

# TRANSPORT OF DANGEROUS GOODS, LITHIUM BATTERIES

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This ISI article cancels and supersedes Service Information Letter SIL 00-066.

## Purpose:

This ISI article is released to provide reference on the practices and documentation related to the carriage of Lithium Batteries as air cargo.

The number of Lithium Batteries carried as part of Airfreight has exponentially grown over the last decades. Lithium Batteries are sensitive Dangerous Goods and may experience Thermal Runaways under certain circumstances. Therefore the probability of having lithium batteries involved in a cargo fire, either as the initiating or as a fuel source, if involved in a fire initiated by other cargo has increased. Globally, several cargo incidents are reported each year where lithium batteries have been involved.

In response to fatal accidents on cargo aircraft, which according to the manifest were transporting lithium batteries, the European Aviation Safety Agency (EASA) published a Safety Information Bulletin (SIB) 2010-30 which in turn refers to a Federal Aviation Administration (FAA) Safety Alert For Operators (SAFO) 10017 covering the precautions to be taken with the transport of lithium batteries by air.

As this issue is related to the operation of the aircraft, target audience of this ISI article includes passenger and cargo operators, freight shippers and forwarders.

## ✎ Engineering Support

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### 1. Applicability

All aircraft, all models including Airbus Freighter aircraft.

### 2. Background

#### 2.1 ANALYSIS

Current dangerous goods regulations covering the carriage of lithium batteries do not consider all characteristics of a lithium battery fire. This includes the requirement for packaging to contain the fire and heat, containment of high flammable gases that come from thermal runaway, rapid disassembly of the batteries, the impact of carriage of large quantity of

lithium batteries with consequence of fire propagation from one package to another and the limitations of the current fire protection systems.

A growing body of test data has identified that existing cargo compartment fire protection systems certified to EASA CS 25.857 and US CFR Part 25.857 (CS/CFR Part 25) regulations are unable to suppress or contain a fire involving high density of lithium batteries. This results in a reduced time available for safe flight and landing of an aircraft to a diversion airport

It has been shown that the quantity of heat, smoke and fumes produced by a lithium battery fire is significantly greater than that produced by a fire involving general cargo. Furthermore as thermal runaway progresses throughout the packages of batteries in the compartment, the fume and smoke production rate continues to increase.

The key characteristics of lithium battery fires, as against general cargo fires, is the phenomenon of thermal runaway leading to high temperatures and release of electrolyte gases which can create an explosive atmosphere. This can exceed, and render ineffective, the required Halon concentration for fire suppression and other control mechanism. There is the high likelihood of consequential significant structural damage to the aircraft.

Further information on the investigations performed is available on the FAA website: <http://www.fire.tc.faa.gov/systems/Lithium-Batteries>.

## **2.2 STATUS OF INDUSTRY POSITION**

The results of tests completed by the FAA led to the decision of the ICAO Dangerous Goods Panel to prohibit the carriage of lithium metal batteries of all types, as cargo on passenger aircraft from the beginning of 2015.

Proposals now being considered at industry level to mitigate against the risk induced by the carriage of high density packages of Lithium Ion Batteries are being led by the ICCAIA (International Coordination Council of Aerospace Industries Association). The ICCAIA proposals which are under discussion with ICAO on the means to implement, include the recommendation to prohibit the carriage as cargo of high density packages of lithium ion batteries and cells (such as defined by UN3480) on passenger aircraft until such time as safer methods of transport including appropriate packaging and shipping requirements are established and followed.

The proposals are also looking at establishing appropriate packaging and shipping requirements to ensure safer shipment of lithium metal and lithium ion batteries as cargo on freighter aircraft. (Refer to ICAO DGP-WG/15-WP – <http://www.icao.int/safety/DangerousGoods/DGPWG15/DGPWG.15.WP.004.5.en.pdf> released on 10 March 2015).

## **3. Recommendation**

The following guidance relating to the shipping of Lithium Batteries is available:

### **3.1 AUTHORITIES' DOCUMENTATION:**

- European Aviation Safety Agency (EASA) Safety Information Bulletin (SIB) 2010-30R1
- Federal Aviation Administration (FAA) Safety Alert For Operators (SAFO) 10017
- Civil Aviation Authority (CAA) Flight Operations Communication FODCOM 30/2010

All documents are available on the internet or can be requested from the applicable airworthiness authority.

### **3.2 GENERAL GUIDANCE WITH REGARDS TO THE TRANSPORT OF DANGEROUS GOODS**

The transport of dangerous goods (also known as hazardous goods) in passenger and cargo aircraft is regulated by the ICAO, "Technical Instructions for the Safe Transport of Dangerous Goods" and the IATA "Dangerous Goods Regulations (DGR)". These documents are updated on a yearly basis. Airbus advises cargo operators and shippers to consult the last validated edition of this documentation as the binding reference. They provide, amongst other things, the identification code for the goods to be transported (UN number), special provisions for the packaging of the goods and a list of national airworthiness authorities for dangerous goods transport. It has to be noted that the IATA Dangerous Goods Regulations fully comply with the ICAO regulations.

Furthermore additional regulations from national aviation authorities may apply to the carriage of Lithium batteries, and these shall also be considered.

## AIRBUS POSITION

Airbus is not in a position to provide recommendations on the transport of Dangerous Goods including Lithium Batteries, considering that:

- The sole responsibility for the preparation of the shipments of dangerous goods lies with the shipper/operator.
- The responsibility for the acceptance, loading and the actual transport of dangerous goods is with the operator.

Regarding the carriage of high quantities of lithium batteries as cargo, Airbus recommends that operators conduct a full risk assessment, taking into account factors such as industry available information and guidance. The assessment should consider other mitigating factors, for example but not exhaustive:

- The quantity and density of lithium battery shipment
- The type of lithium batteries to be shipped
- The separating of lithium battery shipments into smaller and separated groupings to minimize the size of a potential battery fire
- Who the supplier/shipper of lithium batteries is and their quality control
- The identification and notification of all shipments of lithium batteries (especially Section II)
- Accepting only lithium battery shipments that comply with applicable regulations (ICAO and/or local regulations)
- Provision of customer education materials to increase awareness on the safe shipping of lithium batteries and to minimize undeclared battery shipments
- Training and education of employees regarding regulations, handling procedures, the dangers of mishandling, and methods to identify lithium battery shipments
- The capabilities of the aircraft cargo compartment in which the batteries are to be carried.
- Use of the most efficient means that are available for containment of Lithium Battery fires.
- Consideration of the routing of the flight, and location of nearest diversionary airfield.
- The likely location of the pallets/containers in the cargo hold, and their proximity to key aircraft systems, such as Gaseous Oxygen systems and Additional Center Tanks
- Segregation of any lithium battery shipments from other dangerous goods that present a fire hazard (e.g. Class 3 flammable liquid shipments) to minimize the effects of a lithium battery fire and the potential for involving lithium batteries in adjacent cargo fire events
- Potential sources of ignition within the cargo compartment.
- Consider establishing a policy to notify the flight crew of all lithium battery shipments (including exempted shipments, Section II) so the flight crew is aware of the potential hazard.

Attention should also be given to latest information released through Airworthiness Authorities

## 4. Way forward

Airbus is working together with industry partners, but also with ICAO and other regulatory bodies to find proper mitigation means for the safe shipment of lithium battery as cargo. At industry level the focus is on developing a performance packaging standards for safe battery shipment.

For the future, new storage energy devices (e.g. fuel cells, ...) should also be considered by a risk assessment which has the aircraft limitations in mind, before getting transported as cargo by air.

## 5. Procurement information

- Orders for the ICAO and IATA documents should be made at the following addresses:  
ICAO, Reproduction, Sales and External Distribution Services (RSED)  
999 University Street, Montréal, Quebec H3C 5H7, Canada

Tel.: +1 514-954-8022  
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IATA Dangerous Goods Regulations  
Publications Customer Services  
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Montréal, Quebec  
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Fax: +1 (514) 874 2660  
Tty: YMQRAXB  
E-mail: [dangood@iata.org](mailto:dangood@iata.org)

## **6. Correspondence**

For availability of the mentioned Airbus manuals, operators and interested third parties are requested to contact AIRBUS by using TechRequest tool (within AirbusWorld portal).

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