



EASA Safety Information Bulletin

SIB No.: 2009-22
Issued: 29 July 2009

Subject: **Fighting Fires Caused By Lithium Type Batteries in Portable Electronic Devices**

Ref. Publications: Federal Aviation Administration (FAA) Safety Alert for Operators (SAFO) 09013, dated 23 June 2009, including Supplement.

Description: The FAA Flight Standards Service published the above-referenced advisory document (which is attached as pages 2 through 4 of this bulletin) to recommend procedures for fighting fires caused by lithium type batteries in portable electronic devices (PED).

After reviewing the information, EASA supports the recommended actions contained in FAA SAFO 09013. This SIB is published to ensure that all owners and operators of aircraft, registered in European Union Member States or associated countries, are made aware of these important reminders.

Applicability: All aeroplanes and helicopters where a PED can be carried onboard that has lithium type batteries installed.

Contact: For further information contact the Airworthiness Directives, Safety Management & Research Section, Certification Directorate, EASA. E-mail: ADs@easa.europa.eu.



SAFO

Safety Alert for Operators

SAFO 09013
DATE: 6/23/09

Flight Standards Service
Washington, DC

U.S. Department
of Transportation

**Federal Aviation
Administration**

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo

A SAFO contains important safety information and may include recommended action. SAFO content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest possible degree of safety in the public interest. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO.

Subject: Fighting Fires Caused By Lithium Type Batteries in Portable Electronic Devices

Purpose: To recommend procedures for fighting fires caused by lithium type batteries in portable electronic devices (PED).

Background: The two types of batteries commonly used to power consumer PEDs brought on aircraft are lithium batteries (disposable) and lithium-ion batteries (rechargeable). Both these types are capable of ignition and subsequent explosion due to overheating. Overheating results in thermal runaway, which can cause the release of either molten burning lithium or a flammable electrolyte. Once one cell in a battery pack goes into thermal runaway, it produces enough heat to cause adjacent cells to go into thermal runaway. The resulting fire can flare repeatedly as each cell ruptures and releases its contents.

Discussion: Based on testing by the Fire Safety Branch of the Federal Aviation Administration (FAA) William J. Hughes Technical Center, the following procedures are recommended for fighting a fire of a lithium-type-battery powered PED. The procedures consist of two phases: (1) extinguishing the fire, and (2) cooling the remaining cells to stop thermal runaway.

- (1) Utilize a Halon, Halon replacement or water extinguisher to extinguish the fire and prevent its spread to additional flammable materials.
- (2) After extinguishing the fire, douse the device with water or other non-alcoholic liquids to cool the device and prevent additional battery cells from reaching thermal runaway.

WARNING: Do not attempt to pick up and move a smoking or burning device! Bodily injury may result.

WARNING: Do not cover the device or use ice to cool the device. Ice or other materials insulate the device, increasing the likelihood that additional battery cells will reach thermal runaway.

Reference Materials: The following are additional information related to lithium-type battery fires:

Additional information on lithium-type battery fires may be found at the following Web site, http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/media/2009/SAFO09013sup.pdf

The FAA has developed a training video to demonstrate effective techniques for fighting lithium-type battery fires. See the Video on Laptop Battery Fires at <http://www.fire.tc.faa.gov/2007Conference/proceedings.asp> Click on the "Training Videos" link on the lower right of the page.

Recommended Action: Directors of safety, directors of operations, training managers, and crewmembers should collaborate to include these procedures in the operator's manuals, operations, and training.

The following information expands upon SAFO 09013.

Safety Alerts for Operators (SAFO) are posted at:

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/

Lithium Battery Fires. Although lithium is a metal, do not treat a fire involving a small number of lithium batteries as a Class D fire. Halon, Halon replacement and/or water fire extinguishers can be used to control fires involving a small number of lithium batteries, such as found in common portable electronic devices (PED) or a laptop computer.

Lithium batteries are capable of ignition and subsequent explosion due to overheating. Overheating may be caused by shorting, rapid discharge or overcharging. Overheating results in thermal runaway, which is a chemical reaction within the battery causing the internal temperature and pressure to rise. The result is the release of flammable electrolyte from the battery and, in the case of disposable lithium batteries, the release of molten burning lithium. Once one battery cell goes into thermal runaway, it produces enough heat to cause adjacent battery cells to also go into thermal runaway. This produces a fire that repeatedly flares up as each battery cell in turn ruptures and releases its contents.

Fighting a fire that contains either disposable or rechargeable lithium battery cells requires extinguishment of the fire and cooling of the remaining cells to stop the thermal runaway. Water is the most effective coolant. Halon, Halon replacement and/or water fire extinguishers should be used for initial knockdown of these fires, followed by immediate dousing with water from any available source.

WARNING: Do not use fire resistant burn bags to isolate burning lithium-type batteries. Transferring a burning appliance into a burn bag may be extremely hazardous. Do not move the device until you are certain the fire is extinguished and the device is cool.

Specific Types of Lithium Batteries

(1) AA Sized Lithium Batteries.

Disposable. Lithium (non-rechargeable) cells are constructed with metallic lithium. Metallic lithium is extremely flammable and cannot be extinguished with the typical hand-held extinguishers found on board transport aircraft. However, the amount of metallic lithium in each AA sized lithium battery is very small and will consume itself in less than one minute. Lithium cells will spray molten lithium as they burn, which can cause severe bodily harm and spread the fire.

Do not treat a fire involving a small number of lithium batteries as a Class D fire.

Rechargeable. Lithium-ion (rechargeable) cells are constructed with a flammable electrolyte and have the same fire hazard as non-rechargeable cells.

(2) Battery Pack (Multiple Larger) Lithium-ion Cells. Laptop computers and other battery operated devices are often powered by battery packs using multiple larger lithium-ion battery cells. The individual cells are not visible and are encased in a plastic housing.

Fighting a Fire Involving Lithium Batteries

The technique for fighting a fire involving lithium batteries is the same, regardless if the battery is a disposable or rechargeable lithium battery or battery pack.

- Relocate passengers away from the device.
- Utilize a Halon, Halon replacement, or water fire extinguisher to prevent the spread of the fire to adjacent battery cells and materials.
- Pour water, or other non-alcoholic liquid, from any available source over the cells immediately after knockdown or extinguishment of the fire.

Only water or other non-alcoholic liquid can provide sufficient cooling to prevent re-ignition and/or propagation of the fire to adjacent batteries. Water, though it may react with the tiny amount of lithium metal found in a disposable battery, is most effective at cooling remaining cells, stopping thermal runaway and preventing additional flare-ups. Significant cooling is needed to prevent the spread of fire to additional cells in a battery pack.