of entry to the aircraft. Several aircraft have been damaged or destroyed by explosion or fire in recent years. It is believed that most explosions and fires, which have occurred during fuelling at low temperature, may he attributed to the use of a funnel/filter and the resultant charging. Tests confirm that filtration of fuels through funnels equipped with felt, filters results in high charging, particularly ifler passage through felt. The static charge in fuel leaks away very slowly because fuel, being a good insulator, is therefore a poor conductor and cannot conduct the electric charge.

3. The conclusions are therefore:-

   3.1 Felt and chamois filters are NOT desirable because:

   (a) Added electrostatic charging.
   (b) Felt becomes water-saturated and does not strain out water.
   (c) Chamois releases fuel insoluble material which can cause burner clogging.

(d) Flow rates through these types of filter are reduced.

3.2 A much more desirable type of filter is a fine mesh metal screen, using 200 mesh.

(a) No injurious particles released into fuel tanks and engine.
(b) Fine mesh will filter out most contamination.
(c) Increased flow rate.
(d) A Fine mesh screen filter does not contribute to static charging.

3.3 Aviation gasoline/air mixtures are flammable roughly in the temperature range - 50 degrees F. to + 10 degrees F. Fuelling with JP - 4, which forms a flammable fuel vapour/air mixture over the range of- 20 degrees F. and + 65 degrees F. is a potential hazard, particularly when strained felt or chamois.

CANCELLATION:- This issue cancels all previous issues of Notice No. 17 which should be destroyed.

For/ Director General
Civil Aviation Authority