

Thermal runaway and fire propagation of on-board Li-ion batteries: a really controlled risk?

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Battery fire containment devices are widely made available to crews in civil aviation (commercial and private) as well as to some military aircraft personnel. They are supposed to isolate a thermal runaway incident and contain the smoke, which can be a serious issue in small cabin or cockpit.

The range of "battery fire containment devices" available is significant, the prices of the different solutions varying from a few dollars to several thousand dollars. However, currently, no regulations govern the manufacture or the use of these materials and it has been shown through tests that their effectiveness is questionable.

DGA works with the Civil Aviation Technical Service (STAC) of the French DGAC, in order to assess the behavior of different fire containment devices under thermal runaway. These devices are intended to be used by flight personnel to control thermal runaway and/or fire outbreaks of lithium battery PEDs in the cabin or in the cockpit.

For this study, air operators have provided the equipment that equip their fleet in order to carry out fire resistance tests. In addition, a cabin crew training center carried out ergonomic tests.

This campaign made it possible to evaluate the effectiveness of different types of PED containment bags with regard to their retention performance against the effects of thermal runaway.

The tests carried out have shown that none of the systems evaluated is capable of containing the smoke. Some devices do not resist the pressure generated by the release of gases during thermal runaway. They open and ignite. In some cases, the gases released within the retention device during the thermal runaway process are likely to generate an explosive mixture.

For all cases, the various tests carried out have shown that once initiated, the thermal runaway process is very fast. It seems important to take this parameter into account as well as the response time of the on-board personnel and the handling constraints of the retention device in order to establish suitable procedures for use.