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Investigators gather debris from the 1998 Swissair crash off the east coast of Canada. Media speculated that Kapton wire was responsible.

THE KAPTON WIRE CONTROVERSY

by Eugene Holzapfel

In the 1998 Swissair crash off the coast of Nova Scotia, 229 passengers and crew were killed as the flight, enroute from New York to Geneva, ditched into the ocean while trying to make an emergency landing.

Media speculation at the time suggested that Kapton wire was a possible cause of the disaster.

The pilot reported smoke in the cockpit shortly before the aircraft disappeared from radar. Accident investigators later found signs of heat stress on small fragments of the cockpit recovered from the crash site.

Investigators speculated that just before crashing, the aircraft was operating without any electrical power, and smoke and fumes from an electrical fire could have hampered the pilots efforts to operate the fuel-heavy aircraft.

The source of the smoke has never been discovered, but investigations raised concern about the insulation of electrical wire. The FAA subsequently issued a number of airworthiness directives (ADs) on MD-11 aircraft wiring. However, as these aircraft are not on the Australian register, the ADs have not been issued in Australia.

The incident highlights the question: which wires can be used in aircraft?

Despite media comment about the safety of Kapton wire, the product is still approved by the FAA and listed as suitable for aircraft installations in AC 43.13-1A and 1B (MIL-W-81381/11 and /12). CASA has not identified any accidents in Australia which could be attributed to this wire and therefore has no reason to place restrictions on its use. The situation is under review and users will be advised of any changes to the approval.

However, Kapton insulation is tough and lightweight, which means that you need to ensure that the wire is installed in accordance with manufacturers limitations for bend radii and physical mounting arrangements. Similar to other wire types, Kapton may also require additional protection if used in areas subject to aircraft fuel, hydraulic fluid or frequent bending.

Replacement wire: You should be careful to follow the rules for aircraft replacement parts when installing wire. Civil Aviation Regulation (CAR) 42W states that replacement parts must be identical to the component replaced, unless approved under regulation CAR 36. Civil Aviation Order (CAO)108.32 para 5.1 reiterates that the cable must be approved by the aircraft manufacturer, unless approved by CASA. The US Federal Aviation Administration advisory Circular (AC) 43.13-1A has been listed as approved data, and includes sections covering the use of electrical wire.

Advisory Circular 43.13-1A and superseding AC 43.13-1B state that the wire must be of aircraft standard. Wires used in domestic and automotive applications may contain materials which produce toxic fumes or continue to burn when electrical power has been switched off, and must not be used in aircraft installations.

Wire types are often difficult to determine solely from appearance, and a suitable audit trail is often needed to confirm that the wire is approved for a specific installation.

Advisory Circular 43.13-1A is approved data and suitably qualified LAMEs may use the circular for the selection of suitable replacement wire unless the aircraft manufacturer has nominated a specific wire. If a specific wire type has been nominated by the manufacturer then the substitution must be approved under CAR 36. Any reduction in wire gauge must be approved under CAR 36.

Some components contain small amounts of wire which is not approved for use in aircraft. Any person approving installation of electronic equipment in an aircraft must confirm that the installation design is suitable for such components.

In summary:

- Wire must be suitable for its intended purpose.
- Wire must satisfy the requirements of the aircraft designer.
- Any variation from the wire specified by the aircraft manufacturer must be suitably approved, with AC 43.13-1A providing guidance for approval.

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